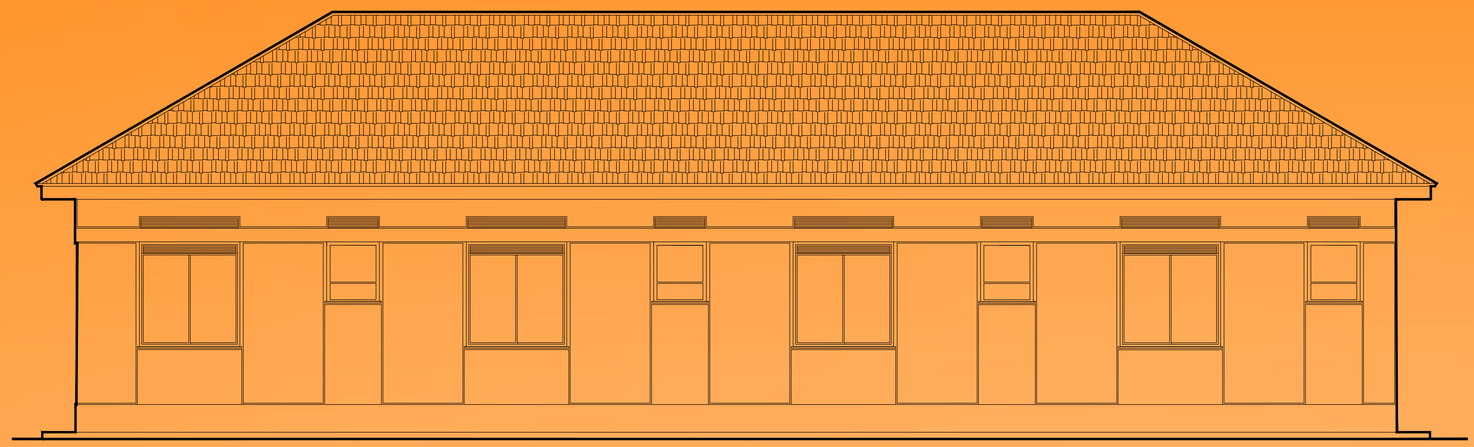
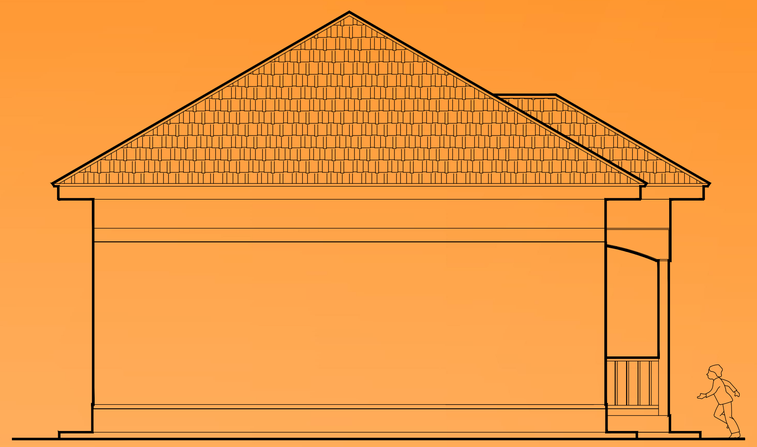
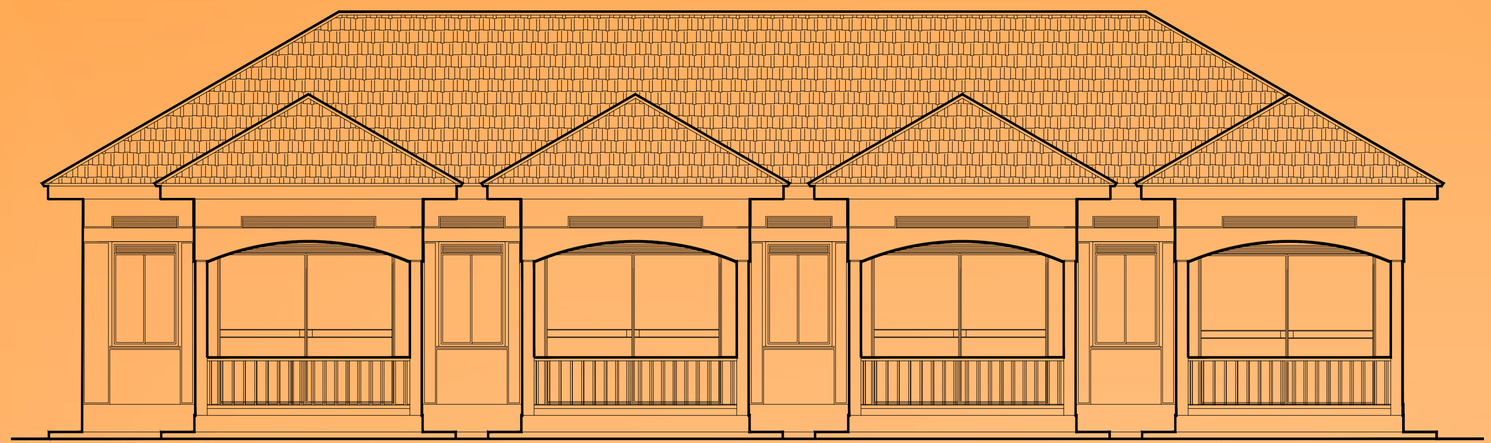
ADVANCED LEVEL BUILDING CONSTRUCTION AND TECHNICAL DRAWING BY NTALO ROBERT



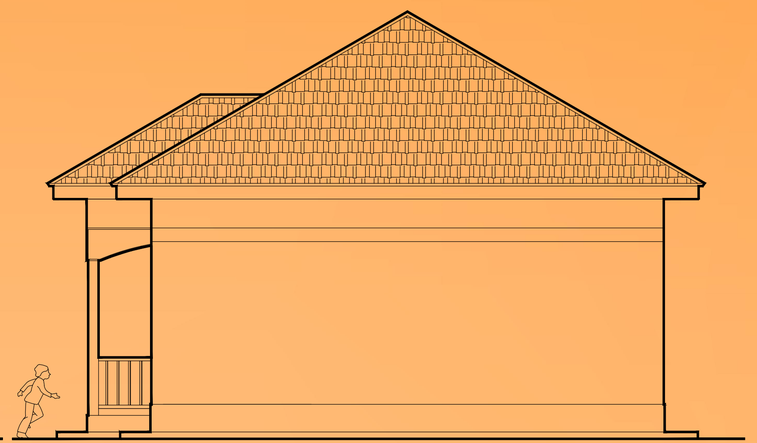
BE- REAR ELEVATION



2- SIDE ELEVATION



FE- FRONT ELEVATION



1- SIDE ELEVATION

1. Projection of solids
2. Foundations and floors
3. Surface developments
4. Wall construction
5. Vector geometry
6. interpenetration of solids
7. Roofs
8. Building drawing

A-Level Technical Drawing Revision Book

TOPIC 1: PROJECTION OF SOLIDS

Competency

The learner correctly represents three-dimensional objects using orthographic and pictorial projections.

Teaching Focus

Ensure learners can:

- identify principal planes
- determine visibility
- produce complete orthographic views
- draw sectional views
- construct isometric projections

Expected Learning Evidence

A competent learner should demonstrate ability to

- interpret given views correctly
- maintain alignment of projections
- transfer dimensions accurately
- apply conventions for visible and hidden lines
- maintain proportionality.

Common Misconceptions

Learners often

- misalign views
- interchange width and depth
- omit hidden details
- confuse first-angle and third-angle projection
- draw incorrect isometric angles.

Teacher Assessment Checklist

Observe whether the learner can

✓ identify viewing directions

✓ project dimensions correctly

✓ complete missing views

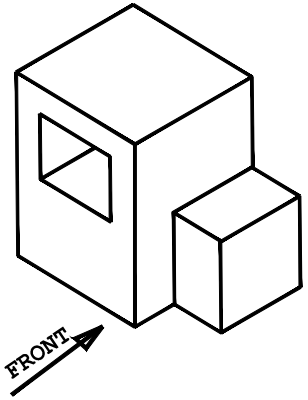
✓ maintain drawing standards

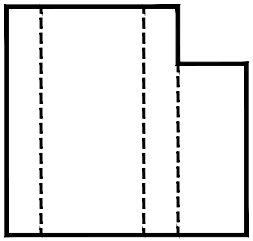
✓ present neat work

Marking Guide

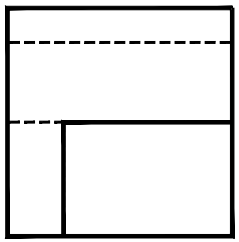
Award marks for

- layout
- accuracy
- projection principles
- line quality
- completeness
- lettering
- neatness

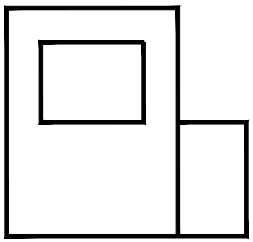




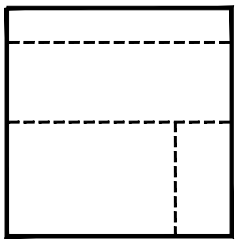
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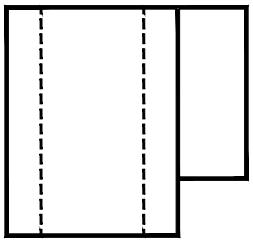
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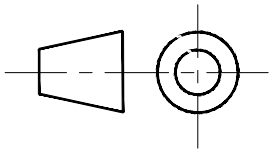
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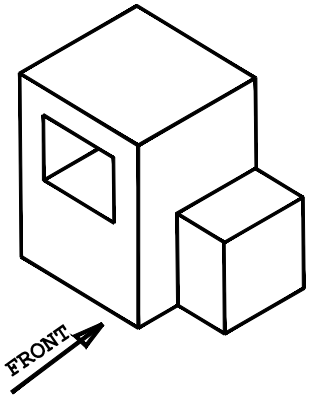
FIRST ANGLE PROJECTION

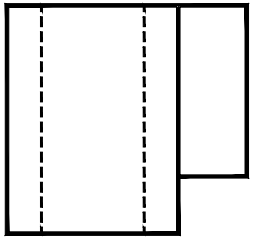
Here we use the principal of a torch, that is, what you see on a given side put that view on the opposite side.



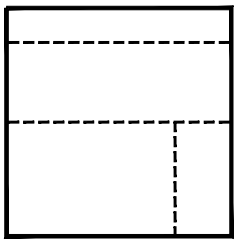
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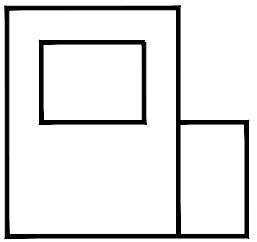




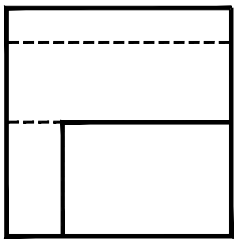
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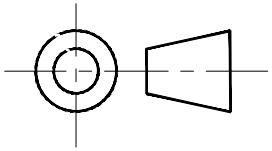
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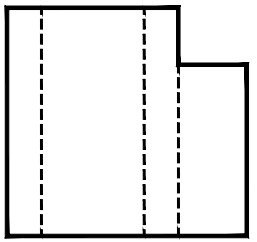


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THIRD ANGLE PROJECTION

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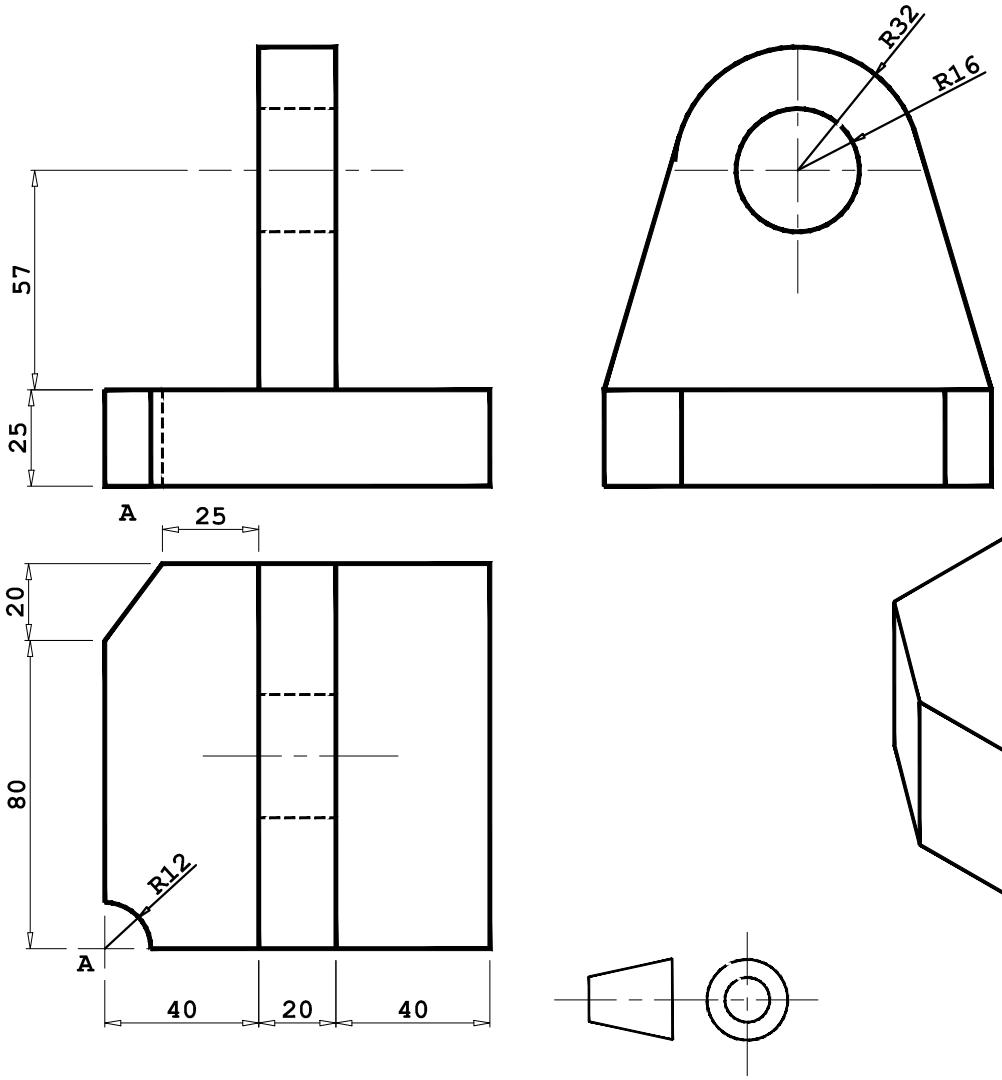


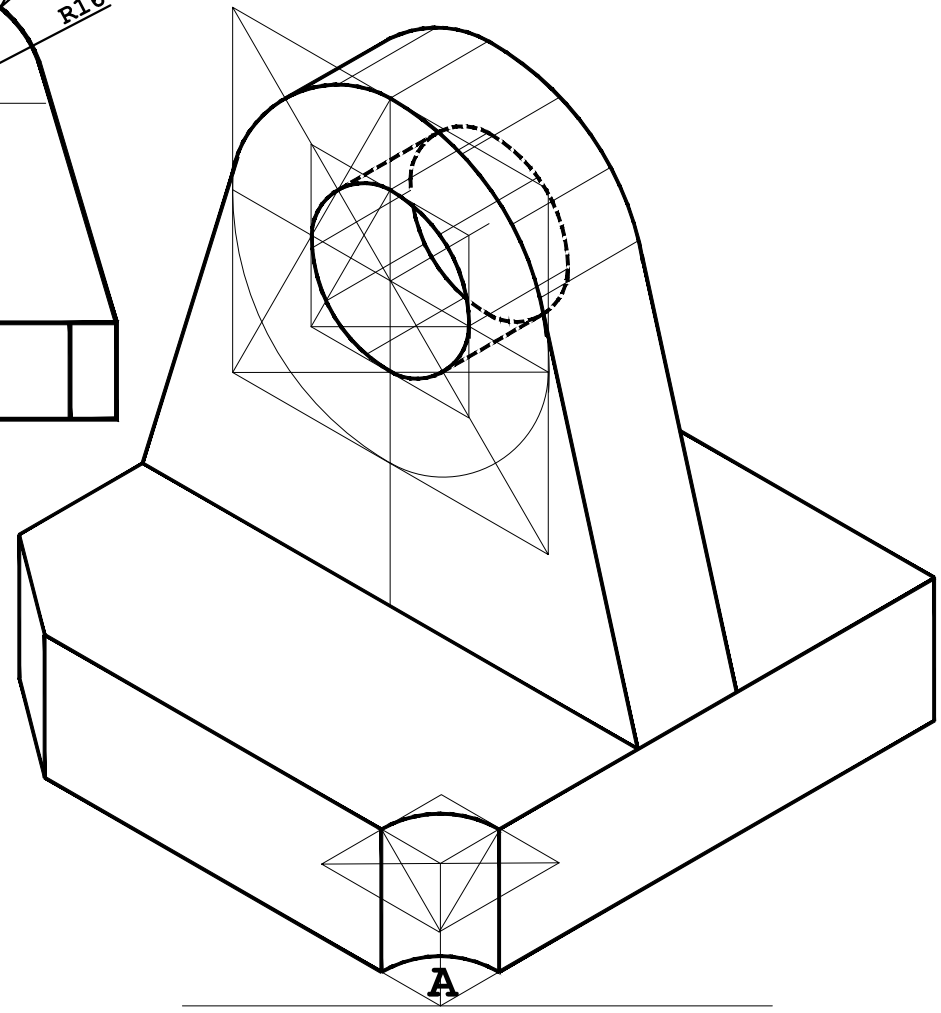


PLAN

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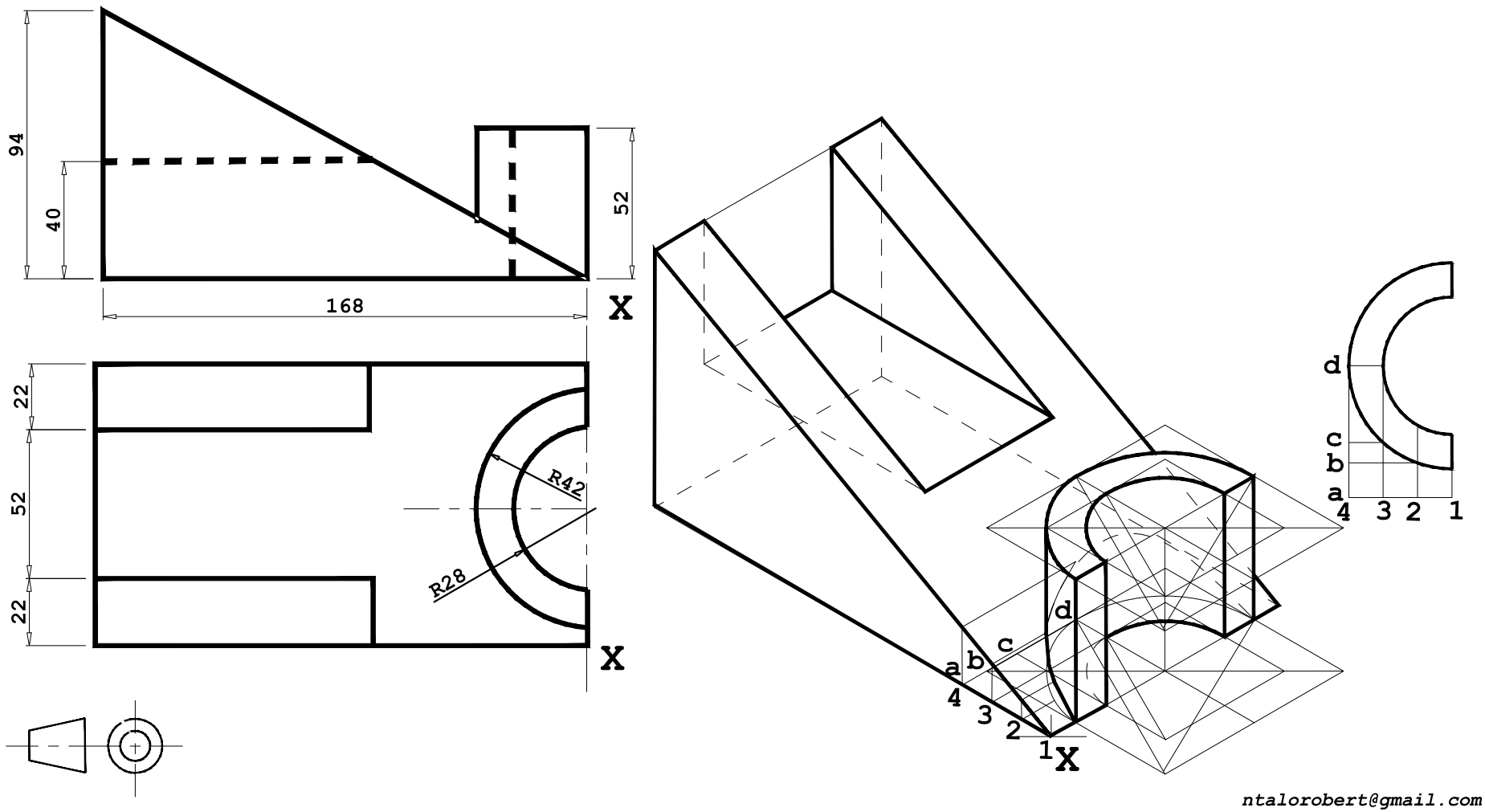
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
ORTHOGRAPHIC AND PICTORIAL PROJECTION	THE DIFFERENCE BETWEEN FIRST AND THIRD ANGLE PROJECTION 3.1	In first angle the view seen is put on the opposite side well as it is put on the very side in third angle projection.	The front elevation should be drawn first followed by the plan and end elevation there after.the plan can either be up or down regardless of whether fist or third angle.





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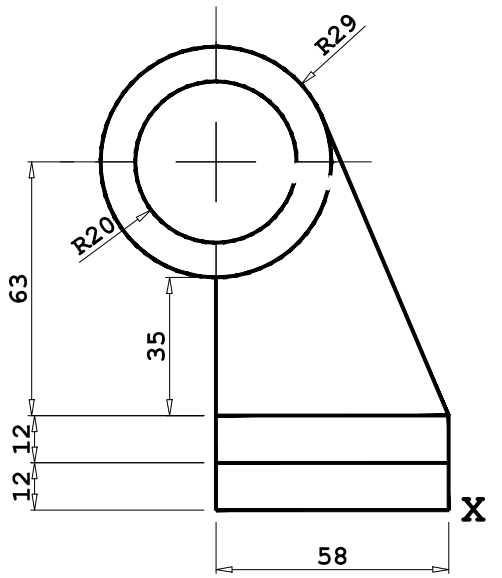
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
ORTHOGRAPHIC AND PICTORIAL PROJECTION	CONVERTING ORTHOGRAPHIC TO ISOMETRIC PROJECTION 3.2	Find out the angle of projection used,then interpret the given views using a sketch before making the final drawing.	Draw the straight edges first before constructing the slanting and curved profiles

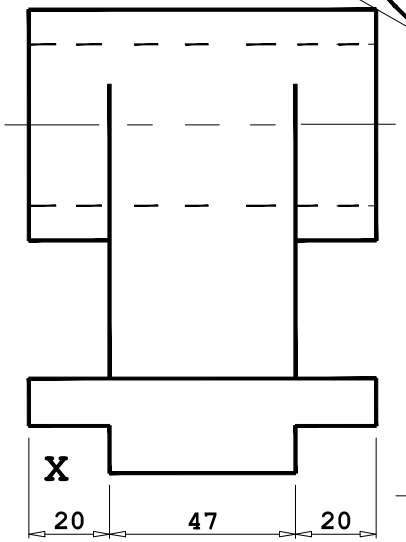


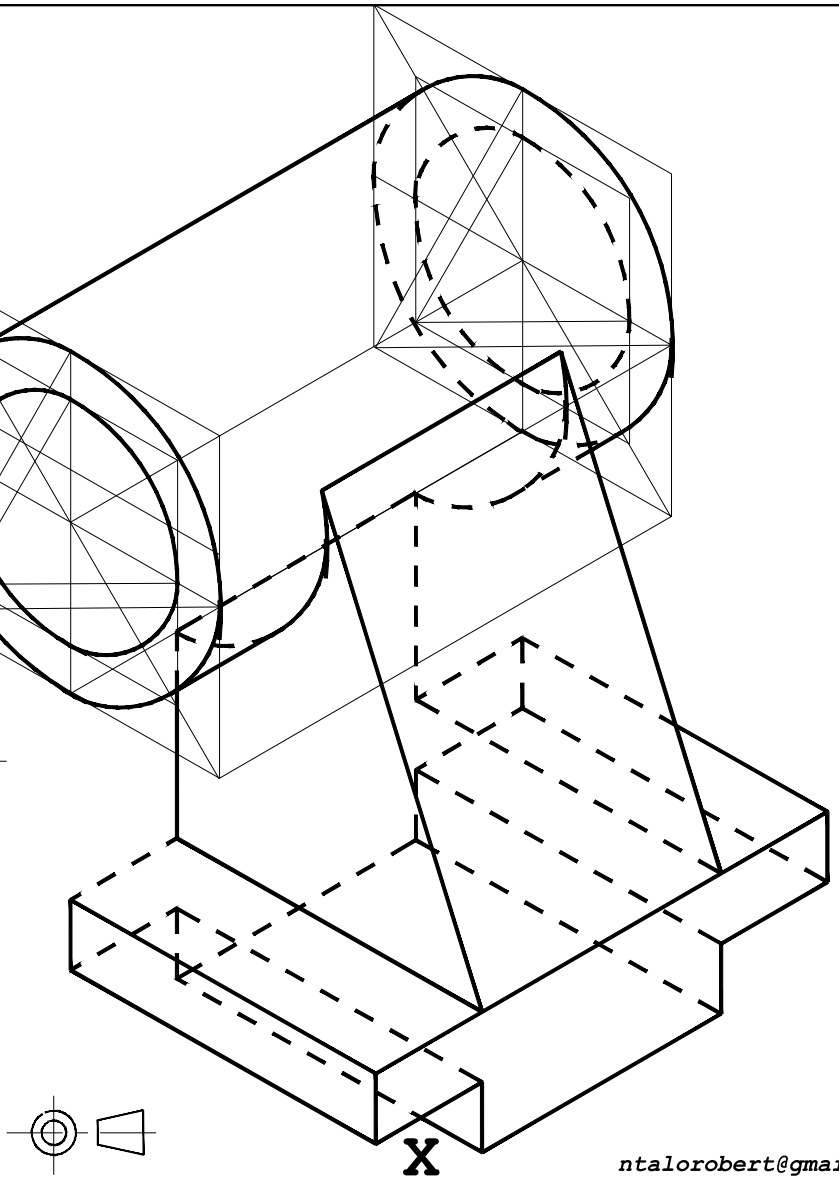
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
ORTHOGRAPHIC AND PICTORIAL PROJECTION	CONVERTING ORTHOGRAPHIC TO ISOMETRIC PROJECTION 3.3	Find out the angle of projection used,then interpret the given views using a sketch before making the final drawing.	In this particular case one can use the ordinates to construct the compound curve in isometric projection.

X as the lowest point.

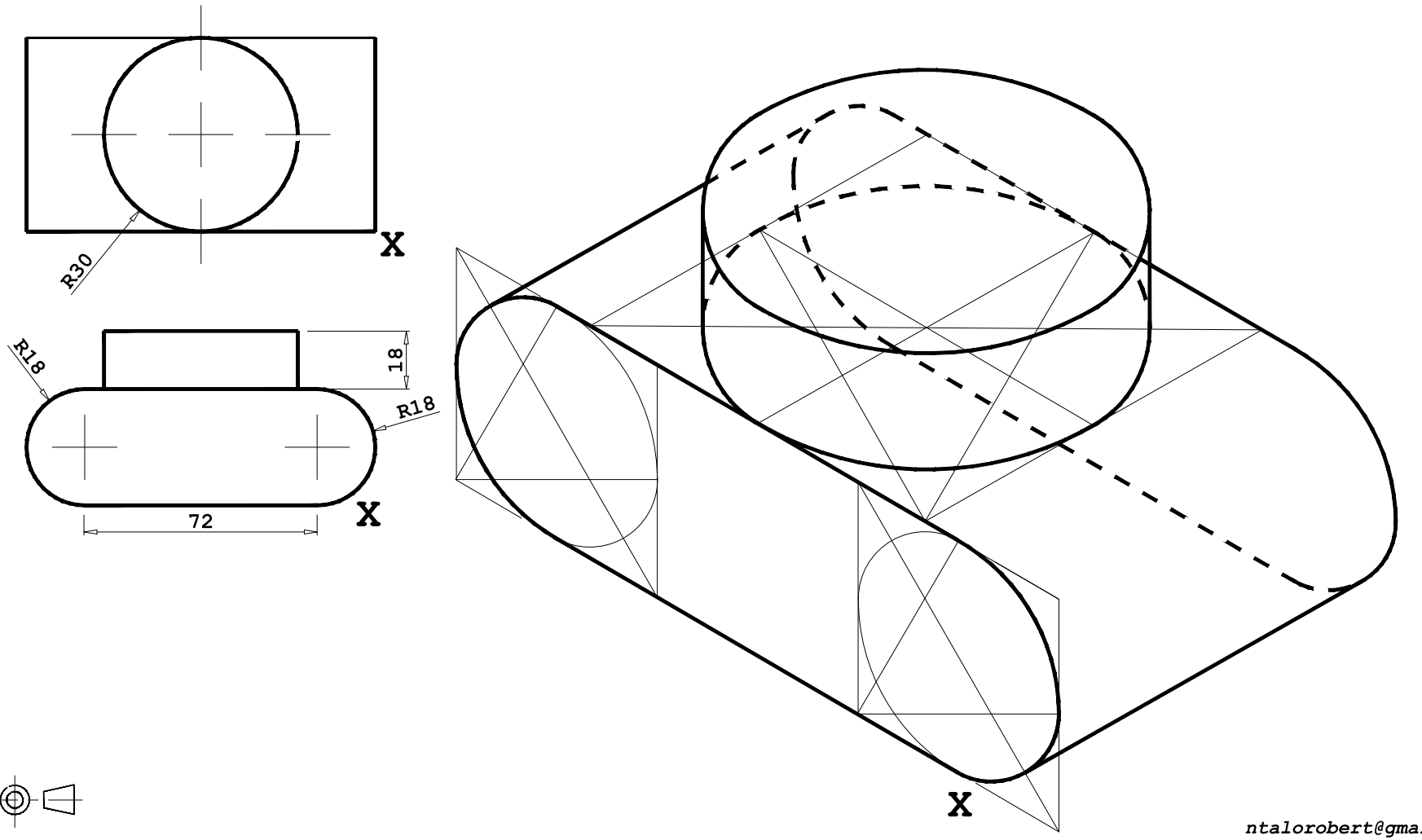






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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
ORTHOGRAPHIC AND PICTORIAL PROJECTION	CONVERTING ORTHOGRAPHIC TO ISOMETRIC PROJECTION 3.4	Find out the angle of projection used,then interpret the given views using a sketch before making the final drawing.	Draw the straight edges first before constructing the slanting and circular profiles puting the required corner at the lowest point



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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
ORTHOGRAPHIC AND PICTORIAL PROJECTION	CONVERTING ORTHOGRAPHIC TO ISOMETRIC PROJECTION 3.5	Find out the angle of projection used,then interpret the given views using a sketch before making the final drawing.	Draw the straight edges first before constructing the slanting and curved profiles

KEY POINTS TO ANSWERING SCENARIOS OF TOPIC1

When answering a scenario test item on projection of solids, the learner must begin with a focused introduction stating the type of projection required (first-angle or third-angle), identifying the principal planes, and explaining the viewing directions to represent the three-dimensional object on a two-dimensional surface. The essential materials, tools, and equipment include a drawing board, T-square, set squares (30°, 45°, and 60°), compasses, dividers, scale ruler, French curves, pencils (H, 2H, HB), eraser, masking tape, and A3 paper. Health and safety awareness requires proper posture to prevent back strain, careful handling of sharp instruments, adequate lighting and ventilation, keeping instruments clean, and observing fire safety measures. The operational procedure involves interpreting given views, identifying visible and hidden edges, establishing correct alignment between front, top, and side views using projection lines, transferring dimensions accurately, applying standard line conventions (visible edges as continuous thick lines, hidden edges as dashed lines), constructing sectional views with hatching at 45°, and constructing isometric projections with axes at 30° maintaining proportionality. Maintenance recommendations include regular cleaning of instruments to prevent rust, proper storage of compasses and dividers with protective caps, periodic pencil sharpening, and safe handling of the drawing board. Evaluation assesses whether orthographic projections accurately represent the solid, views are correctly aligned and dimensioned, hidden details are included, sectional views reveal internal features, and isometric projections maintain correct angles. In conclusion, successful completion demonstrates mastery of projection principles, and the final drawing set, characterized by neat presentation, accurate dimensioning, and consistent line quality, is fit for its intended purpose of conveying precise geometric information for manufacturing, construction, or design review.

TOPIC 2: FOUNDATIONS AND FLOORS

Competency

Learners produce correct construction drawings for foundations and floors.

Teaching Focus

Guide learners to identify

- site preliminary works
- site temporary works
- building construction materials
- excavations
- strip foundations
- pad foundations
- hardcore
- blinding
- DPM
- concrete slab
- screed
- reinforcement
- floor finishes.

Assessment Focus

Assess the learner's ability to

- identify components
- sequence construction correctly
- apply material symbols
- dimension correctly
- use correct scales.

Common Errors

Learners frequently

- omit DPC/DPM
- use wrong material symbols
- misplace foundation levels
- draw incorrect wall thicknesses.

Expected Answers

Learners should correctly label

- natural ground
- foundation trench
- strip foundation
- wall
- hardcore
- sand blinding
- DPM
- concrete slab
- screed
- floor finish.

TOPIC 2: FOUNDATIONS AND FLOORS IN THE DESIGN AND CONSTRUCTION OF BUNGALOW HOUSES

INTRODUCTION

Foundations and floors are essential structural components of a building that ensure its strength, stability, and durability. The foundation transfers the load of the building safely to the ground, while the floor provides a level, strong, and comfortable surface for occupants and activities.

- Proper planning and site preparation ensure a successful construction.
- Appropriate building materials ensure safety and durability.
- A strong foundation supports the building and prevents settlement.
- Understanding construction enables accurate drawings and quality buildings.

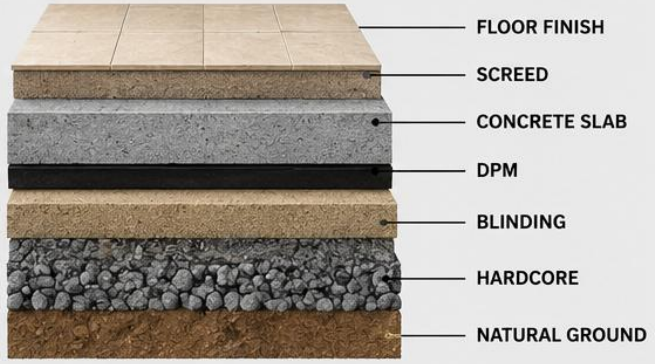



FOUNDATION CONSTRUCTION

USE OF APPROPRIATE BUILDING MATERIALS



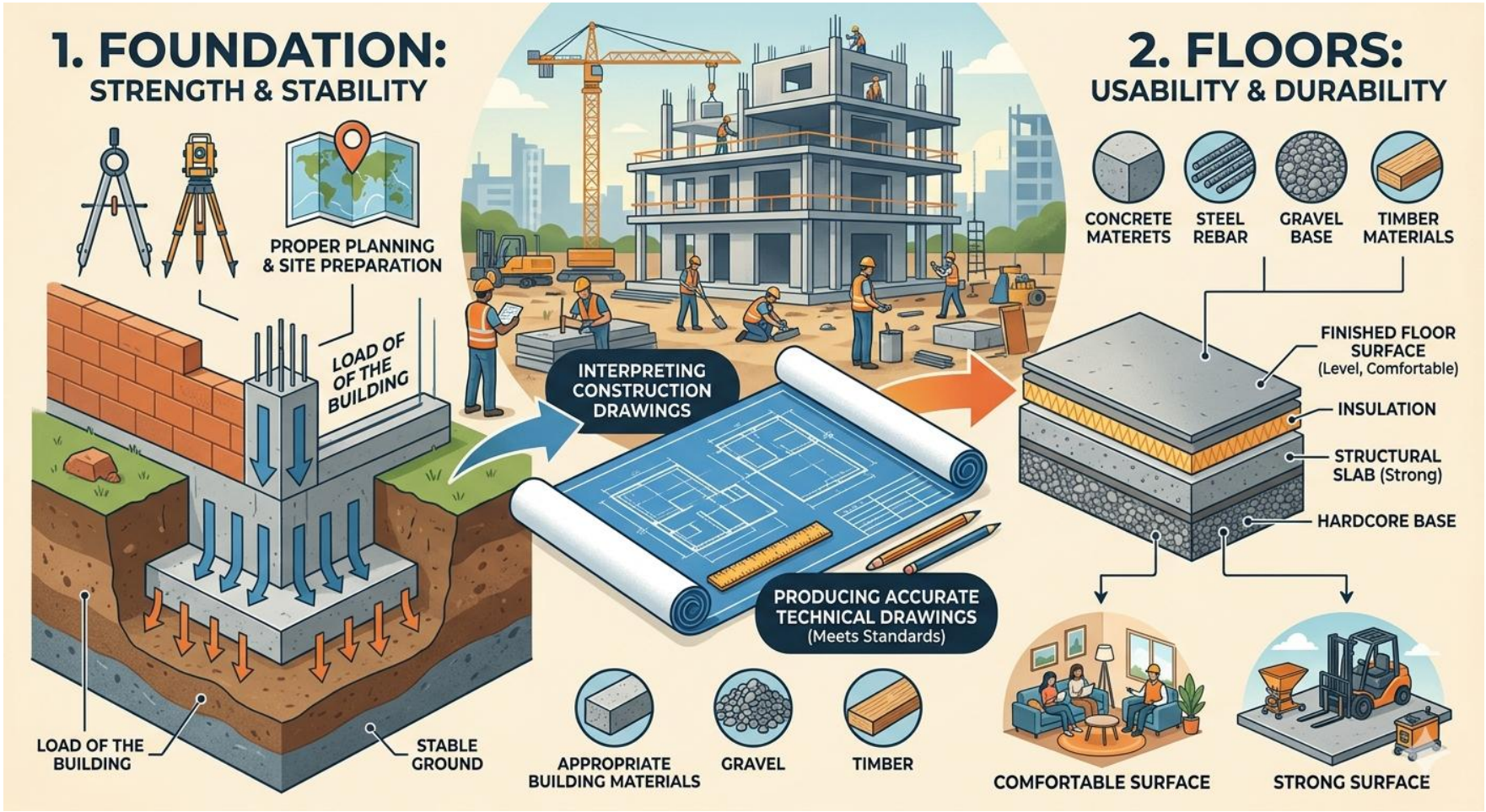
TYPICAL FLOOR CONSTRUCTION (FROM TOP TO BOTTOM)



A good foundation and floor system are the key to a safe, durable and comfortable building.

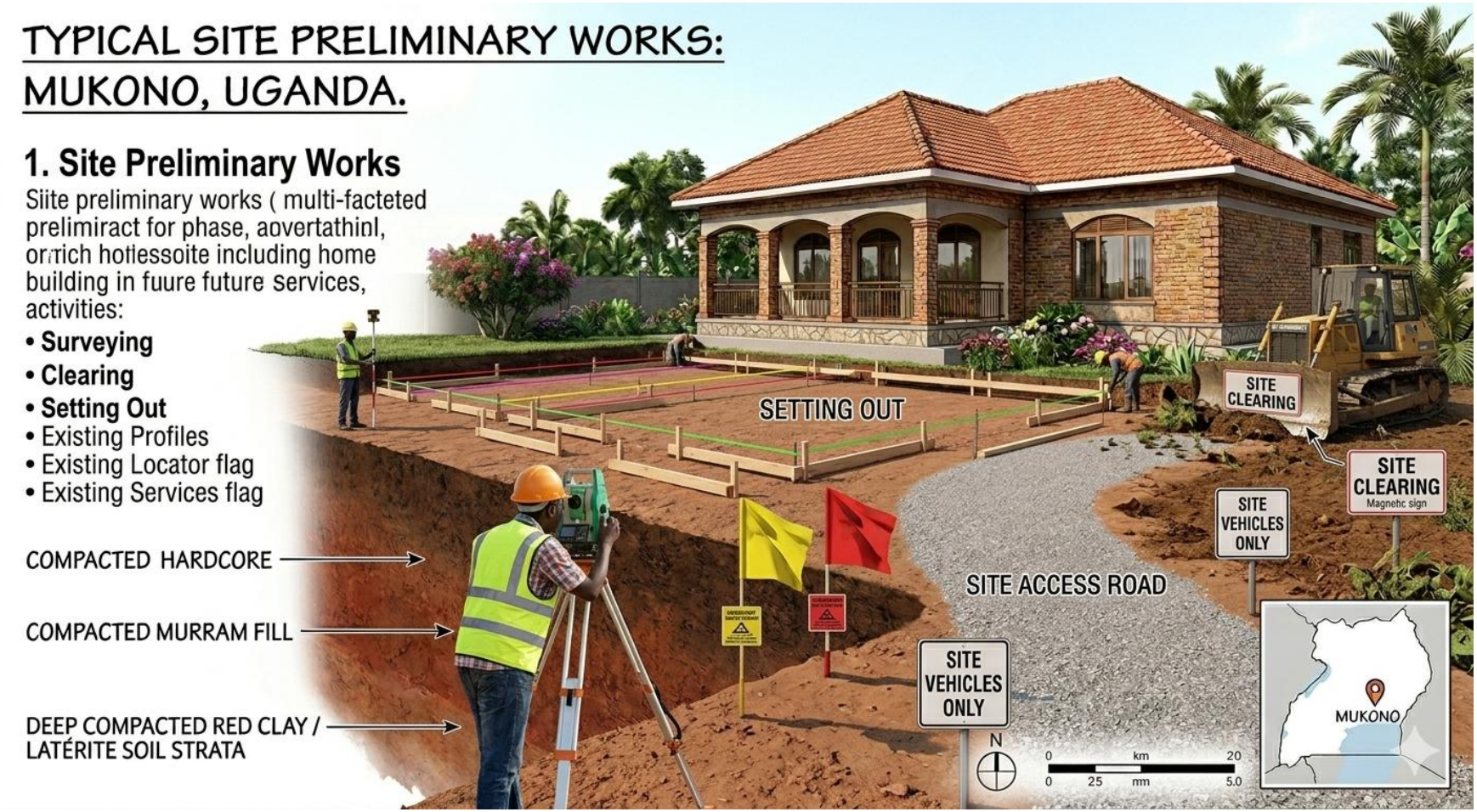
2.1Introduction

Foundations and floors are essential structural components of a building that ensure its strength, stability, and durability. The foundation transfers the load of the building safely to the ground, while the floor provides a level, strong, and comfortable surface for occupants and activities. Before any construction work begins, proper planning, site preparation, and the use of appropriate building materials are necessary to ensure that the building is safe and durable. Understanding the construction process of foundations and floors enables learners to interpret construction drawings correctly and produce accurate technical drawings that meet construction standards.



2.2 Site Preliminary Works

Site preliminary works are the activities carried out before the actual construction of a building begins. These activities prepare the site for safe and efficient construction operations. They include surveying the site to determine boundaries and ground levels, clearing vegetation, rocks, old structures, and other obstacles, and setting out the building by transferring the dimensions from the construction drawings onto the ground using pegs, string lines, and profile boards. Levelling is also carried out to establish the correct ground levels and ensure that excavations and foundations are constructed at the required depths. Proper site preliminary works reduce construction errors, improve safety, and ensure that the building is correctly positioned on the site.



2.3 Site Temporary Works

Site temporary works are temporary facilities and structures provided to support construction activities. These works are not part of the permanent building and are removed once construction is completed. They include temporary site offices, storage sheds for construction materials, temporary fencing to secure the site, scaffolding, temporary roads, water supply systems, electricity connections, sanitation facilities, and safety signs, formwork, centering, shorering, shattering, timbering, Temporary works create a safe and organized working environment, protect construction materials and equipment, and improve the efficiency of construction activities.



2.4 Building Construction Materials

Building construction materials are the substances used to construct different parts of a building. The main materials include cement, sand, coarse aggregates, hardcore, water, reinforcement steel, damp proof membranes, and timber. Cement acts as the binding material in mortar and concrete, while sand and aggregates combine with cement and water to form concrete. Hardcore consists of broken stones or bricks that provide a firm base beneath ground floors. Reinforcement steel is embedded in concrete to improve its tensile strength and prevent cracking. Damp proof membranes prevent moisture from rising through the floor, while timber is commonly used for formwork during concrete construction. The selection of quality materials is essential for producing strong, durable, and safe buildings.



2.5 Excavations

Excavation is the process of removing soil to create space for foundations below ground level. The depth and width of an excavation depend on the type of foundation, the size of the building, and the bearing capacity of the soil. Excavations must reach firm ground capable of supporting the building safely. Common types include basement excavation, trench excavations for strip foundations and pit/pire excavations for pad foundations. During excavation, safety measures such as supporting weak sides, preventing water accumulation, and providing safe access should be observed to protect workers and maintain the stability of the excavation.



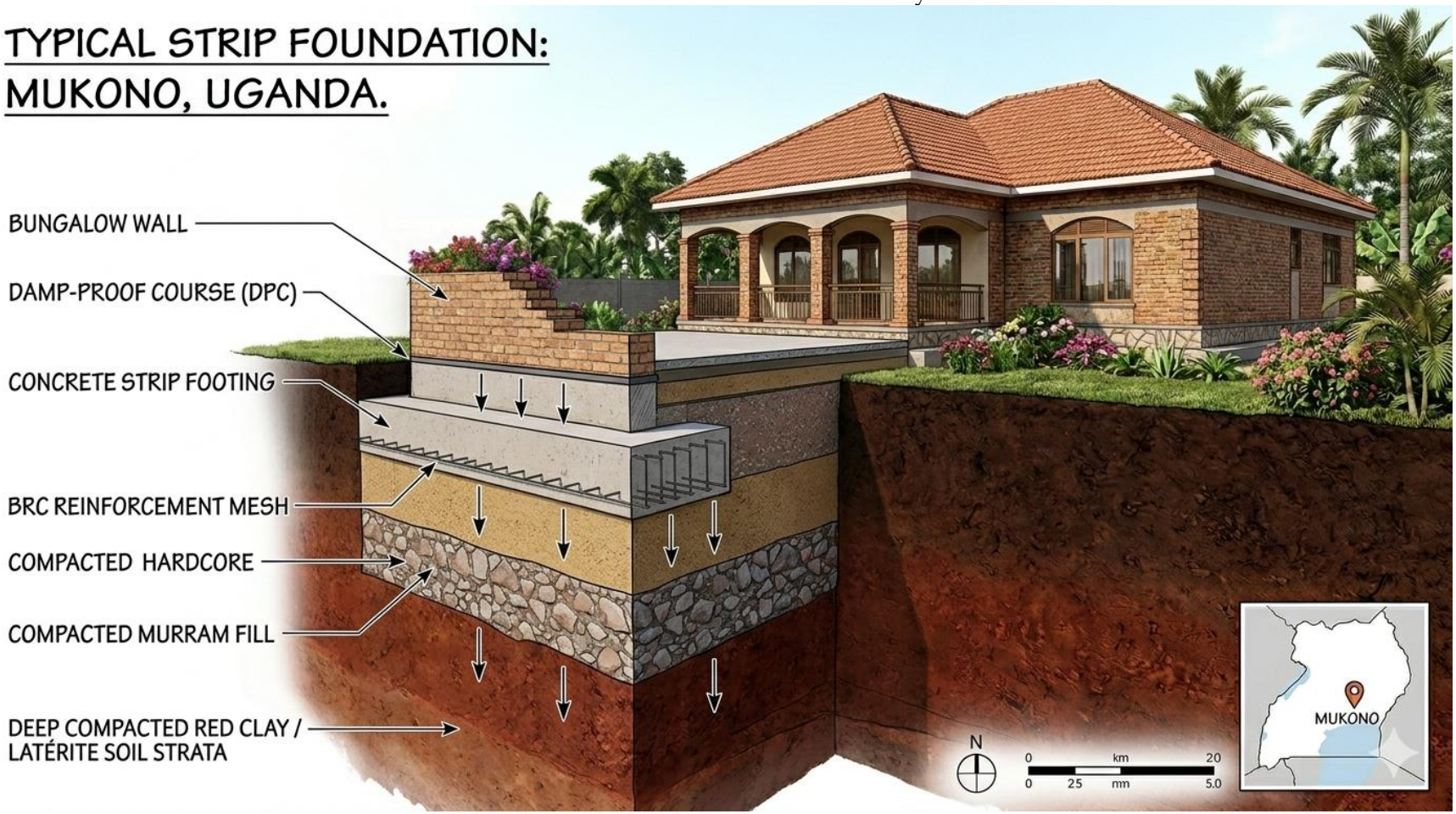
2.6 Materials, Tools and equipment used in building construction



Measuring tape, Theodolite or Total Station, Dumpy level, Ranging rods, Peg hammer, Machetes, Hoes, Wheelbarrows

2.7 Strip Foundations

A strip foundation is a continuous strip of concrete constructed beneath load-bearing walls to distribute the weight of the building evenly to the ground. It is one of the most common foundation types used in residential and small commercial buildings because it is economical and easy to construct. After excavation, concrete is poured into the trench to form the foundation footing, upon which the foundation wall is constructed. Strip foundations are suitable where soil conditions are stable and building loads are relatively light. Correct dimensions and levels must be maintained to ensure structural stability.



2.8 Pad Foundations

Pad foundations are isolated reinforced or plain concrete bases constructed beneath individual columns to support concentrated structural loads. Unlike strip foundations, pad foundations are used in framed structures where loads are transferred through columns rather than continuous walls. The size of each pad foundation depends on the load it carries and the strength of the supporting soil. Pad foundations distribute concentrated loads over a larger area, reducing the pressure exerted on the ground and preventing excessive settlement.



2.9 Plinth Wall

A **plinth wall** is a wall constructed between the foundation wall and the ground floor level to raise the building above the surrounding ground. It is built after the foundation has been completed and serves as the enclosure for the filled area beneath the floor. The plinth wall provides structural support for the floor slab, retains the hardcore filling, and helps protect the building against dampness, flooding, and the entry of surface water. It also improves the stability of the structure by evenly transferring loads from the walls to the foundation. The height and thickness of the plinth wall depend on the building design, site conditions, and the required finished floor level. Proper construction, including accurate alignment, sound bonding, and the installation of a damp-proof course (DPC), ensures the durability and performance of the building.



2.10 Hardcore

Hardcore is a layer of compacted broken stones, crushed rock, or brick fragments placed beneath the floor slab after the foundation walls have been completed and backfilled. Its primary function is to provide a stable and well-drained base for the concrete floor slab. Proper compaction of the hardcore reduces settlement, improves load distribution, and minimizes the risk of floor cracking. The thickness of the hardcore layer varies depending on the design requirements and the condition of the ground.



2.11 Blinding

Blinding is a thin layer of fine sand or weak concrete spread over the compacted hardcore before the damp proof membrane is laid. It fills the spaces between the hardcore particles, creating a smooth and level surface that protects the damp proof membrane from being punctured by sharp stones. Blinding also improves the quality of the finished floor by providing an even surface on which the concrete slab can be cast.



2.12 Damp Proof Membrane (DPM)

A damp proof membrane (DPM) is a waterproof plastic sheet placed on top of the blinding layer beneath the concrete floor slab. Its main purpose is to prevent moisture from rising from the ground into the concrete slab and floor finishes through capillary action. Moisture penetration can damage floor finishes, weaken adhesives, and create unhealthy indoor conditions. To ensure effective protection, the membrane should be laid continuously with overlapping joints and without tears or punctures.



2.13 Reinforcement

Reinforcement consists of steel bars or welded steel mesh(BRC) embedded within concrete to improve its ability to resist tensile forces. Since concrete is naturally strong in compression but weak in tension, reinforcement helps prevent cracking, increases structural strength, and enhances durability. Reinforcement is commonly used in pad foundations, reinforced strip foundations, suspended floors, and heavily loaded concrete slabs. The reinforcement must be correctly positioned and adequately covered with concrete to protect it from corrosion.



2.14 Concrete Slab

The concrete slab is the main structural component of a ground floor and is cast directly over the damp proof membrane. It is made by mixing cement, sand, coarse aggregates, and water in the correct proportions to produce strong and durable concrete. The slab distributes loads from occupants, furniture, and equipment evenly across the ground while providing a firm base for the screed and floor finishes. Adequate curing after casting is necessary to achieve the required strength and prevent shrinkage cracks.



2.15 Screed

A screed is a thin layer of cement and sand mortar applied over the concrete slab to create a smooth, level, and even surface for receiving the final floor finish. Screeding corrects minor surface irregularities in the slab and improves the appearance and performance of the finished floor. The screed should be compacted, levelled, and cured properly before any floor finish is installed to ensure long-term durability.



2.16 Floor Finishes

Floor finishes are the final decorative and protective materials applied over the screed to improve the appearance, durability, and functionality of the floor. Common floor finishes include cement screed finishes, ceramic tiles, terrazzo, timber flooring, vinyl flooring, marble, granite, and other natural stones. The choice of floor finish depends on factors such as cost, durability, ease of maintenance, aesthetics, and the intended use of the building. For example, ceramic tiles are commonly used in kitchens and bathrooms because they are waterproof and easy to clean, while terrazzo and granite are preferred in public buildings because of their durability and attractive appearance.



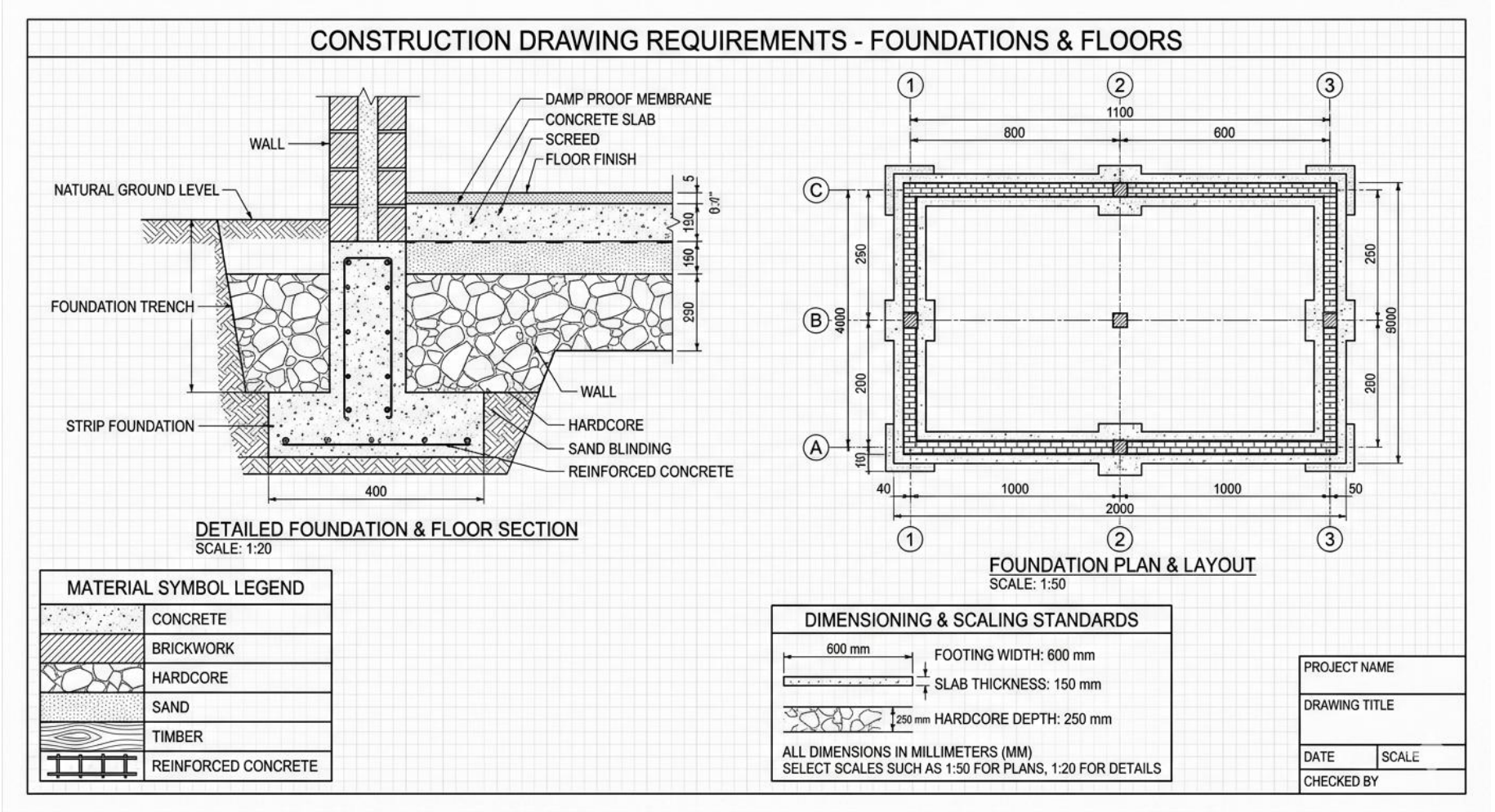
2.17 Construction Sequence of Foundations and Floors

The construction of foundations and floors follows a logical sequence to ensure structural stability and quality workmanship. The process begins with site preliminary works, followed by temporary site works and setting out of the building. Excavations are then carried out for the foundations, after which strip or pad foundations are constructed depending on the structural design. Foundation walls are built and the excavated areas are backfilled. Compacted hardcore is placed inside the foundation walls, followed by a layer of sand blinding. A damp proof membrane is then laid over the blinding, reinforcement is positioned where required, and the concrete floor slab is cast. After the slab has been properly cured, a screed is applied to create a smooth surface before the final floor finish is installed. Following the correct construction sequence ensures that each layer performs its intended function effectively and contributes to the overall strength and durability of the building.



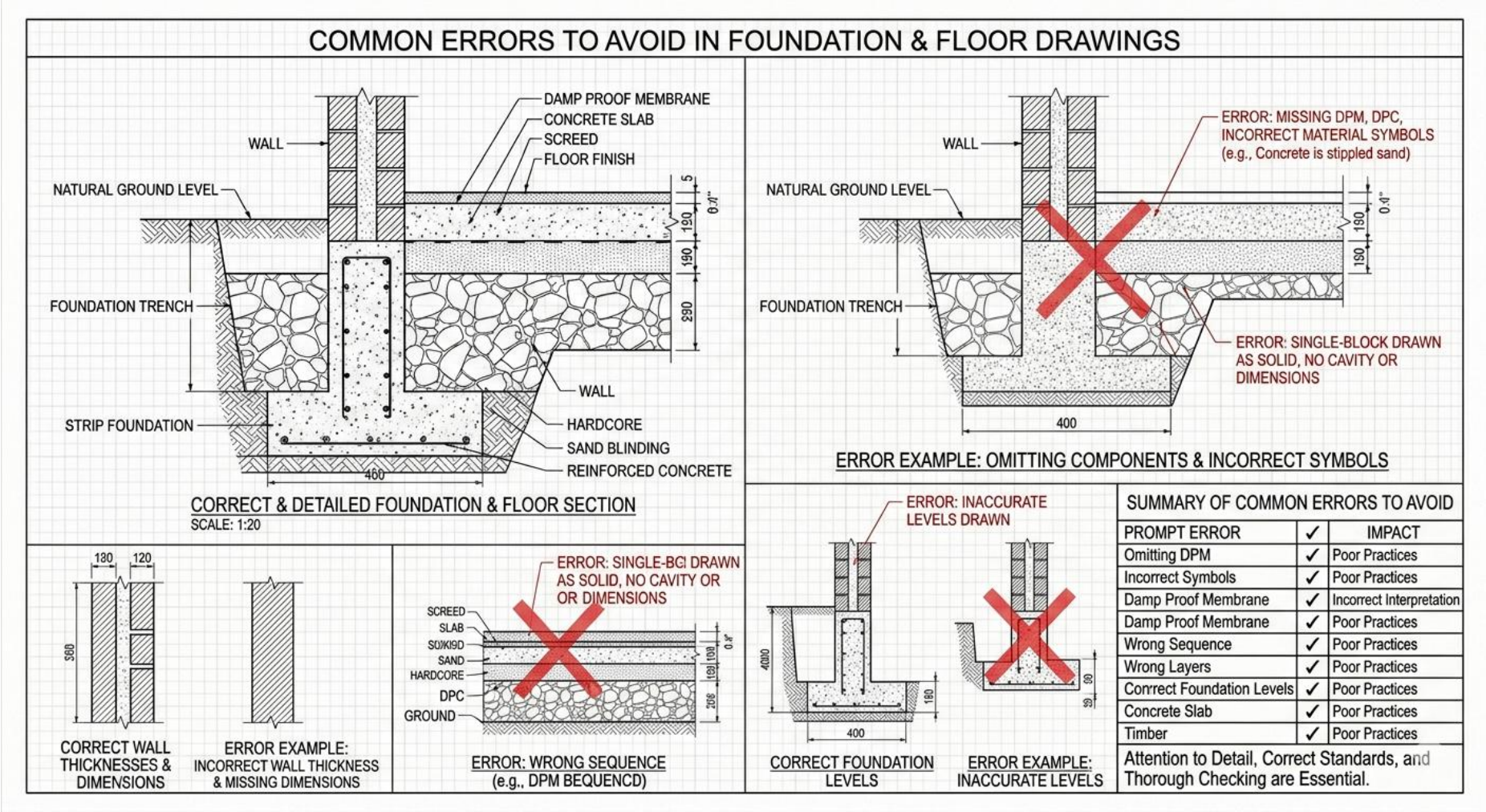
2.18 Construction Drawing Requirements

Construction drawings for foundations and floors should be accurate, clearly dimensioned, and correctly labelled. Appropriate material symbols should be used to represent concrete, brickwork, hardcore, sand, timber, and reinforced concrete. Standard drawing scales such as 1:50 for foundation plans and 1:20 for detailed sections should be selected to ensure clarity. Important components including the natural ground level, foundation trench, strip foundation, wall, hardcore, sand blinding, damp proof membrane, concrete slab, screed, and floor finish should all be correctly labelled. Accurate dimensions and proper scaling enable builders to interpret the drawings correctly and construct the building according to the designer's specifications.



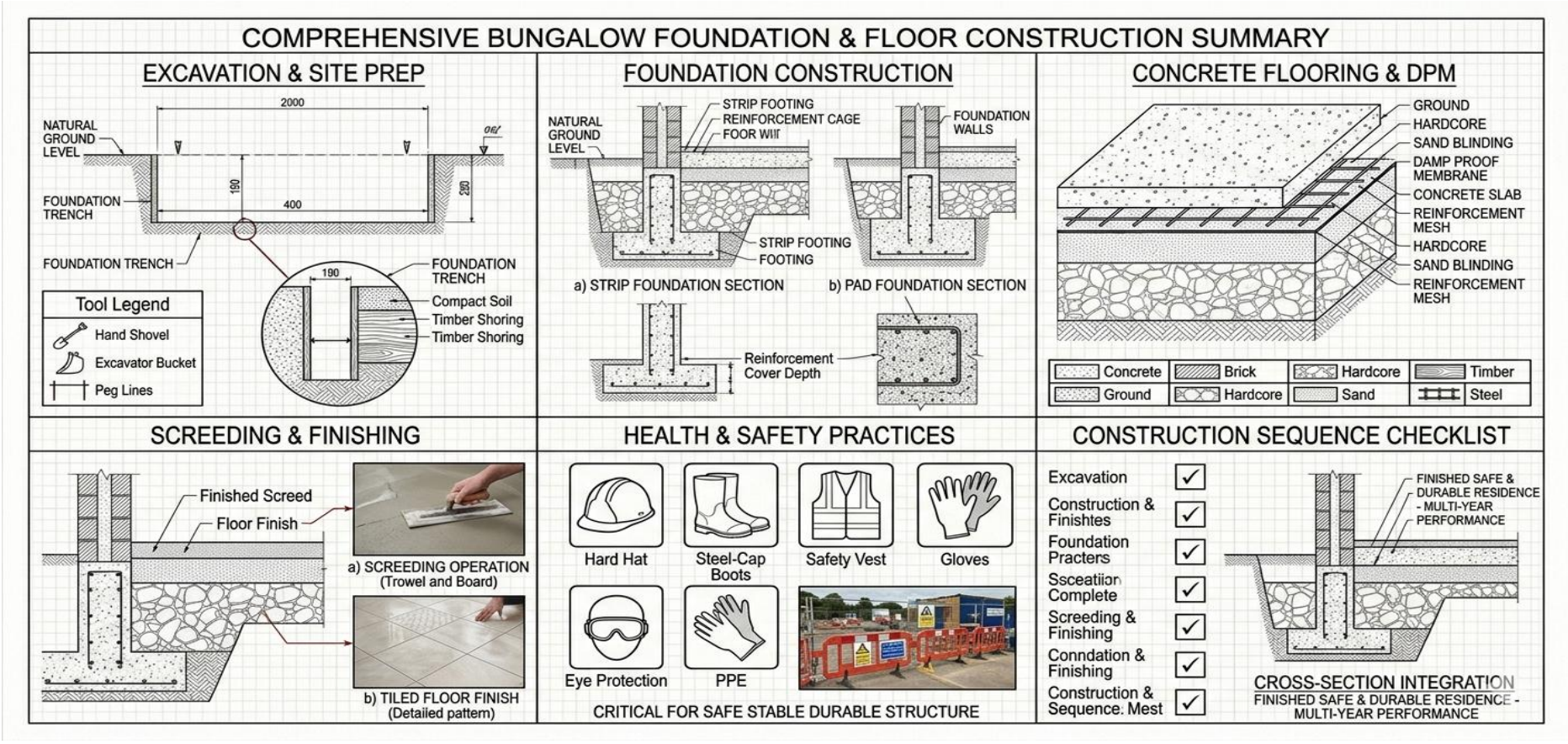
2.19 Common Errors to Avoid

When producing construction drawings for foundations and floors, learners should avoid omitting important components such as the damp proof membrane or damp proof course, using incorrect material symbols, drawing incorrect wall thicknesses, placing foundation levels inaccurately, failing to show dimensions, or arranging the construction layers in the wrong sequence. Such errors can lead to incorrect interpretation of drawings and poor construction practices. Careful attention to detail, correct use of construction standards, and thorough checking of drawings before submission help produce professional and accurate construction drawings.



2.20 Summary

The construction of foundations and floors is one of the most critical phases in bungalow house construction because it provides the structural support and durable surface for the entire building. Each stage—from site preparation and excavation to foundation construction, concrete flooring, reinforcement, screeding, and finishing—must follow correct operational procedures while observing strict health and safety measures. The use of appropriate materials, tools, and equipment, combined with proper maintenance practices, ensures that the completed structure remains safe, stable, durable, and fit for its intended purpose for many years. These concepts provide lea rners with the theoretical knowledge required before undertaking practical construction activities.



2.21 KEY POINTS TO ANSWERING SCENARIOS OF TOPIC2

When answering a scenario test item on foundations and floors, the learner must begin with a focused introduction explaining the importance of foundations and floors as structural components ensuring building strength, stability, and durability, stating the type of foundation required (strip or pad), and identifying the key construction sequence. The necessary materials, tools, and equipment include cement, sand, coarse aggregates, hardcore, reinforcement steel, damp proof membrane, timber for formwork, measuring tape, theodolite or dumpy level, ranging rods, pegs and string lines, wheelbarrows, hoes, machetes, and appropriate drawing instruments. Health and safety awareness requires wearing PPE (helmets, steel-toe boots, gloves, reflective clothing), supporting excavation sides to prevent collapse, preventing water accumulation, providing safe access, maintaining good housekeeping, observing proper manual handling techniques, and ensuring electrical equipment is properly insulated. The operational procedure follows the construction sequence: site preliminary works (surveying, clearing, setting out), excavation to required depth, constructing strip or pad foundation, building foundation wall with DPC, backfilling, placing and compacting hardcore, applying sand blinding, laying DPM continuously with overlapping joints, positioning reinforcement, casting concrete slab with proper curing, applying screed, and installing floor finish. Maintenance recommendations include regular inspection for cracks or settlement, monitoring for rising damp, checking floor surfaces for cracking, ensuring proper drainage, repairing damaged finishes promptly, and periodic sealing of floor surfaces. Evaluation assesses whether the drawing accurately represents all components (natural ground, foundation trench, strip foundation, wall, hardcore, sand blinding, DPM, concrete slab, screed, floor finish), appropriate material symbols are used, dimensions are correct with appropriate scales (1:50 for plans, 1:20 for sections), and the drawing follows the correct construction sequence. In conclusion, the learner demonstrates thorough understanding of critical structural components and logical construction sequence, and the final drawing, including DPM and DPC, is fit for its intended purpose of guiding foundation and floor construction, ensuring a stable, durable structure that safely transfers loads and prevents moisture penetration.

TOPIC 3: SURFACE DEVELOPMENT

Competency

Learners unfold engineering objects into accurate flat patterns.

Teaching Focus

Emphasize

- true lengths
- radial line development
- parallel line development
- triangulation
- transition pieces.
- Panel development

Assessment Criteria

Check whether learners

- identify suitable development methods
- obtain true lengths
- transfer measurements accurately
- produce complete developments.

Common Misconceptions

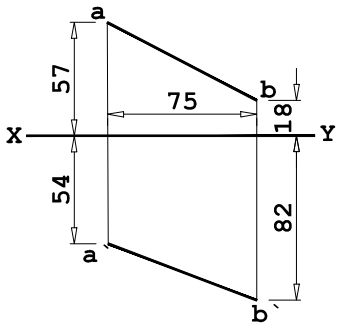
Learners usually

- measure sloping edges incorrectly
- omit seam allowances
- confuse generators
- fail to maintain continuity.

Marking Guide

Marks should reward

- correct construction
- true lengths
- pattern accuracy
- completeness
- neatness.

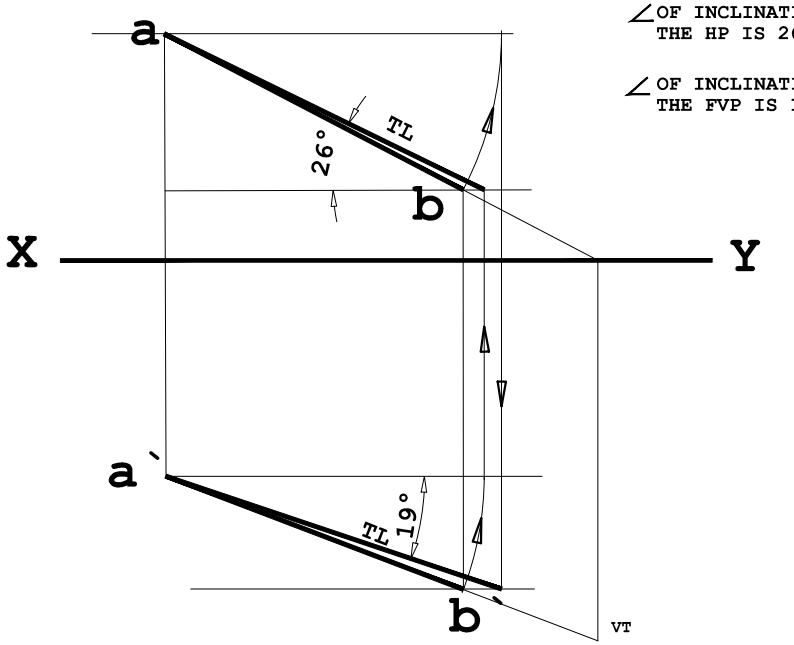


METHOD ONE

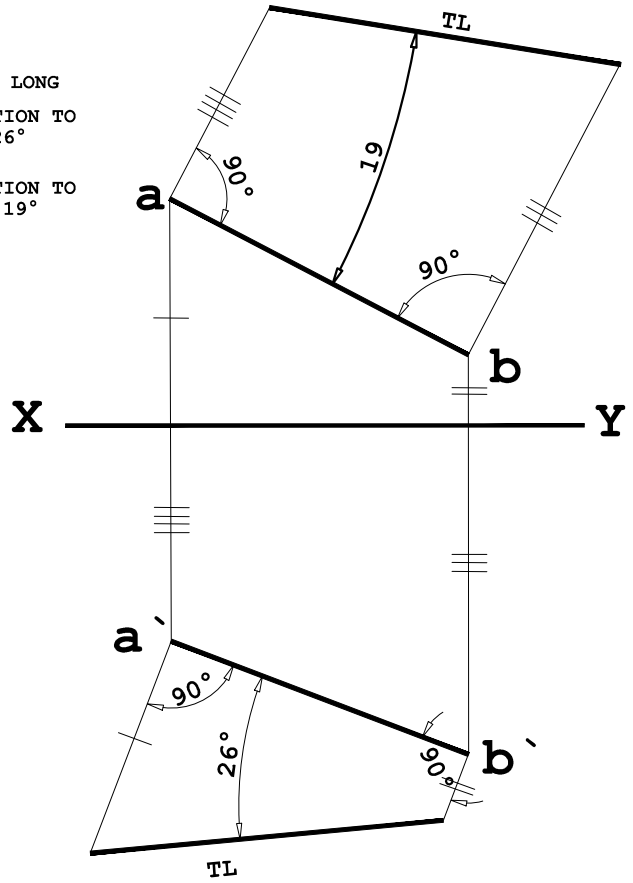
TL IS 89MM LONG

∠OF INCLINATION TO THE HP IS 26°

∠OF INCLINATION TO THE FVP IS 19°

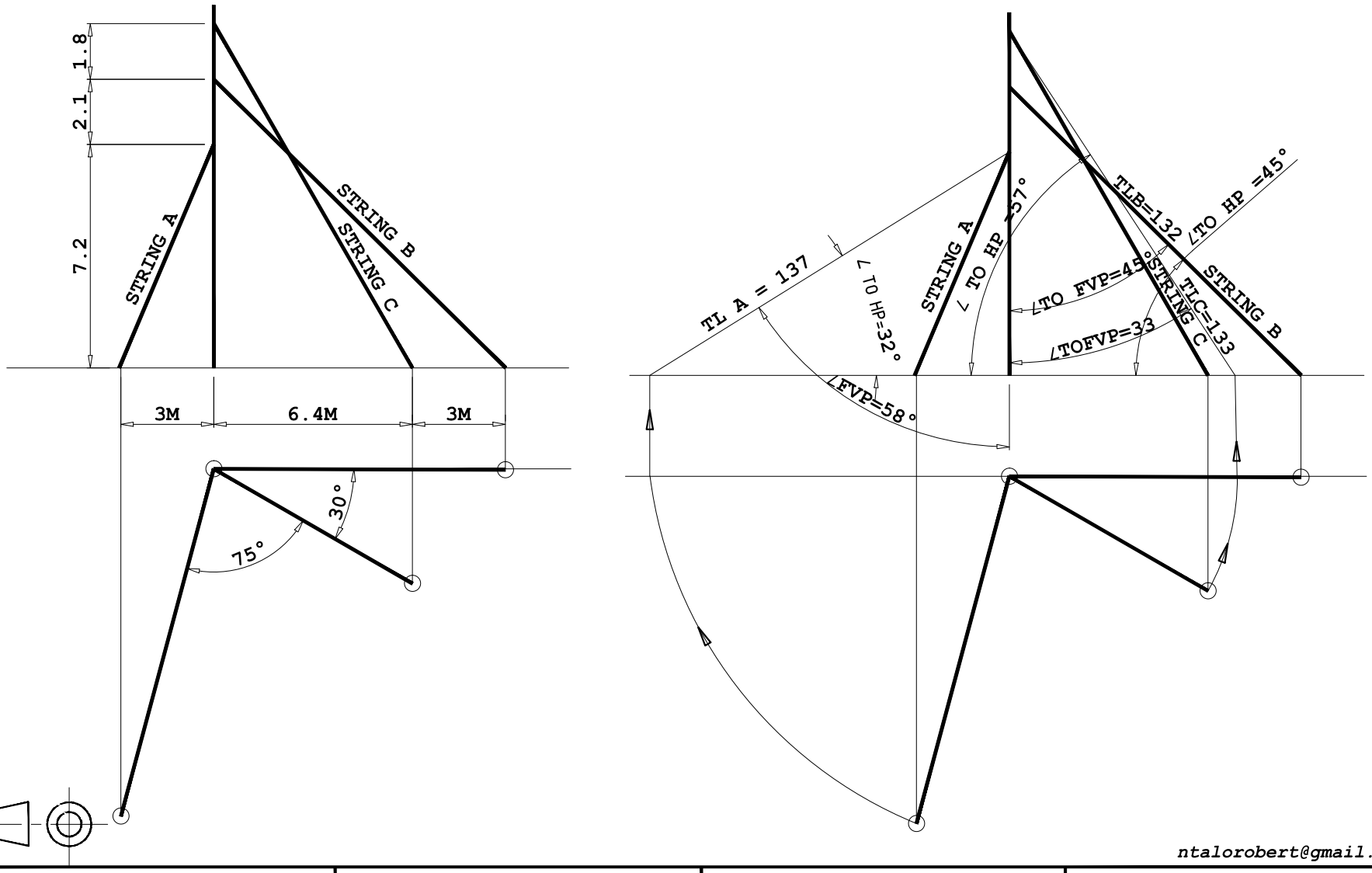


METHOD TWO



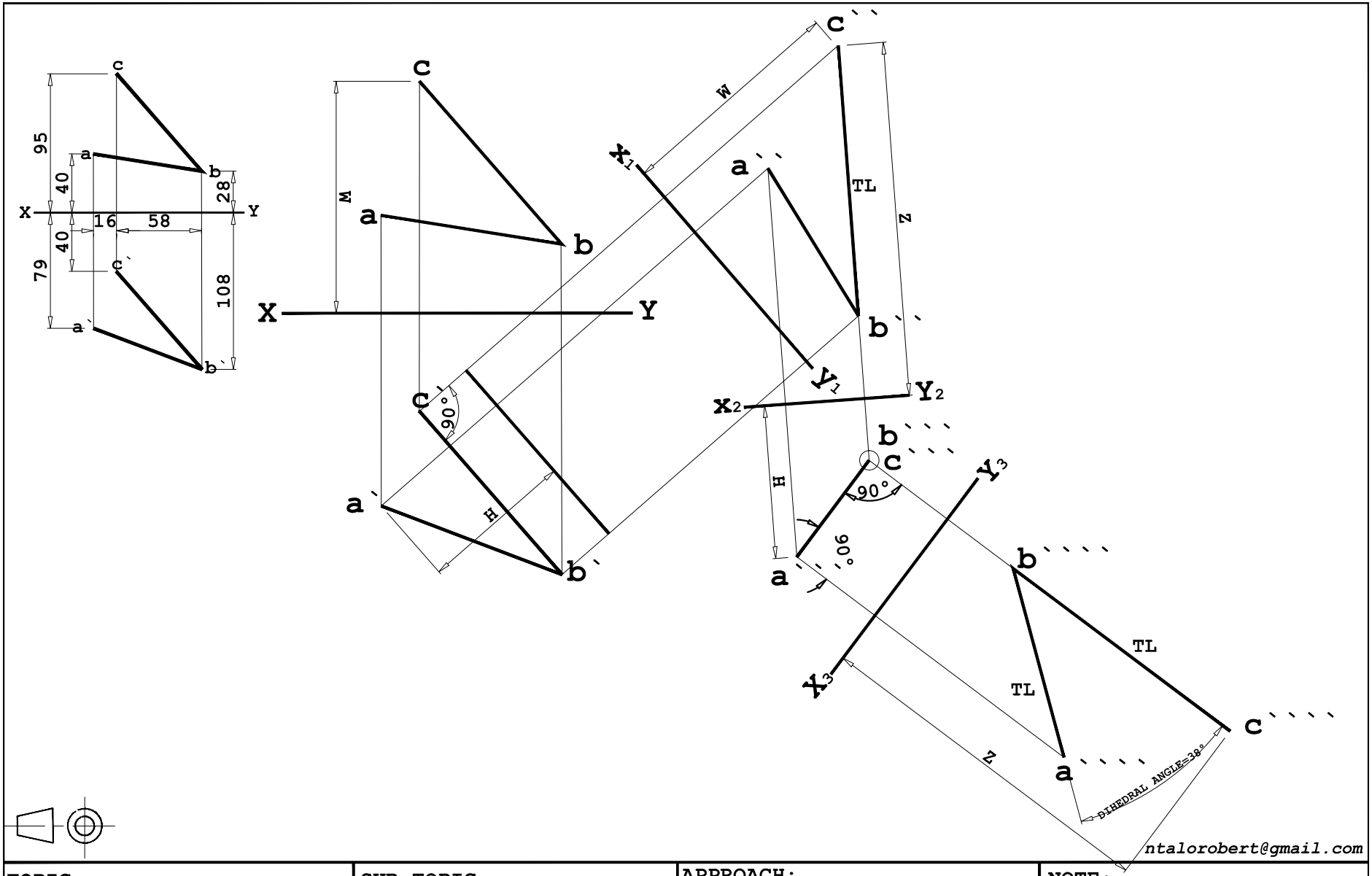
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	FINDING THE TRUE LENGTH OF A LINE 4.1	In method one, swing one of the views until its parallel to the ground line XY then read off the true length and angle of inclination on the other view.	Method one is referred to us triangulation and method two as the auxiliary method.



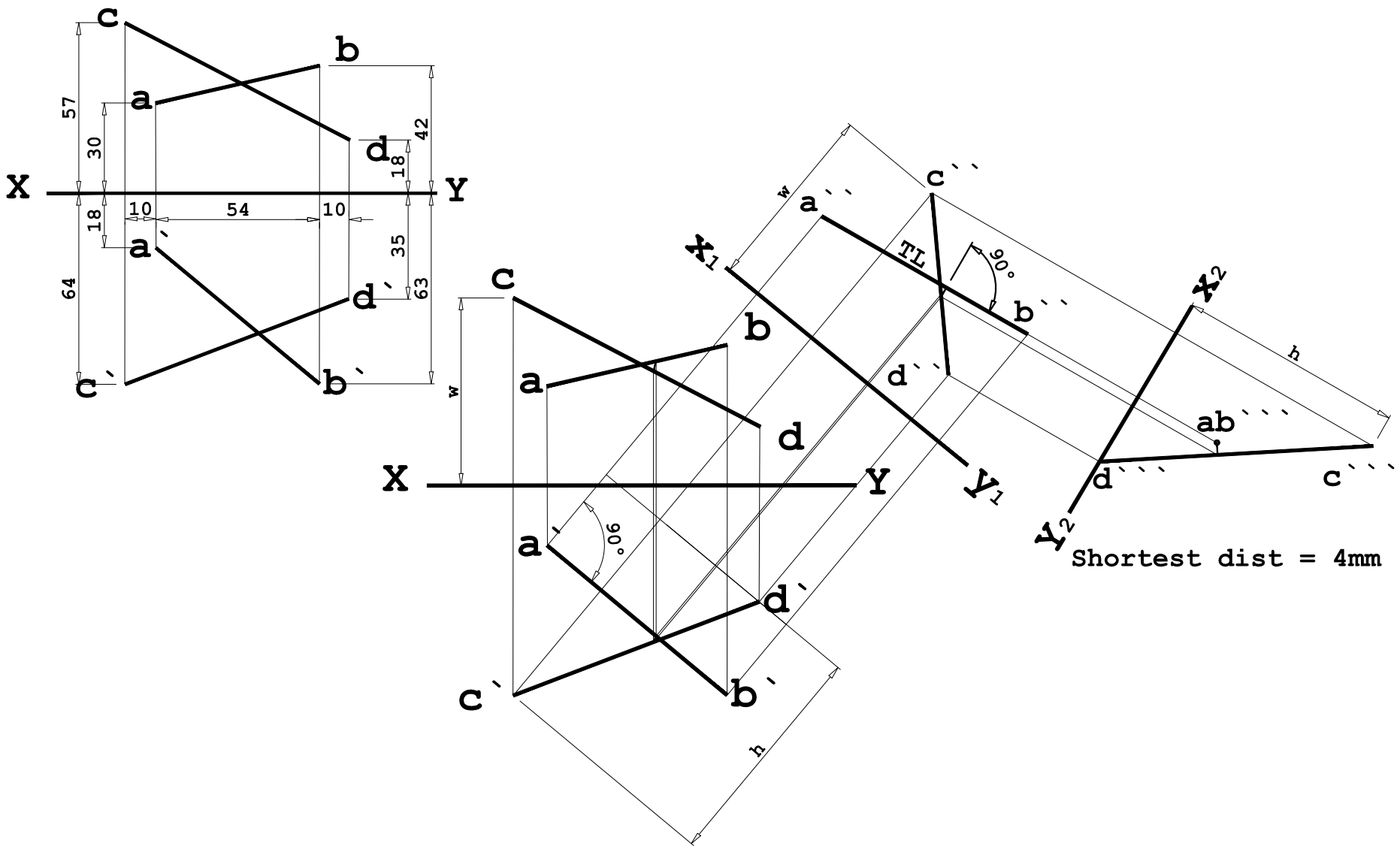
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	FINDING THE TRUE LENGTH OF A LINE 4.2	swinging the line such that is parallel to the ground line XY and then reading off the true length on the other view.	The method of swinging is referred to as triangulation.



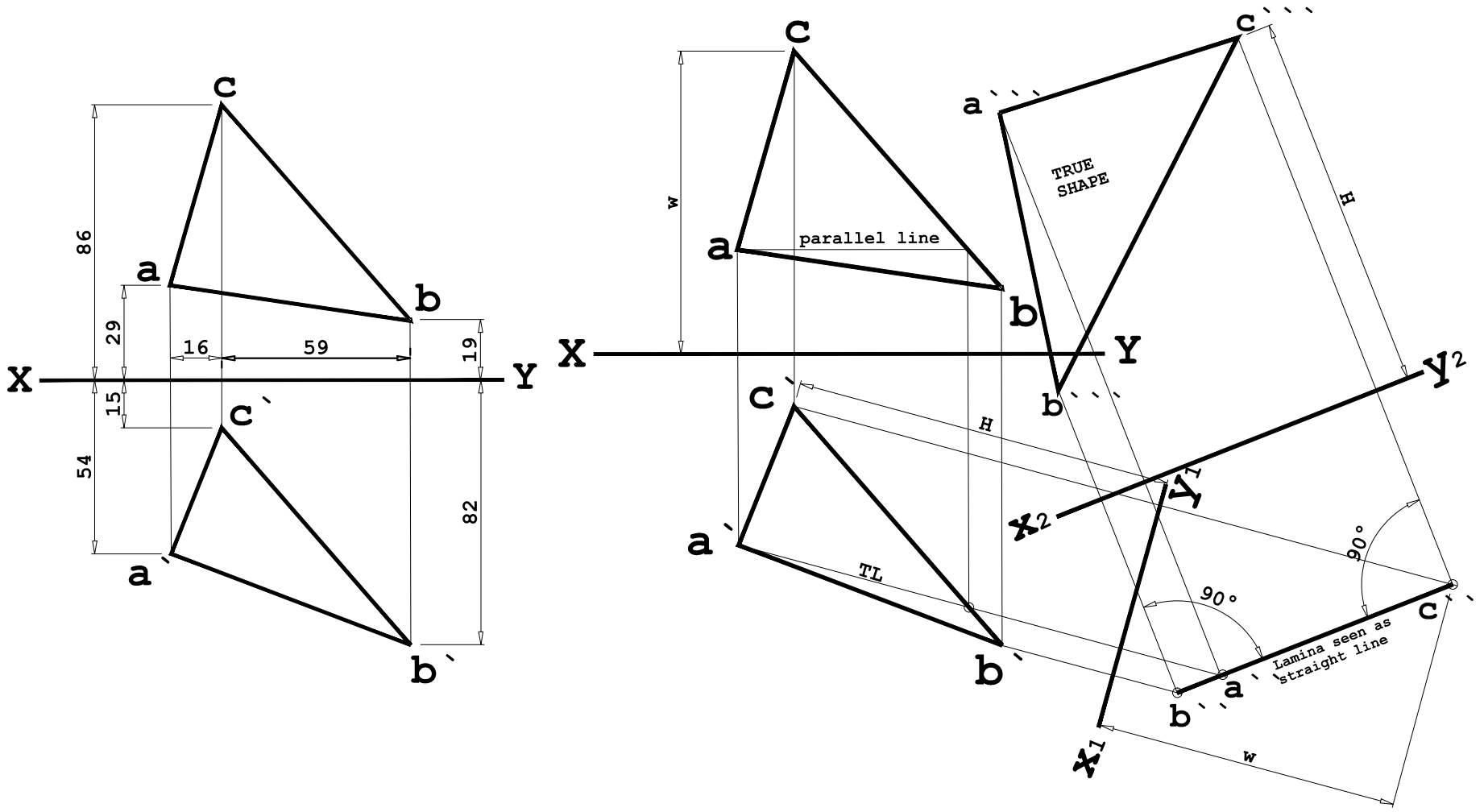
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	FINDING THE DIHEDRAL ANGLE BETWEEN TWO LINES 4.3	Using the auxiliary method find the true length of CB, see through the true length of CB got to see it as a dot and finally get the true length of the remaining AB.	The dihedral angle between two lines can only be read off after getting the true length of both lines.



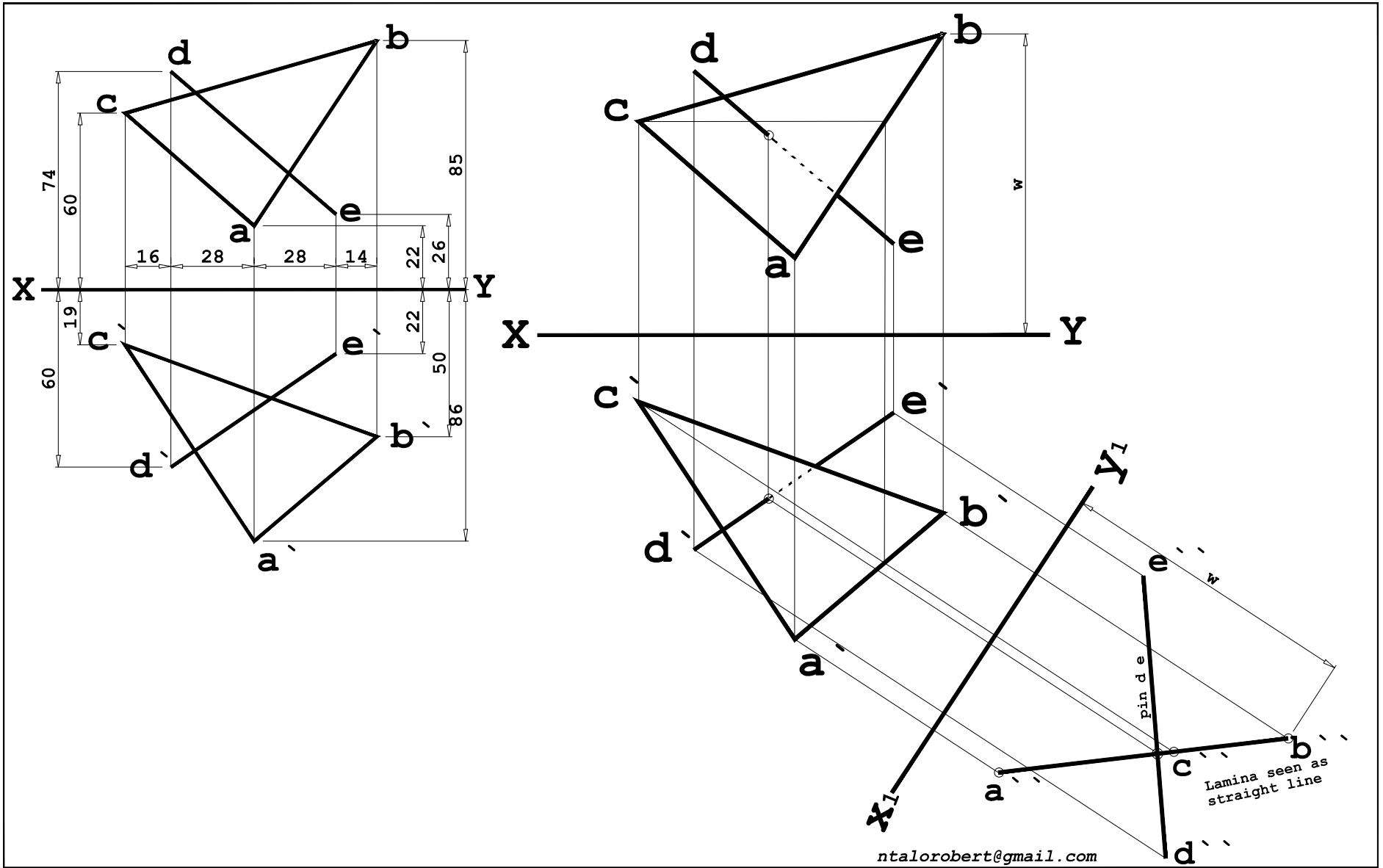
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	FINDING THE SHORTEST DISTANCE BETWEEN TWO LINES (SKEWS) 4.4	Using the auxiliary projection, get the true length of AB as CD remains in the background. See through the true length of AB got such that you see it now as a dot.The shortest distance it makes with CD at this point will be clearly seen.	For the shortest distance to be read off, one of the lines should first be seen as a dot with the other in the background.



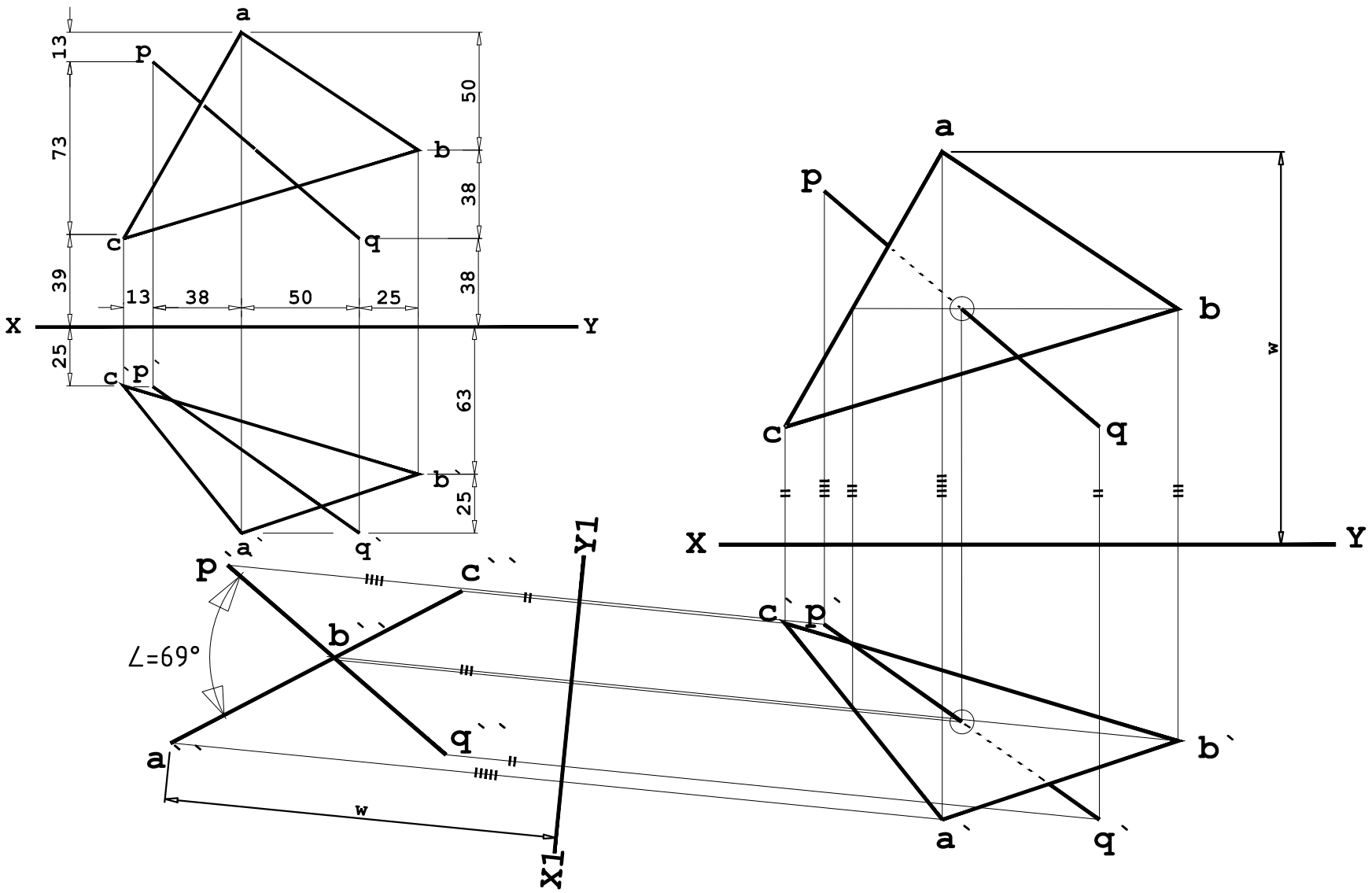
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	FINDING THE TRUE SHAPE OF A LAMINA 4.5	Use auxiliary projection to see a given lamina as a straight line. Perpendicular to that straight line one can see its true shape.	To see a lamina as a straight line we start by fixing a line parallel to the XY ground line in one view. The true length we see in the other view gives us the direction of our working.



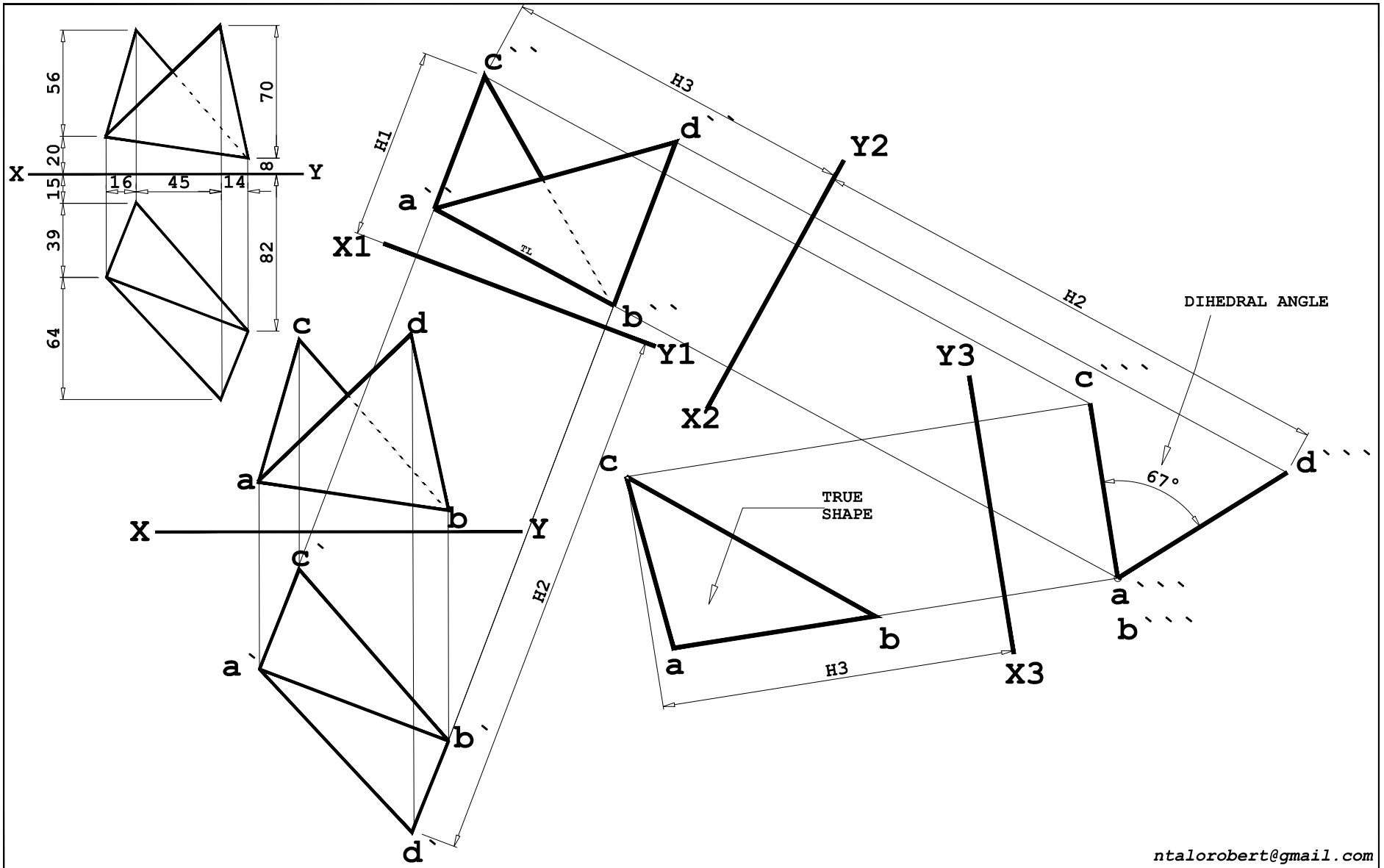
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	A LINE PIECING THROUGH A LAMINA 4.6	Use auxiliary projection to see the lamina as a straight line hence seeing where the pin pieces it from.	The point of piecing has to be projected back to the front and plan and clearly indicate whether the line is visible or hidden after piecing.



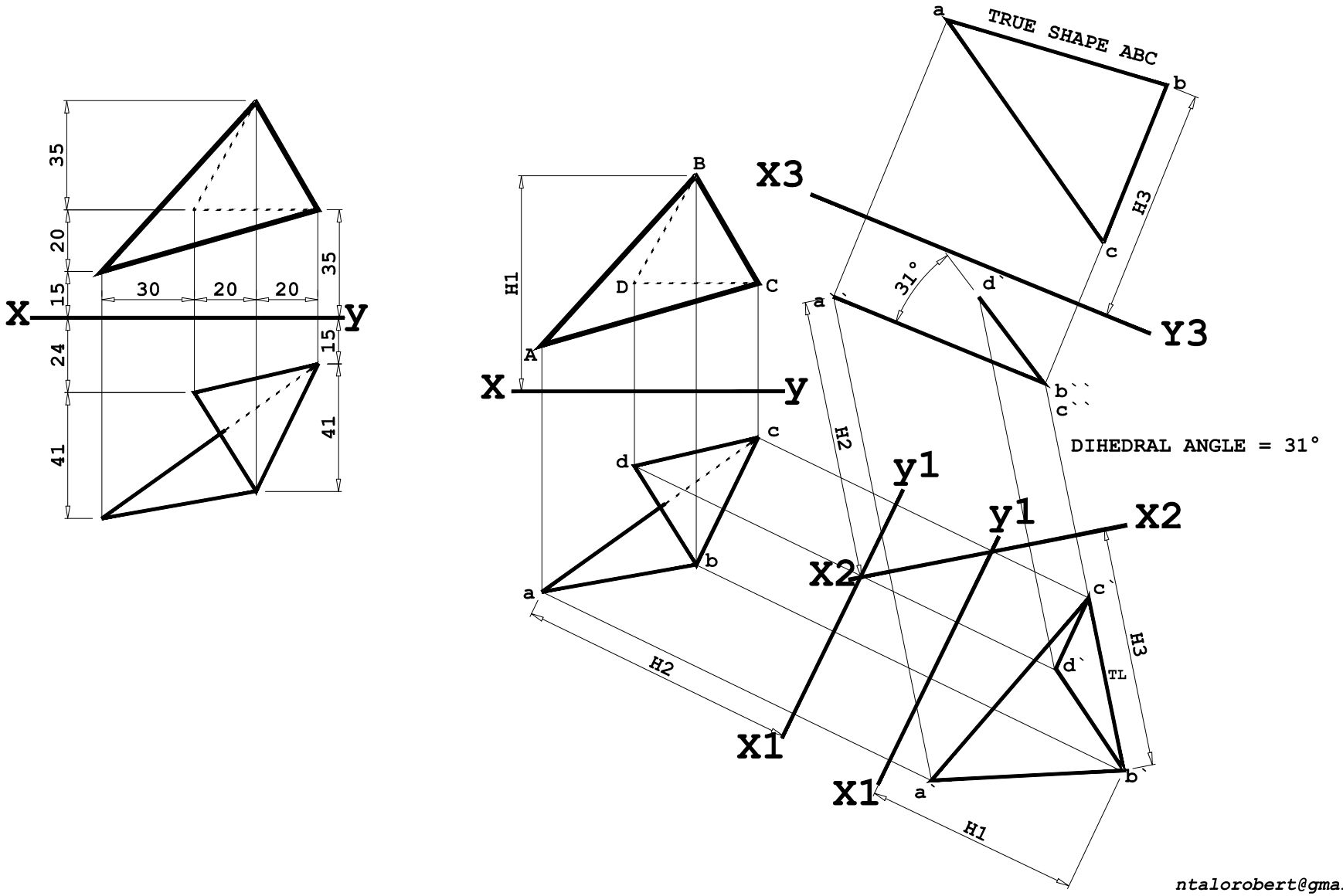
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	A LINE PIERCING THROUGH A LAMINA 4.7	Use auxiliary projection to see the lamina as a straight line hence seeing where the pin pieces it from.	The point of piecing has to be projected back to the front and plan and clearly indicate whether the line is visible or hidden after piecing.



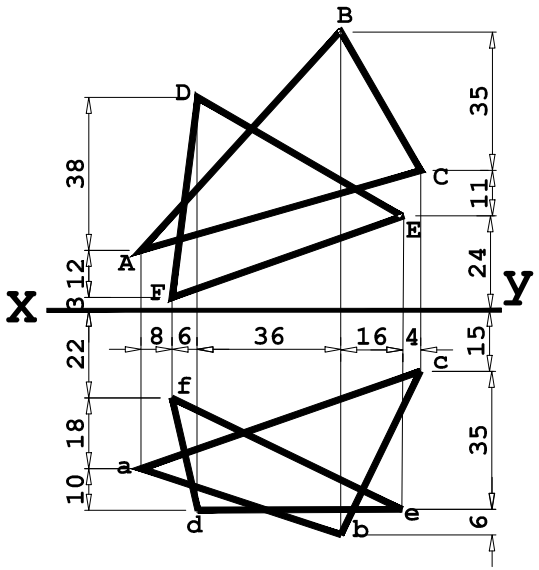
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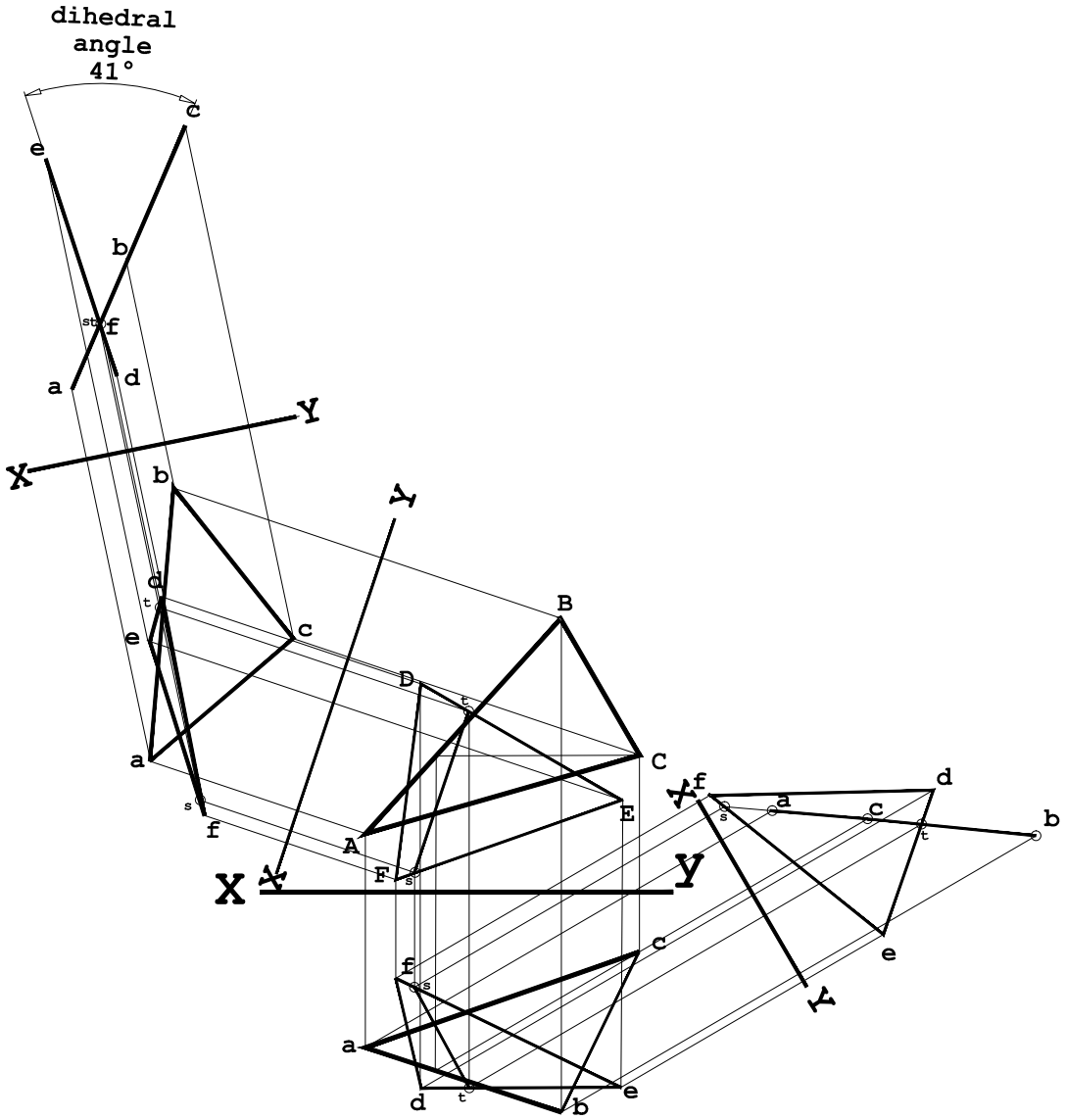
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	FINDING THE DIHEDRAL ANGLE BETWEEN TWO LAMINAS 4.8	Using auxiliary projection, Find the true length of the line of interpenetration AB between the two laminas. See through the true length got and later V will be seen hence reading off the dihedral angle.	Knowing the angle of projection used in drawing the two laminas helps in indicating the visible and hidden parts of the laminas.



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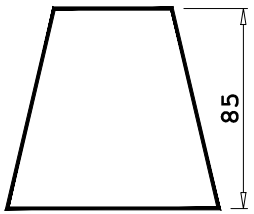
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	FINDING THE DIHEDRAL ANGLE BETWEEN TWO LAMINAS 4.9	Using auxiliary projection, Find the true length of the line of interpenetration BC between the two laminas. See through the true length got and later V will be seen hence reading off the dihedral angle.	Knowing the angle of projection used in drawing the two laminas helps in indicating the visible and hidden parts of the laminas.

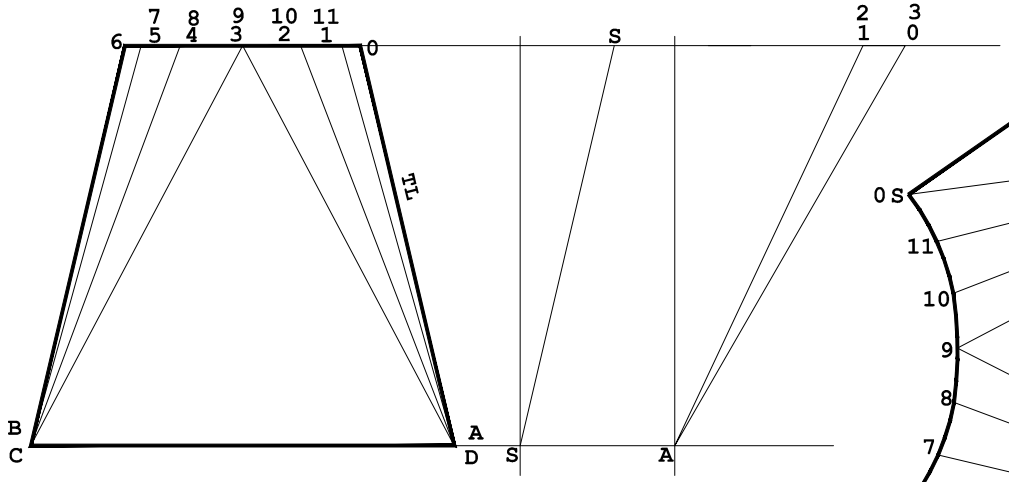


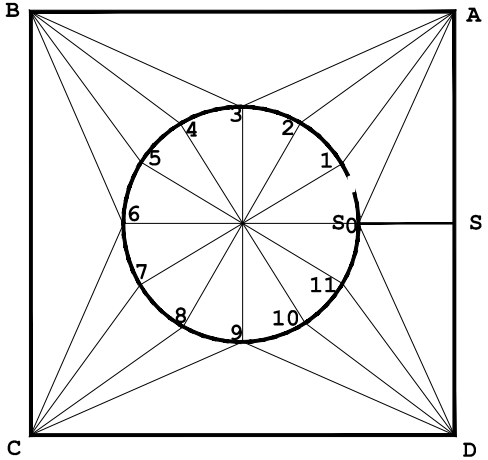


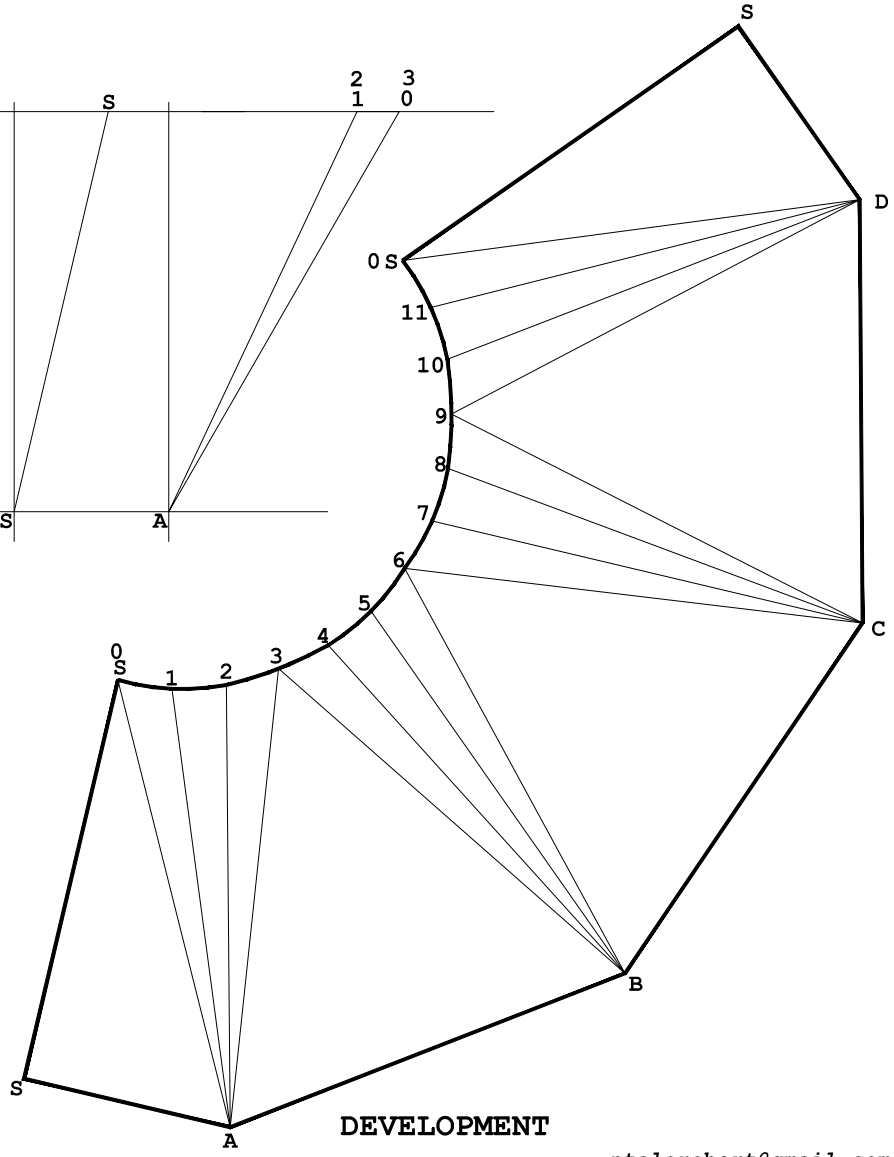
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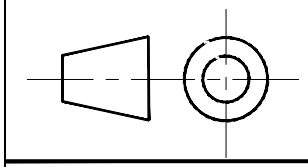
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
LINES IN SPACE	FINDING DIHEDRAL ANGLE BETWEEN TWO LAMINAS 4.10	Use auxiliary projection to get the line of interpenetration between the two laminas ST. construct the true length of the line of interpenetration and then see through it to see the dihedral angle	The parts in interpenetration between the two laminas may be minimal but we can still extend the line of interpenetration to tourch atleast a given side.







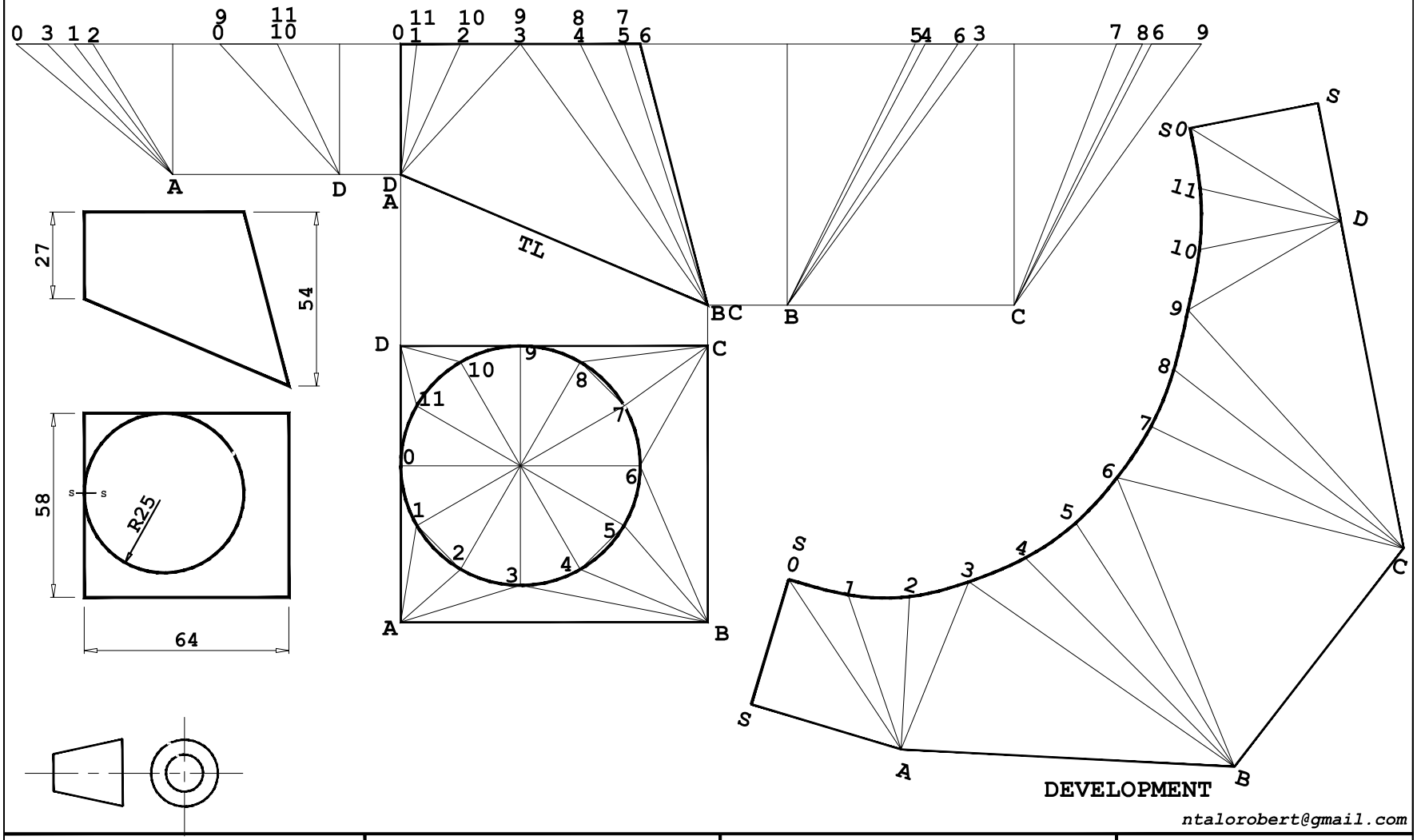




DEVELOPMENT

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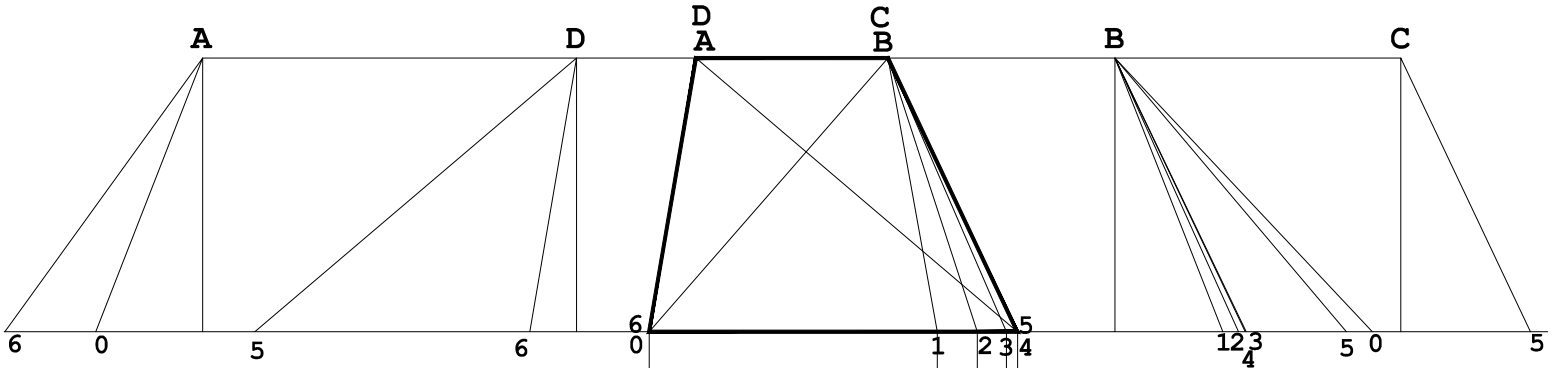
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	TRANSITIONAL PIECE 5.1	Fixing imaginary lines in a triangular pattern from the circular top to a square base.Finding the true length of the imaginary lines and then interconnecting them to come up with the development.	Observe the lines of symmetry to avoid wasting time on finding the true length of duplicate lines.

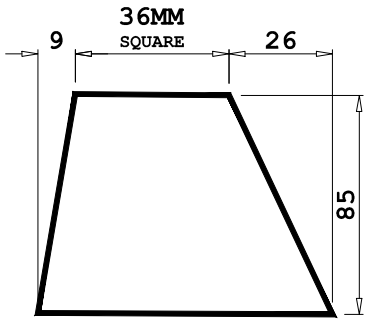


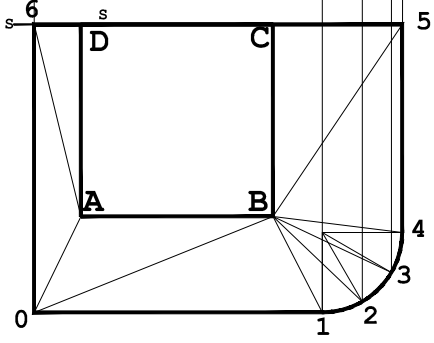
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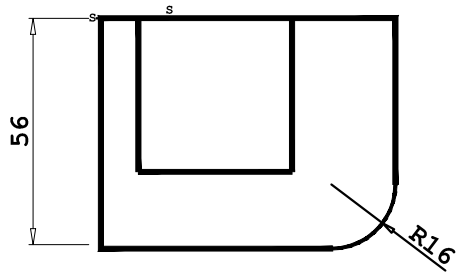
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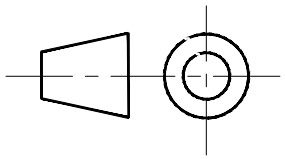
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	TRANSITIONAL PIECE 5.2	Fixing imaginary lines in a triangular pattern from the circular top to a square base.Finding the true length of the imaginary lines and then interconnecting them to come up with the development.	In this case the transitional piece has no line of symmetry so its a must to find the true length of all the imaginary lines.







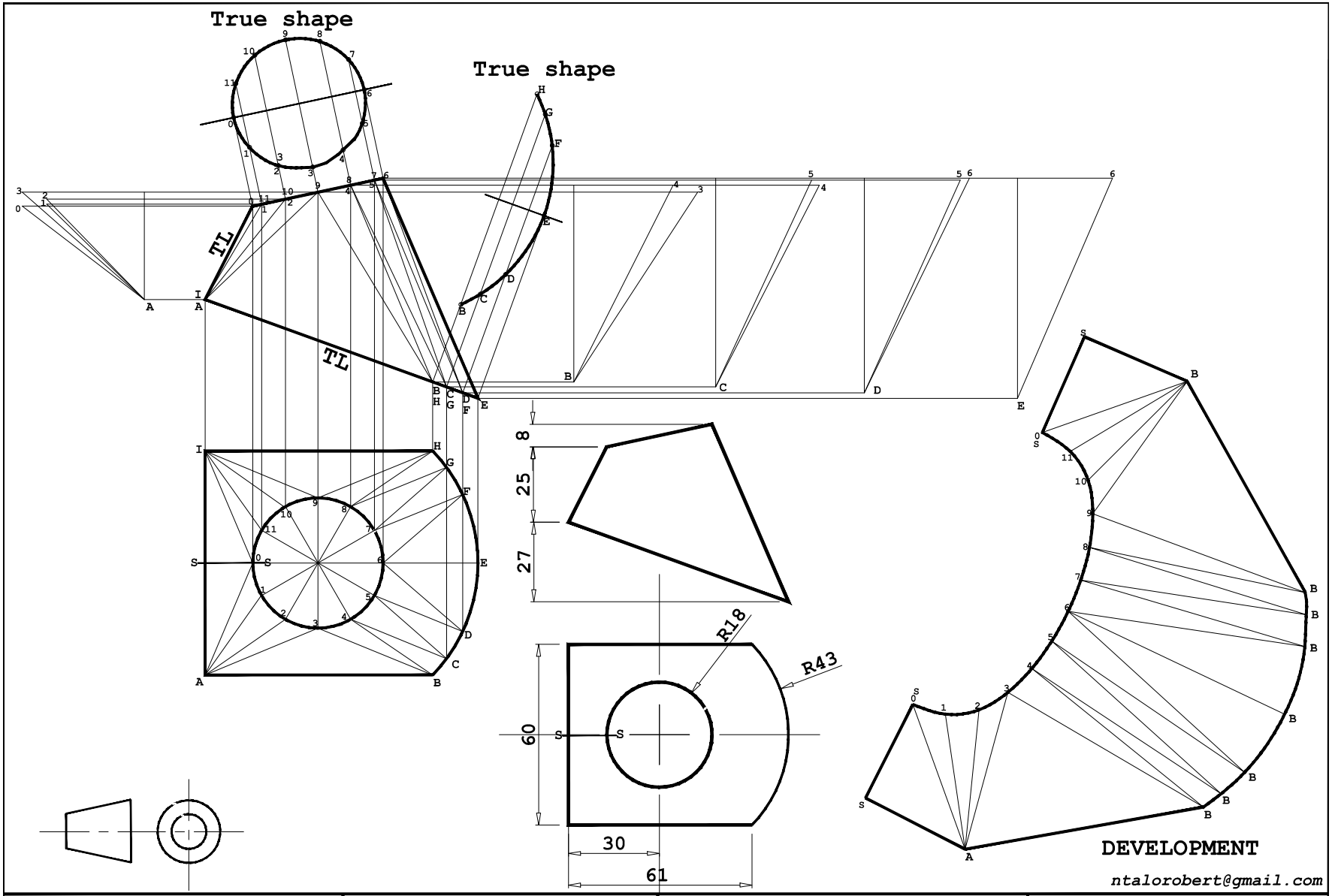




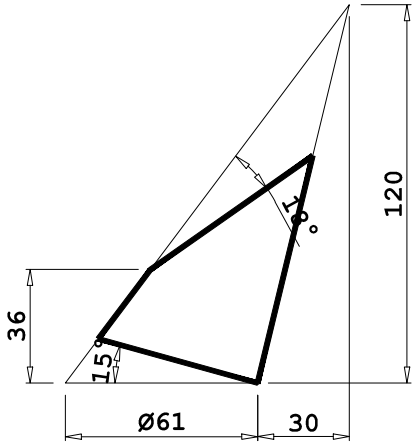
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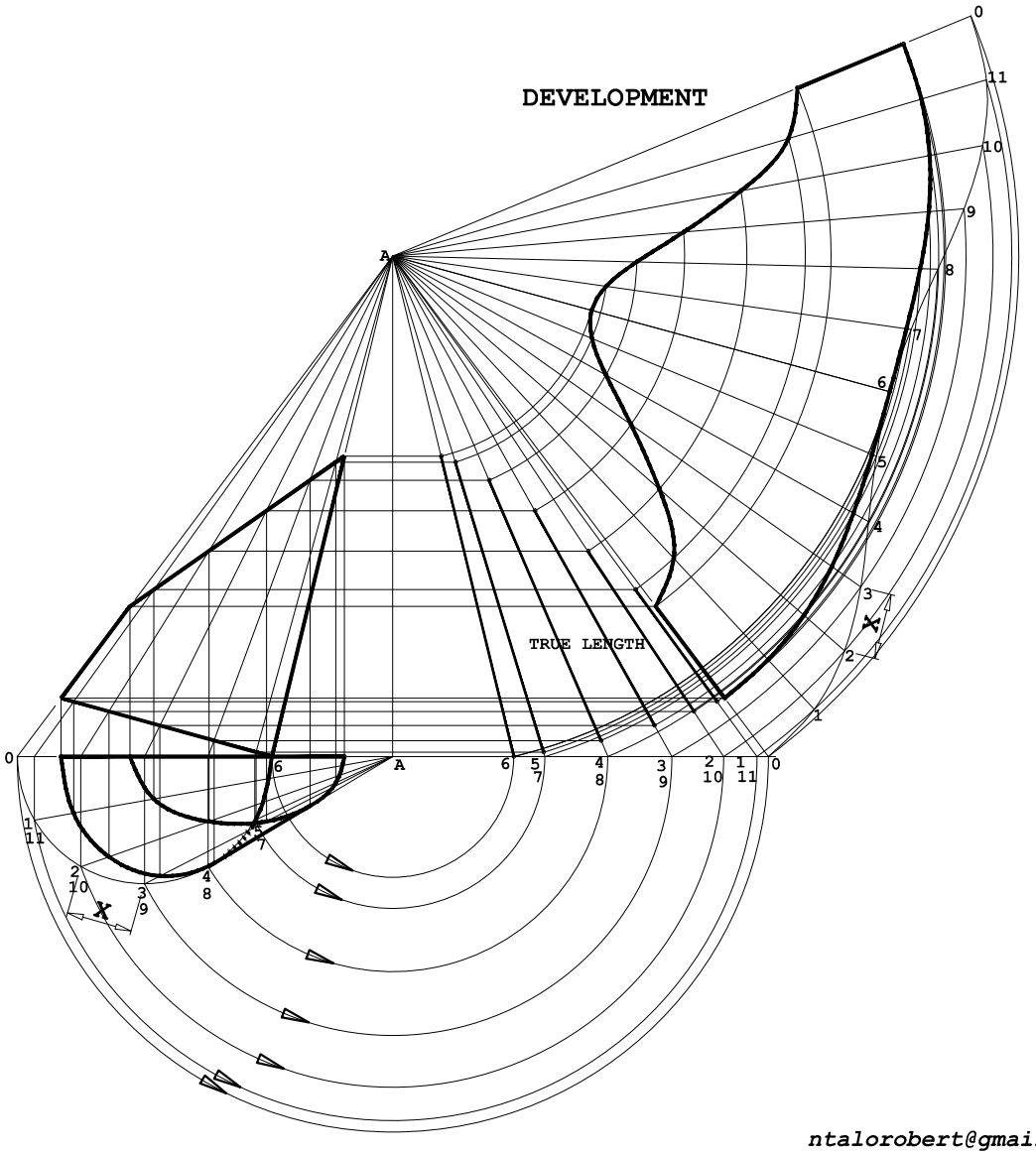
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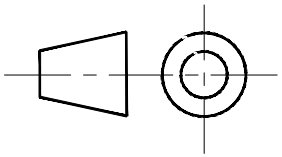
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	TRANSITIONAL PIECE 5.3	Fixing imaginary lines in a triangular pattern from the square top to the base.Finding the true length of the imaginary lines and then interconnecting them to come up with the development.	In this case the transitional piece has no line of symmetry so its a must to find the true length of all the imaginary lines.



TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	TRANSITIONAL PIECE 5.4	Fixing imaginary lines in a triangular pattern from the circular top to the base.Finding the true length of the imaginary lines and then interconnecting them to come up with the development.	since the circular top and bottom are slanting therefore we need to get their true shape in order to get the exact cordal length to use in the development.

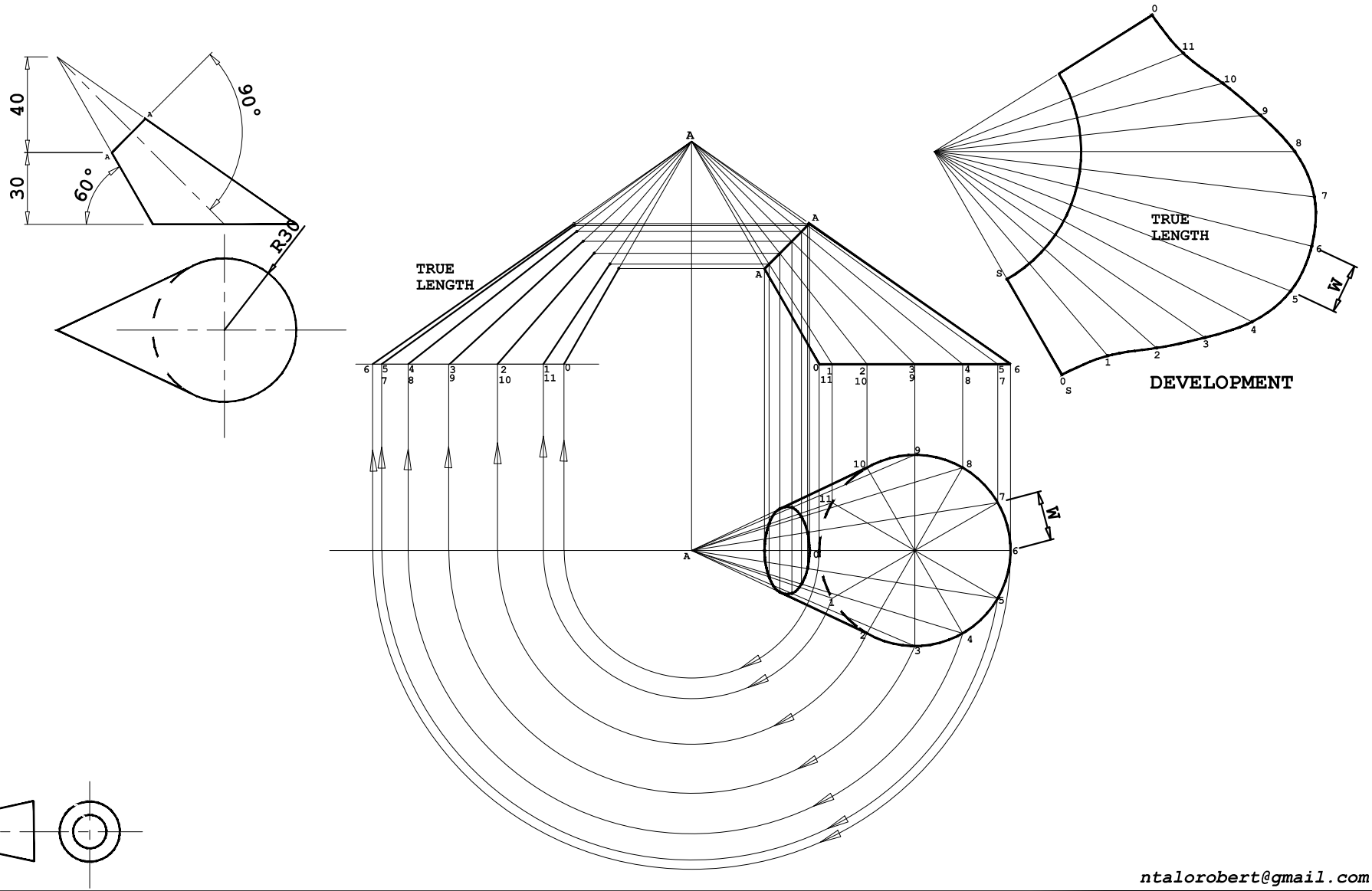






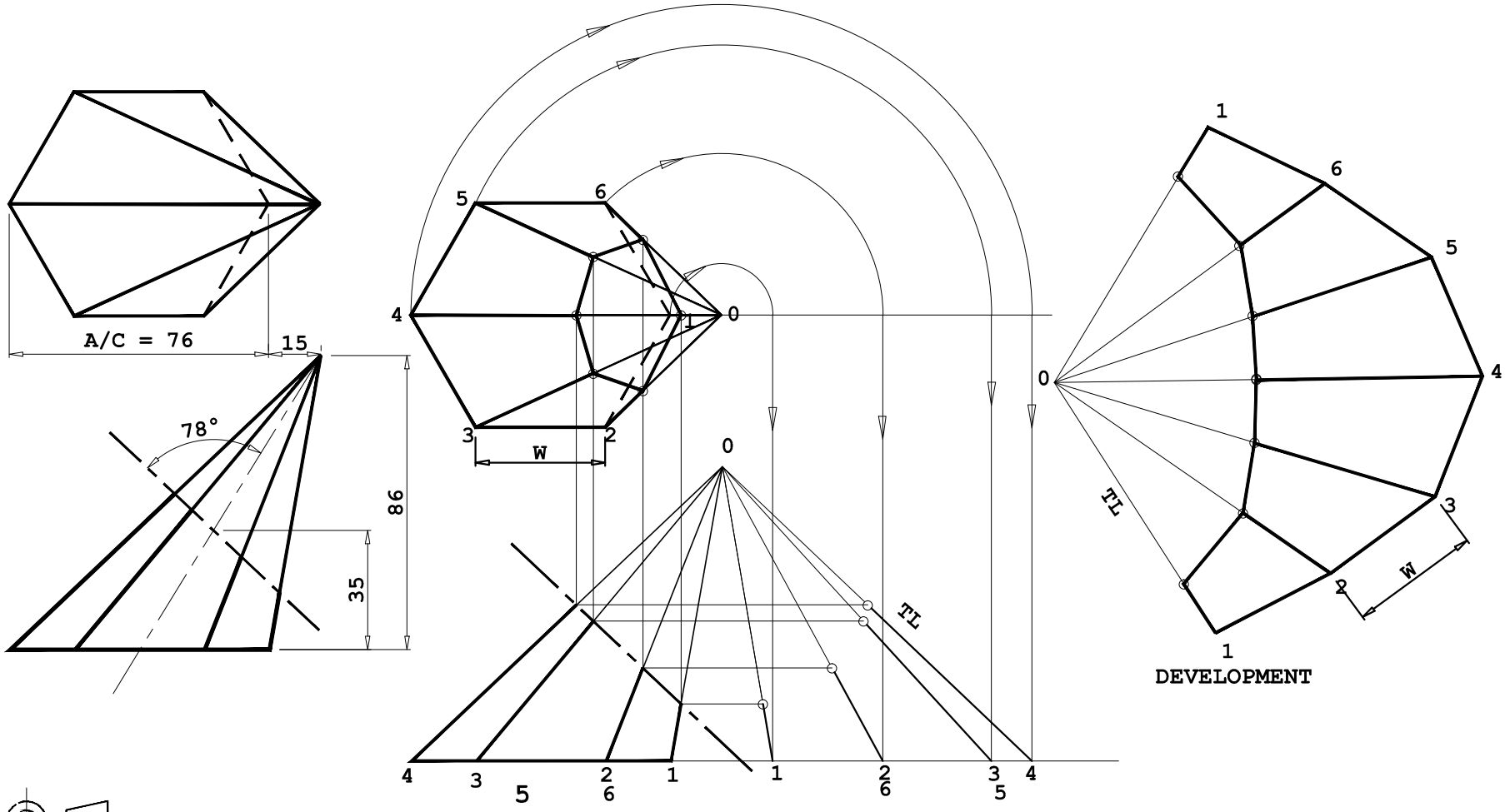
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	OBLIQUE CONE 5.5	Fix the 12 imaginary lines on the surface of the oblique cone, get their true length and interconnect the true length to come up with the development.	In this case the rabatment method has been used to get the true length and since the cone is bilaterally symmetrical only half of the figure is considered.



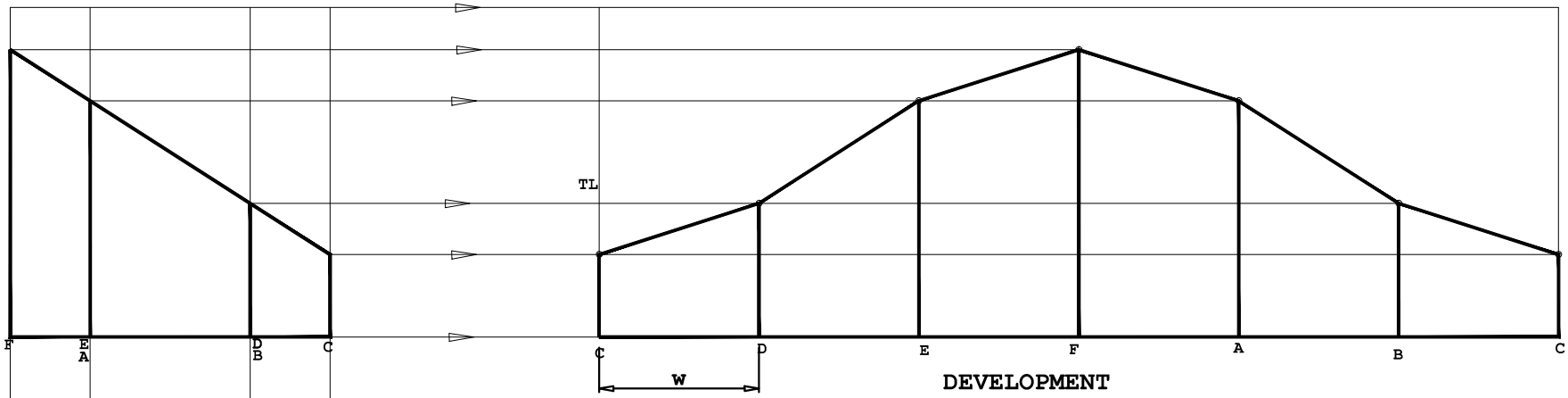
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	OBLIQUE CONE 5.6	Fix the 12 imaginary lines on the surface of the oblique cone, get their true length and interconnect the true length to come up with the development.	In this case the rabatment method has been used to get the true length and since the cone is bilaterally symmetrical only half of the figure is considered.

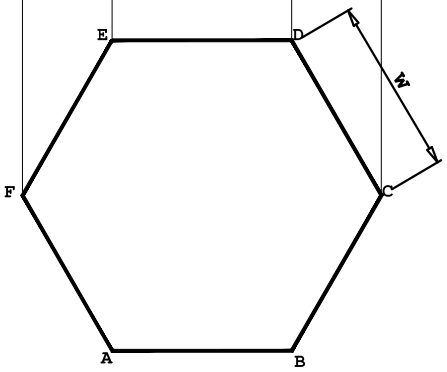


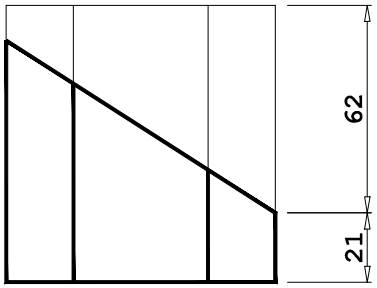
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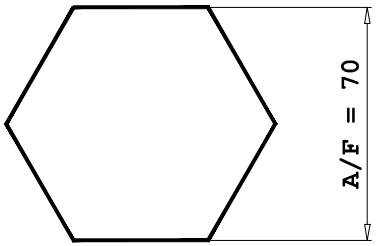
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	OBLIQUE PYRAMID 5.7	Annotate the edges of an oblique pyramid with numbers, get their true length and interconnect the true length got to come up with the development.	The pyramid is bilaterally symmetrical therefore true length of only one half has been used to avoid duplication.

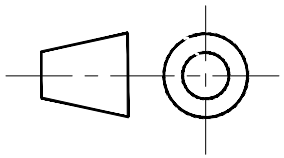


DEVELOPMENT



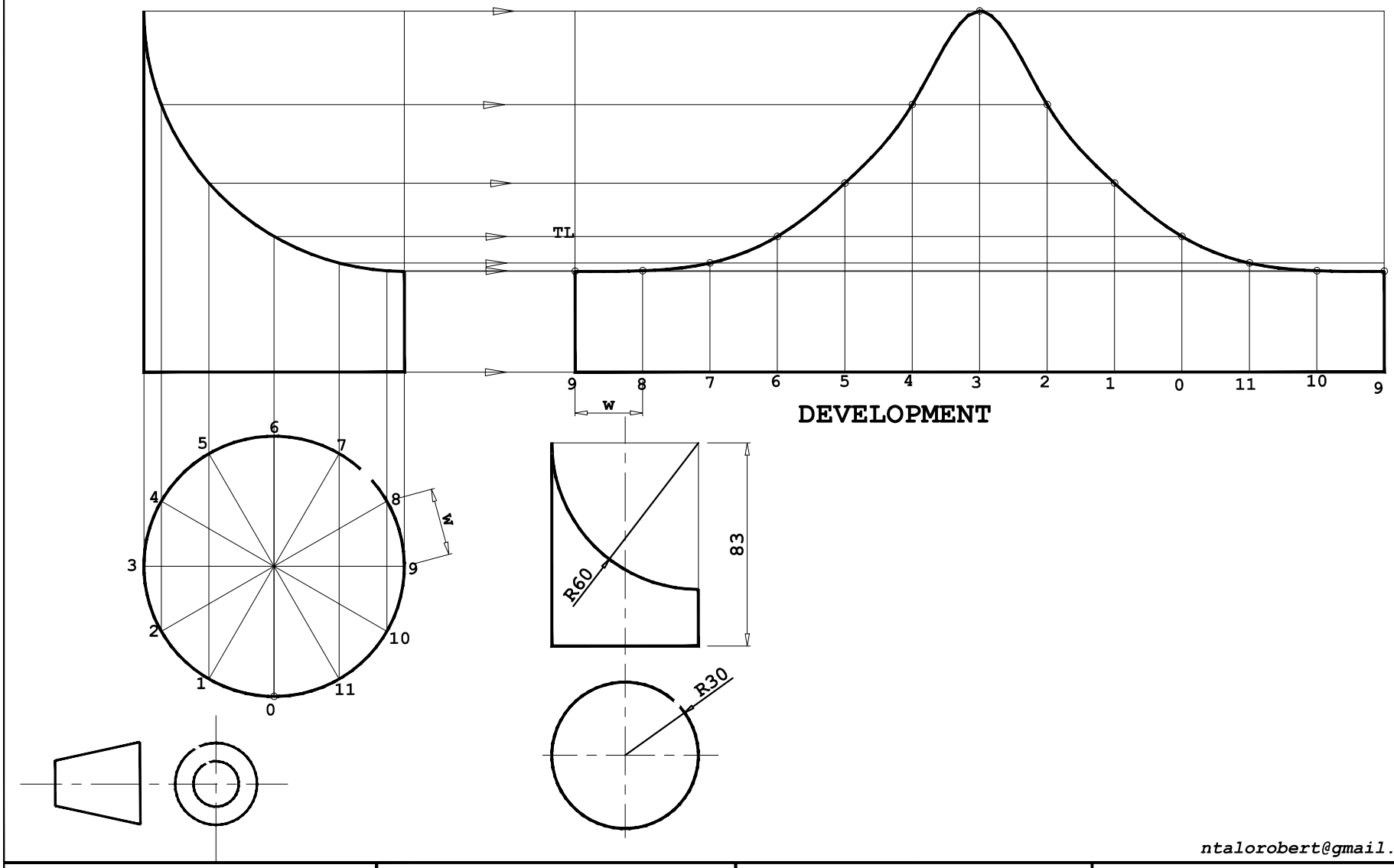






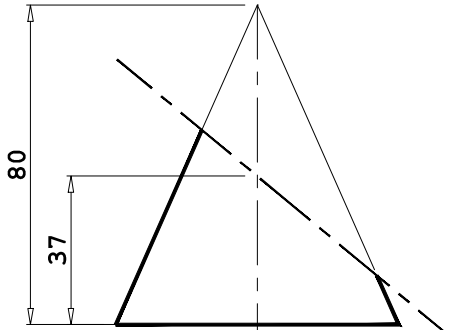
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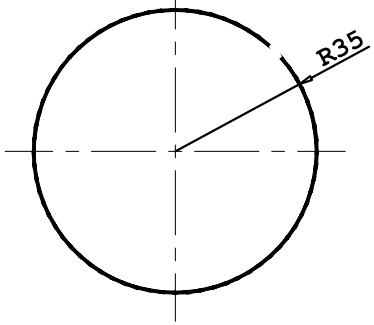
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	REGULAR PRISM 5.8	The edges of the prism are spaced out using the distance from the plan.	The height of the prism is the true length of the edges since on the plan they are seen as dots.

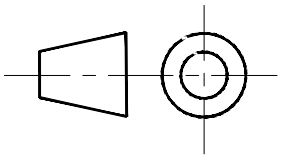


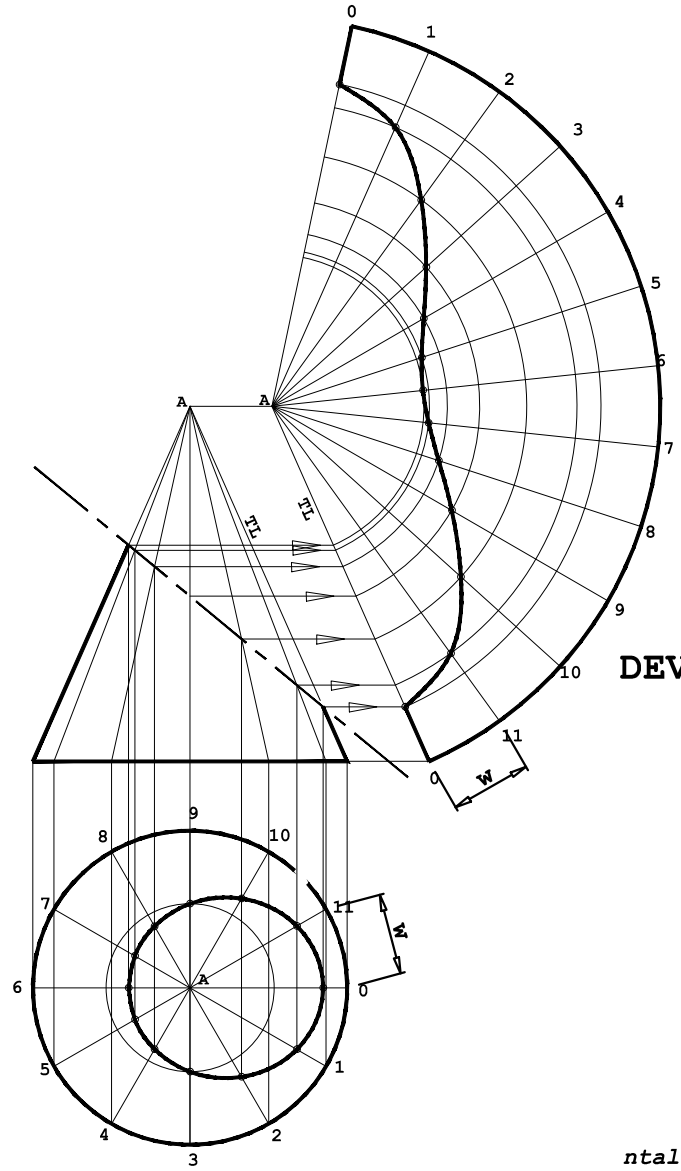
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	REGULAR CYLINDER 5.9	The imaginary lines on the surface of a cylinder are spaced out using the chordal length from the radial lines drawn on the plan.	The height of the cylinder is the true length of the imaginary lines on the surface since the plan is seen as a circle.





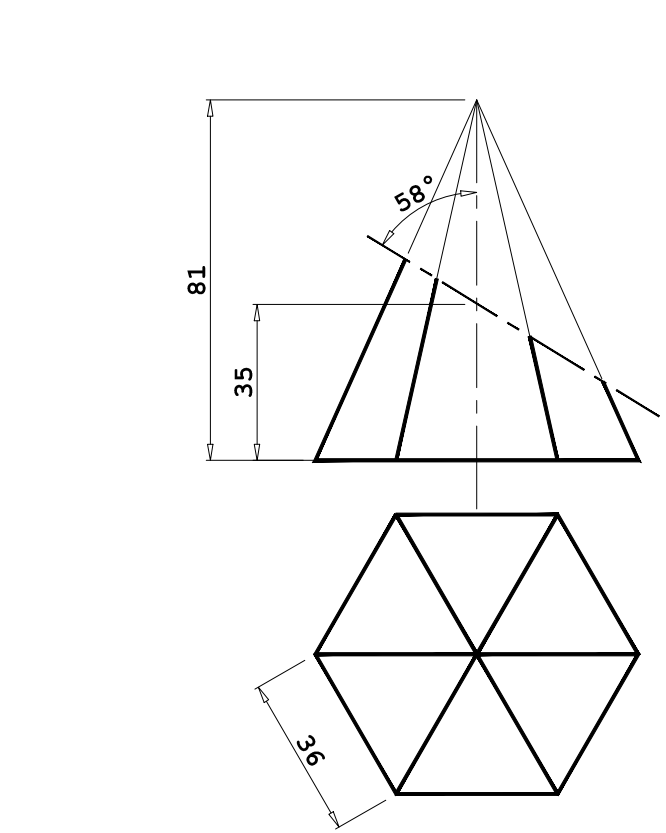


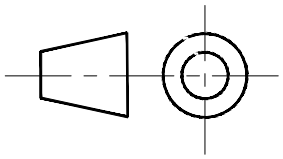


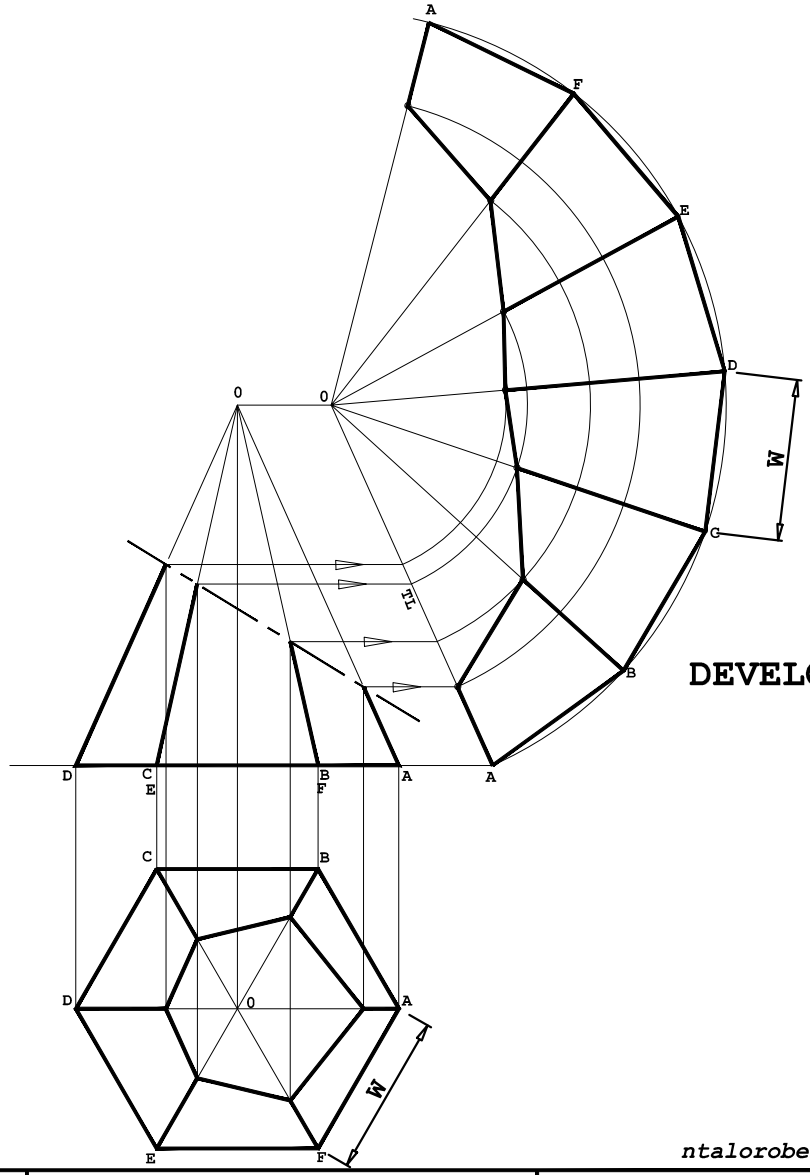
DEVELOPMENT

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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	REGULAR CONE 5.10	Interconnect the true length of the imaginary lines using the chordal length got from the plan.	Radial line A0 is parallel to the would be ground line XY therefore what is seen of radial line A0 on the front elevation is the true length.



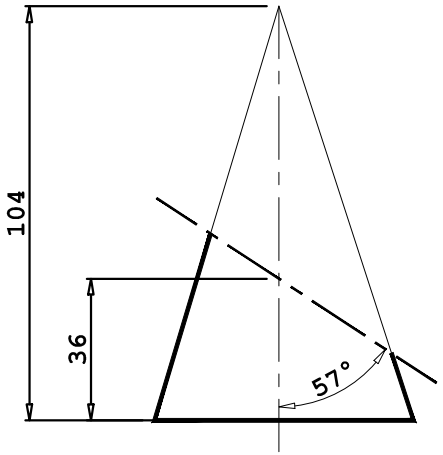


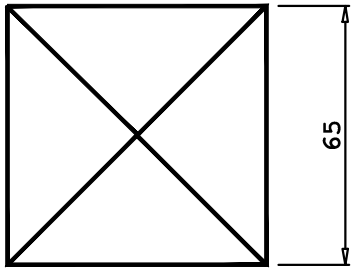


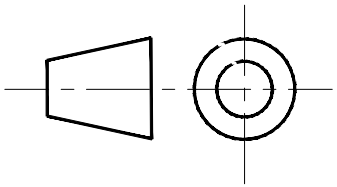
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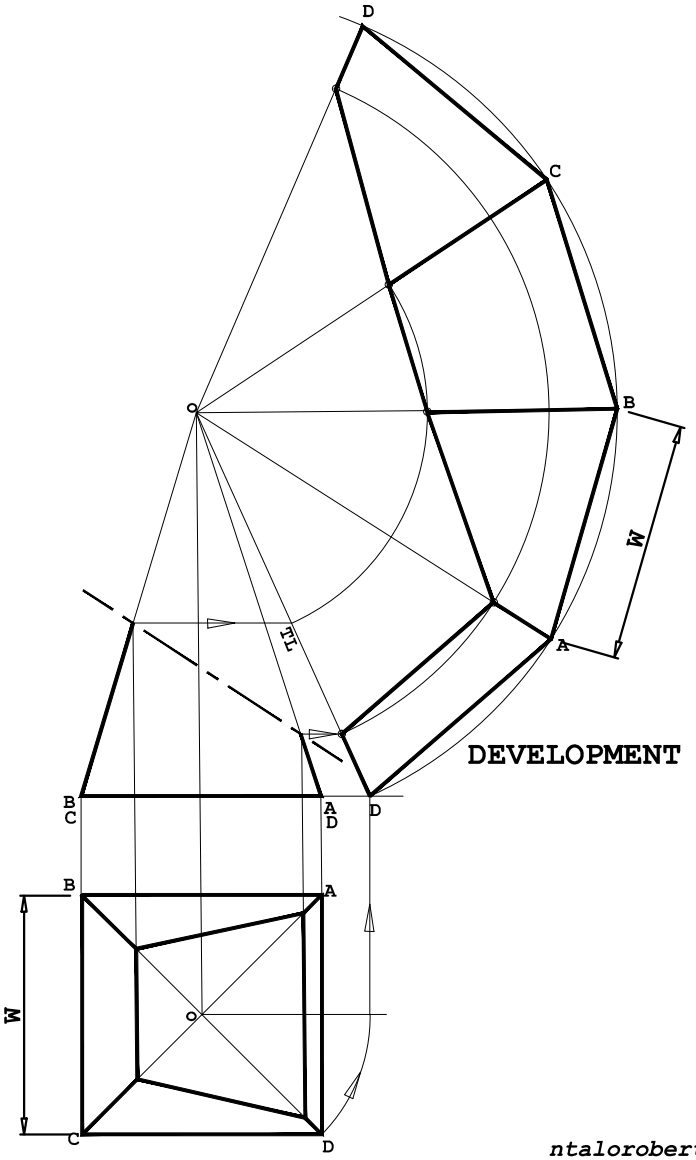
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	REGULAR PYRAMID 5.11	Interconnect the true length of the the edges, getting the distance of spacing at the base of the development from the plan.	Radial line A0 is parallel to the would be ground line XY therefore what is seen of it on the front elevation is the true length.







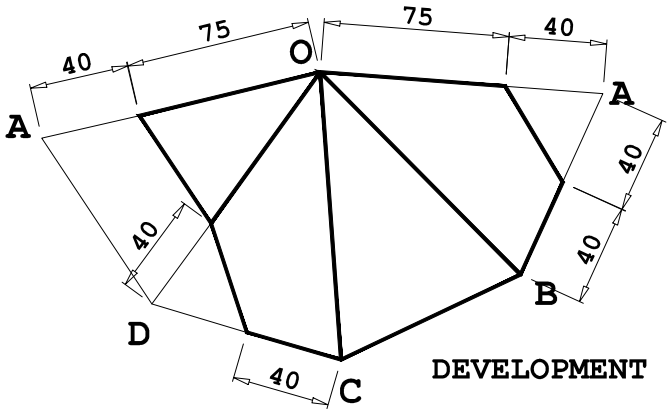


DEVELOPMENT

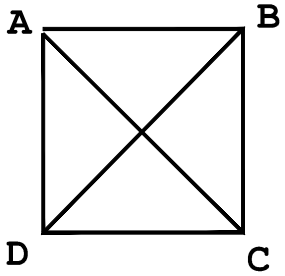
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	REGULAR PYRAMID 5.12	Interconnect the true length of the the edges, getting the distance of spacing at the base of the development from the plan.	The true length of OD is got by rabating OD about O to make it parallel to the would be ground line XY.

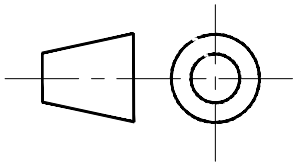
Converting the development of a regular pyramid back to the front and plan.

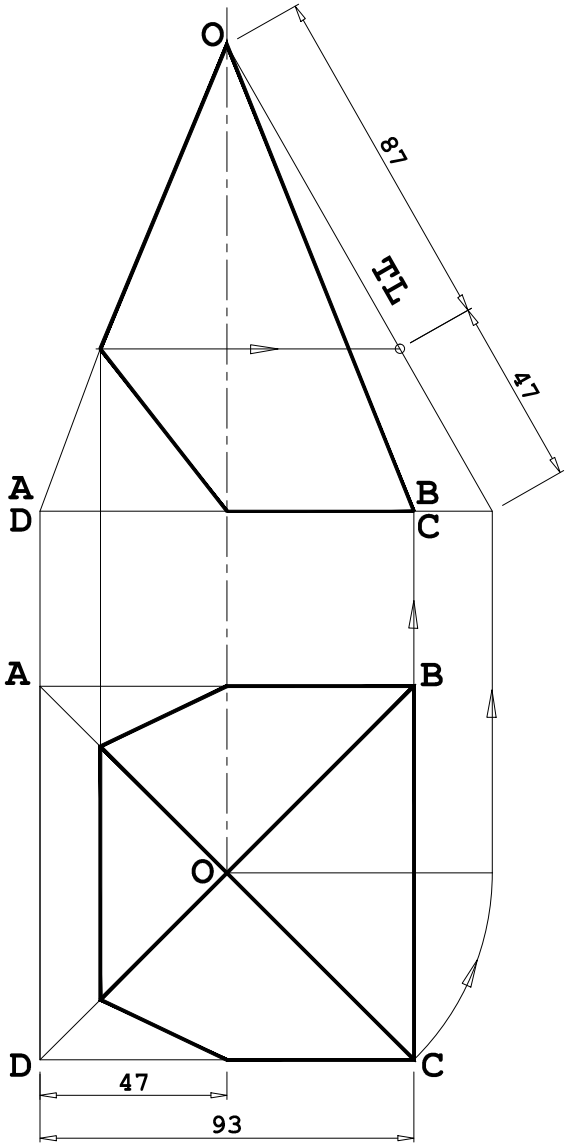


DEVELOPMENT



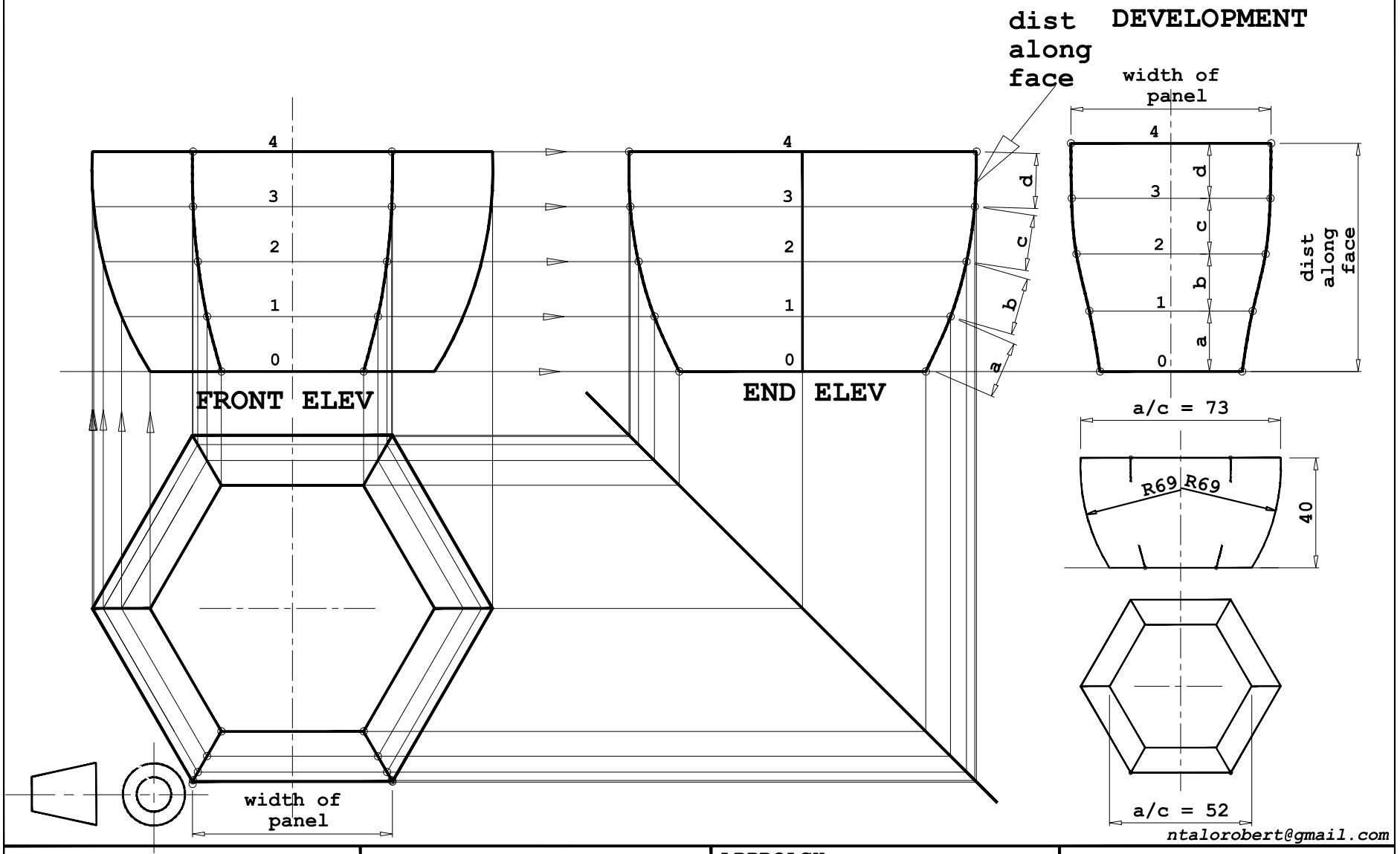
PLAN





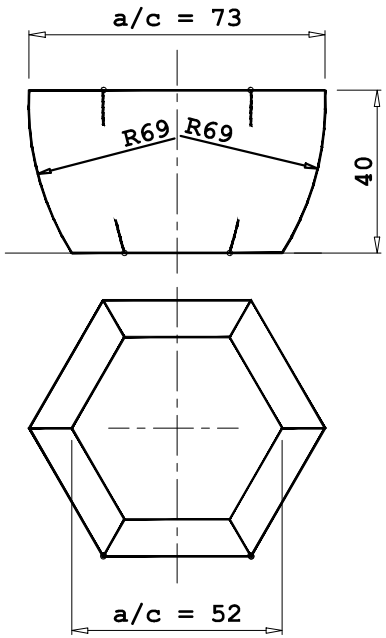
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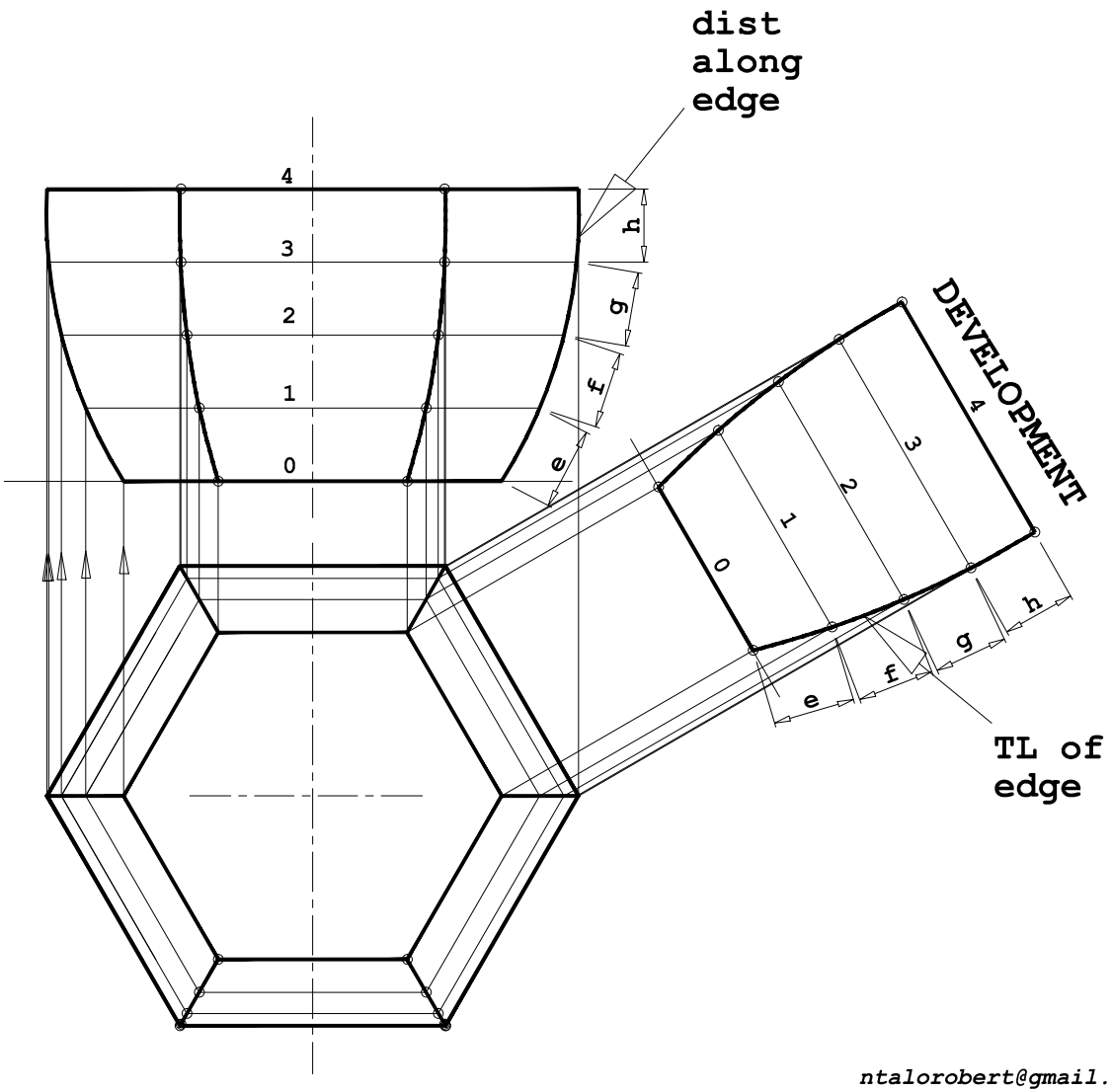
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	REGULAR PYRAMID 5.13	On the plan, swing edge OC to the horizontal and fix its true length from the development to the front elevation.	In this case we reverse the concept of pyramid development seen earlier.

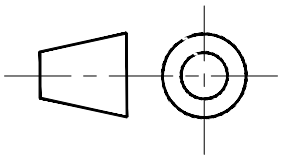


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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	PANEL DEVELOPMENT 5.14	With the rings fixed on the surface construct the development getting the width of the rings from the plan and the spacing between rings from the end elevation.	The end elevation is important in this case because it enables us to see the distance along the faces

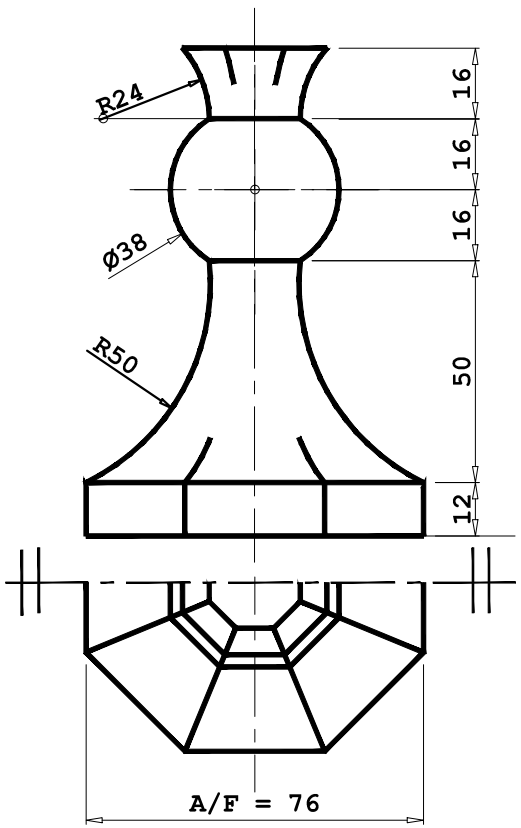


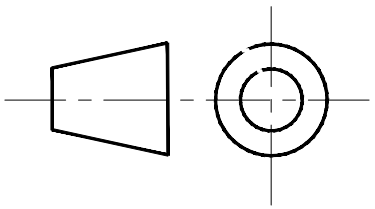


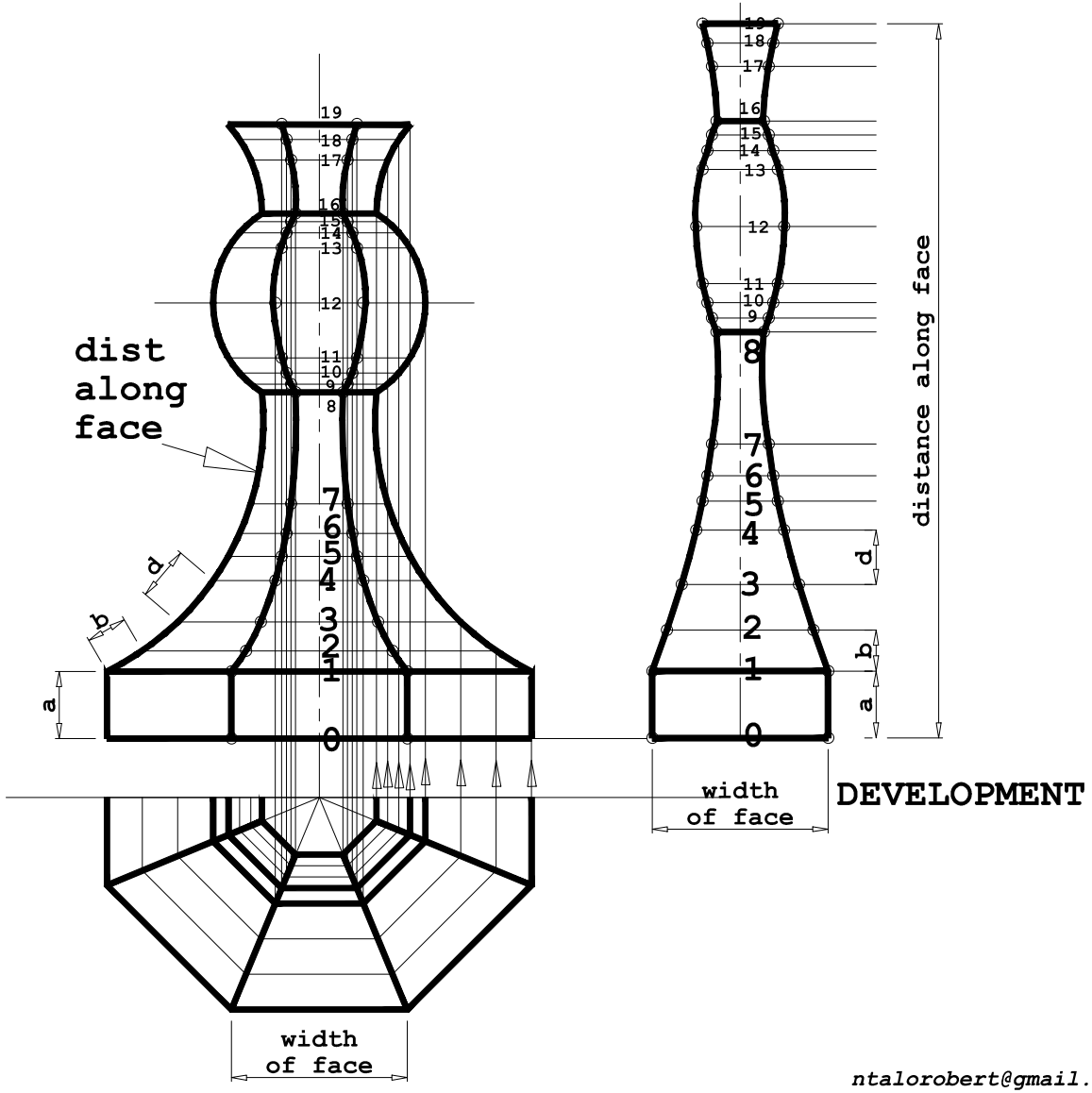


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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	PANEL DEVELOPMENT 5.15	Using auxiliary projection to get the true shape of a panel but in this method we use the true length of the edge.	In this method there is no need of the end elevation we use the true length of the edge.

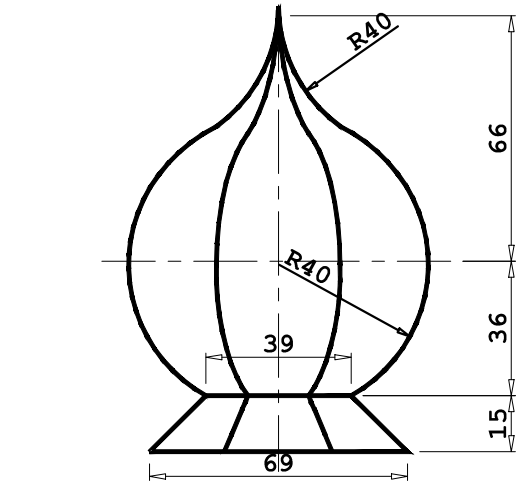


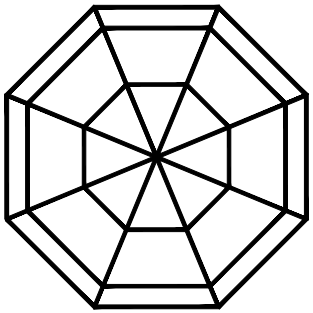


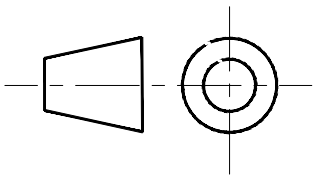


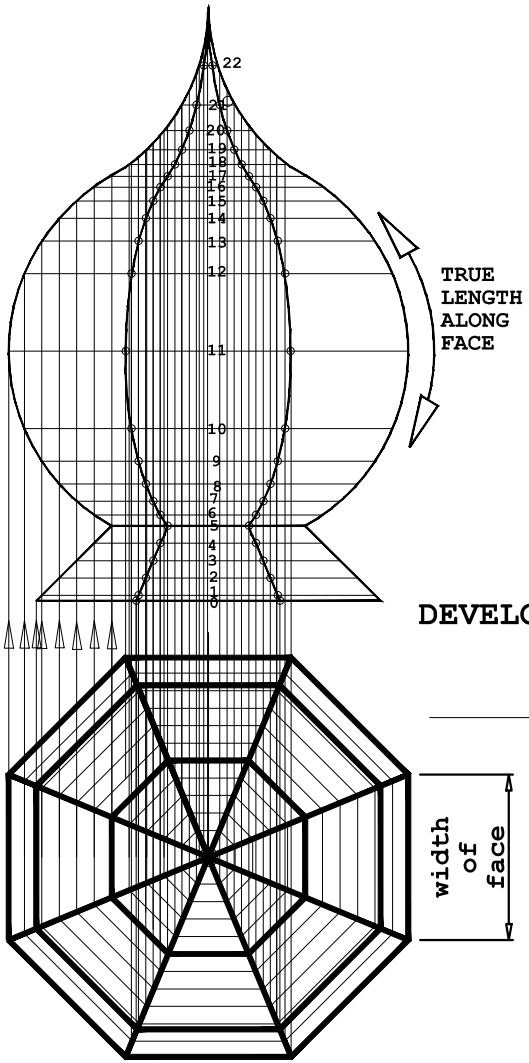
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	PANEL DEVELOPMENT 5.16	In this question there is no need for the end elevation since the width of the rings can be got on the plan and the distance along the face from the front elevation.	The development should start from the same horizontal line as the front elevation.

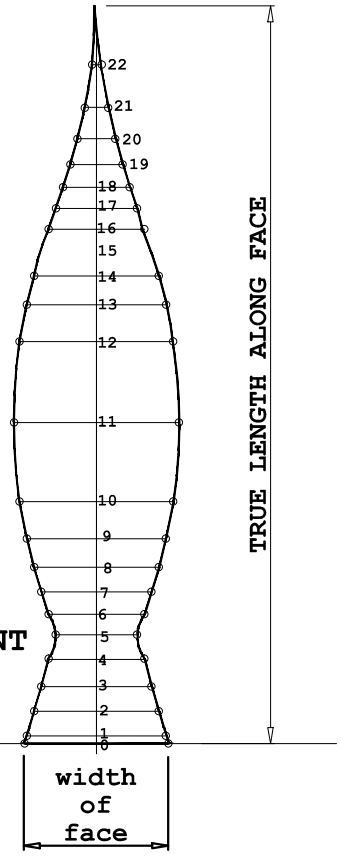






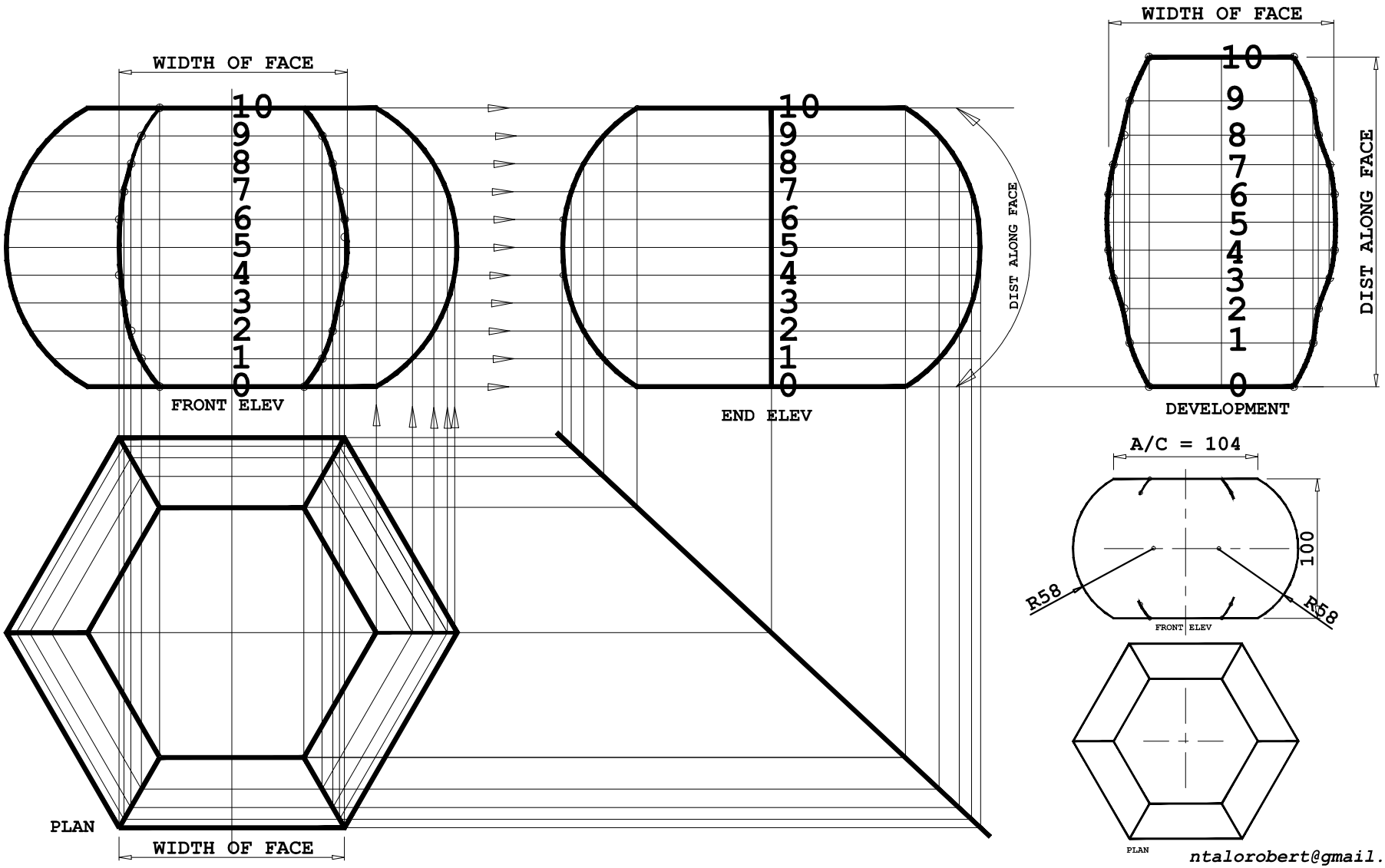


DEVELOPMENT



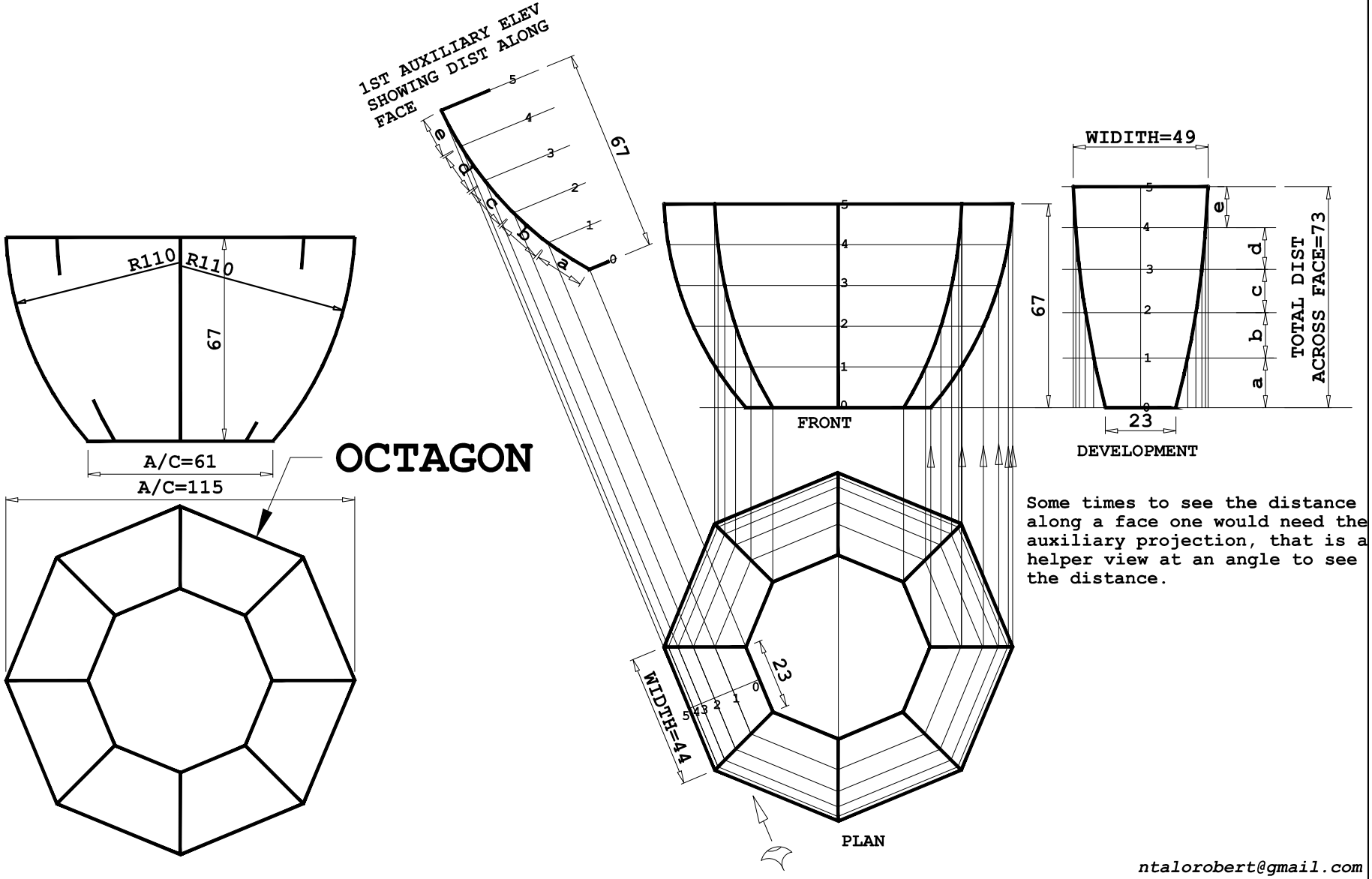
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	PANEL DEVELOPMENT 5.17	In this question there is no need for the end elevation since the width of the rings can be got on the plan and the distance along the face from the front elevation.	The development should start from the same horizontal line as the front elevation.



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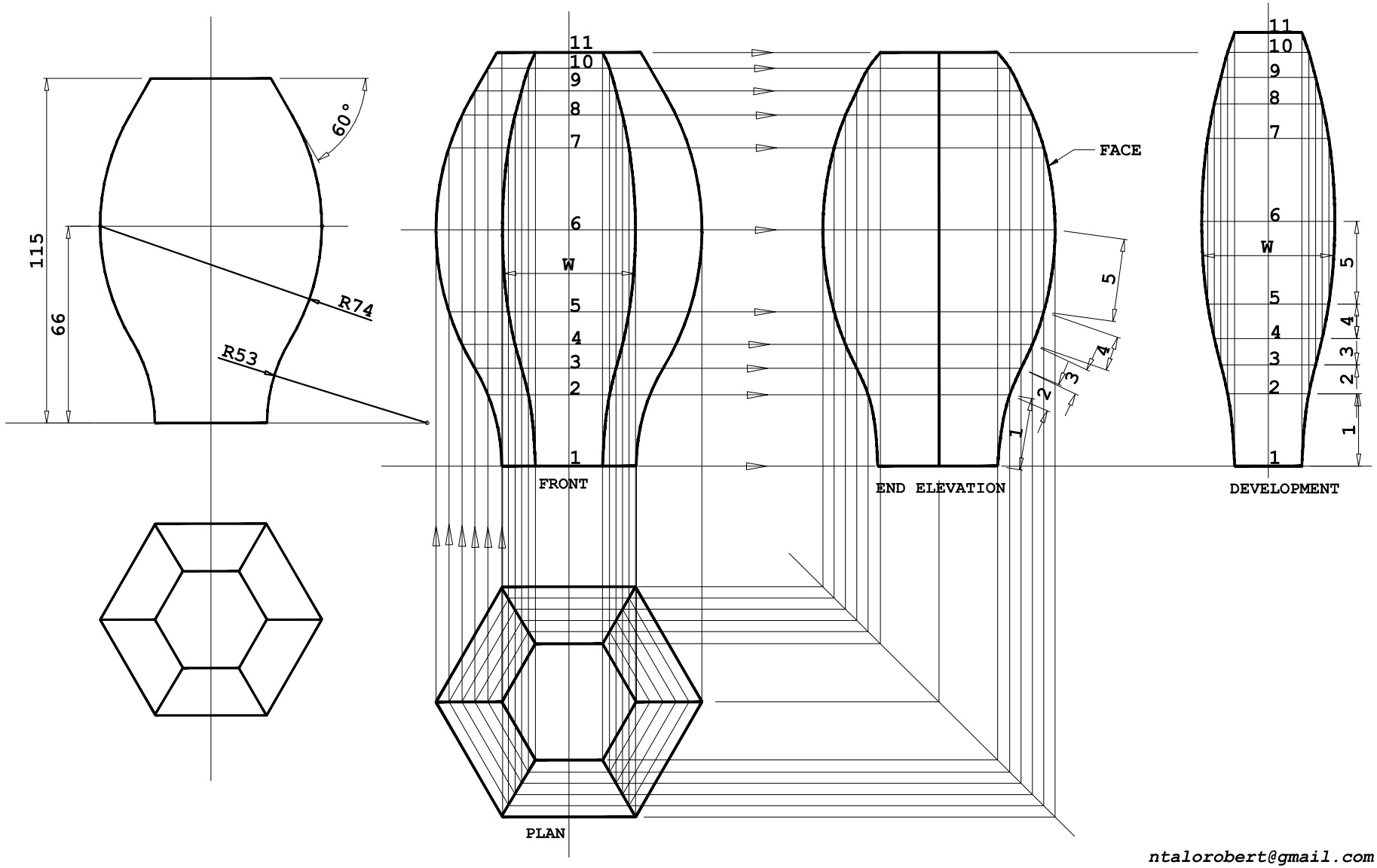
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	PANEL DEVELOPMENT 5.18	With the rings fixed on the surface construct the development getting the width of the rings from the plan and the spacing between rings from the end elevation.	The end elevation is important in this method because it enables us to see the distance along the faces



Some times to see the distance along a face one would need the auxiliary projection, that is a helper view at an angle to see the distance.

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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	PANEL DEVELOPMENT 5.19	With the rings fixed on the surface construct the development getting the width of the rings from the plan and the spacing between rings from the auxiliary projection.	The end elevation is important in this method because it enables us to see the distance along the faces



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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
DEVELOPMENTS	PANEL DEVELOPMENT 5.20	With the rings fixed on the surface construct the development getting the width of the rings from the plan and the spacing between rings from the end elevation.	The end elevation is important in this method because it enables us to see the distance along the faces

KEY POINTS TO ANSWERING SCENARIOS OF TOPIC3

When answering a scenario test item on surface development, the learner must begin with a focused introduction identifying the object to be developed, explaining the purpose of unfolding the solid into a flat pattern for fabrication, and stating the suitable development method (parallel line, radial line, or triangulation). The essential materials, tools, and equipment include a drawing board, T-square, set squares, compasses, dividers, scale ruler, French curves, pencils, eraser, A3 paper, and calculators for measurements. Health and safety awareness requires proper posture, safe handling of sharp instruments, clean work surface, adequate lighting, and maintaining instruments in good condition. The operational procedure involves identifying all surfaces, obtaining true lengths using auxiliary views or rotation methods, selecting and applying the appropriate development method, transferring measurements accurately, maintaining continuity between adjacent surfaces, including seam allowances, showing bend lines and cut lines distinctly, and ensuring all surfaces are included without duplication. Maintenance recommendations include regular checking and calibration of instruments, proper storage of compasses and dividers, periodic pencil sharpening, cleaning of French curves and templates, and safe handling of completed developments. Evaluation assesses whether the development pattern would accurately produce the required solid when folded, all true lengths are correctly determined and transferred, all surfaces are included, the pattern is neatly presented with clear line quality, and the development could be used by a fabricator to cut and form the component. In conclusion, the learner has successfully unfolded the engineering object into an accurate flat pattern, and the final pattern, characterized by accuracy, completeness, and neat presentation, provides a practical template for manufacturing, confirming fitness for purpose in providing an accurate flat pattern for production.

TOPIC 4: WALLS IN THE DESIGN AND CONSTRUCTION OF BUNGALOW HOUSES

Competency

Learners prepare working drawings showing wall construction details.

Teaching Focus

Guide learners on

- wall bonds
- wall thicknesses
- junctions (choin, at a squint
- openings in walls (head, jambs, sills/threshold)
- dimensions
- symbols.

Assessment Focus

Observe learners'

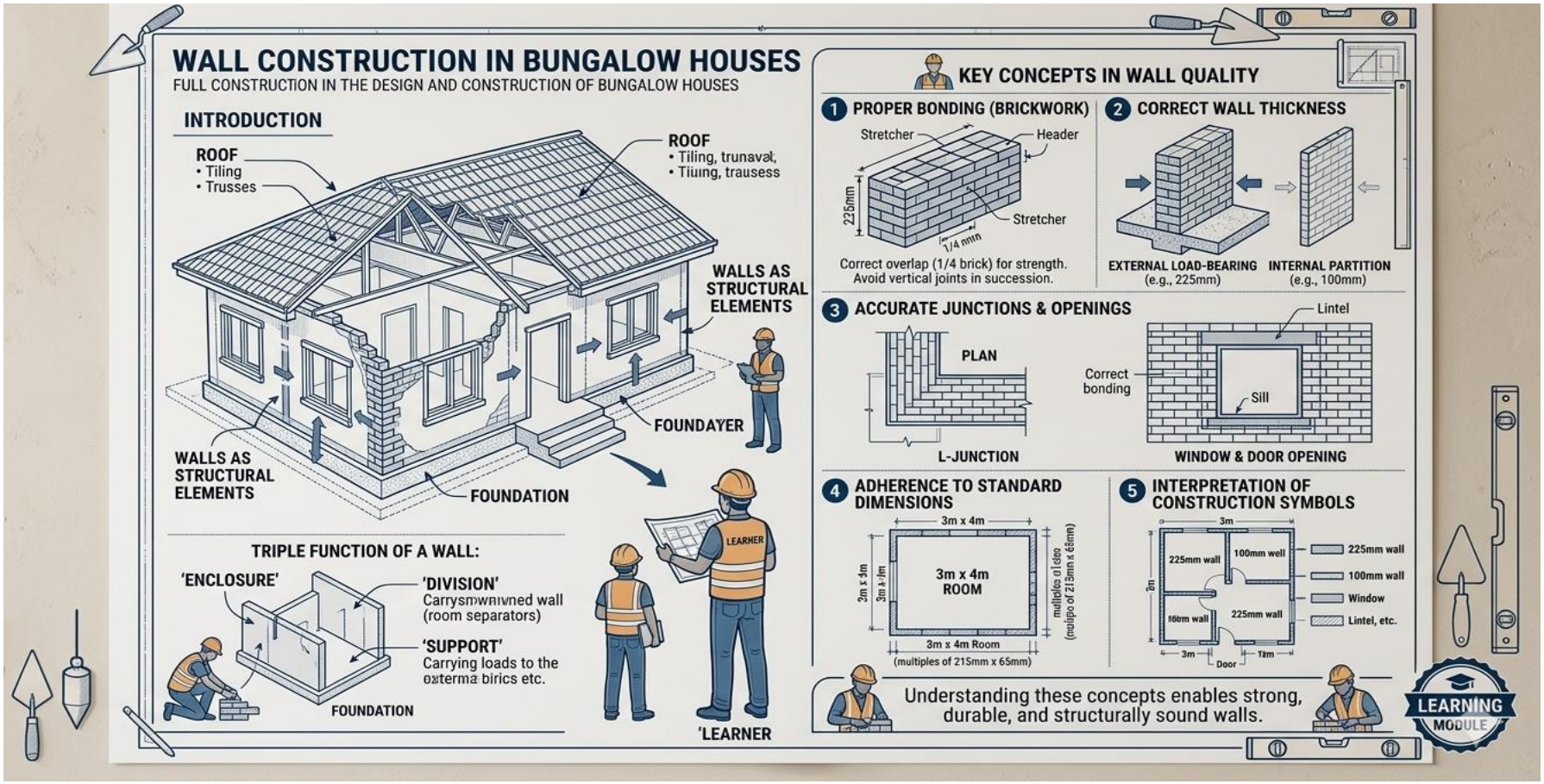
- understanding of bond patterns
- spacing
- alignment
- drawing conventions.

Common Mistakes

- incorrect bonding
- poor alignment
- missing dimensions
- incorrect wall thickness.

4.1 Introduction to Walls in Building Construction

Walls are among the most important structural and functional components of a bungalow house. They define the shape of the building, enclose internal spaces, support structural loads, and protect occupants from weather and external hazards. Besides separating rooms and providing privacy, walls contribute to thermal comfort, sound insulation, fire resistance, and the overall appearance of the building. A well-constructed wall results from careful planning, proper material selection, accurate setting out, and sound workmanship. For advanced learners, understanding walls extends beyond laying bricks or blocks to appreciating how walls interact with foundations, floors, roofs, openings, and finishes to produce a stable and durable building.



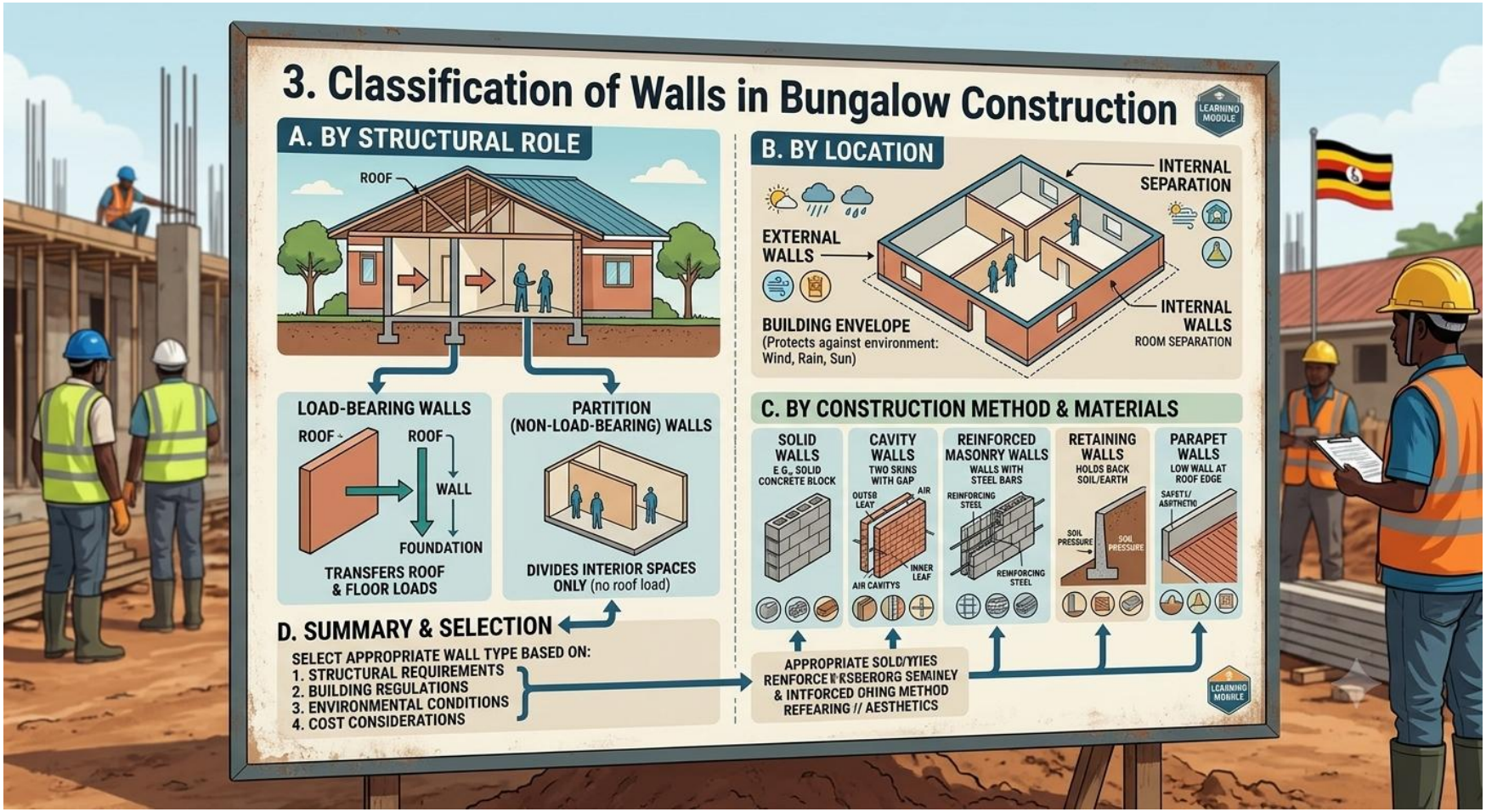
4.2 Functions and Performance Requirements of Walls

Every wall in a bungalow performs one or more functions depending on its location and purpose. Structural walls carry the weight of the roof and transfer loads safely to the foundation, while non-load-bearing walls mainly divide interior spaces without supporting major structural loads. External walls resist wind, rain, sunlight, and temperature changes, whereas internal walls improve privacy and organize the building into functional rooms. Good walls should possess adequate strength, durability, weather resistance, fire resistance, sound insulation, thermal efficiency, and an attractive appearance. Meeting these requirements depends on quality design, correct construction techniques, and regular maintenance.



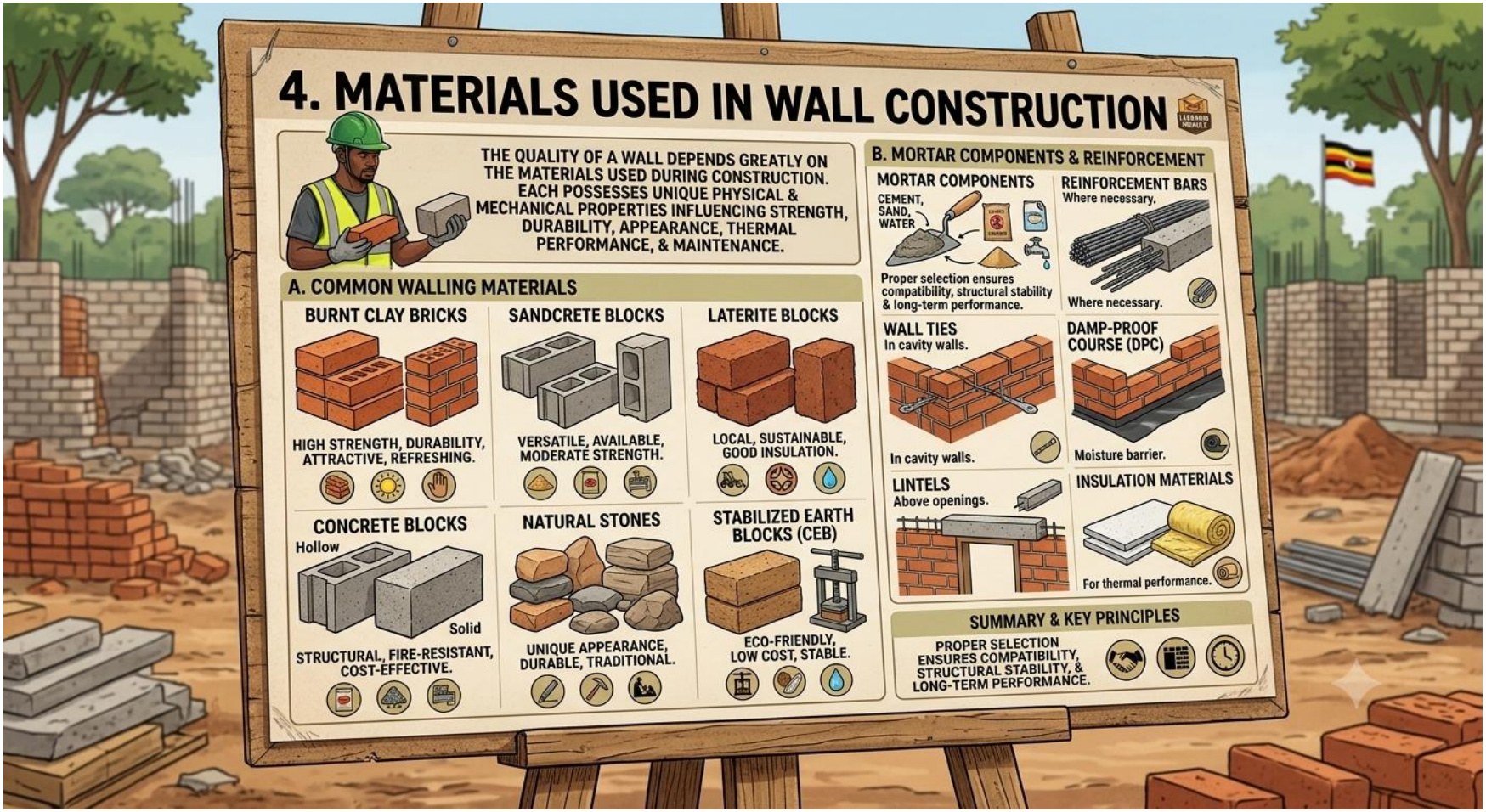
4.3 Classification of Walls in Bungalow Construction

Walls can be classified according to their structural role, location, construction material, and method of construction. Load-bearing walls transfer structural loads to the foundation, while partition walls divide spaces without carrying roof loads. External walls form the building envelope and protect against environmental conditions, whereas internal walls separate rooms. Other classifications include cavity walls, solid walls, reinforced masonry walls, retaining walls, and parapet walls. Understanding these classifications enables builders to select the most appropriate wall type based on structural requirements, building regulations, environmental conditions, and cost considerations.



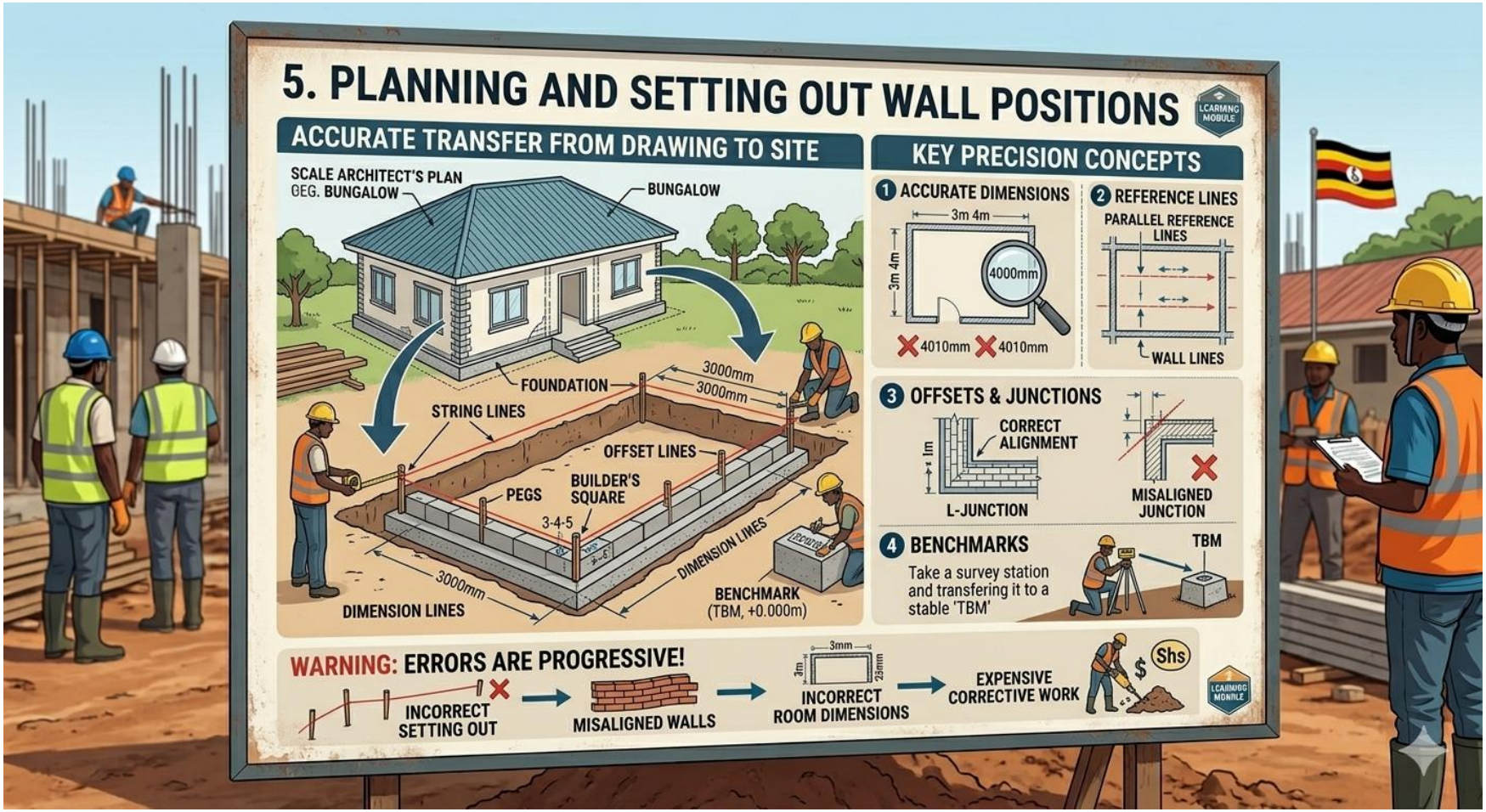
4.4 Materials Used in Wall Construction

The quality of a wall depends greatly on the materials used during construction. Common walling materials include burnt clay bricks, sandcrete blocks, laterite blocks, concrete blocks, natural stones, stabilized earth blocks, cement, sand, water, and mortar. Reinforcement bars, wall ties, damp-proof courses, lintels, and insulation materials may also be incorporated where necessary. Each material possesses unique physical and mechanical properties that influence the wall's strength, durability, appearance, thermal performance, and maintenance requirements. Proper selection of materials ensures compatibility, structural stability, and long-term performance.



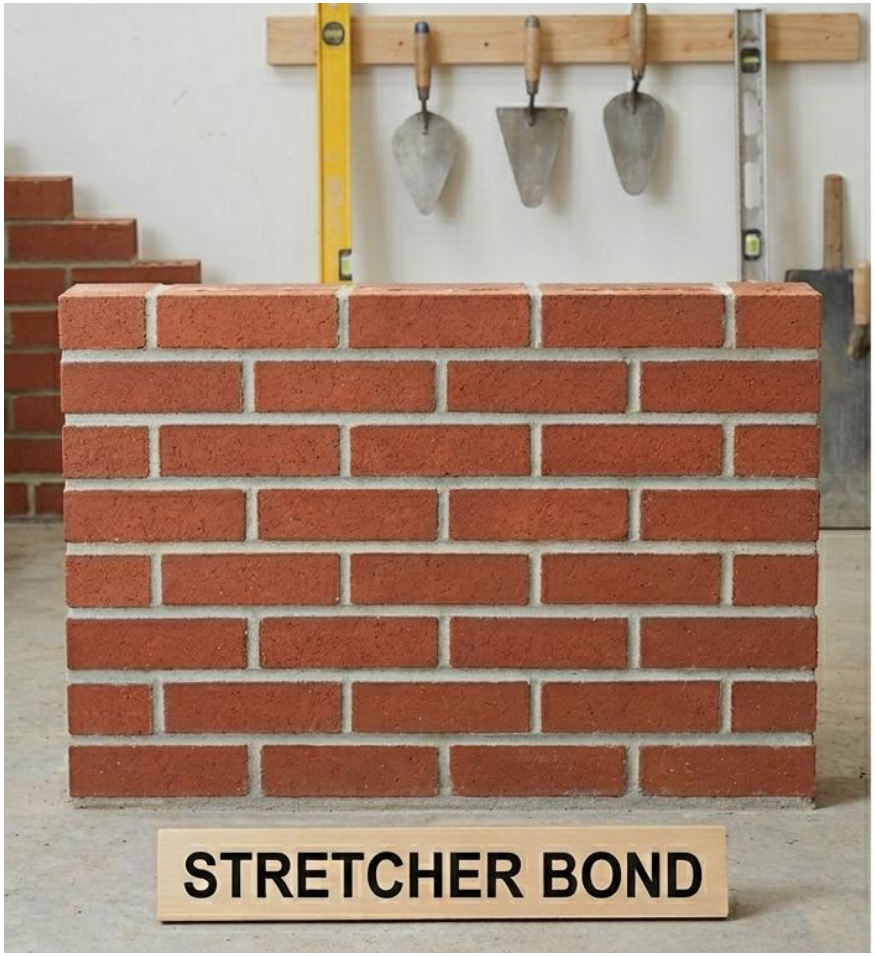
4.5 Planning and Setting Out Wall Positions

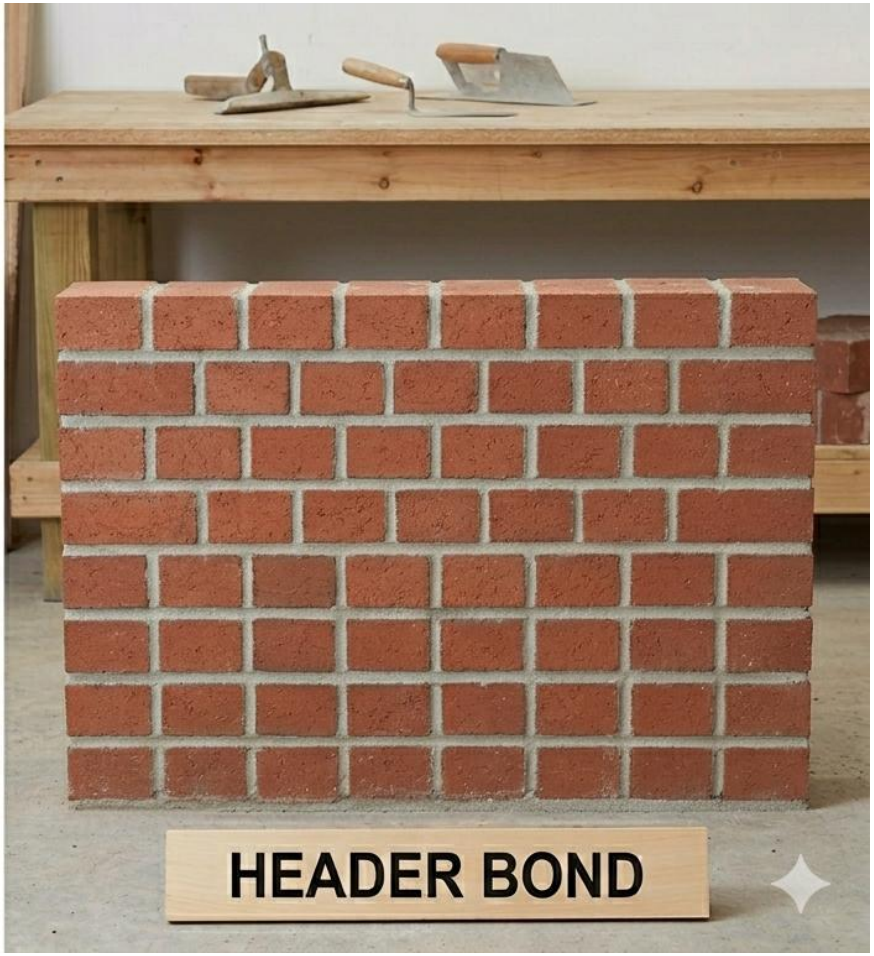
Successful wall construction begins with accurate planning and setting out. Builders transfer measurements from architectural drawings onto the foundation using pegs, string lines, builder's squares, and measuring tapes. Accurate setting out establishes wall positions, room sizes, door and window locations, and junctions. Errors made at this stage often continue throughout the project, leading to misaligned walls, incorrect room dimensions, and expensive corrective work. Advanced learners should understand how dimensions, reference lines, offsets, and benchmarks are used to achieve precision before the first block or brick is laid.



4.6 Wall Bonds and Masonry Patterns

Bonding refers to the systematic arrangement of bricks or blocks to produce strength, stability, and an attractive appearance. Proper bonding prevents continuous vertical joints, distributes loads uniformly, and improves resistance to cracking. Common bonds include stretcher bond, header bond, English bond, Flemish bond, English garden wall bond, Flemish garden wall bond, and rat-trap bond. The choice of bond depends on wall thickness, structural loading, architectural style, and available materials. Correct bonding ensures that adjacent units interlock effectively, allowing the wall to function as a single structural element. In Uganda we commonly use the stretcher and header bonds.





4.7 Mortar and Joint Construction

Mortar serves as the binding material that joins bricks or blocks together into a continuous wall. It consists mainly of cement, sand, and water mixed in appropriate proportions to achieve adequate workability and strength. Mortar joints distribute loads evenly, accommodate minor dimensional variations, and improve weather resistance. Joint thickness should remain consistent throughout construction to maintain uniform appearance and structural performance. Different joint finishes, including flush, weathered, recessed, struck, and bucket-handle joints, influence both the aesthetics and durability of masonry walls.



4.8 Wall Thickness and Structural Stability

Wall thickness is determined by the intended function of the wall, the height of the building, the loads to be supported, and applicable building regulations. Common brick wall thicknesses include half-brick, one-brick, one-and-a-half-brick, and two-brick walls, while block walls are commonly constructed using 150 mm or 200 mm blocks. Adequate wall thickness enhances compressive strength, lateral stability, fire resistance, sound insulation, and resistance to weather. Designers must balance structural safety with economy by selecting thicknesses that satisfy engineering requirements without unnecessary material use.



4.9 Wall Alignment, Level, and Vertical Accuracy

A professionally constructed wall must be perfectly straight, level, and plumb throughout its height. Horizontal alignment is maintained using string lines, while spirit levels verify level surfaces and plumb bobs confirm verticality. Builder's squares ensure accurate right angles at corners and junctions. Continuous checking during construction prevents cumulative errors that could affect roof installation, door and window fitting, plastering, and final appearance. Precision in alignment reflects good workmanship and contributes significantly to structural integrity.



4.10 Construction of Wall Junctions

Wall junctions are locations where two or more walls intersect. These include corner junctions, tee junctions, cross junctions, and squint junctions. Proper interlocking of masonry units at junctions creates continuity within the structure and allows loads to transfer safely between adjoining walls. Weak or poorly bonded junctions may develop cracks, separation, or structural instability over time. Advanced learners should understand the importance of maintaining bond patterns through junctions while ensuring accurate alignment and dimensional control.



4.11 Openings in Walls: Doors and Windows

Openings are deliberately formed within walls to accommodate doors, windows, ventilation systems, and building services. Every opening interrupts the continuity of the wall and therefore requires careful construction to maintain structural stability. Components of an opening include the head, lintel, jambs, sill, and threshold. Proper sizing, positioning, and reinforcement of openings prevent excessive stress concentrations and ensure that loads above the opening are transferred safely to the supporting wall sections.



4.12 Lintels and Load Distribution Above Openings

Lintels are horizontal structural members installed above openings to support the weight of masonry and roof loads located above doors and windows. They may be constructed from reinforced concrete, steel, timber, or precast concrete depending on design requirements. Proper bearing length, reinforcement detailing, curing, and installation are essential to ensure effective load transfer. Inadequate lintel construction may result in cracking, sagging, or even collapse of the wall above the opening.



4.13 Damp-Proofing and Moisture Control

Moisture is one of the greatest threats to masonry walls because it weakens mortar, damages finishes, encourages mould growth, and reduces the lifespan of building materials. Damp-proof courses (DPCs) are installed near foundation level to prevent rising damp, while cavity walls, waterproof coatings, flashing, and proper drainage systems protect walls from rain penetration. Advanced learners should understand the causes of moisture movement, methods of waterproofing, and the importance of maintaining dry, healthy building interiors.



4.14 Reinforcement and Strengthening of Walls

Although masonry performs well under compression, it possesses relatively low tensile strength. Reinforcement is therefore introduced where additional strength is required. Steel reinforcement bars, ladder reinforcement, vertical reinforcement, reinforced concrete columns, ring beams, and bond beams improve resistance to tension, bending, earthquakes, wind loads, and differential settlement. Proper placement, anchorage, and concrete cover are essential to ensure that reinforcement performs effectively throughout the life of the building.



4.15 Wall Finishes and Surface Protection

After wall construction, finishes are applied to improve appearance, protect against environmental exposure, and increase durability. Common finishes include plastering, rendering, painting, cladding, tiling, textured coatings, and decorative stone facing. High-quality finishes seal minor surface imperfections, reduce water penetration, improve fire performance, and simplify maintenance. The selection of finishes should consider environmental conditions, intended use of the building, maintenance requirements, and architectural style.



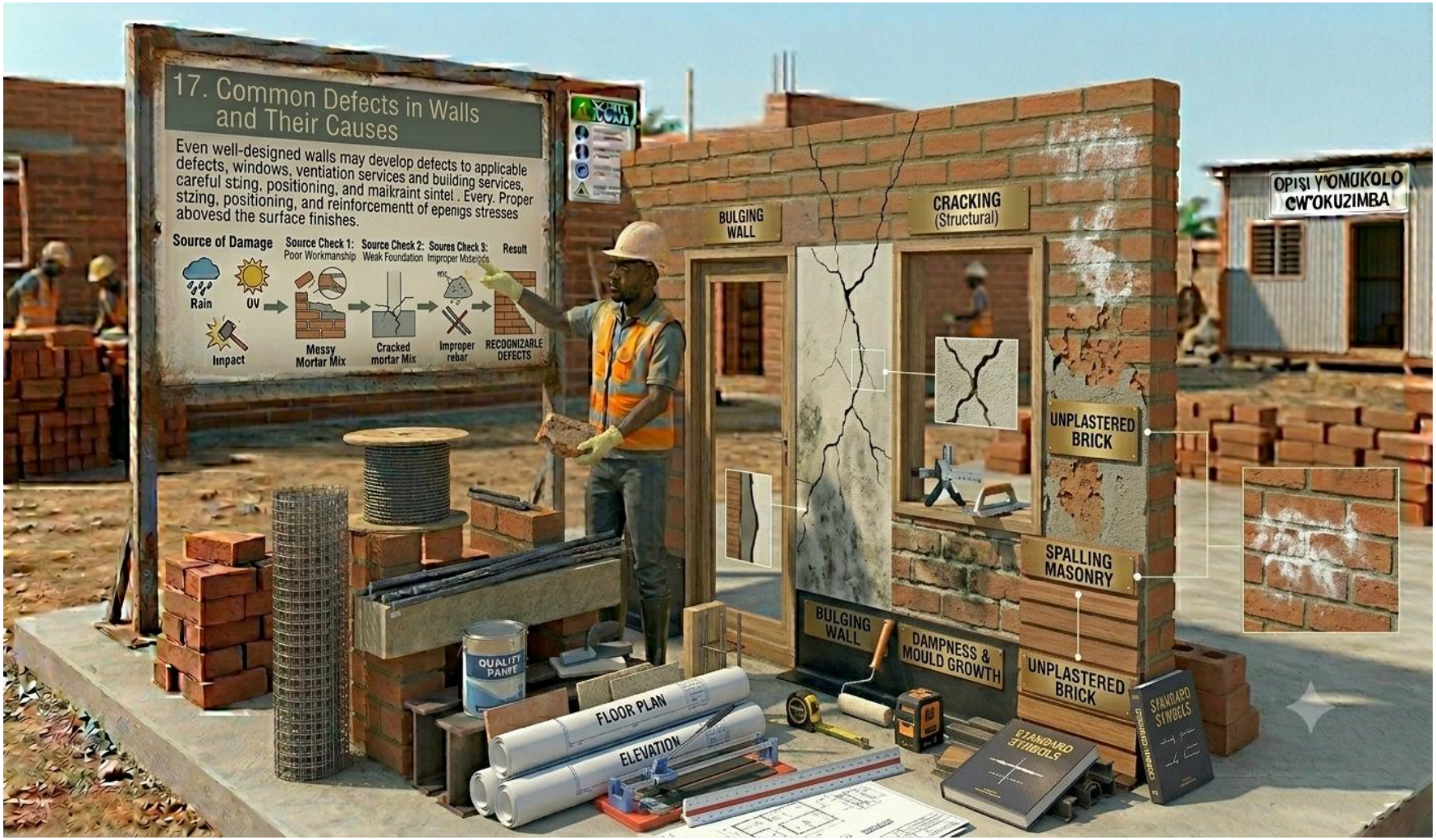
4.16 Interpretation of Wall Dimensions and Construction Drawings

Accurate interpretation of construction drawings is fundamental to successful wall construction. Architectural drawings provide wall dimensions, thicknesses, opening locations, structural details, levels, symbols, and construction notes. Learners should develop the ability to read floor plans, elevations, sections, and detail drawings while understanding scale, dimensioning conventions, abbreviations, and standard symbols. Competence in drawing interpretation minimizes construction errors, improves coordination among trades, and ensures compliance with design specifications.



4.17 Common Defects in Walls and Their Causes

Even well-designed walls may develop defects if construction standards are not maintained. Common problems include cracking, bulging, settlement, efflorescence, dampness, spalling, mortar deterioration, and structural movement. These defects may result from poor workmanship, weak foundations, inadequate bonding, incorrect mortar proportions, moisture penetration, thermal expansion, or overloading. Identifying the underlying causes enables builders to implement appropriate repair techniques and prevent recurrence in future projects.



4.18 Inspection, Maintenance, and Repair of Walls

Regular inspection and maintenance preserve the structural integrity and appearance of bungalow walls throughout their service life. Maintenance activities include checking for cracks, repairing damaged mortar joints through repointing, replacing broken bricks or blocks, sealing water leaks, cleaning wall surfaces, and repainting protective finishes. Structural inspections should also assess movement, settlement, moisture penetration, and deterioration of reinforcement. Preventive maintenance extends the lifespan of walls while reducing costly repairs.



4.19 Health, Safety, and Quality Control in Wall Construction

Safe construction practices are essential throughout wall construction. Workers should wear personal protective equipment such as helmets, gloves, safety boots, eye protection, and reflective clothing. Proper scaffolding, safe manual handling techniques, and good housekeeping reduce workplace accidents. Quality control involves inspecting materials before use, verifying mortar mix proportions, checking wall dimensions, monitoring alignment and plumbness, ensuring correct bonding, and confirming compliance with construction specifications. Consistent quality assurance results in durable, safe, and aesthetically pleasing walls.



4.20 Best Practices and Professional Standards in Wall Construction

Professional wall construction requires a combination of technical knowledge, practical skills, adherence to building codes, and ethical workmanship. Builders should follow approved construction drawings, use quality materials, maintain accurate measurements, observe curing periods, protect unfinished masonry from adverse weather, and conduct regular inspections during every stage of construction. Continuous professional development, adoption of modern construction technologies, and strict compliance with national building standards ensure that bungalow walls remain structurally sound, durable, economical, and capable of serving their intended functions for many decades. Advanced learners should strive to understand not only how walls are built but also why each construction procedure contributes to the overall safety, performance, and longevity of the building.



4.21 KEY POINTS TO ANSWERING SCENARIOS OF TOPIC 4

When answering a scenario test item on walls, the learner must begin with a focused introduction explaining the structural and functional importance of walls, identifying whether load-bearing or non-load-bearing walls are required, and stating the type of wall bond (stretcher, English, or Flemish bond) based on wall thickness and structural requirements. The essential materials, tools, and equipment include bricks or blocks, cement, sand, water for mortar, reinforcement bars, DPC material, lintels, measuring tape, spirit level, plumb bob, builder's square, string lines, trowels, mortar boards, wheelbarrows, and drawing instruments. Health and safety awareness requires wearing PPE (helmets, safety boots, gloves, eye protection), ensuring scaffolding is properly erected, observing safe manual handling techniques, maintaining good housekeeping, ensuring adequate ventilation when mixing mortar, and following proper procedures for cutting bricks or blocks. The operational procedure involves planning and setting out wall positions accurately, selecting appropriate wall thickness, preparing mortar in correct proportions, laying bricks or blocks following the specified bond pattern, ensuring walls are straight, level, and plumb, constructing proper junctions (corners, tee, squint), forming openings with heads, jambs, sills, and thresholds, installing lintels above openings, incorporating DPC near foundation level, and applying appropriate wall finishes. Maintenance recommendations include regular inspection for cracks, bulging, or settlement, checking for dampness or efflorescence, repairing damaged mortar joints through repointing, replacing broken bricks or blocks, sealing water leaks, cleaning wall surfaces, repainting protective finishes, and conducting structural inspections. Evaluation assesses whether the drawing accurately shows wall details including bonds, thicknesses, junctions, openings with heads, jambs, sills, and thresholds, dimensions are correct, appropriate material symbols are used, and the drawing follows building conventions. In conclusion, the learner demonstrates understanding of structural principles, material properties, and construction techniques, and the final drawing is fit for its intended purpose of guiding wall construction, ensuring structurally stable, properly bonded, weather-resistant walls capable of serving their functions for many decades.

TOPIC 5: VECTOR GEOMETRY

Competency

Learners analyse forces graphically.

Teaching Focus

Ensure learners understand

- concurrent forces
- equilibrium
- Bow's notation
- vector polygons
- space diagrams
- reactions
- shear force diagrams
- bending moment diagrams.

Assessment Criteria

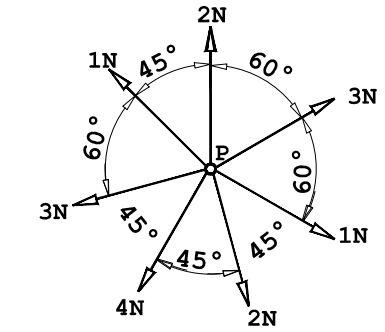
Assess ability to

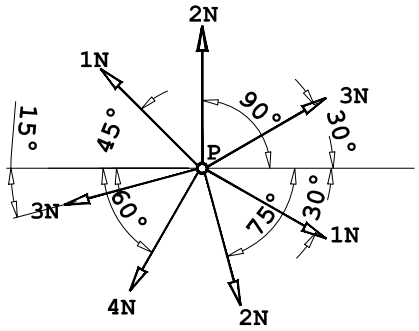
- determine resultants
- determine equilibrants
- construct force polygons
- interpret beam loading.

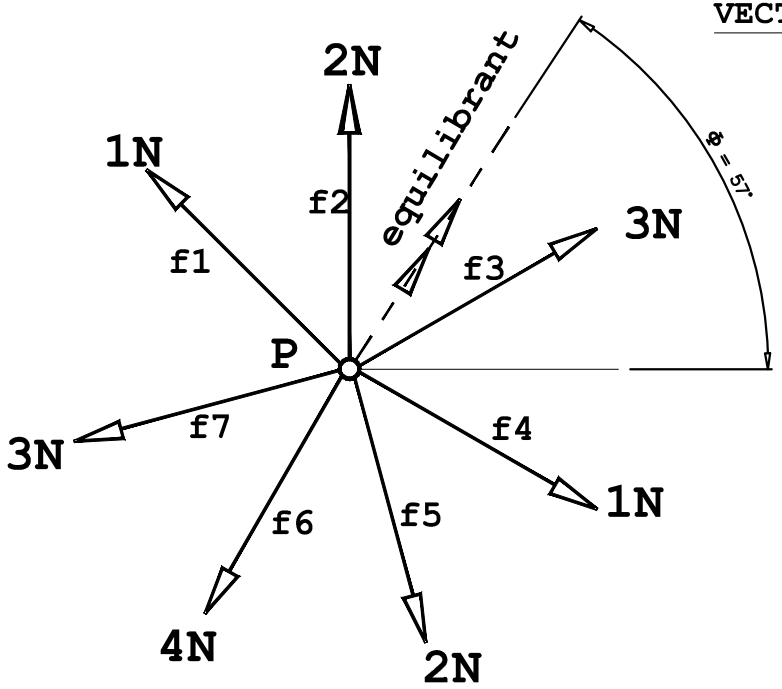
Common Errors

Learners often

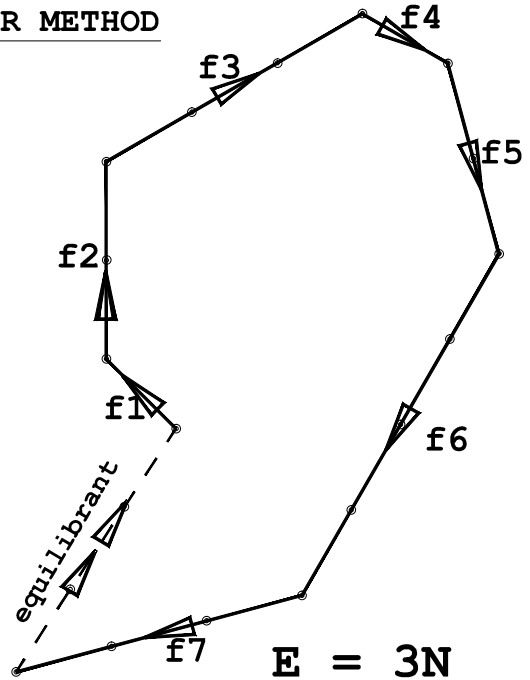
- reverse force directions
- misuse scales
- confuse compression and tension
- draw incorrect polygons.







VECTOR METHOD



E = 3N

Φ = +57°

CALCULATION METHOD

↑ 1sin45° + 3sin30°+ 2sin90° = 4.2071N

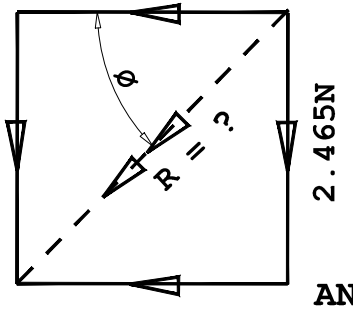
↓ 3sin15° + 4sin60° + 2sin75 + 1sin30° = 6.6725N

← 1cos45° + 3cos15° + 4cos60° = 5.605N

→ 3cos30° + 1cos30°+ 2cos75° = 3.9817N

5.605 - 3.9817 = 1.623N

6.6725 - 4.207 = 2.465N



R = 2.95N

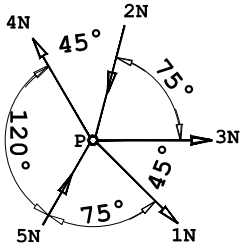
Tan Φ = 2.465 / 1.623

Φ =57°

ANGLE = 57°+180°=+137°

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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	CO-CURRENT CO-PLANAR FORCES 2.1	This can be worked out either by calculations or vectors	The vector method may vary by a small margin from the calculation method because of not constructing perfect parallel lines.



VECTOR METHOD

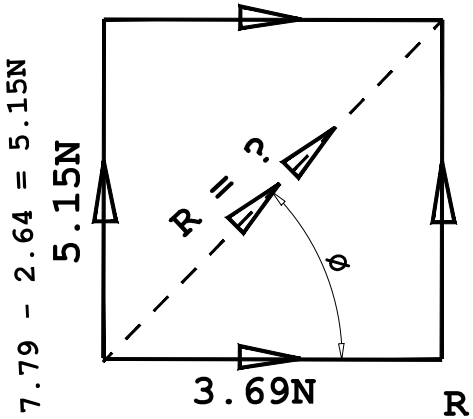
CALCULATION METHOD

↑ $4\sin60° + 5\sin60° = 7.79N$

↓ $2\sin75° + 1\sin45° = 2.64N$

← $4\cos60° + 2\cos75° = 2.52N$

→ $5\cos60° + 1\cos45° + 3\cos0° = 6.21N$



$5.15^2 + 3.69^2 = R^2$

6.21 - 2.52 = 3.69N

$R = 6.3N$

$\text{Tan } \phi = \frac{5.15}{3.69}$

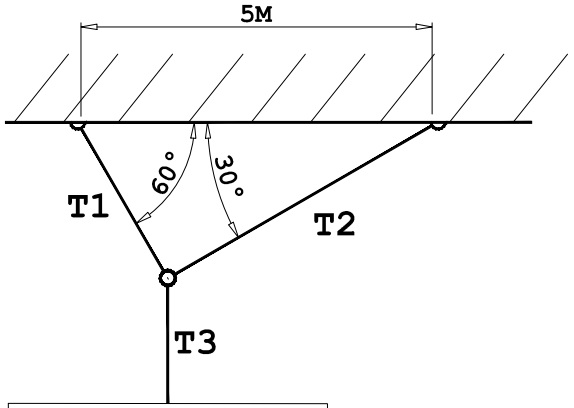
$\phi = +54°$

Resultant
R = 6.3N
Resultant is equal in magnitude to the equilibrant but its opposite in direction

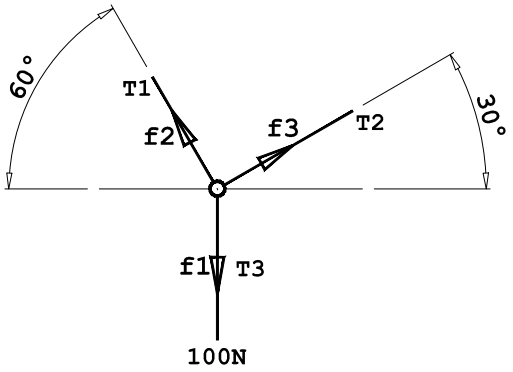
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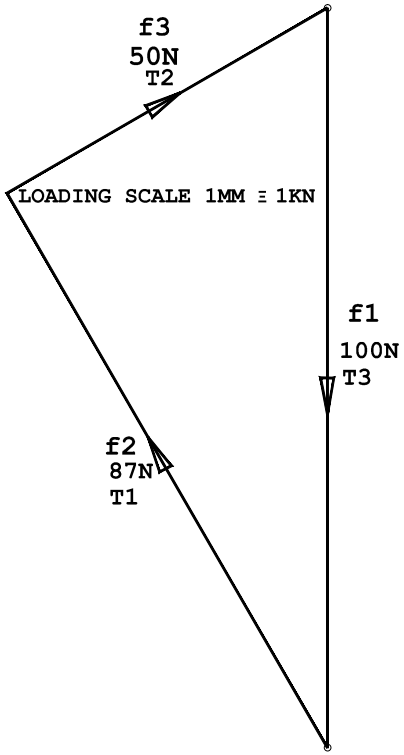
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	CO-CURRENT CO-PLANAR FORCES 2.2	This can be worked out either by calculations or vectors	The vector method may vary by a small margin from the calculation method because of not constructing perfect parallel lines

VECTOR METHOD



FAILING IS A CHOICE
THIS SIGN POST WEIGHS 10KGS





T1 = 87N
T2 = 50N
T3 = 100N

CALCULATION METHOD

↑ $T1\sin60° + T2\sin30°$

↓ $100\sin90° = 100N$

← $T1\cos60°$

→ $T2\cos30°$

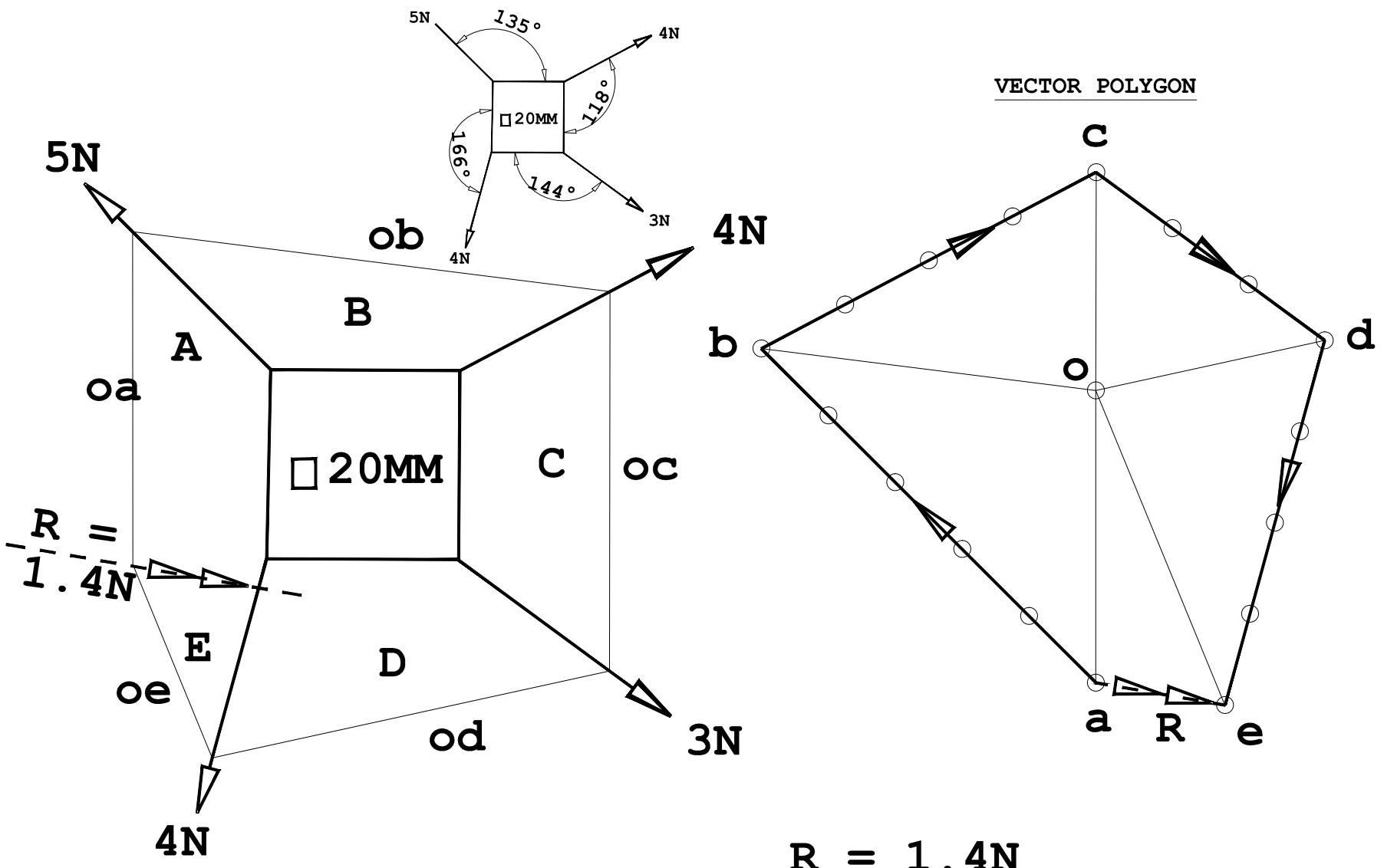
↑ $T1\sin60° + T2\sin30° = 100N$

↔ $T1\cos60° = T2\cos30°$

T1 = 87N
T2 = 50N

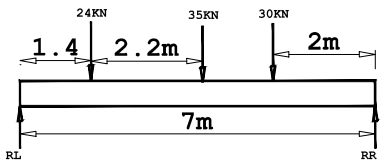
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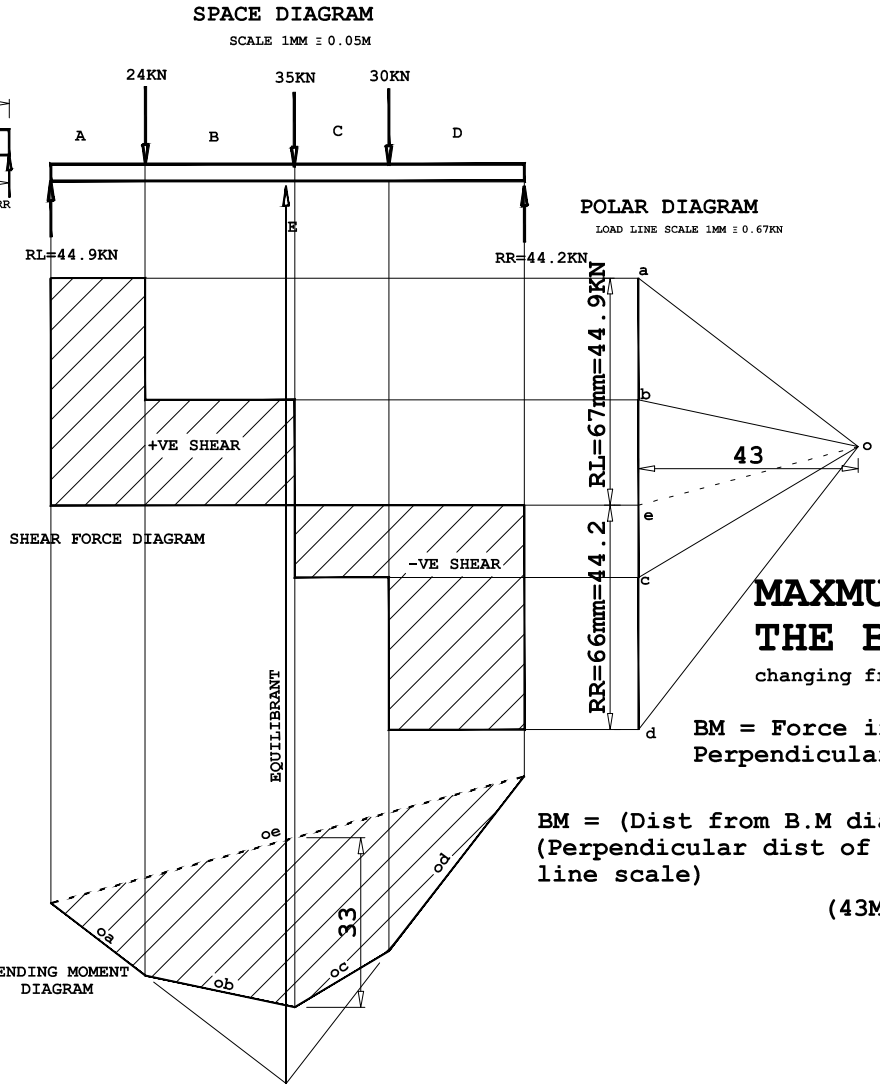
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	CO-CURRENT CO-PLANAR FORCES (Tension force in strings) 2.3	The two members and the load acting are taken as co-current co-planar forces and then worked out by either calculation or vector method.	This system is in a stable equilibrium so the resultant force is zero. (The polygon of forces closes)



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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	NON CO-CURENT CO- PLANAR FORCES 2.4	Labeling the lines of force using BOW`S NOTATION in a clockwise direction and then constructing the vector polygon	In this arrangement of forces we use the vector method alone.





NOTE: The maximum bending moment occurs when the shear force is zero that is when the shear force is changing from positive to negative.

MAXMUM BENDING MOMENT IN THE BEAM (occurs when shear force is changing from postive to negative)

BM = Force in newtons multiplied by the Perpendicular distance in meters

BM = (Dist from B.M diagram X Space diagram scale) X (Perpendicular dist of polar point from load line X Load line scale)

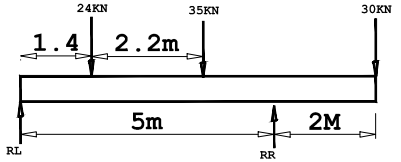
(43MM X 0.67kN) X (33MM X 0.05M)=

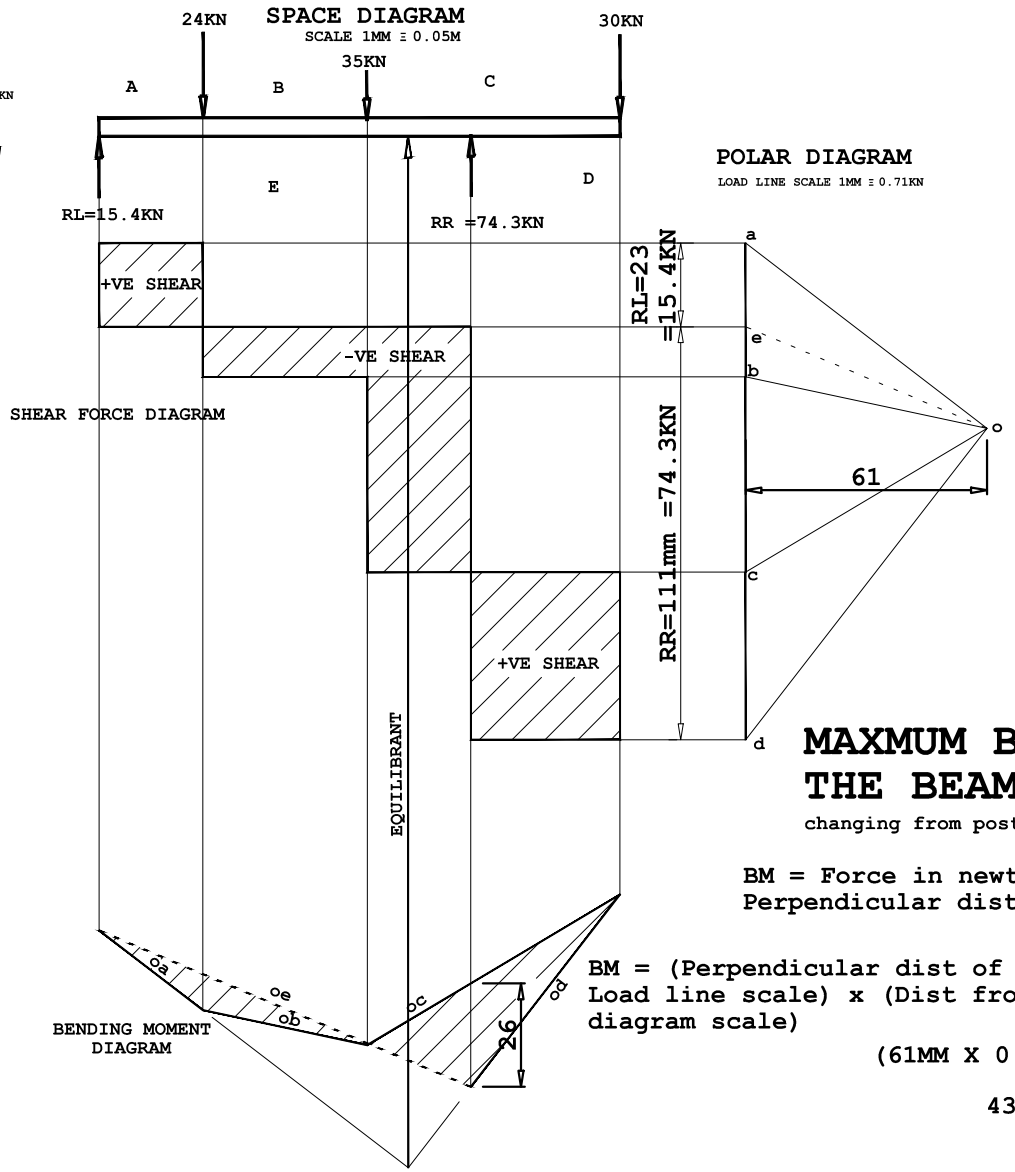
28.8kN X 1.65M =

49.9kNM

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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	POINT LOADS ON BEAMS 2.5	Constructing the space diagram followed by the load line followed by polar diagram then bending moment diagram and finally the shear force diagram	The polar point here was put on the right but it can also be on the left.The maximum bending moment occurs when the shear force is zero





MAXMUM BENDING MOMENT IN THE BEAM (occurs when shear force is changing from postive to negative)

BM = Force in newtons multiplied by the Perpendicular distance in meters

BM = (Perpendicular dist of polar point from load line X Load line scale) x (Dist from B.M diagram X Space diagram scale)

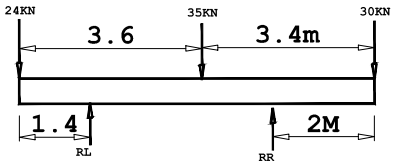
(61MM X 0.71kN) X (26MM X 0.05M)=

43.3kN X 1.3M =

56.3kNM

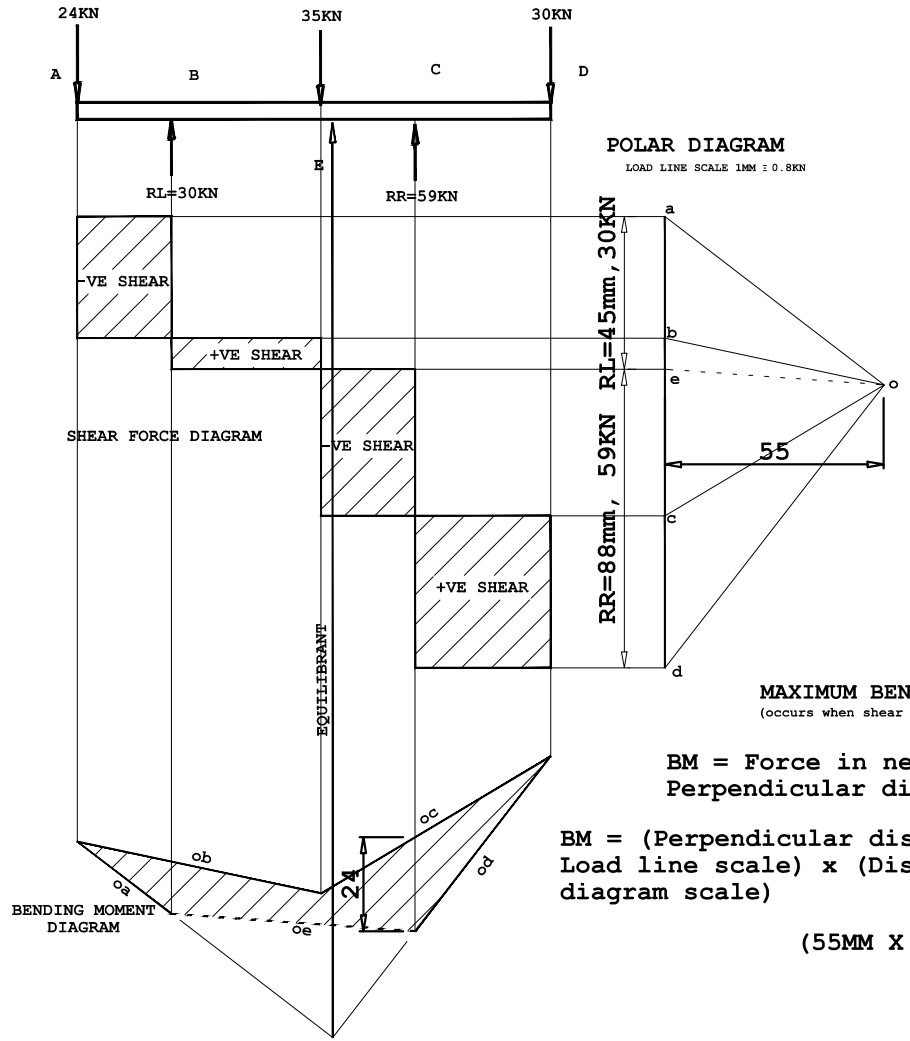
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	OVERHANG POINT LOADS ON BEAMS 2.6	Constructing the space diagram followed by the load line followed by polar diagram then bending moment diagram and finally the shear force diagram	The polar point here was put on the right but it can also be on the left.



SPACE DIAGRAM

SCALE 1MM = 0.06M



POLAR DIAGRAM

LOAD LINE SCALE 1MM = 0.8KN

MAXIMUM BENDING MOMENT IN THE BEAM

(occurs when shear force is changing from positive to negative)

BM = Force in newtons multiplied by the Perpendicular distance in meters

BM = (Perpendicular dist of polar point from load line X Load line scale) x (Dist from B.M diagram X Space diagram scale)

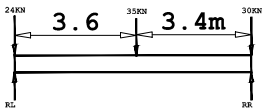
(55MM X 0.8kN) X (24MM X 0.06M)=

44kN X 1.44M =

63.4kNM

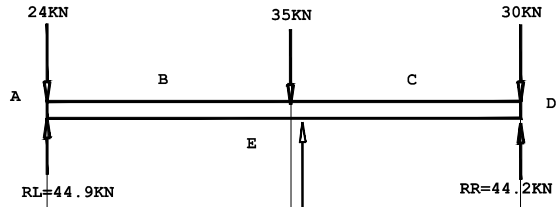
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	OVER HANGING POINT LOADS ON BEAMS 2.7	Constructing the space diagram followed by the load line followed by polar diagram then bending moment diagram and finally the shear force diagram	The polar point here was put on the right but it can also be on the left.



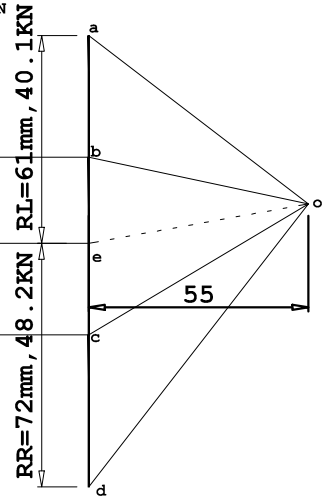
SPACE DIAGRAM

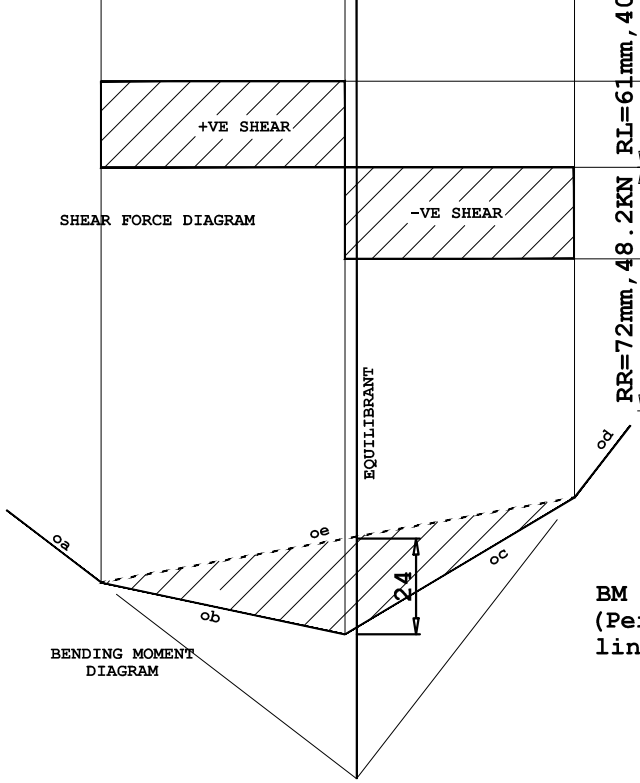
SCALE 1MM ≡ 0.06M



POLAR DIAGRAM

LOAD LINE SCALE 1MM ≡ 0.8KN





MAXIMUM BENDING MOMENT IN THE BEAM

(occurs when shear force is changing from positive to negative)

BM = Force in newtons multiplied by the Perpendicular distance in meters

BM = (Dist from B.M diagram X Space diagram scale) X (Perpendicular dist of polar point from load line X Load line scale)

(55MM X 0.8kN) X (24MM X 0.06M)=

44kN X 1.44M =

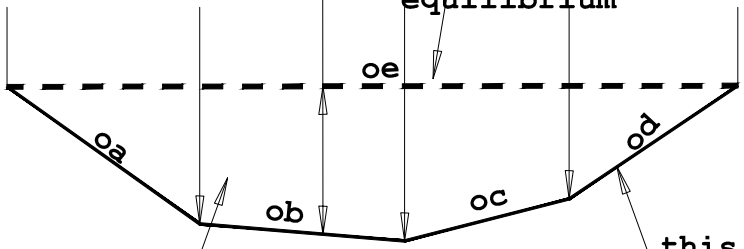
63.4kNM

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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	INLINE POINT LOADS ON BEAMS 2.8	Constructing the space diagram followed by the load line followed by polar diagram then bending moment diagram and finally the shear force diagram	The polar point here was put on the right but it can also be on the left.

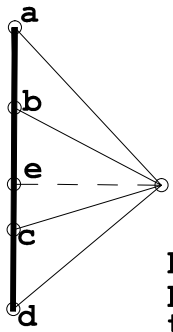
a measure of BM at a section

Closing the link/fanicular polygon since the beam is in a stable equilibrium



The closed area becomes a measure of bending moment at a particular section hence the bending moment diagram.

this is the link or funicular polygon literally taken as a tight wire with point loads acting hence sagging it as seen

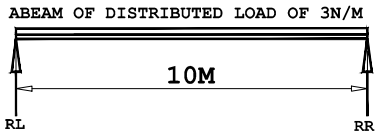


putting the polar point O on the left or right does not mater.what matters is, has the link polygon been left open or closed?

NOTE: THE POLAR POINT can be put on the right side of the load line as seen above or on the left side of the load line but the measure of the bending moment will always be the same regardless of weather its put on the left or right.

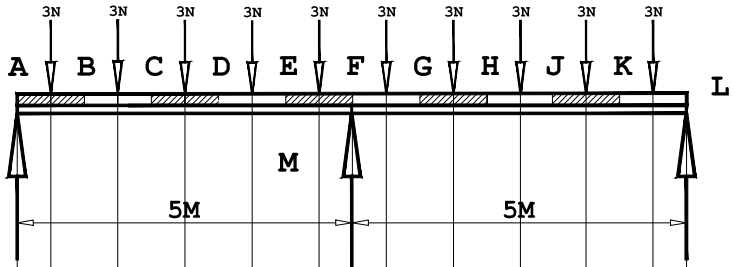
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	UNDERSTANDING THE DIFFERENCE BETWEEN THE FUNICULAR,LINK POLYGON AND BENDING MOMENT DIAGRAM	Clarification on the bending moment diagram	The position of the polar point on the load has no effect on the bending moment diagram



SPACE DIAGRAM

SCALE 1MM ≡ 0.1M

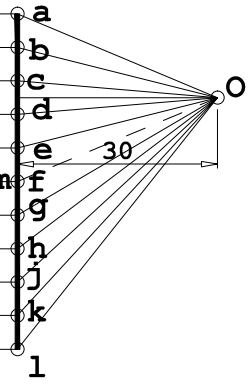


RL =15N

RR =15N

POLAR DIAGRAM

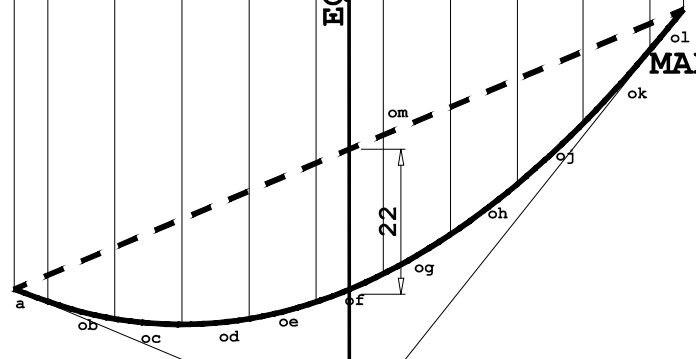
LOAD LINE SCALE 1MM ≡ 0.6N



SHEAR FORCE DIAGRAM



BENDING MOMENT DIAGRAM



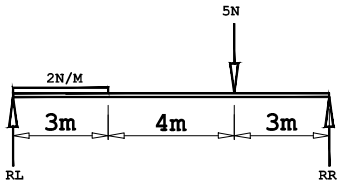
MAX BM = (30X0.6) X (22X0.1)

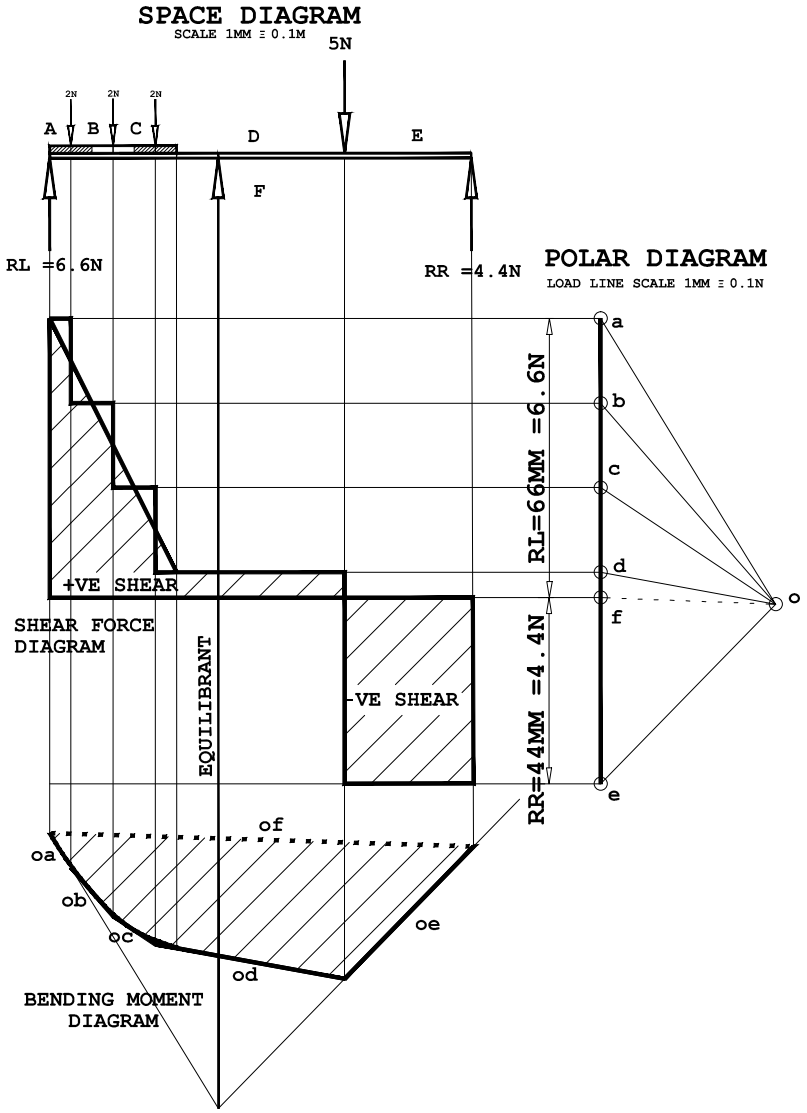
18N X 2.2M

39.6NM

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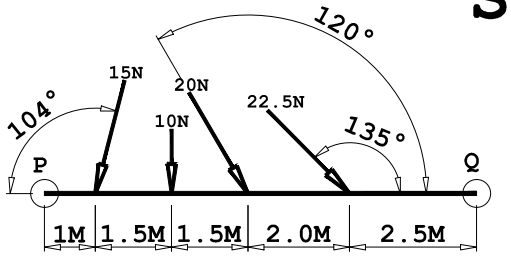
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	BEAM WITH DISTRIBUTED LOADS 2.10	Constructing the space diagram putting the load in the center of each meter, constructing the polar diagram followed by the bending moment diagram and finally the shear force diagram	The shear force diagram of the beam with distributed loads is a straight line from the top to the bottom as the bending moment diagram is a curve.





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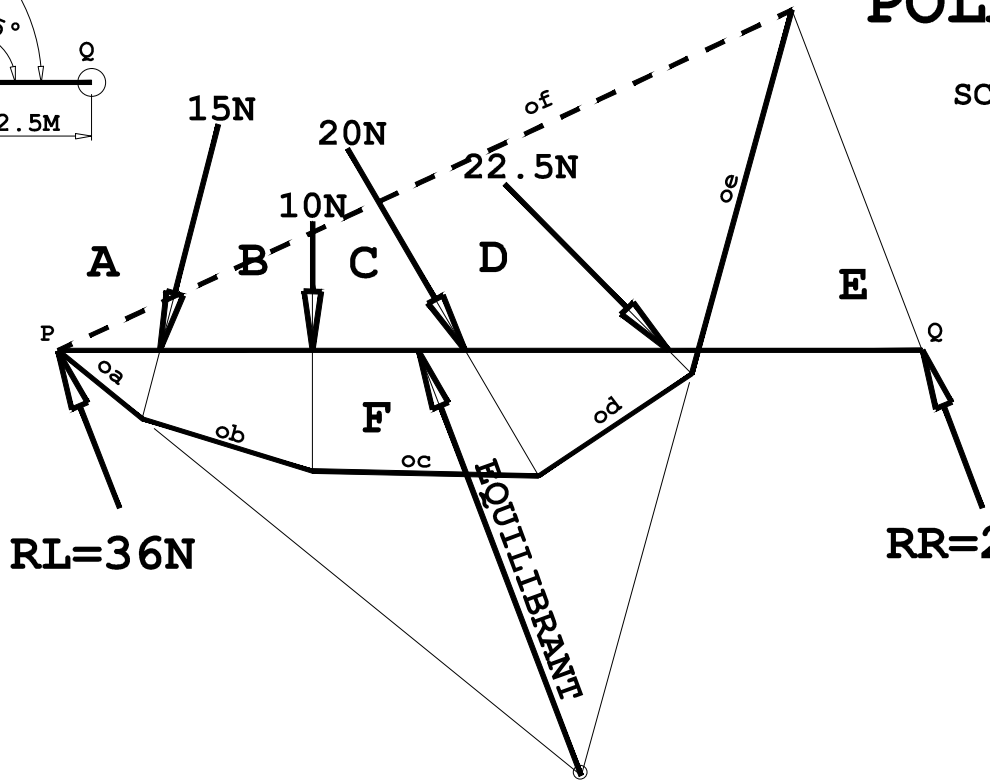
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	BEAM WITH DISTRIBUTED LOADS AND POINT LOADS 2.11	Constructing the space diagram putting the load in the center of each meter, constructing the polar diagram followed by the bending moment diagram and finally the shear force diagram	The shear force diagram of the beam with distributed loads is a straight line from the top to the bottom as the bending moment diagram is a curve.



USING THE LINK POLYGON, FIND THE PARALLEL EQUILIBRANTS FOR THE SYSTEM OF FORCES SHOWN. THE EQUILIBRANTS ARE TO PASS THROUGH THE POINTS P AND Q. FIND ALSO THE RESULTANT OF THE GIVEN SYSTEM OF FORCES.

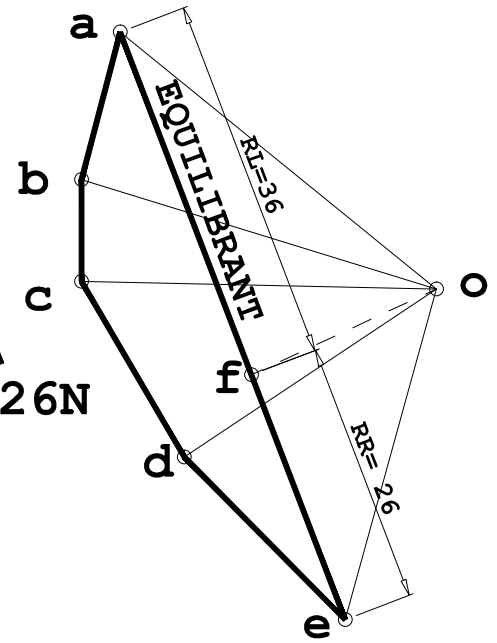
SPACE DIAGRAM

SCALE 1MM ≡ 0.1M



POLAR DIAGRAM

LOAD LINE
SCALE 1MM ≡ 1N

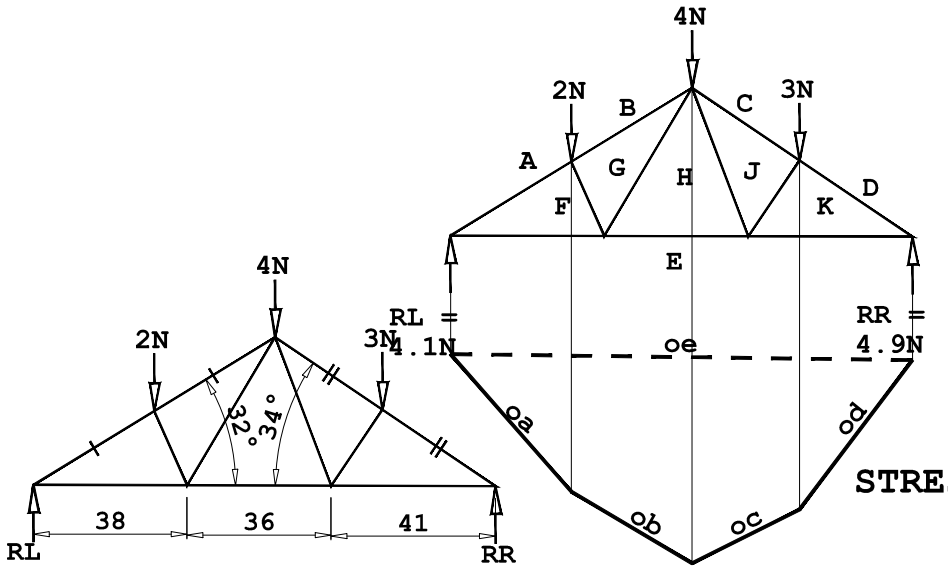


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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	WIND FORCES ON BEAMS 2.12	Starting the link polygon at p.	The reactions are parallel to the equilibrant

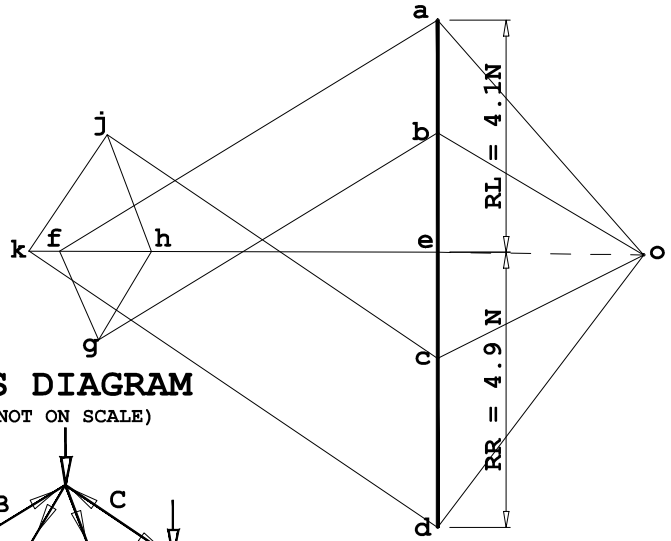
SPACE DIAGRAM

SCALE 1MM ≡ 1MM



POLAR DIAGRAM

LOAD LINE SCALE 1MM ≡ 0.1N



STRESS DIAGRAM

(NOT ON SCALE)

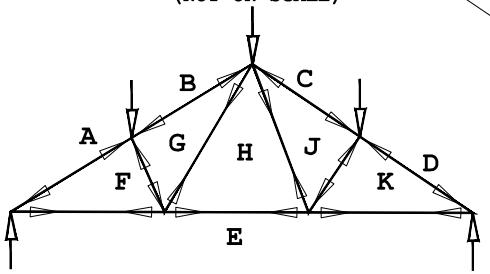
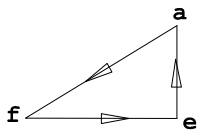


TABLE OF RESULTS

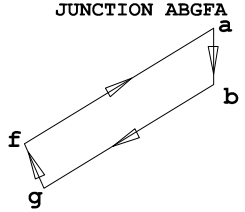
MEMBER	AF	BG	CJ	DK	EK	EH	EF	FG	GH	HJ	JK
MAGNITUDE (N)	7.9	7	7.1	8.8	7.3	5.1	6.7	1.7	1.8	2.2	2.5
STRUT	✓	✓	✓	✓				✓			✓
TIE					✓	✓	✓		✓	✓	

VECTOR DIAGRAMS

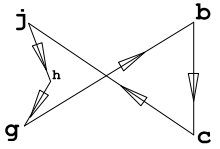
JUNCTION EAFE



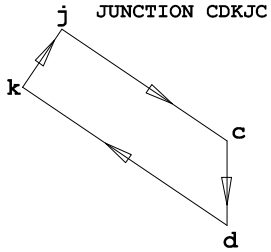
JUNCTION ABGFA



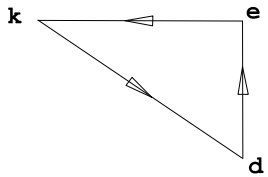
JUNCTION BCJHGB



JUNCTION CDKJC

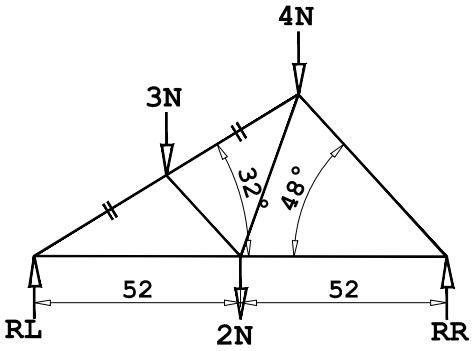


JUNCTION DEKD



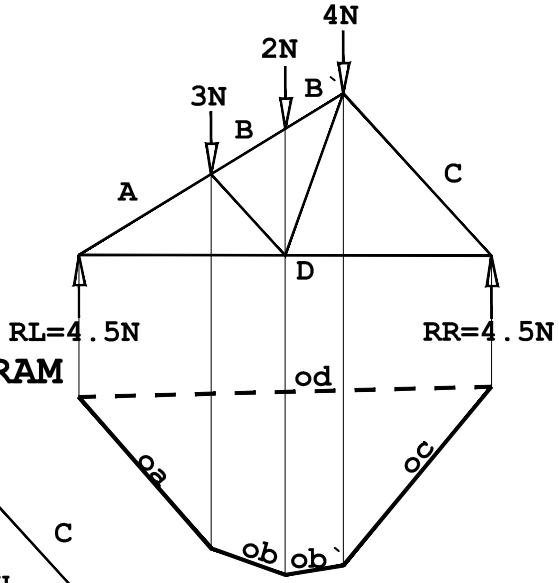
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	DEAD POINT LOADS ON A FRAMEWORK 2.13	Constructing the space diagram,polar diagram,link polygon,vector diagram then the stress diagram	Contrary to the forces on beams the shear force diagram is not important for the frame work because the frame work is made up of several members



SPACE DIAGRAM

SCALE 1MM ≡ 1MM



POLAR DIAGRAM

LOAD LINE SCALE 1MM ≡ 0.1N

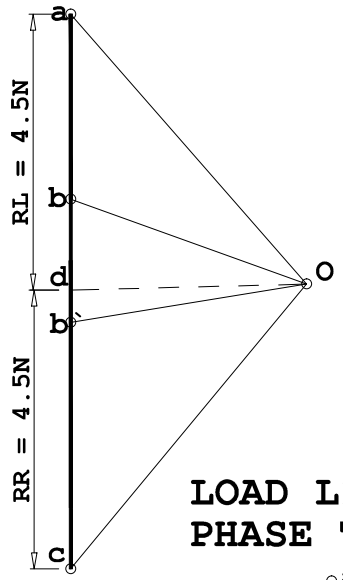
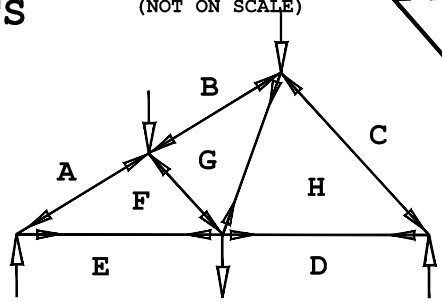


TABLE OF RESULTS

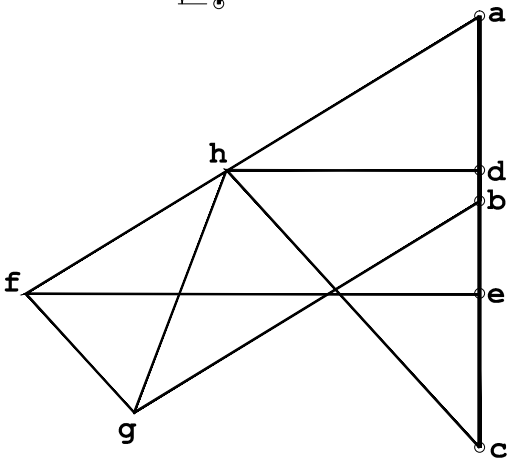
MEMBER	AF	BG	CH	DH	EF	FG	GH
MAGNITUDE (N)	8.6	6.6	6.1	4.1	7.4	2.6	4.2
STRUT	✓	✓	✓			✓	
TIE				✓	✓		✓

STRESS DIAGRAM

(NOT ON SCALE)

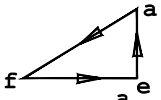


LOAD LINE PHASE TWO

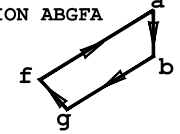


VECTOR DIAGRAMS

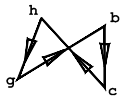
JUNCTION EAFE



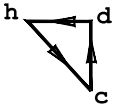
JUNCTION ABGFA



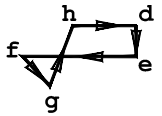
JUNCTION BCHGB



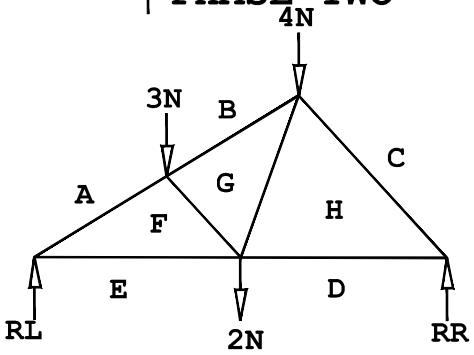
JUNCTION CDHC



JUNCTION DEFGHD



PHASE TWO

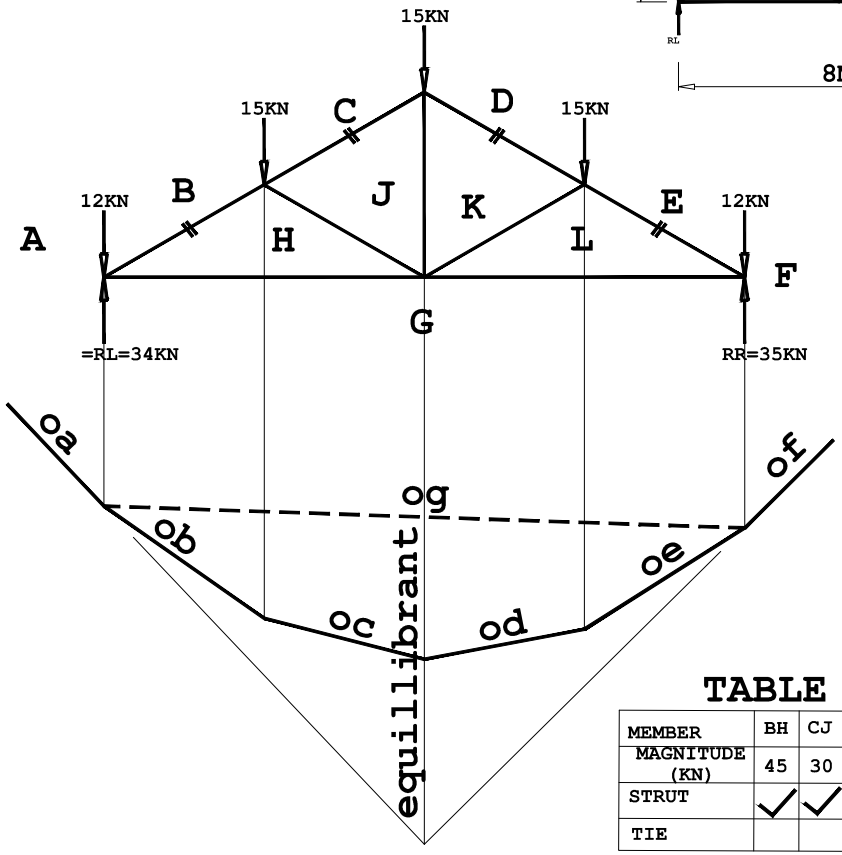


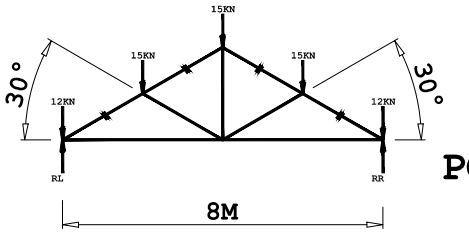
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	A POINT LOAD ACTING FROM UNDERNEATH A FRAME WORK 2.14	This frame work is worked out in two phases,phase one the frame work is treated as a beam to get RL and RR . in phase 2 it is notated as it is loaded with RL and RR already known the load line is completed for the vector diagram.	It is possible to have phase 1 and 2 on the same load line to avoid time wasting.

SPACE DIAGRAM

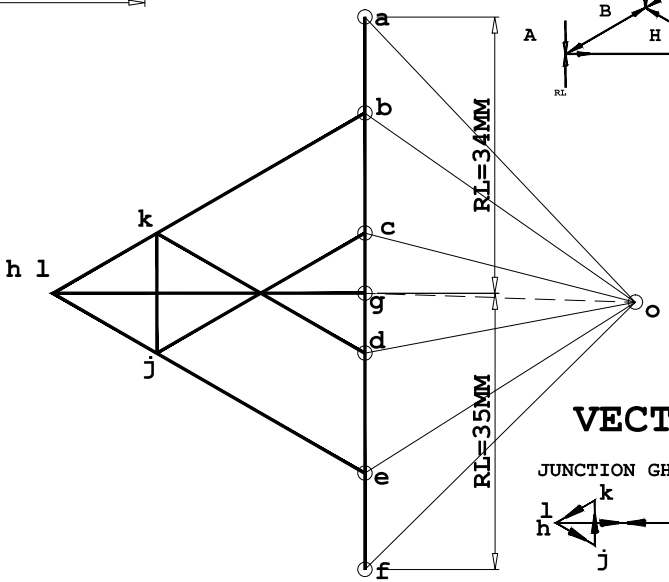
SCALE 1MM ≡ 0.1M





POLAR DIAGRAM

LOAD LINE SCALE 1MM ≡ 1KN



STRESS DIAGRAM

(NOT ON SCALE)

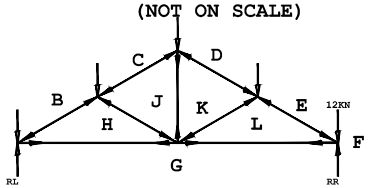


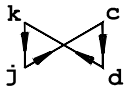
TABLE OF RESULTS

MEMBER	BH	CJ	DK	EL	GL	GH	HJ	JK	KL
MAGNITUDE (KN)	45	30	30	45	39	39	15	15	15
STRUT	✓	✓	✓	✓			✓		✓
TIE					✓	✓		✓	

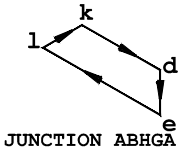
VECTOR DIAGRAMS

JUNCTION GHJKLG

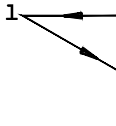
JUNCTION CDKJC



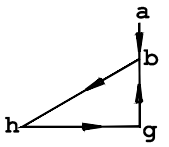
JUNCTION DELKD



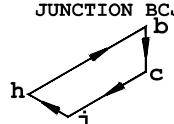
JUNCTION EFGLE



JUNCTION ABHGA

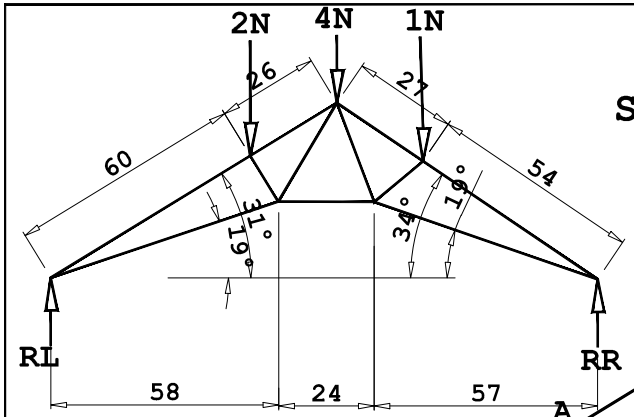


JUNCTION BCJHB



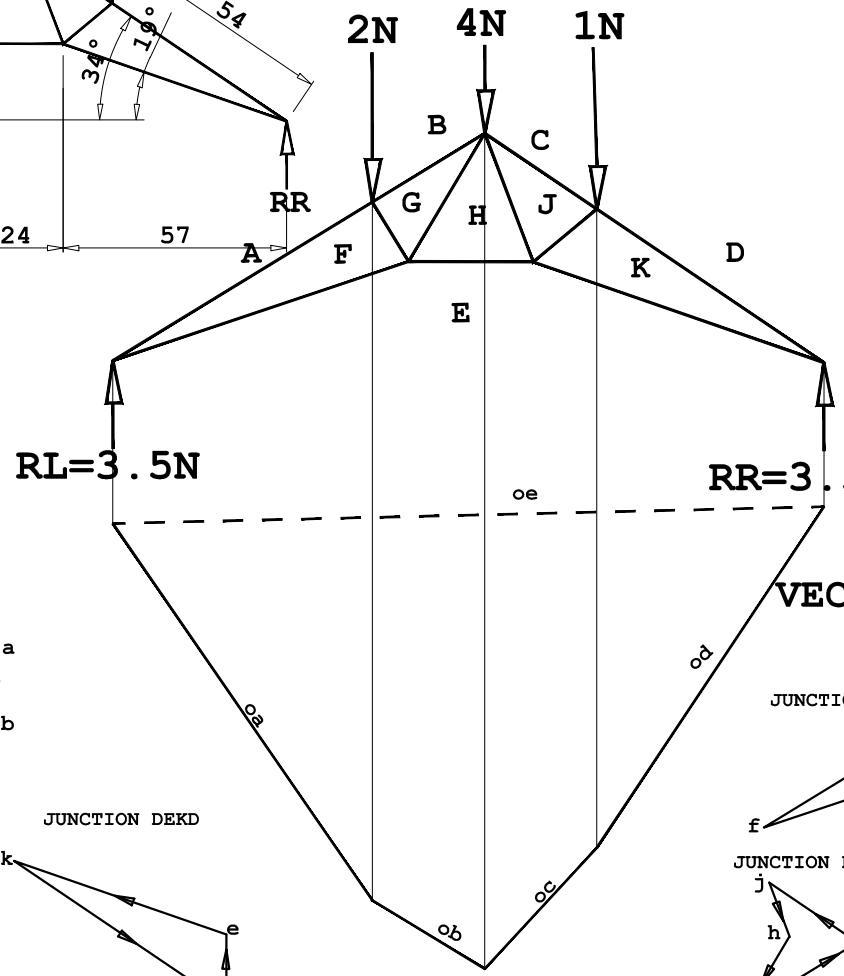
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	A FRAME WORK WITH LOADS IN LINE WITH THE REACTIONS 2.15	Constructing the space diagram,polar diagram, bending moment diagram and finally the vector diagram.	Line oa and of will only be used to locate the position of the equilibrant.



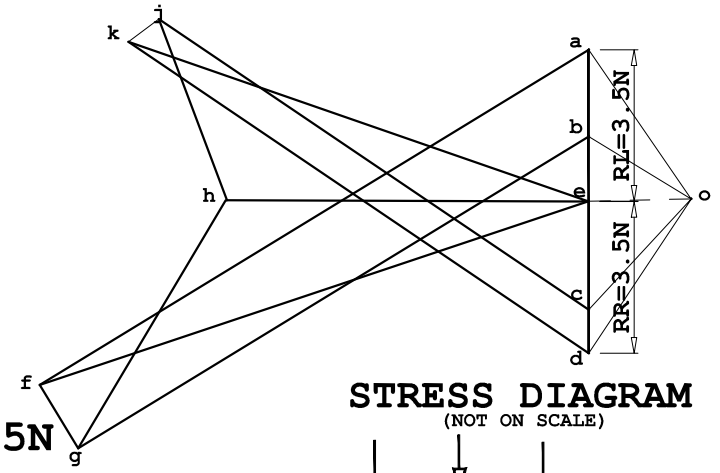
SPACE DIAGRAM

SCALE 1MM ≡ 1MM

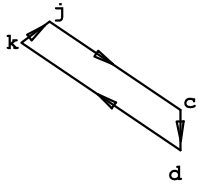


POLAR DIAGRAM

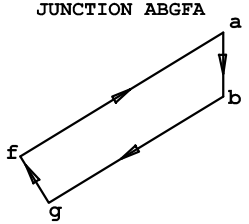
LOAD LINE SCALE 1MM ≡ 0.1N



JUNCTION CDKJC



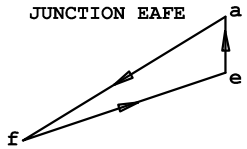
JUNCTION ABGFA



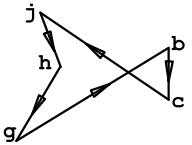
JUNCTION DEKD

VECTOR DIAGRAMS

JUNCTION EAFE



JUNCTION BCJHGB



STRESS DIAGRAM

(NOT ON SCALE)

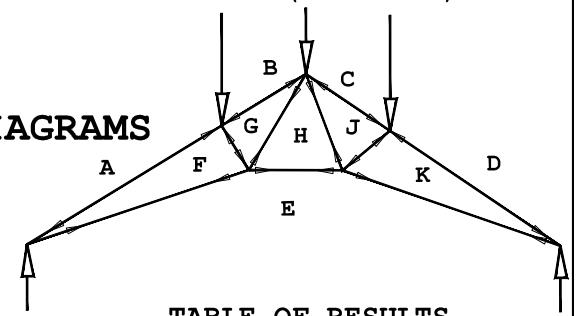


TABLE OF RESULTS

MEMBER	AF	BG	CJ	DK	EK	EH	EF	FG	GH	HJ	JK
MAGNITUDE (N)	14.8	13.8	12	12.8	11	8.4	13.3	1.7	6.6	4.5	0.9
STRUT	✓	✓	✓	✓				✓			✓
TIE					✓	✓	✓		✓	✓	

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TOPIC:

VECTORS IN FORCES

SUB-TOPIC

POINT LOADS ON A FRAME WORK

2.16

APPROACH:

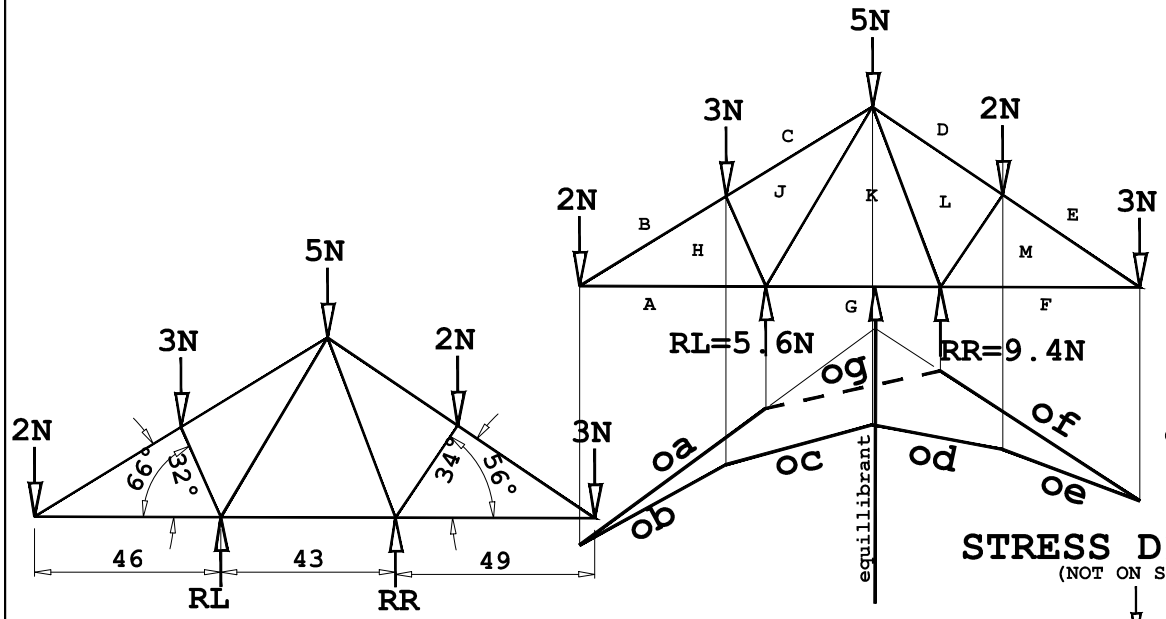
Constructing the space diagram, polar diagram, bending moment diagram and finally the vector diagram

NOTE:

Point **e** on the load line will have tree lines from it representing the tree tie beams on the frame work.

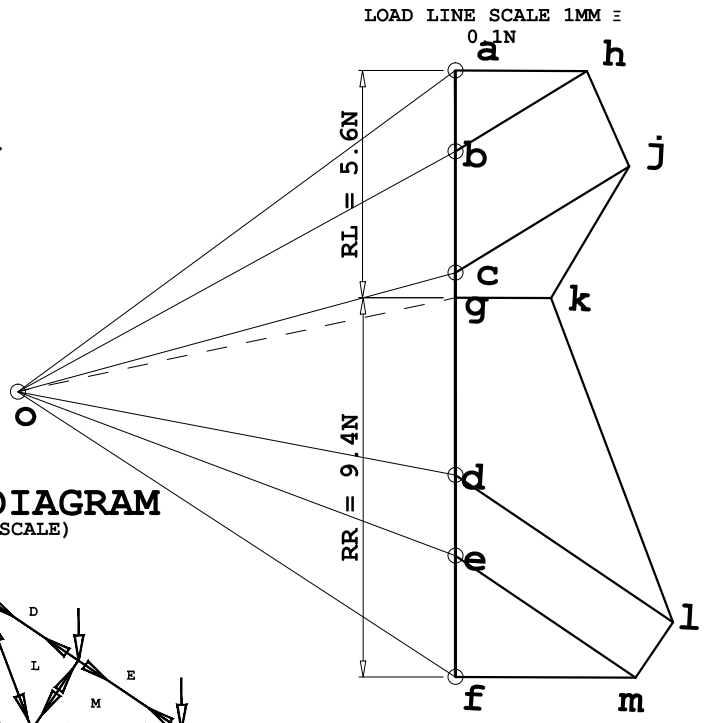
SPACE DIAGRAM

SCALE 1MM ≡ 1MM



POLAR DIAGRAM

LOAD LINE SCALE 1MM ≡ 0.1N



STRESS DIAGRAM

(NOT ON SCALE)

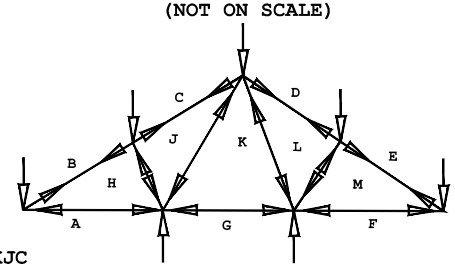
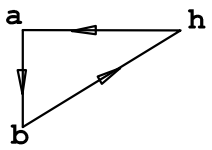


TABLE OF RESULTS

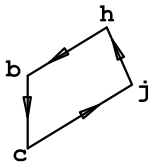
MEMBER	BH	CJ	DL	EM	FM	GK	AH	HJ	JK	KL	LM
MAGNITUDE (N)	3.8	5.0	6.5	5.4	4.5	2.4	3.3	2.6	3.8	8.6	1.8
STRUT					✓	✓	✓				
TIE	✓	✓	✓	✓				✓	✓	✓	✓

VECTOR DIAGRAMS

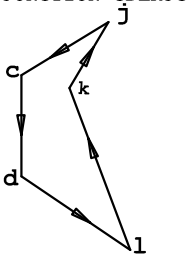
JUNCTION ABHA



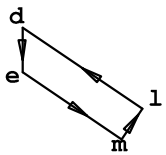
JUNCTION BCJHB



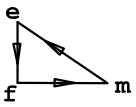
JUNCTION CDLKJC



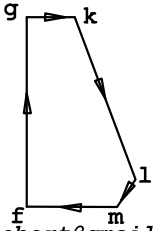
JUNCTION DEMLD



JUNCTION EFME



JUNCTION FGKLMF

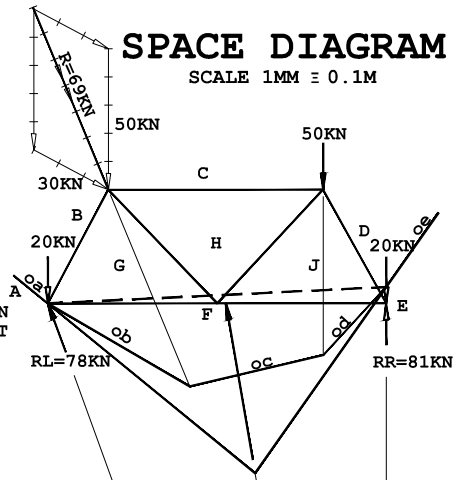


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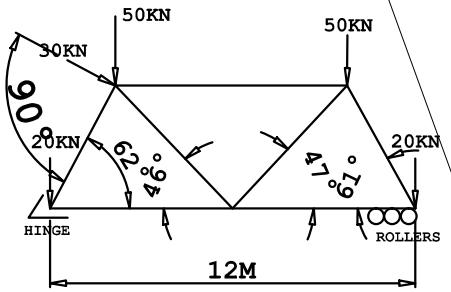
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	FORCES ON THE FRAME WORK OVERHANGING THE REACTIONS 2.17	Constructing the space diagram, polar diagram, bending moment diagram and finally the vector diagram	The polar point should be put on the LEFT of the load line to avoid it interfering with the vector diagram.

SPACE DIAGRAM

SCALE 1MM ≡ 0.1M

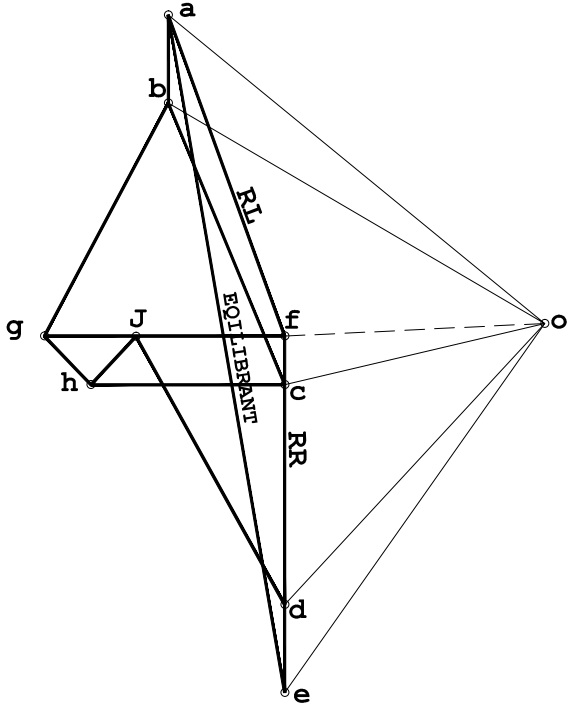


SINCE THIS REACTION IS AT AN ANGLE PLOT THE LINK POLYGON STARTING FROM THIS POINT

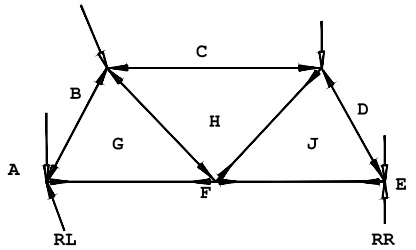


POLAR DIAGRAM

LOAD LINE SCALE 1MM ≡ 1KN

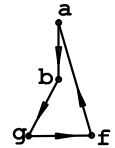


STRESS DIAGRAM

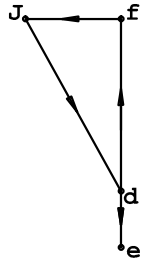


VECTOR DIAGRAMS

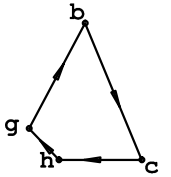
JUNCTION ABGFA



JUNCTION DEFJD



JUNCTION BCHGB



JUNCTION CDJHC

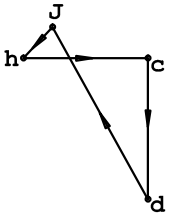
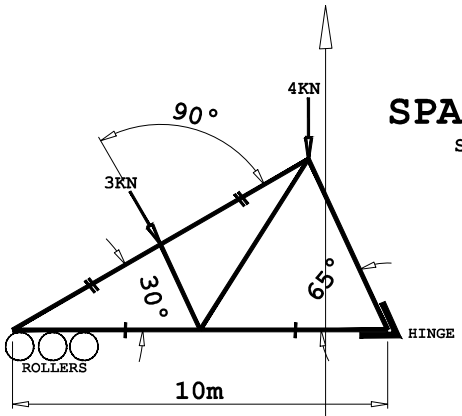


TABLE OF RESULTS

MEMBER	BG	GH	HJ	DJ	CH	JF	GF
MAGNITUDE (KN)	60	15	15	70	44	34	55
STRUT	✓	✓		✓	✓		
TIE			✓			✓	✓

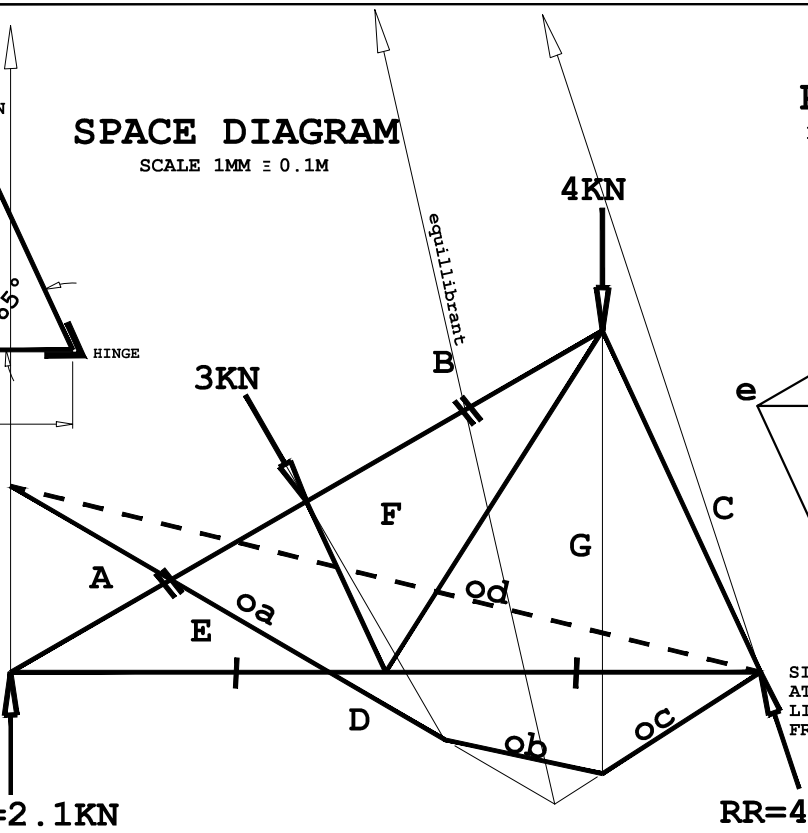
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	WIND LOADS ACTING ON A FRAME WORK 2.18	The load line has both the dead and wind loads therefore it cant be a straight line as in the previous examples.	The extension of RL and RR meet at the same point with the equilibrant.



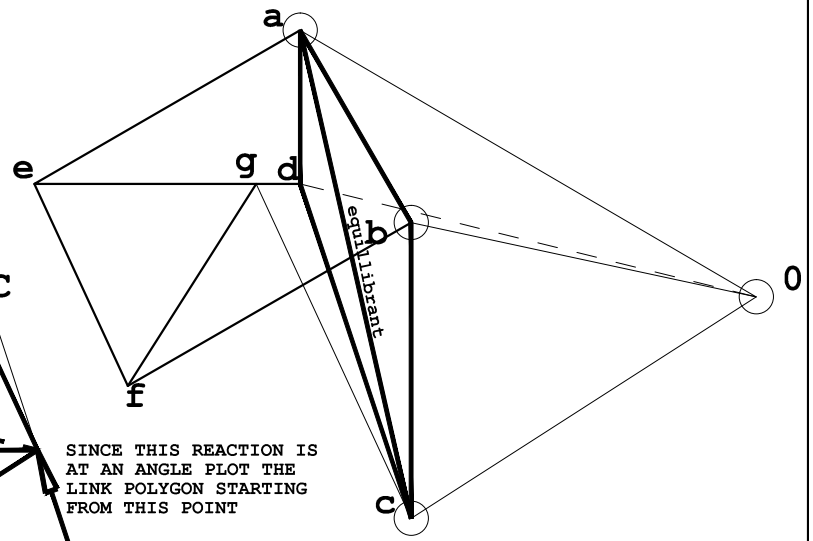
SPACE DIAGRAM

SCALE 1MM ≡ 0.1M



POLAR DIAGRAM

LOAD LINE SCALE 1MM ≡ 1KN



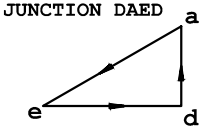
SINCE THIS REACTION IS AT AN ANGLE PLOT THE LINK POLYGON STARTING FROM THIS POINT

TABLE OF RESULTS

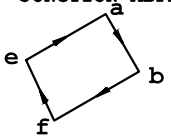
MEMBER	AE	BF	CG	DG	DE	EF	FG
MAGNITUDE (KN)	4.1	4.4	5.0	0.6	3.6	3.0	3.2
STRUT	✓	✓	✓			✓	
TIE				✓	✓		✓

VECTOR DIAGRAMS

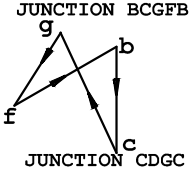
JUNCTION DAED



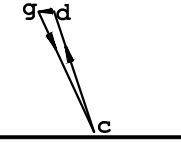
JUNCTION ABFEA



JUNCTION BCGFB

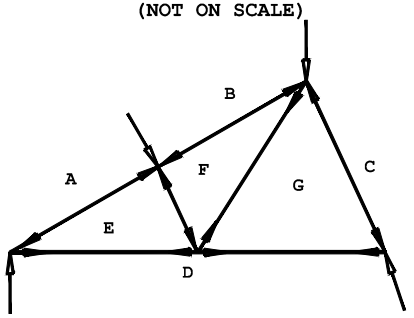


JUNCTION CDGC



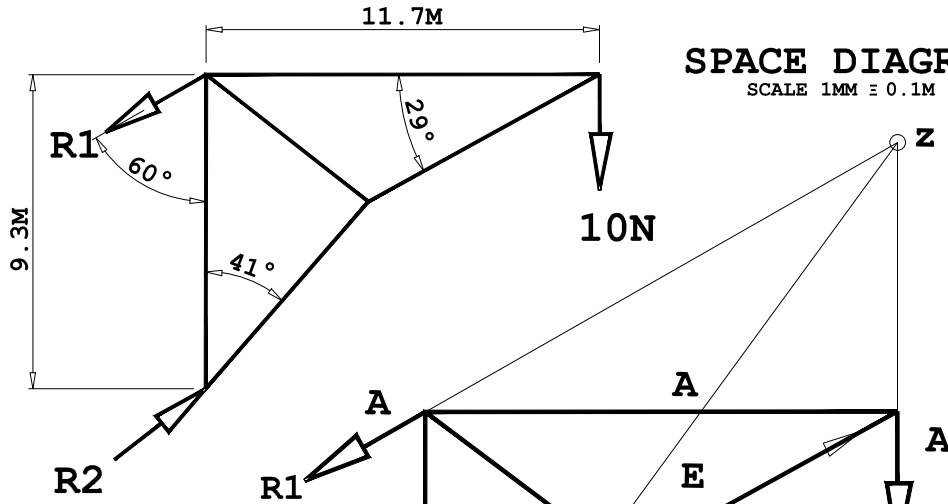
STRESS DIAGRAM

(NOT ON SCALE)



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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	WIND LOADS ACTING ON A FRAME WORK 2.19	The load line has both the dead and wind loads therefore it cant be a straight line as in the previous examples.	The extension of RL and RR meet at the same point with the equilibrant.



SPACE DIAGRAM

SCALE 1MM ≡ 0.1M

VECTOR DIAGRAM

LOAD LINE SCALE 1MM ≡ 0.1N

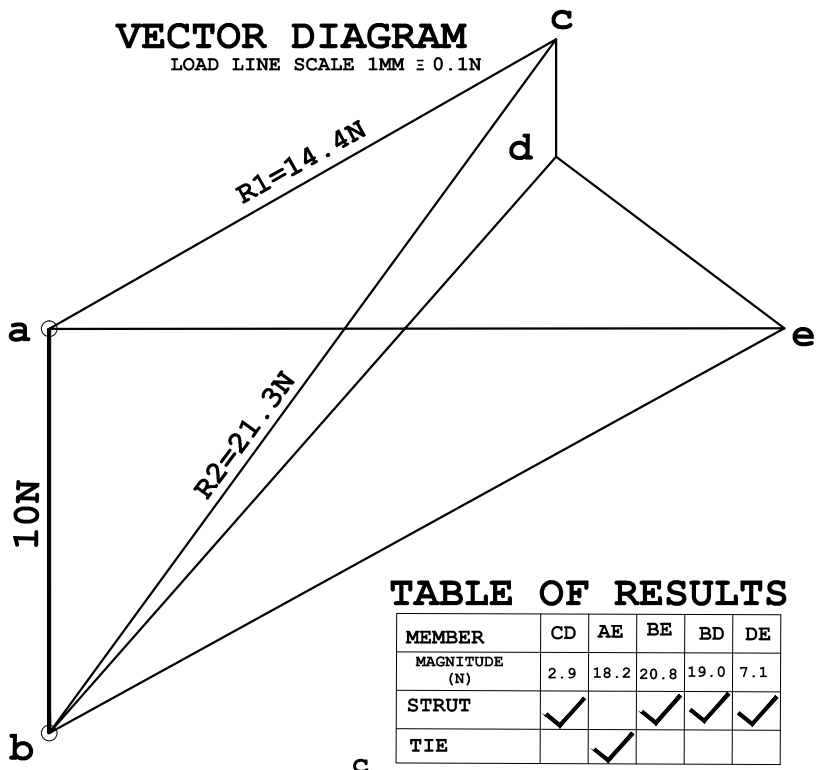
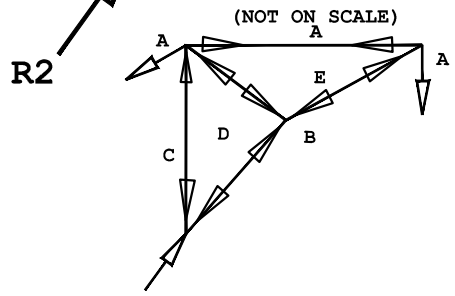


TABLE OF RESULTS

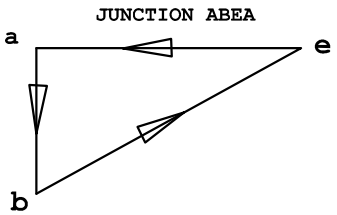
MEMBER	CD	AE	BE	BD	DE
MAGNITUDE (N)	2.9	18.2	20.8	19.0	7.1
STRUT	✓		✓	✓	✓
TIE		✓			

STRESS DIAGRAM

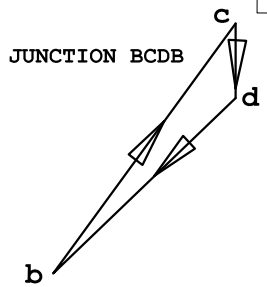
(NOT ON SCALE)



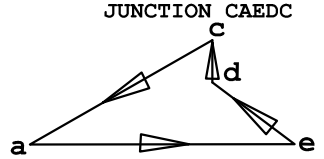
JUNCTION ABEA



JUNCTION BCDB



JUNCTION CAEDC

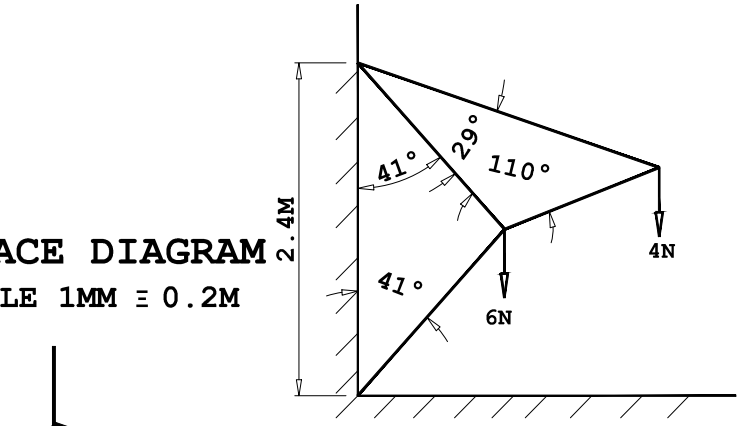


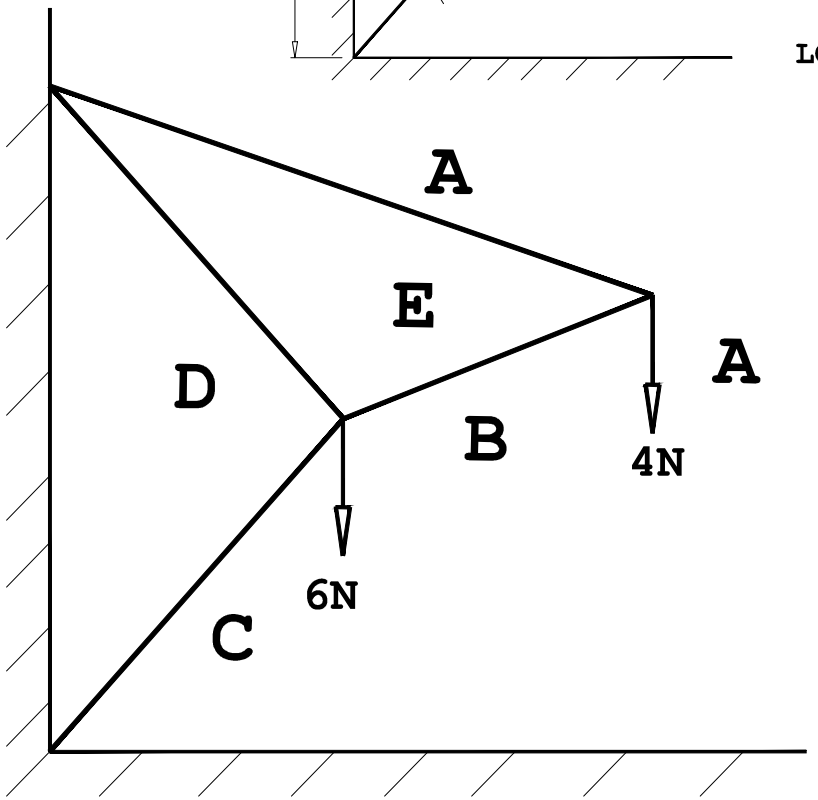
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	A CANTILEVERED FRAME WORK 2.20	Extend the given force to meet with the given reaction at point z, align the second reaction with point z and construct the vector diagram their after.	This frame work doesn`t require the use of the polar diagram and the link polygon.

SPACE DIAGRAM

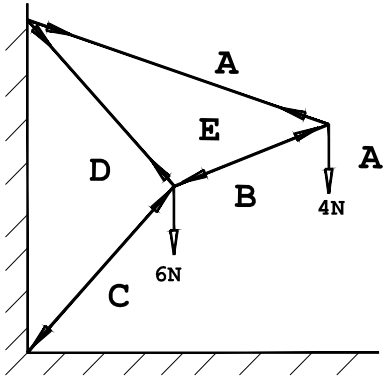
SCALE 1MM ≡ 0.2M





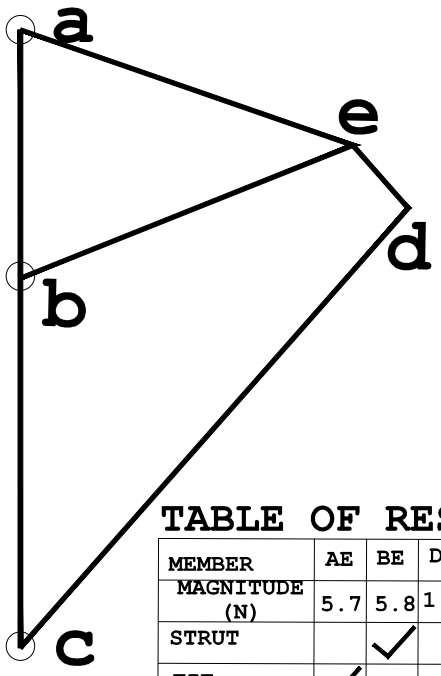
STRESS DIAGRAM

(NOT ON SCALE)

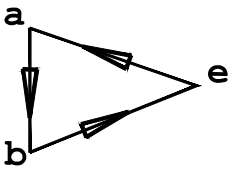


VECTOR DIAGRAM

LOAD LINE SCALE 1MM ≡ 0.1N



JUNCTION ABEA



JUNCTION BCDEB

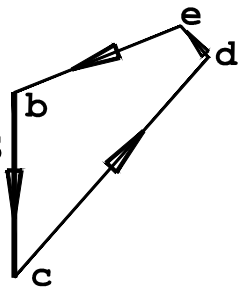


TABLE OF RESULTS

MEMBER	AE	BE	DE	DC
MAGNITUDE (N)	5.7	5.8	1.4	9.5
STRUT		✓		✓
TIE	✓		✓	

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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
VECTORS IN FORCES	A CANTILEVERED FRAME WORK 2.21	Construct the space diagram followed by the vector diagram	This frame work doesn`t require the use of the polar diagram and the link polygon.

KEY POINTS TO ANSWERING SCENARIOS OF TOPIC 5

When answering a scenario test item on vector geometry, the learner must begin with a focused introduction identifying the force system (concurrent or non-concurrent), explaining the purpose of graphical force analysis to determine unknown forces, reactions, or equilibrium conditions, and stating the method including Bow's notation and vector polygon construction. The essential materials, tools, and equipment include a drawing board, T-square, scale ruler, set squares, pencils, eraser, A3 paper, protractor, compasses, and a calculator for checking mathematical relationships. Health and safety awareness requires proper posture, careful handling of instruments, clean work surface, adequate lighting, and proper storage of instruments. The operational procedure involves identifying all forces and drawing an accurate space diagram, applying Bow's notation consistently, choosing an appropriate scale, constructing the vector polygon head-to-tail, determining the resultant or equilibrant, analyzing truss members to identify compression and tension, calculating reactions at supports using equilibrium equations, constructing shear force diagrams, and constructing bending moment diagrams while identifying points of maximum shear and moment. Maintenance recommendations include regular checking and calibration of scale rules and protractors, proper storage of instruments, cleaning of drawing surfaces, periodic checking of vector polygon closures, and safe handling of completed diagrams. Evaluation assesses whether the force analysis correctly determines all unknown forces and reactions, the vector polygon closes properly for equilibrium, compression and tension members are correctly identified, scales are used consistently, and shear force and bending moment diagrams accurately represent loading conditions. In conclusion, the learner has successfully analyzed forces graphically by applying fundamental vector geometry principles, and the completed analysis, characterized by accuracy, neat presentation, and clear labelling, enables engineers and designers to verify structural stability, identify critical loading conditions, and make informed decisions about member sizing and reinforcement, confirming fitness for purpose in guiding structural analysis and design decisions.

TOPIC 6: INTERSECTION OF SOLIDS

Competency

Learners determine curves and lines of intersection accurately.

Teaching Focus

Emphasize

- identification of penetrating solids
- selection of suitable sectioning methods
- transfer of points
- smooth joining of curves
- visibility.

Assessment Checklist

Observe whether learners

✓ identify correct generators

✓ locate all points

✓ transfer points accurately

✓ join curves smoothly

✓ distinguish visible and hidden portions.

Common Misconceptions

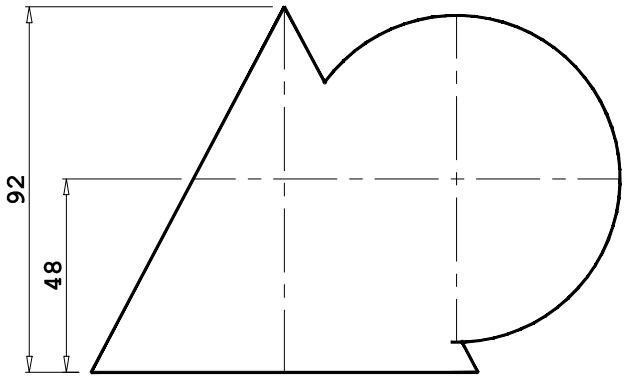
Learners often

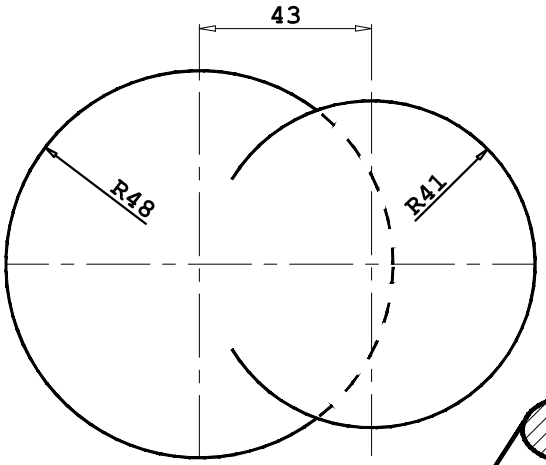
- miss intersection points
- transfer points wrongly
- join points irregularly
- confuse auxiliary and sectioning methods.

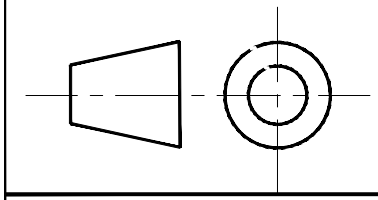
Marking Guide

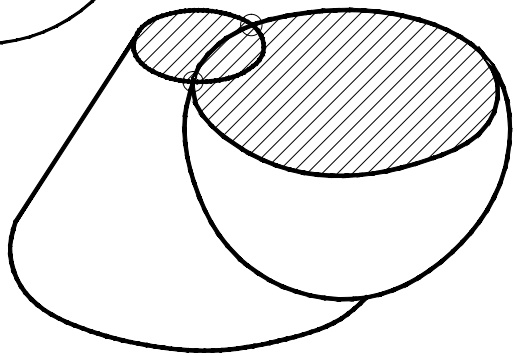
Marks should be awarded for

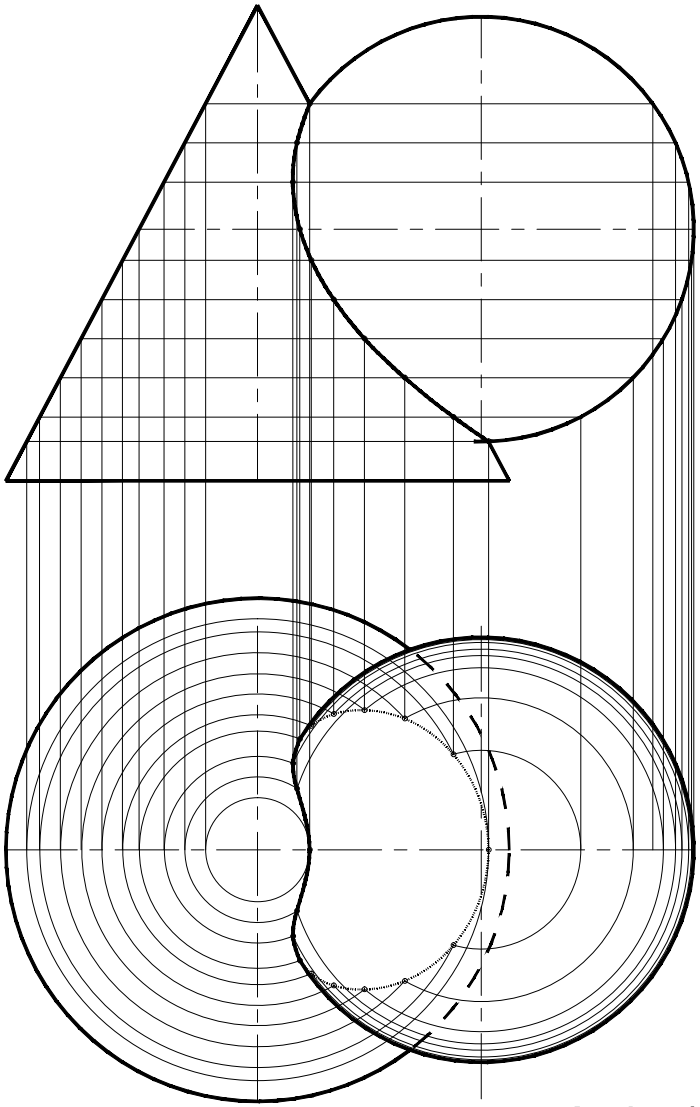
- construction procedure
- accuracy
- visibility
- completeness
- neatness.





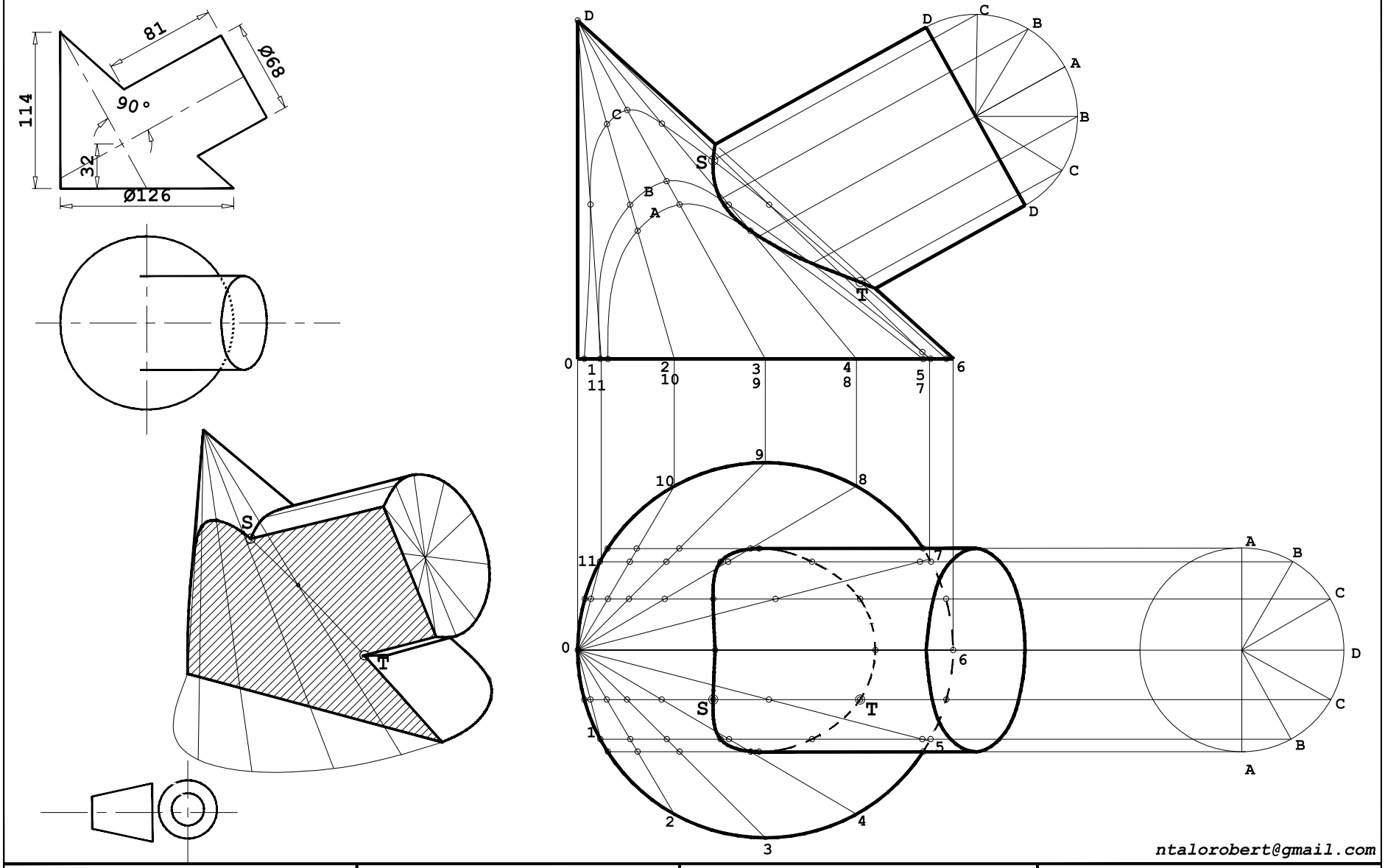






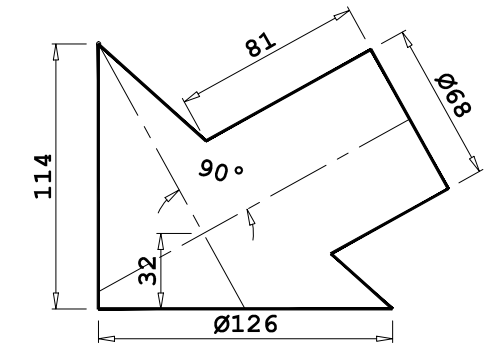
ntalorobert@gmail.com

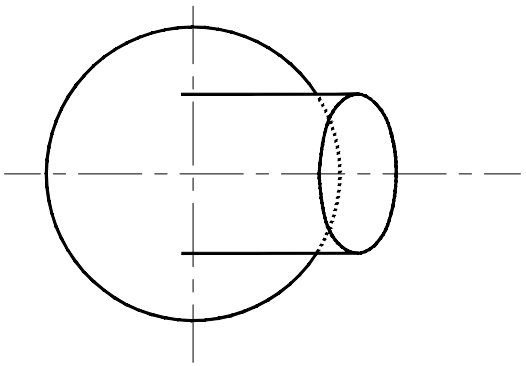
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	CONE AND SPHERE 11.1	Fixing rings on the surface of both cone and sphere, use several horizontal sections to get the points where the cut surface of cone meets the cut surface of the sphere at all the sections.	Horizontal sectioning can be substituted for vertical sectioning in this case.

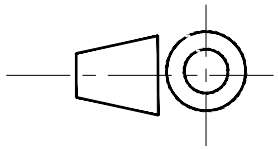


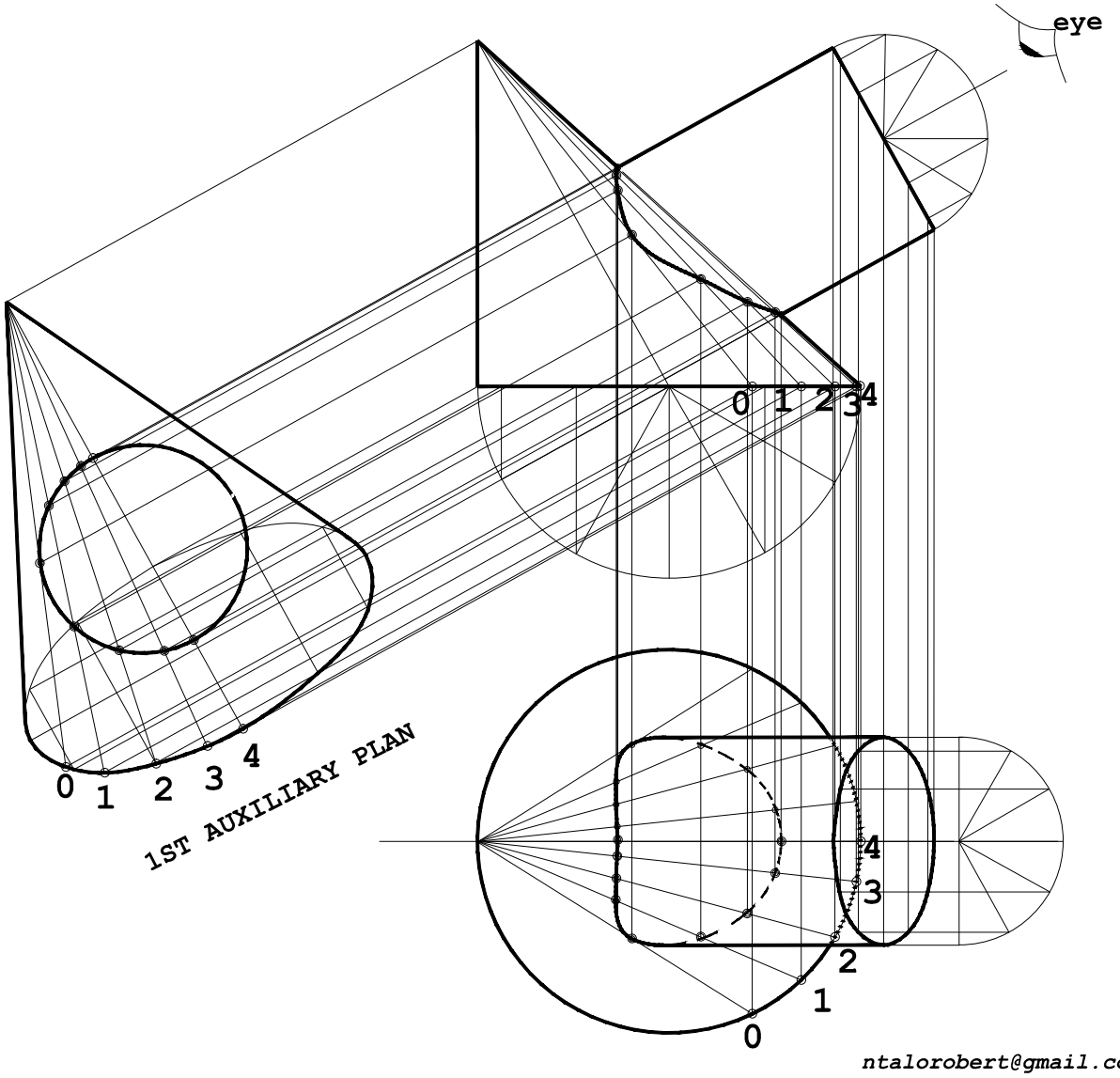
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	OBLIQUE CONE AND CYLINDER 11.2	Fix radial lines on the surface of the oblique cone and the twelve lines on the surface of the cylinder. The lines from the cylinder cut the cone vertically at different sections.	The curve of intersection comes as a result of connecting the different points of contact between The two surfaces. the auxiliary method can also work out this with ease.



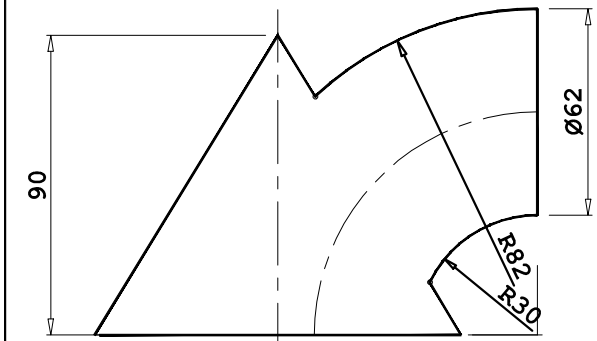


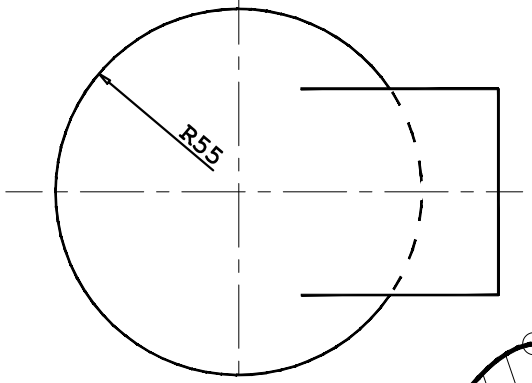


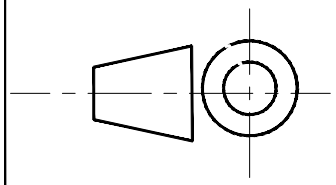


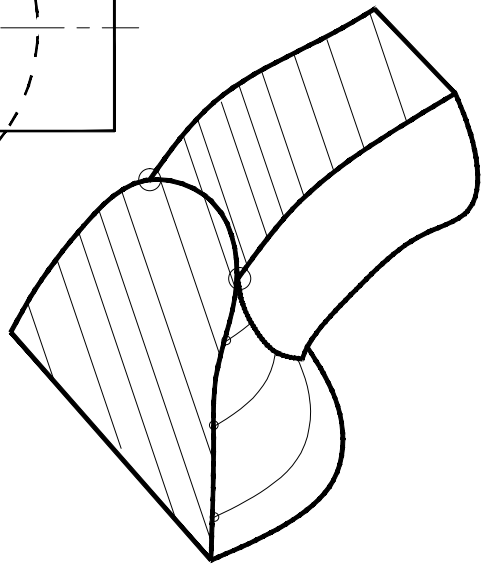
ntalorobert@gmail.com

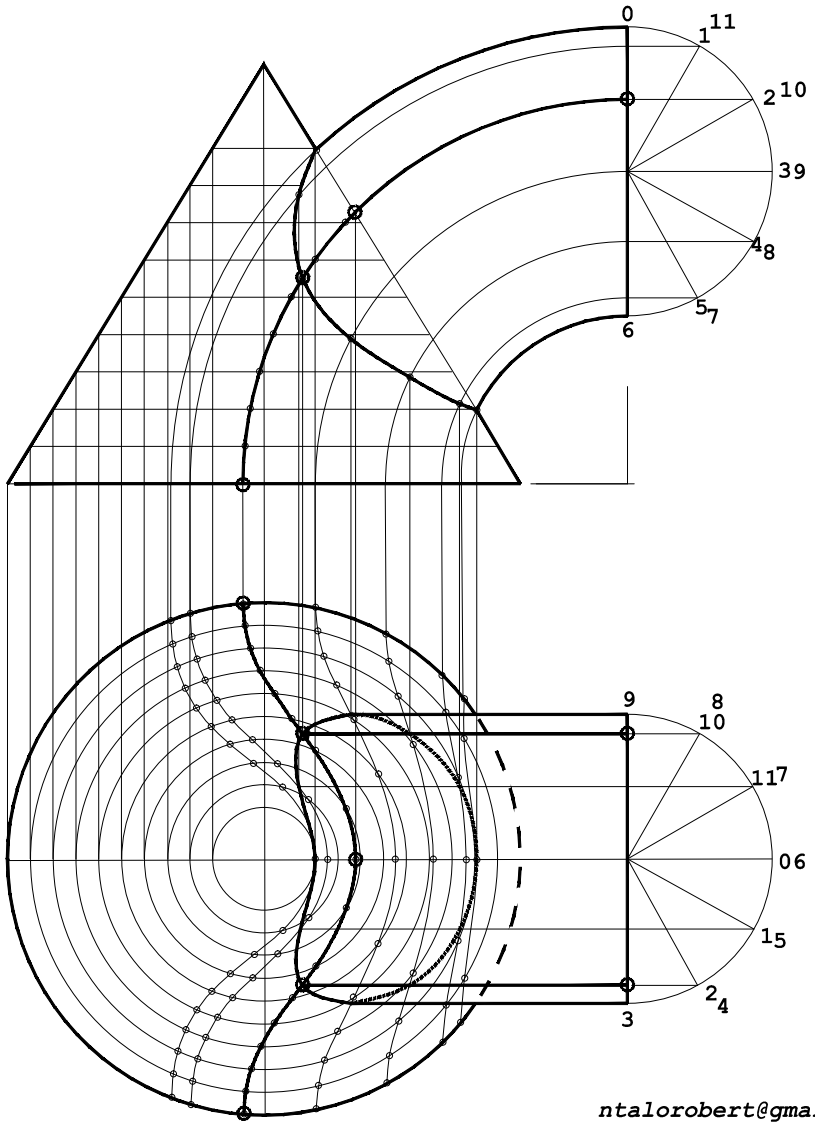
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	OBLIQUE CONE AND CYLINDER 11.3	Use the auxiliary projection in the direction of the eye to see the cylinder as a circle, Fix the radial lines on the surface of the cone to run througth the circle(cylinder).	The radial lines runing through the circle(cylinder) in the auxiliary view are projected back to the front and plan to plot out the curve of interpenetration.





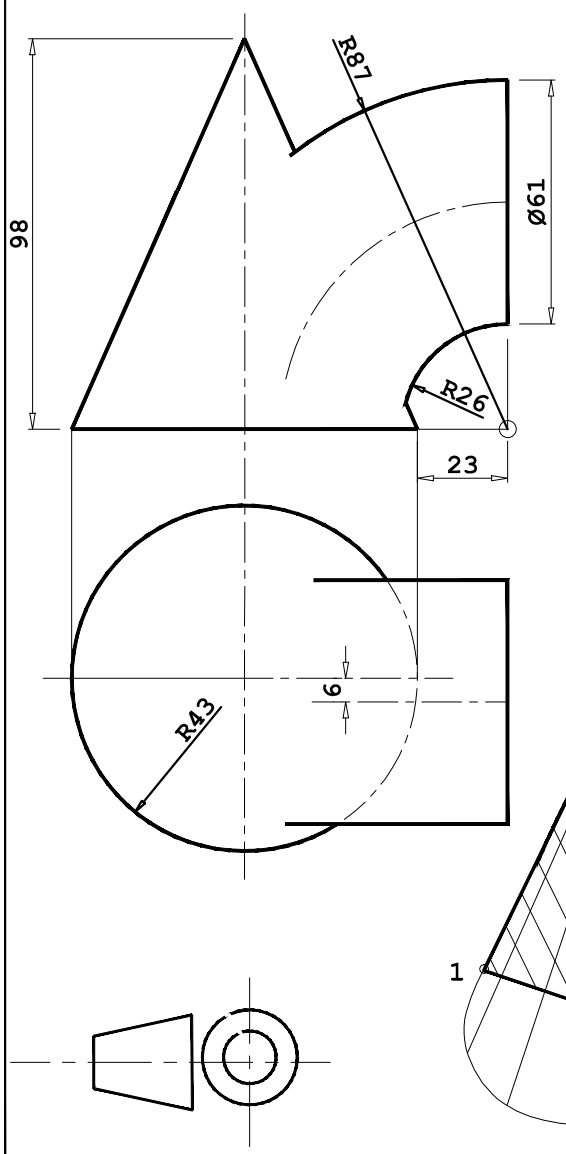


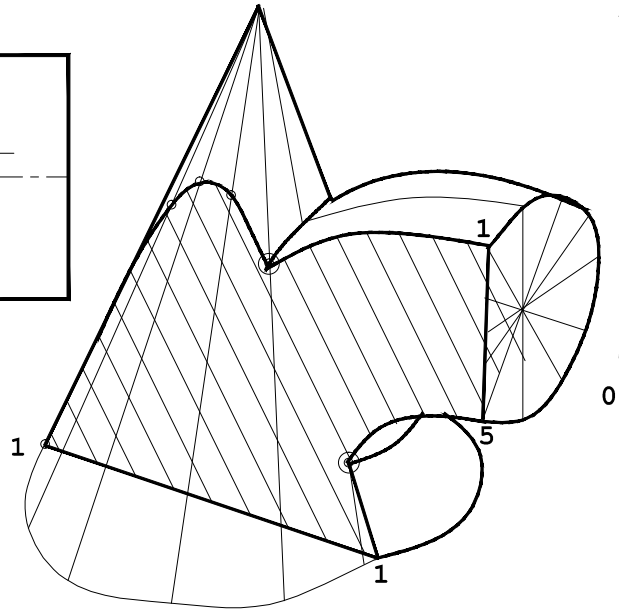


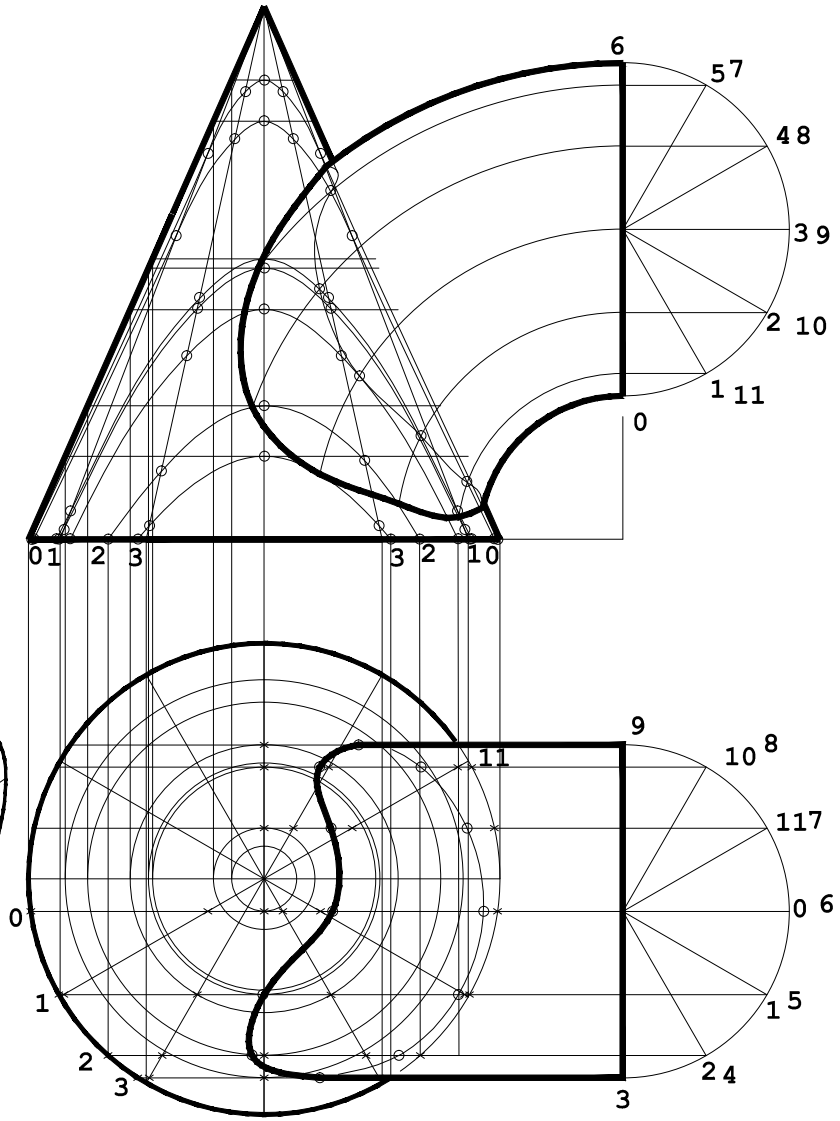


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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	CONE AND ELBOW 11.4	The lines from the elbow(bent cylinder) provides the cutting lines that cut the cone horizontal as seen, rings have been used on the surface of the cone to bring out the cut surface.	The multiple points of contact between the cut surfaces of the elbow and cone at different horizontal sections bring out the curve of interpenetration.

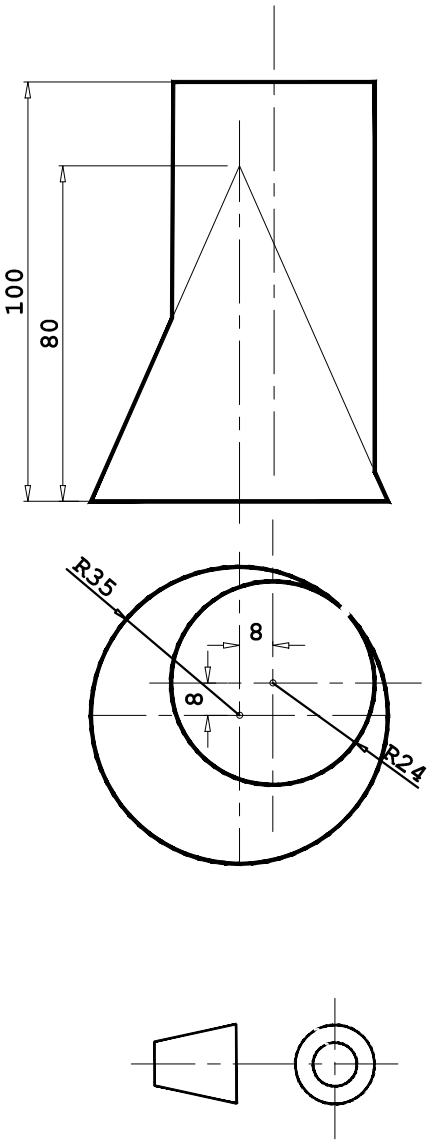


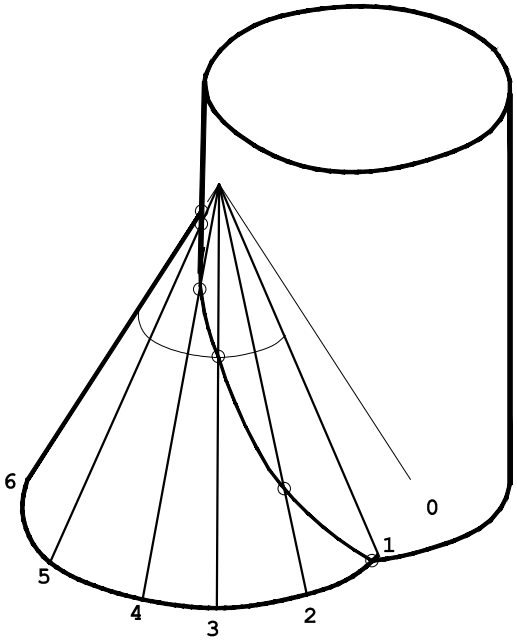


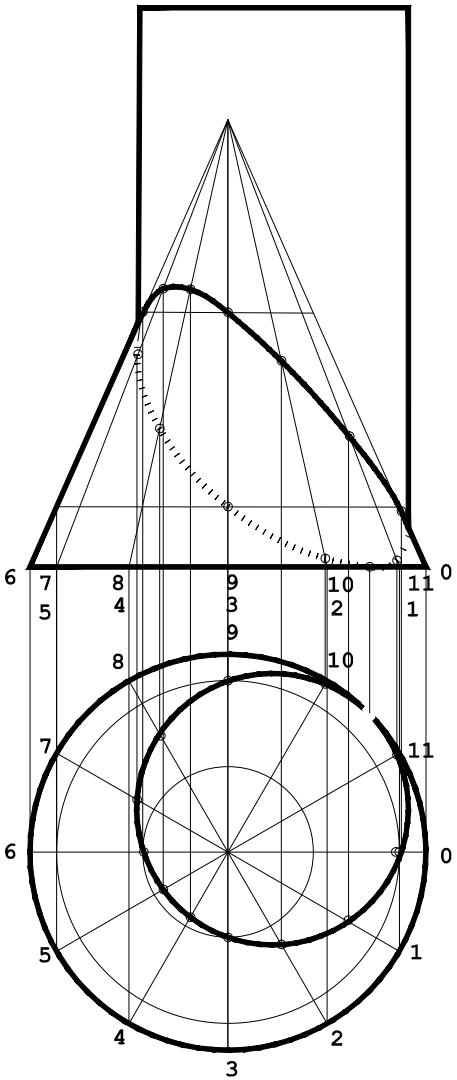


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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	CONE AND ELBOW 11.5	Fix radial lines on the surface of the cone and the twelve lines on the surface of the cylinder. The lines from the cylinder cut the cone vertically at different sections.	The curve of intersection comes as a result of connecting the different points of contact between The two cut surfaces. The auxiliary method can not work out this particular question.

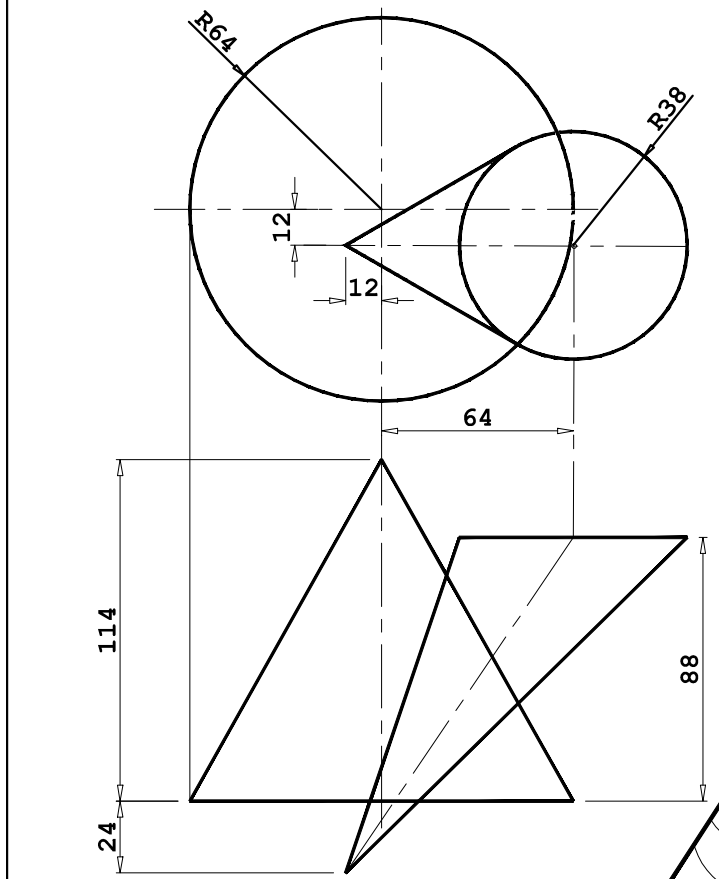




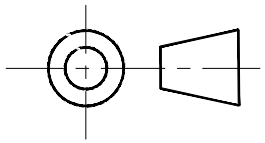


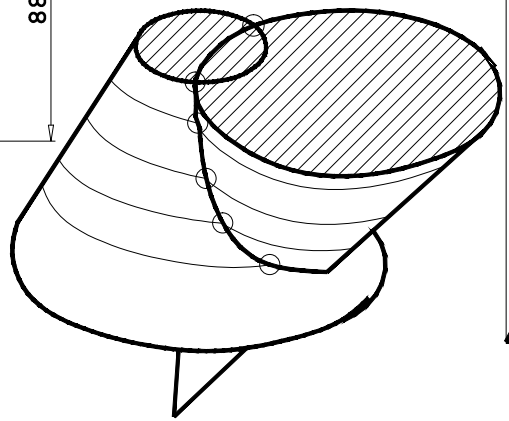
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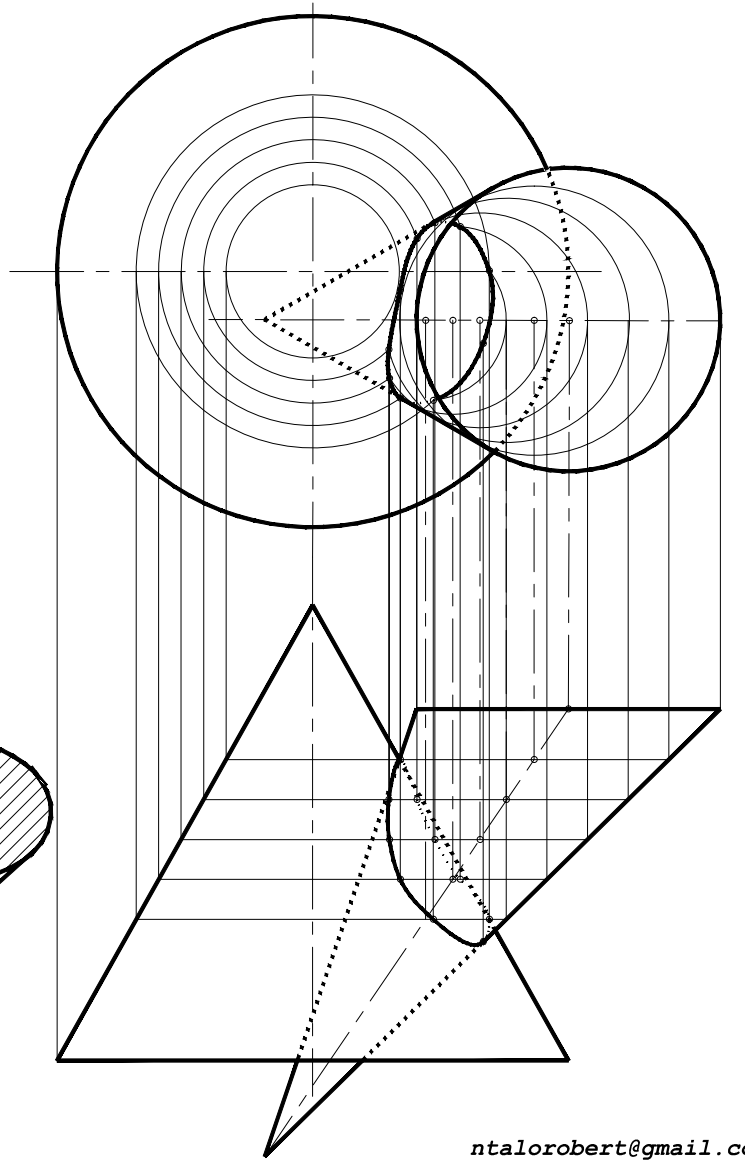
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	CONE AND CYLINDER 11.6	Fix the twelve imaginary radial lines on the surface of the cone.The points of touch of the radial lines on the plan are projected to the front to give the curve of interpenetration.	Since the cylinder is seen as a circle on the plan, so it plays a passive role in constructing out the curve of interpenetration.



NOTE:

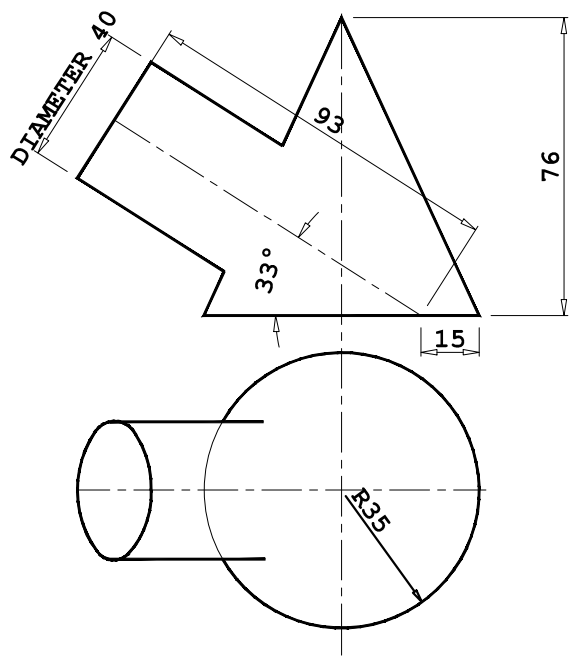


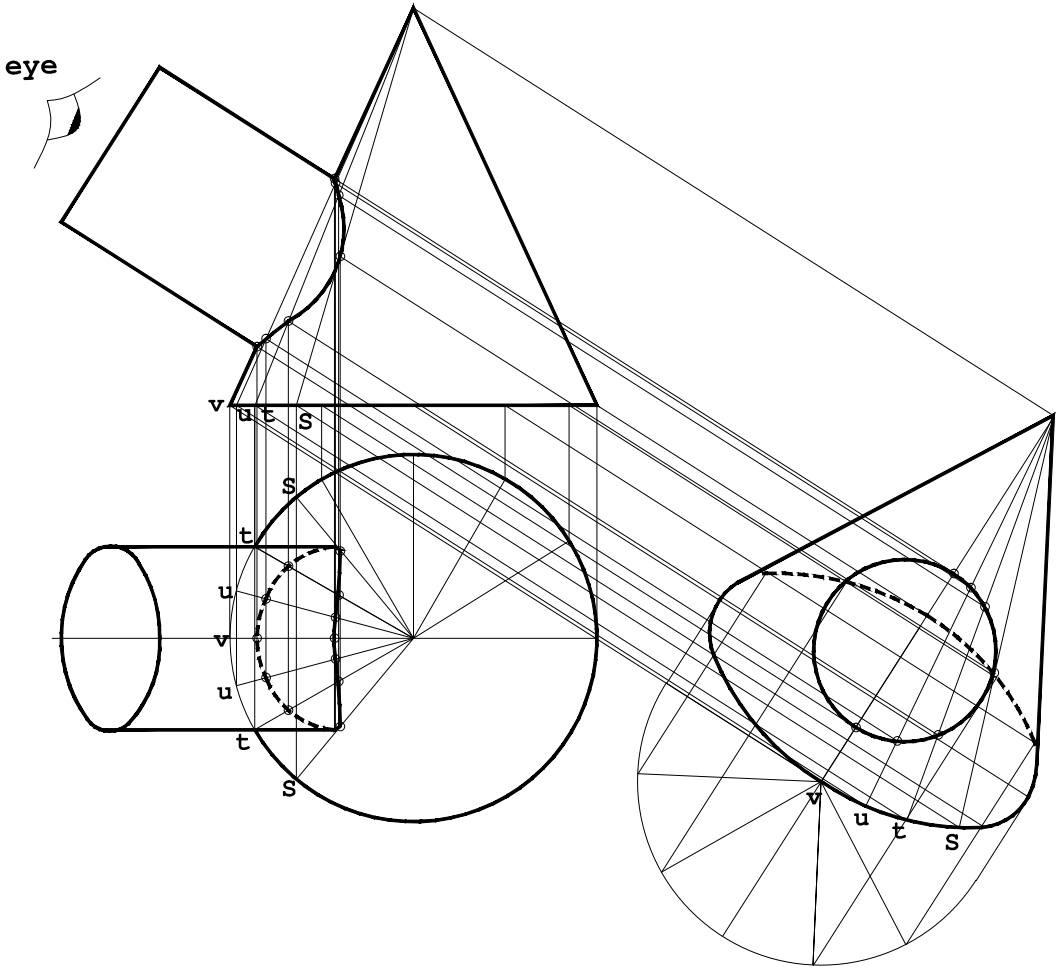


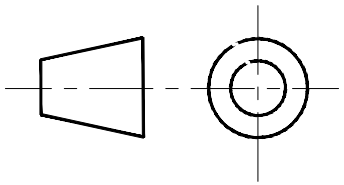


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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	CONE AND OBLIQUE CONE 11.7	Cut horizontal sections at different multiple points and note the points where the cut surfaces of both figures meet.	The curve of interpenetration is as a result of joining the points of contact of the two surfaces at the different horizontal sections.

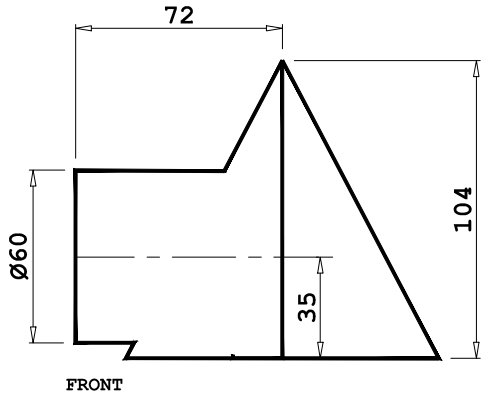


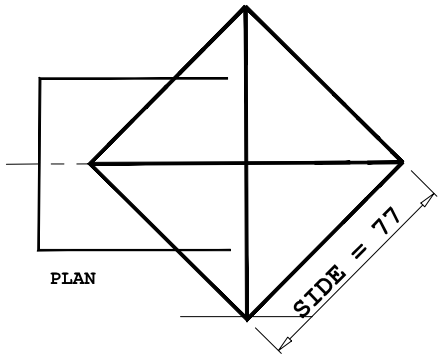


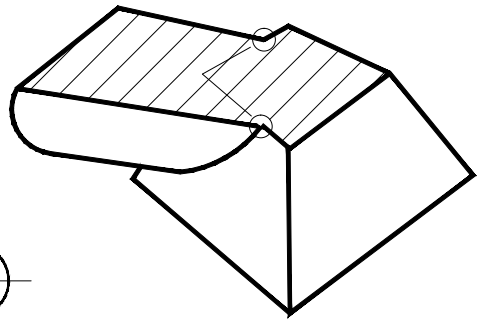


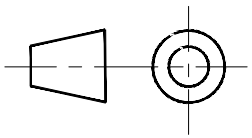
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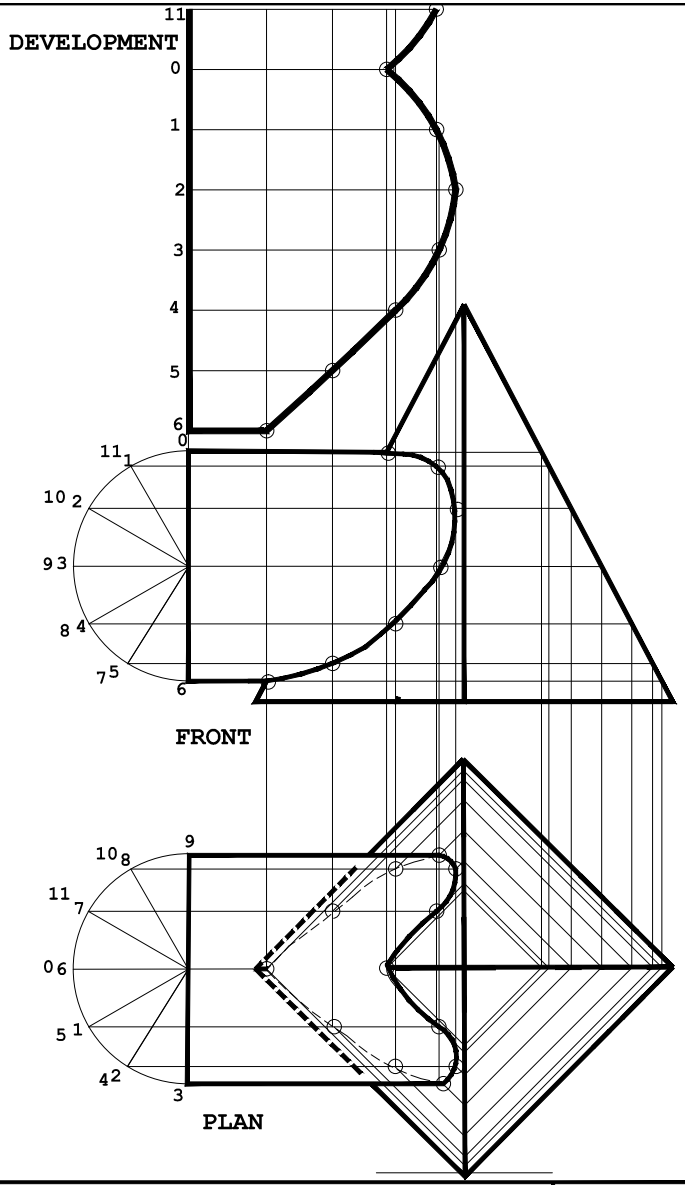
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	CONE AND CYLINDER 11.8	Use the auxiliary projection in the direction of the eye to see the cylinder as a circle, Fix the radial lines on the surface of the cone to run througth the circle(cylinder).	The radial lines runing through the circle(cylinder) in the auxiliary view are projected back to the front and plan to plot out the curve of interpenetration.





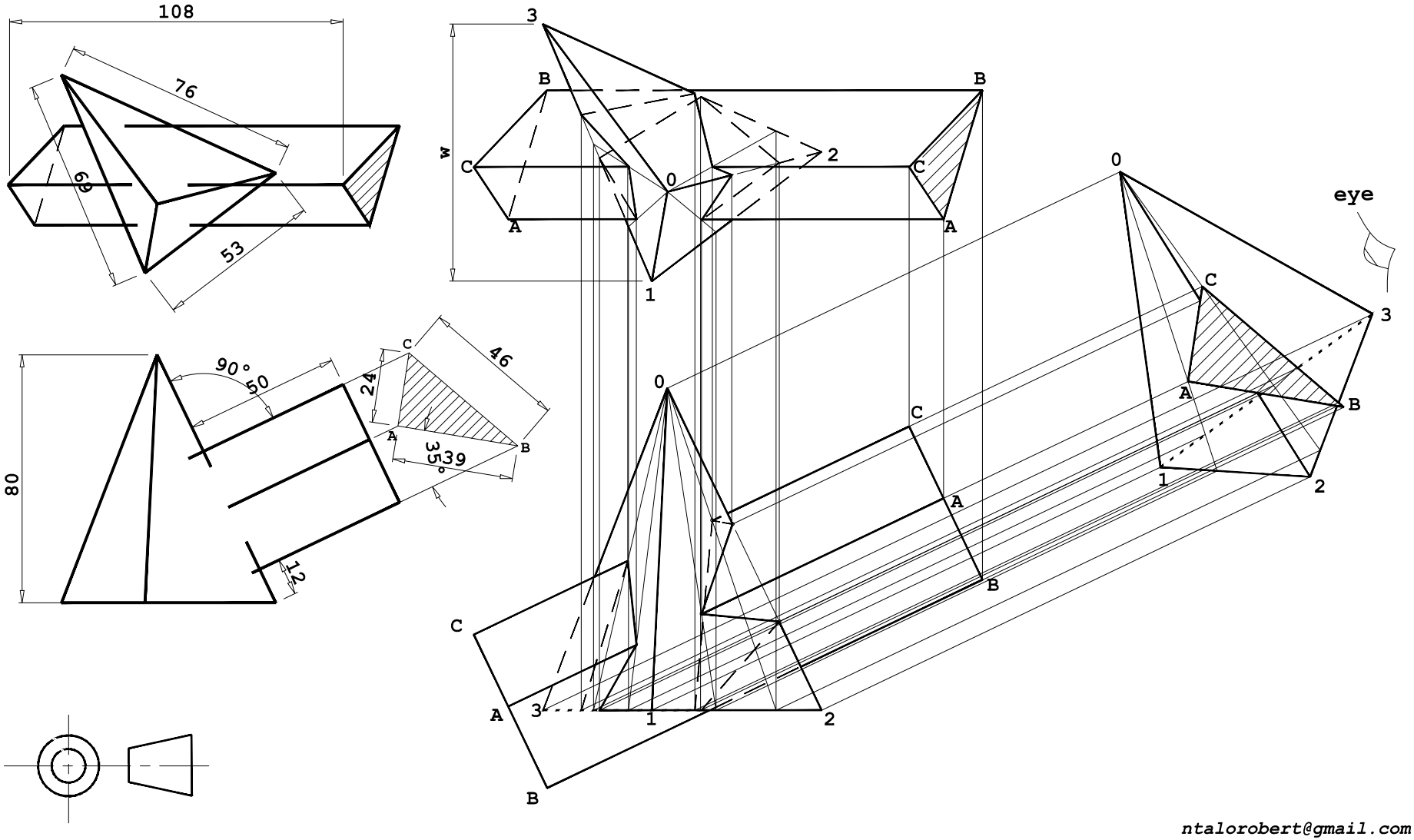






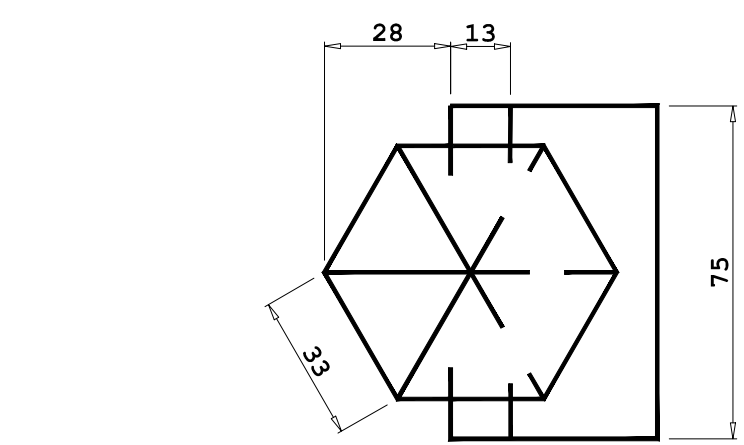
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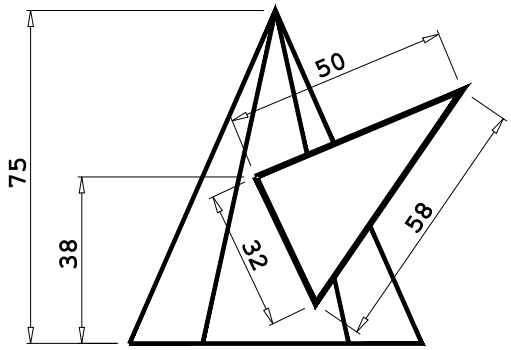
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	PYRAMID AND CYLINDER 11.9	The lines on the surface of a cylinder in the front elevation cut the pyramid horizontally at multiple sections. The meeting point of the two surface of cut will makes up the curve of interpenetration.	The horizontal sectioning in this case is more time saving than vertical sectioning.

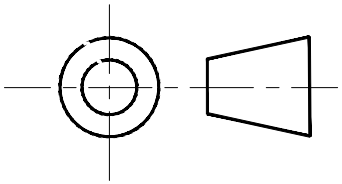


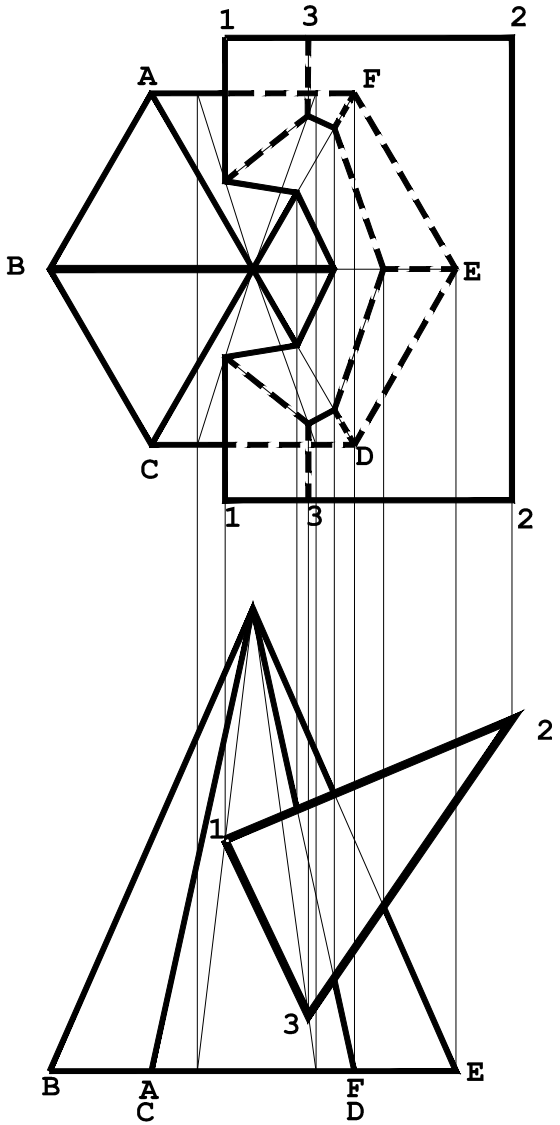
ntalorobert@gmail.com

TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	PYRAMID AND PRISM 11.10	Use the auxiliary projection in the direction of the eye to see the prism as a triangle, Fix the radial lines on the surface of the pyramid to run througth the corners of the triangle.	The radial lines runing through the corners of the triangle(prism) in the auxiliary view are projected back to the front and plan to plot out the lines of interpenetration.



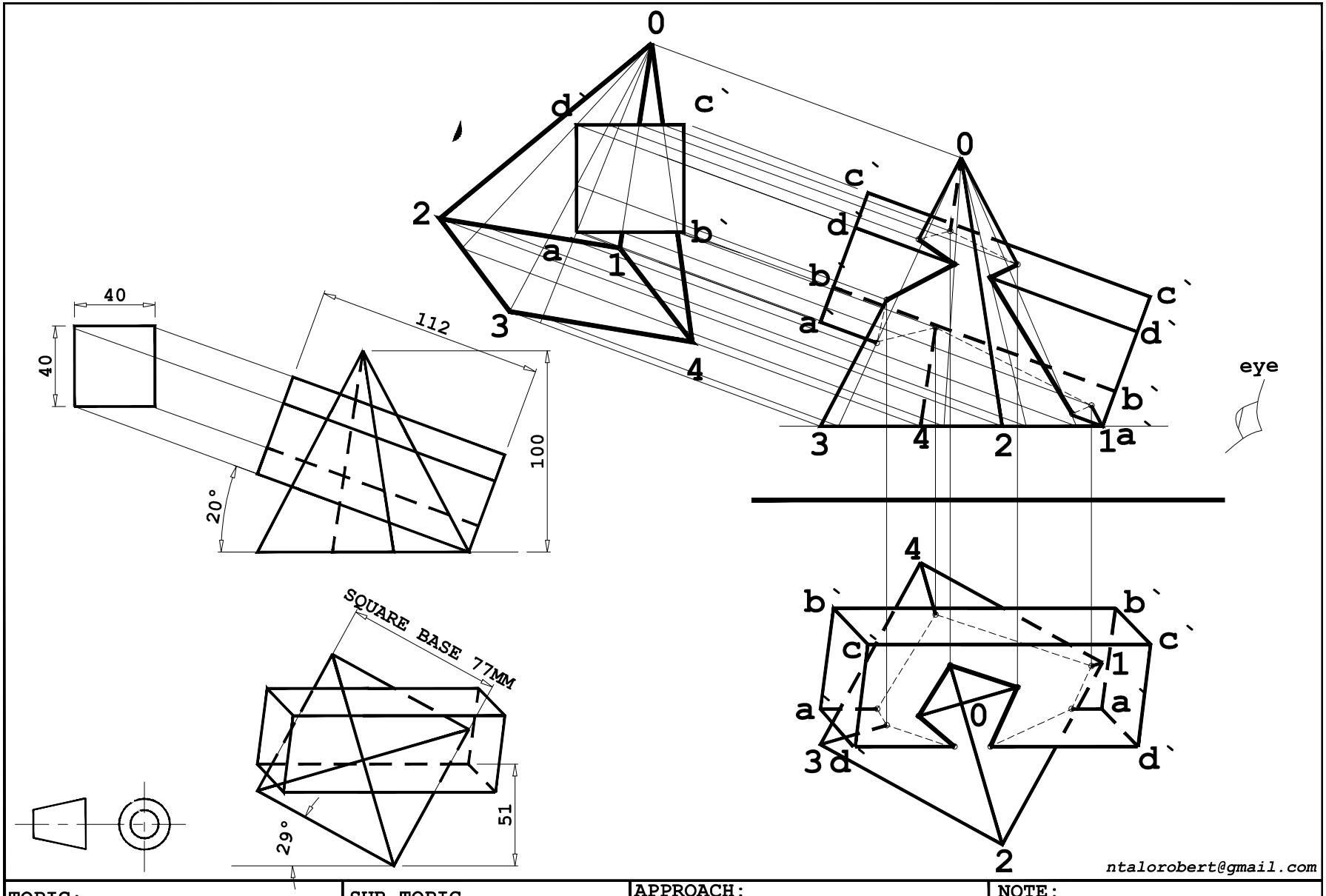






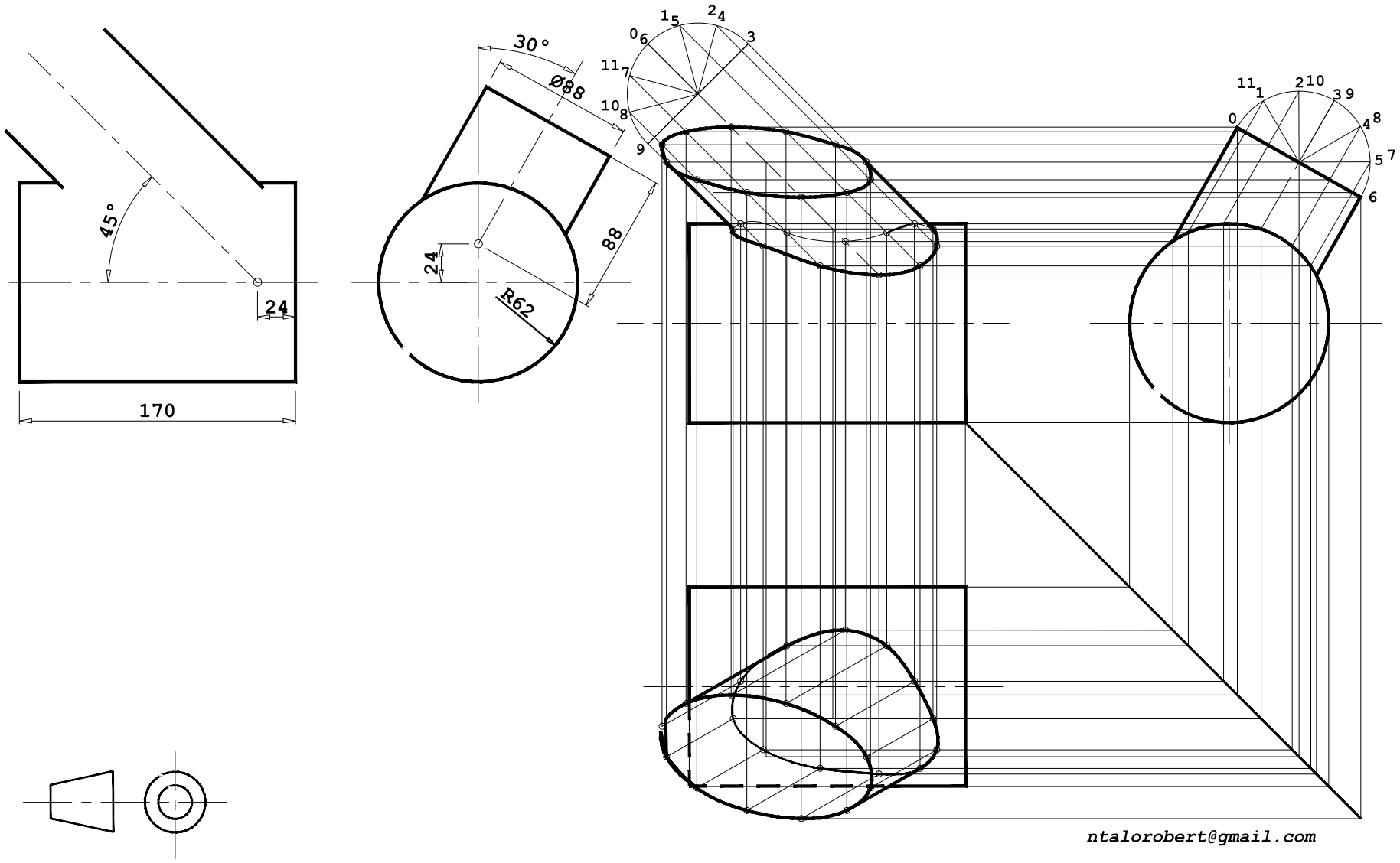
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	PYRAMID AND PRISM 11.11	Since the prism is being seen as a triangle on the plan, fix the radial lines on the surface of the pyramid to run through it and get the points of contact.	The points of contact on the radial lines in the front elevation are projected back to the plan to get the lines of interpenetration.

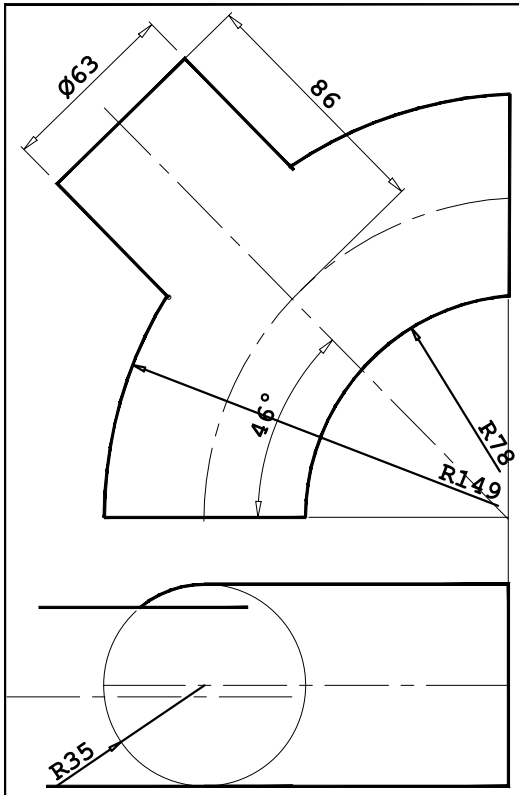


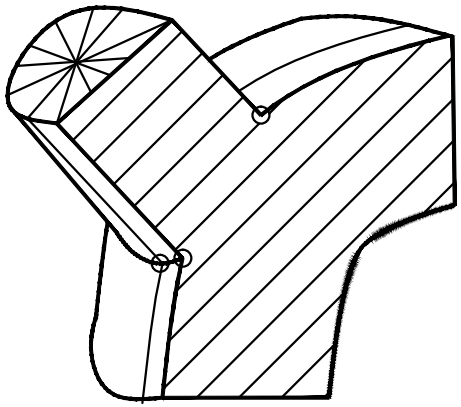
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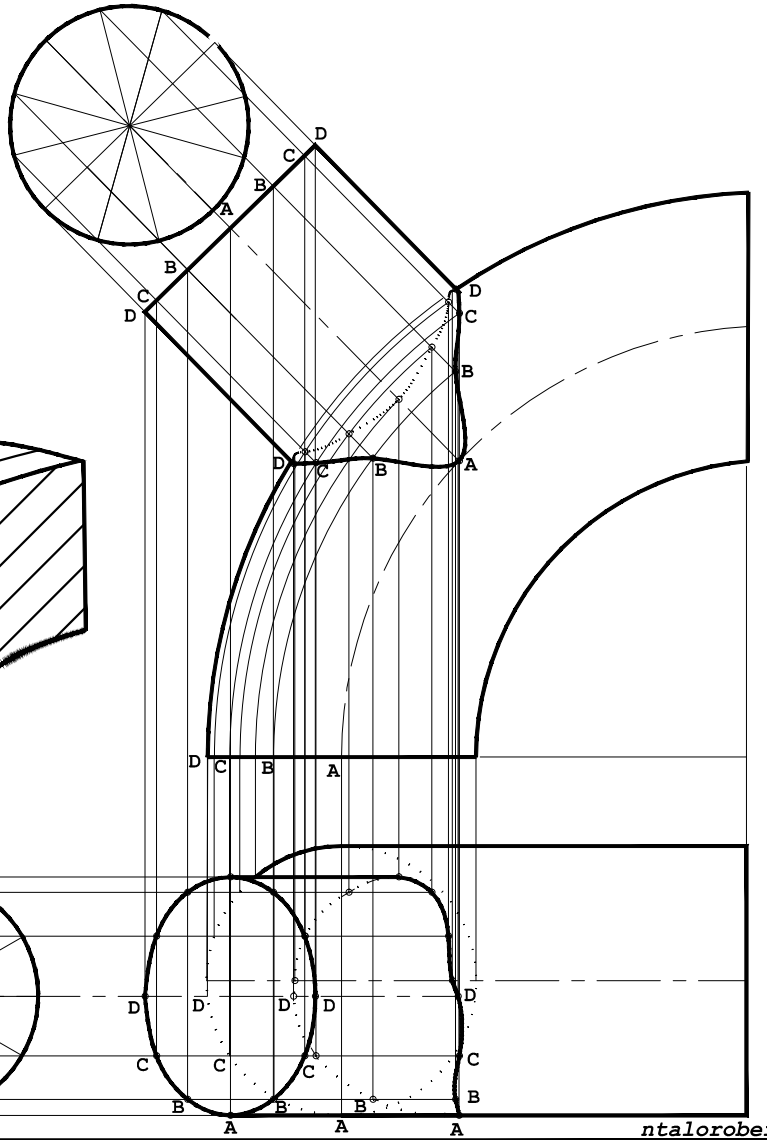
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	PYRAMID AND PRISM 11.12	Use the auxiliary projection in the direction of the eye to see the prism as a square, Fix the radial lines on the surface of the pyramid to run througth the corners of the square.	The radial lines runing through the corners of the square(prism) in the auxiliary view are projected back to the front and plan to plot out the lines of interpenetration.

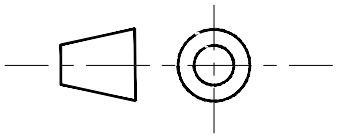


TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	CYLINDER AND CYLINDER 11.13	On the end elevation, the big cylinder is being seen as a circle, So the generators are put on the surface of the small cylinder and are terminated by the circle(surface of big cylinder)	Project the generators on the small cylinder in the end to those of the front elevation to get the curve of interpenetration.



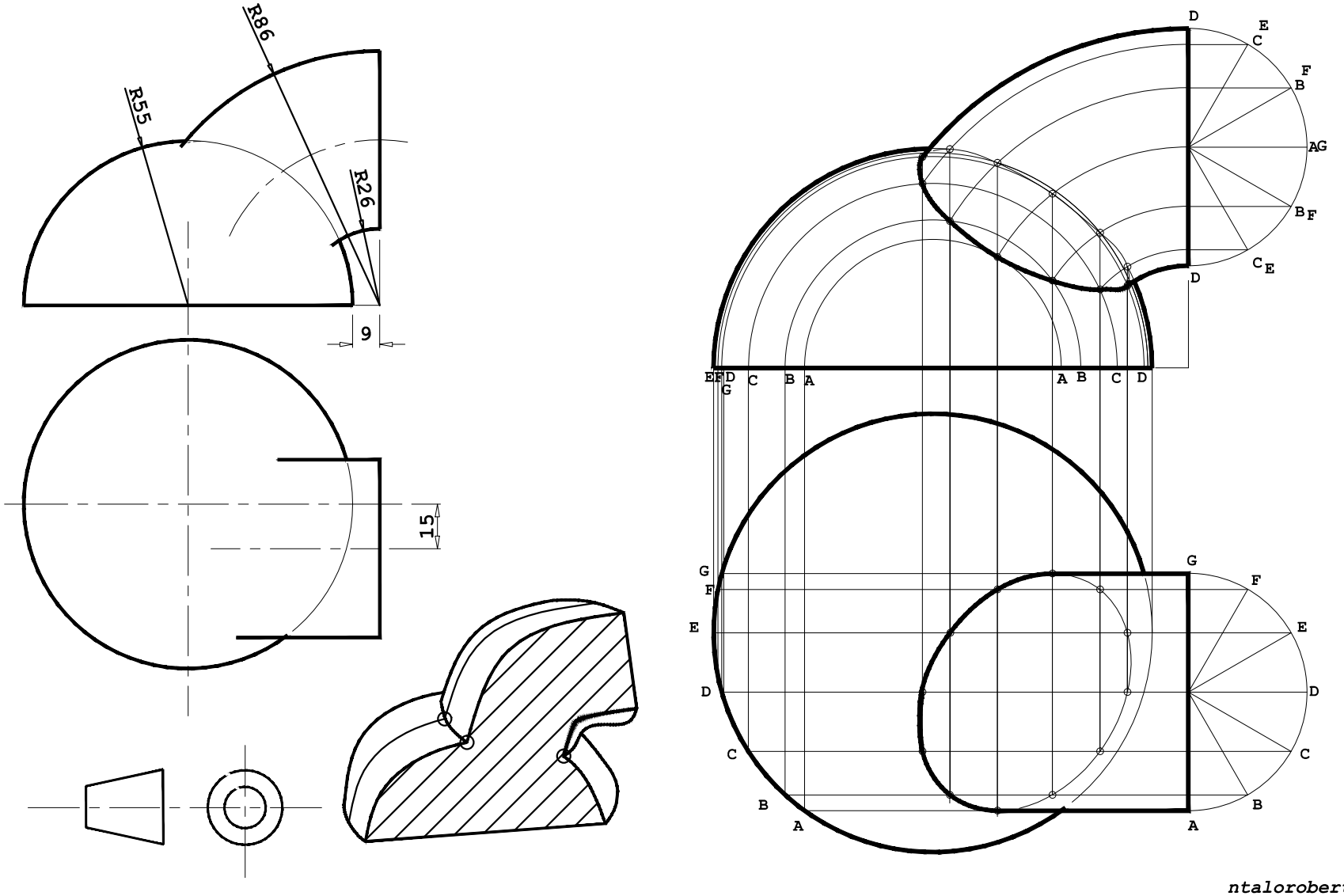






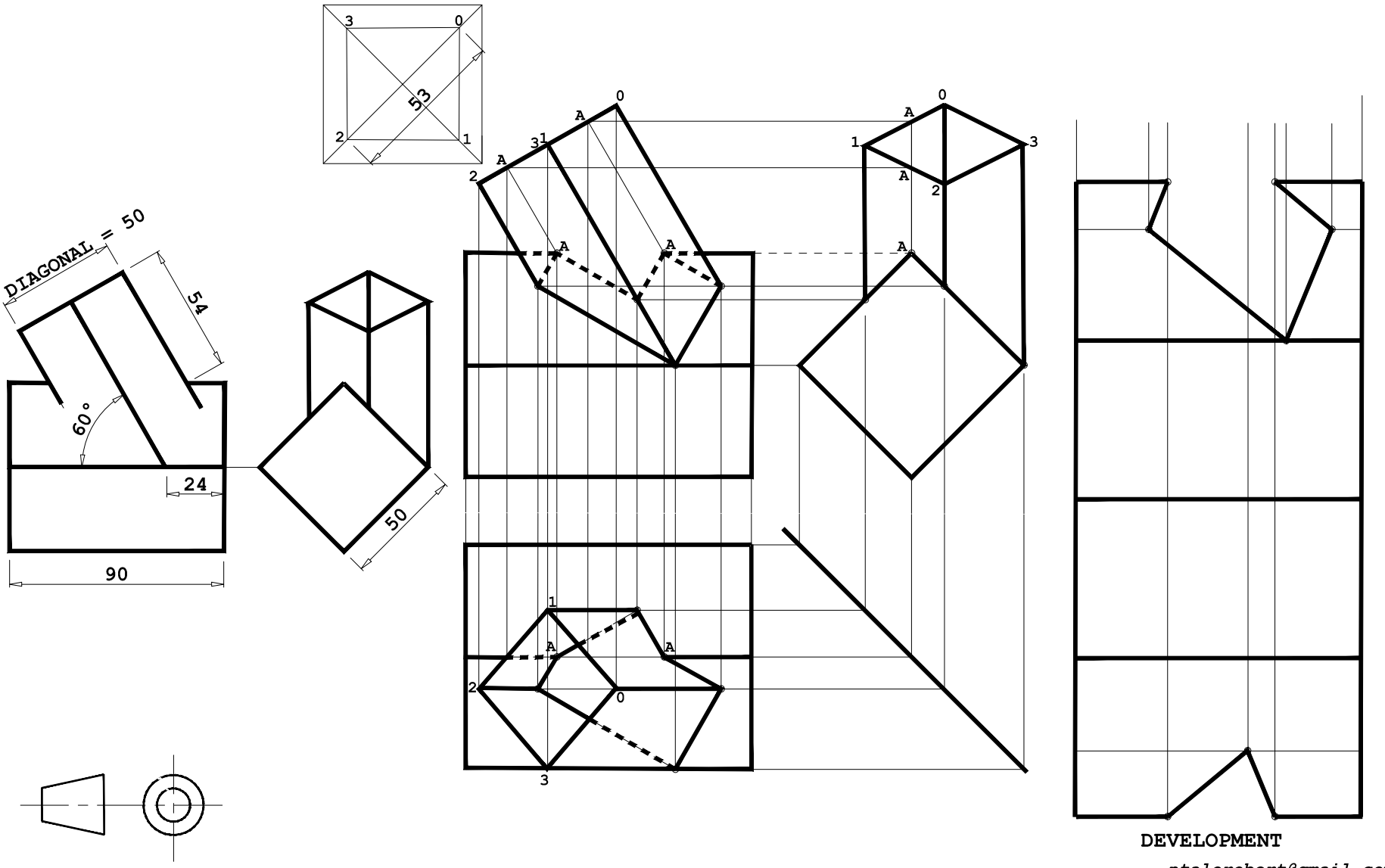
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	ELBOW AND CYLINDER 11.14	The generator lines on the cylinder cuts the elbow vertically at different sections.The points of contact between the two surfaces of cut result into the curve of interpenetration.	Alternatively the auxiliary method can be used.



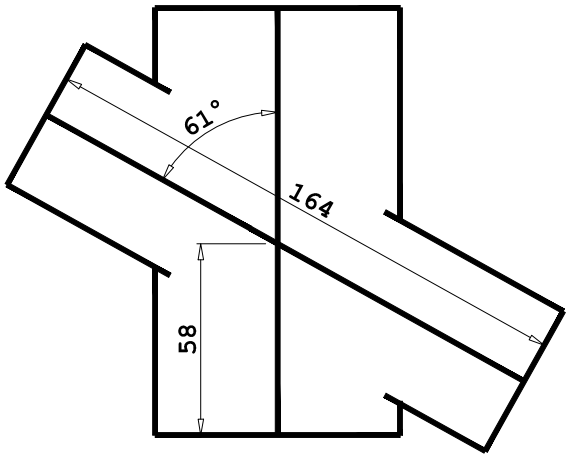
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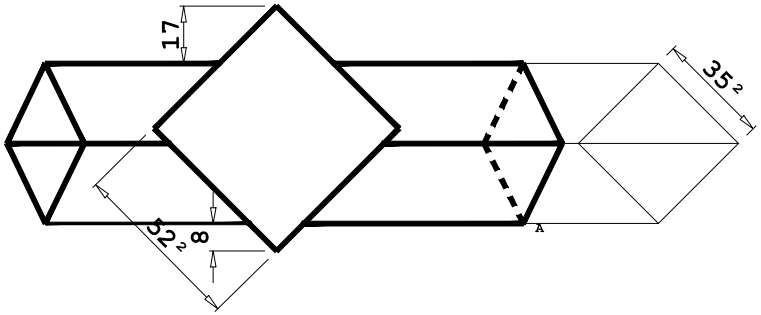
TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	A HALF A SPHERE AND ELBOW 11.15	The generator lines on the elbow cut the sphere vertically on the plan.Project the two cut surface on the plan back to the front elevation to get the points of contact between.	The curve of interpenetration is as a result of joining the different points of contact at different sections.

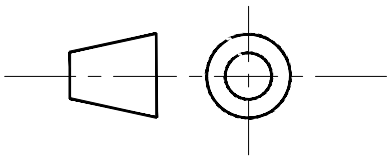


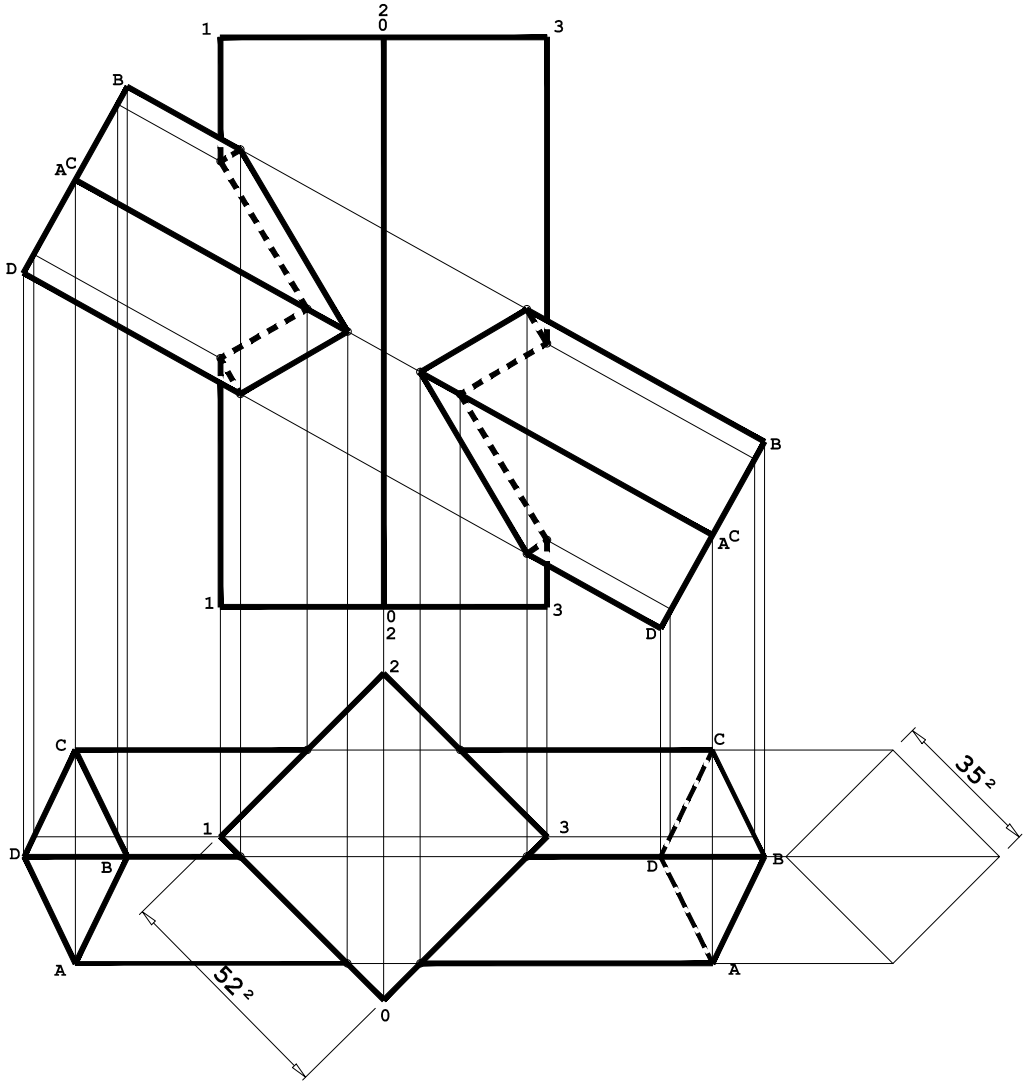
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	PRISM AND PRISM 11.16	Since the big prism is seen in the end elevation as a square so edges of the small prism are seen being terminated on it. project the terminated edges to the front elevation.	On the front elevation connect the lines of interpenatration between the terminated edges from the end elevation.



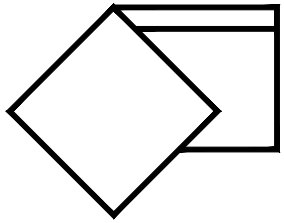


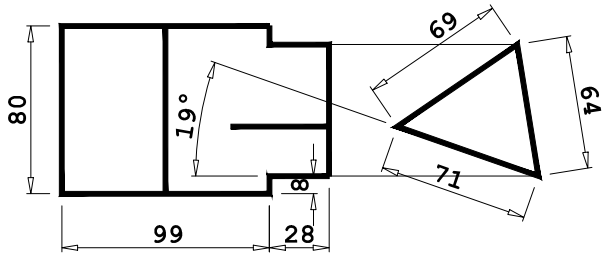


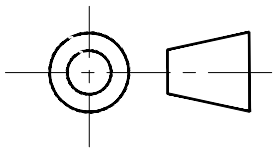


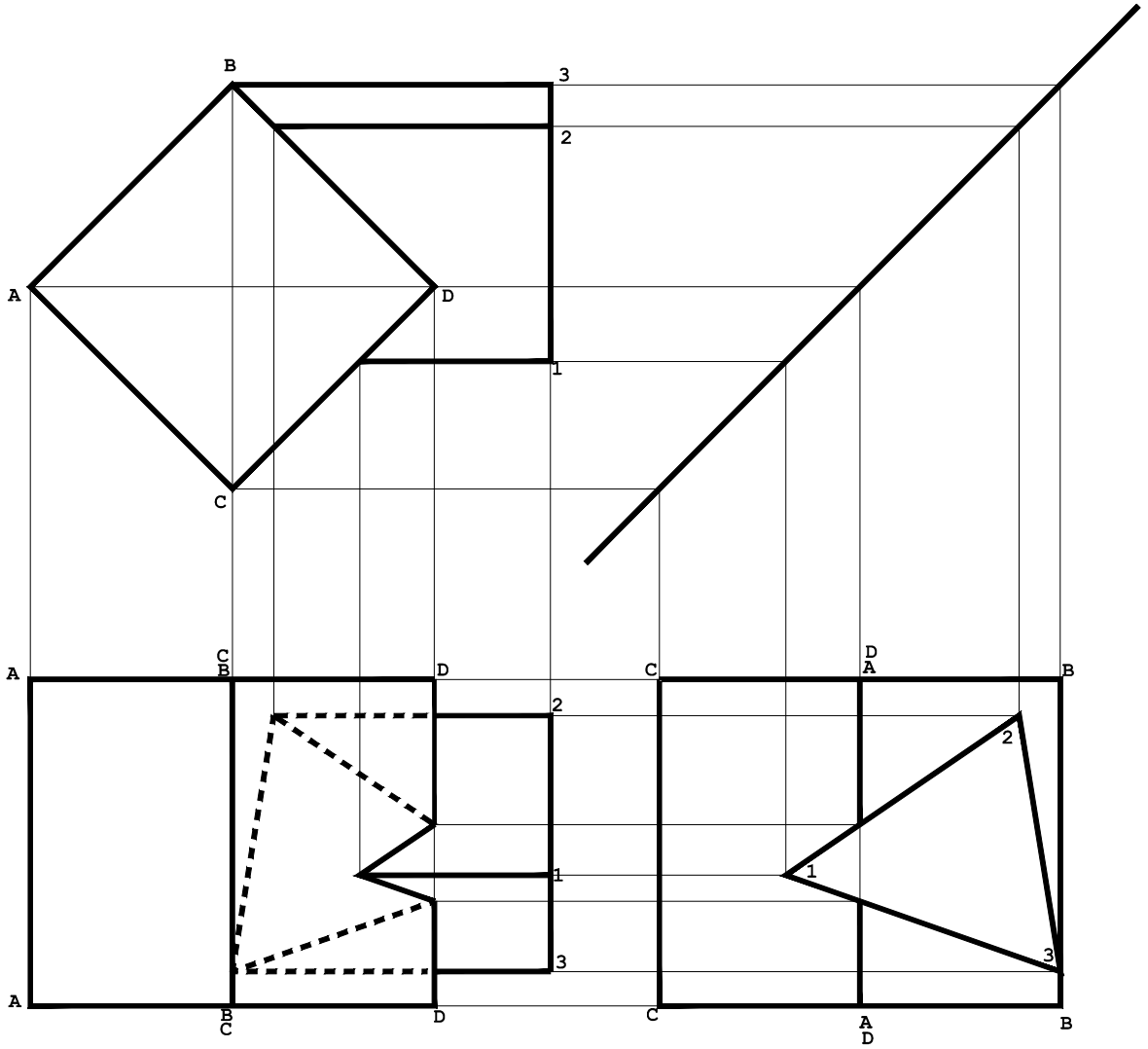
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TOPIC:	SUB-TOPIC	APPROACH:	NOTE:
INTERPENETRATION OF SOLIDS	PRISM AND PRISM 11.17	Since the big prism is seen On the plan as a square so edges of the small prism are seen being terminated on it. project the terminated edges to the front elevation.	On the front elevation connect the lines of interpenatration between the terminated edges from the plan.



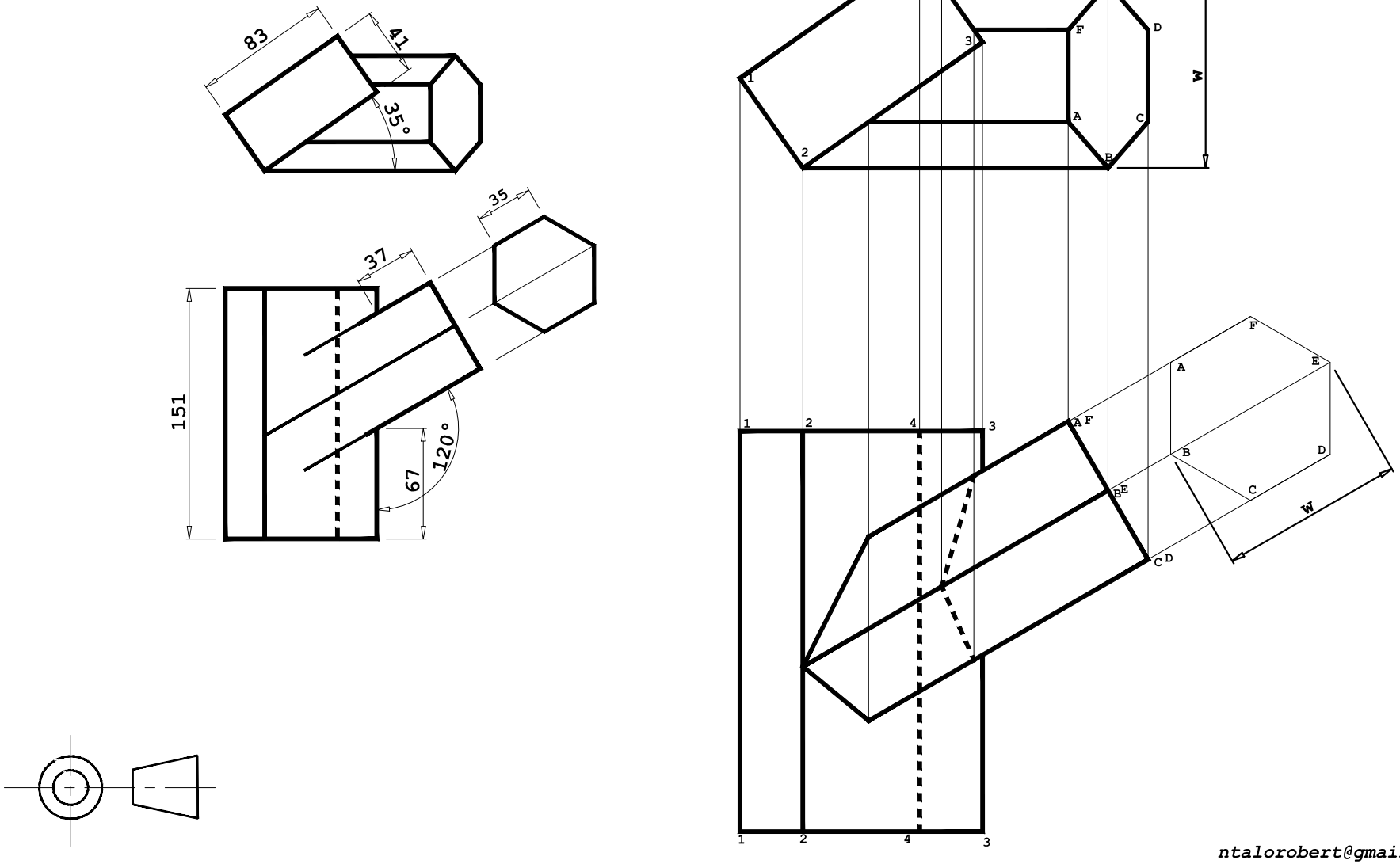






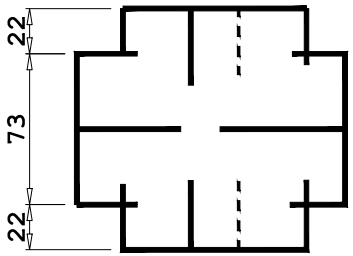
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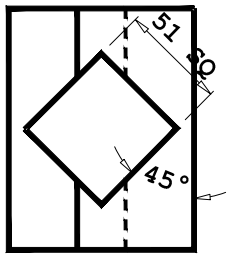
TOPIC:	SUB-TOPIC	APPROACH:
INTERPENETRATION OF SOLIDS	PRISM AND PRISM 11.18	Identify the figure is in 3rd angle projection,label one prism with numbers and the other with latters, Terminate the horizontal and vertical edges on the front elevation basing on plan and end elevation, Interconnect the edges of the front elevation with lines of interpenetration in a logical procedure bearing in mind the angle of projection.

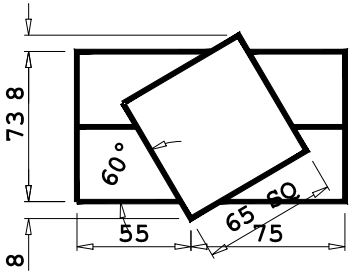


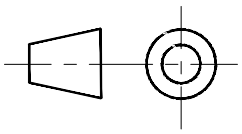
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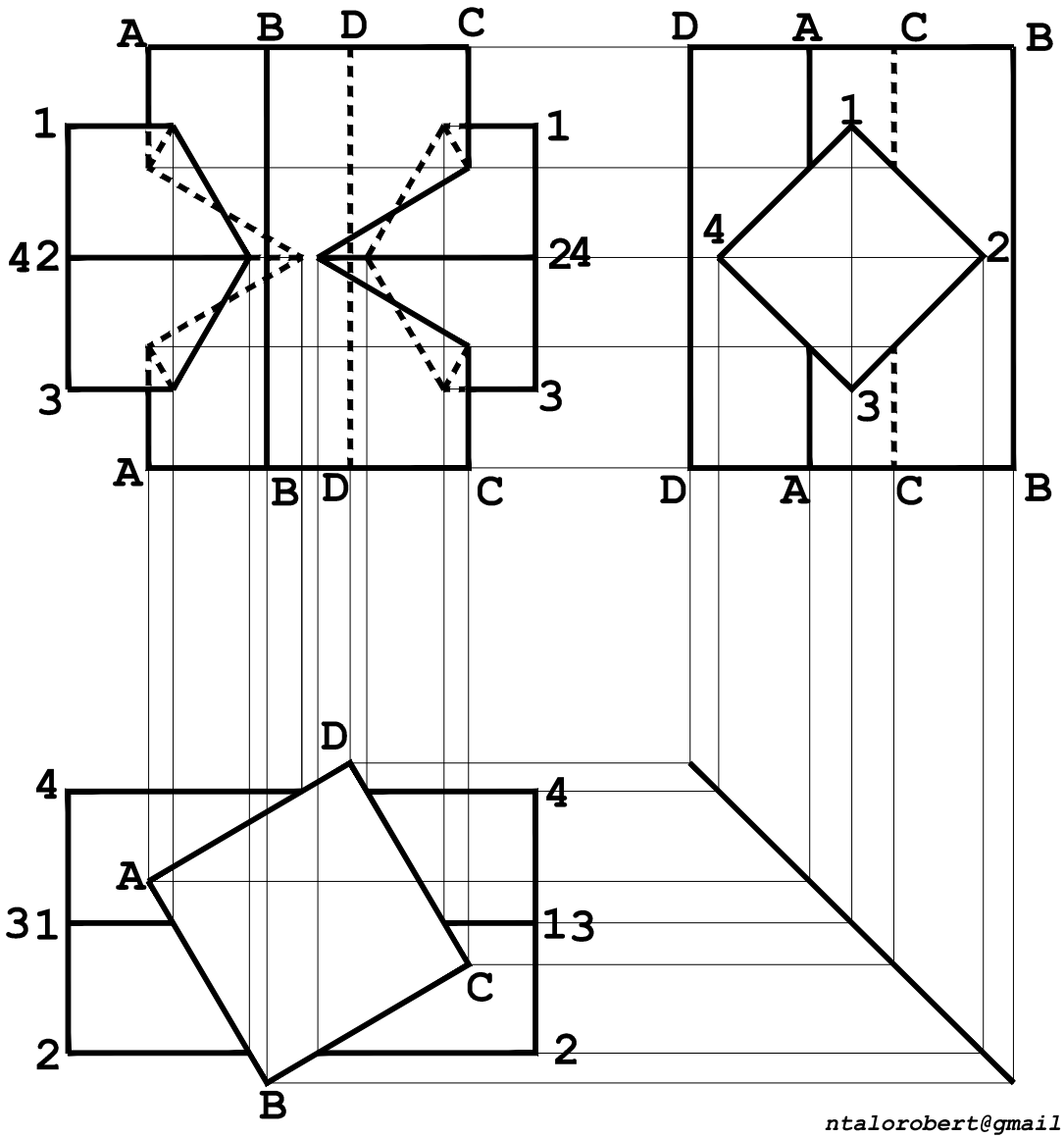
TOPIC:	SUB-TOPIC	APPROACH:
INTERPENETRATION OF SOLIDS	PRISM AND PRISM 11.19	On the plan, the vertical prism is seen as a rectangle hence seeing how it terminates the edges of the second prism. Project the terminated edges on the plan back to the front elevation. on the front elevation connect the edges with the lines of interpenetration bearing in mind that the figure is in third angle projection.





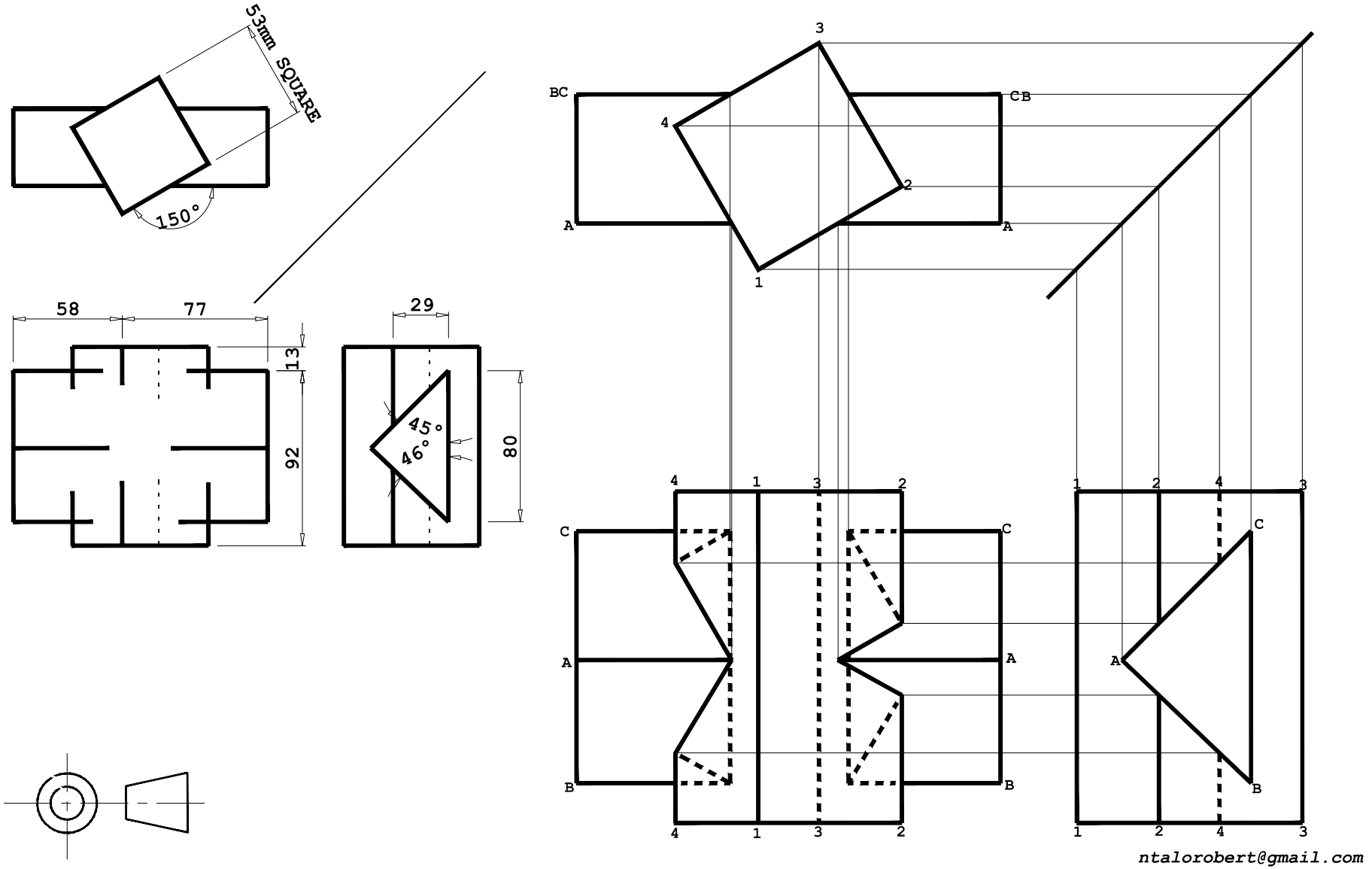




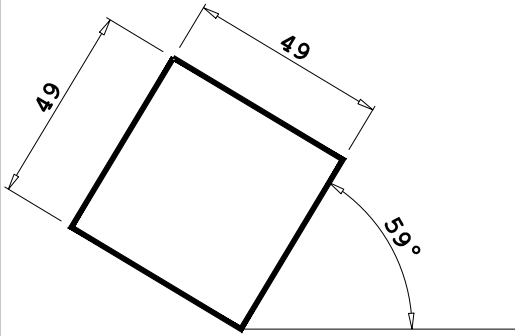


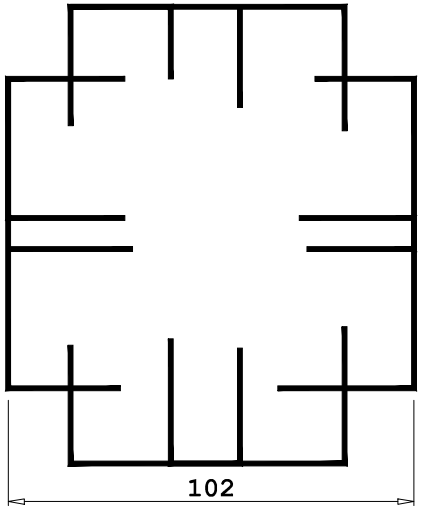
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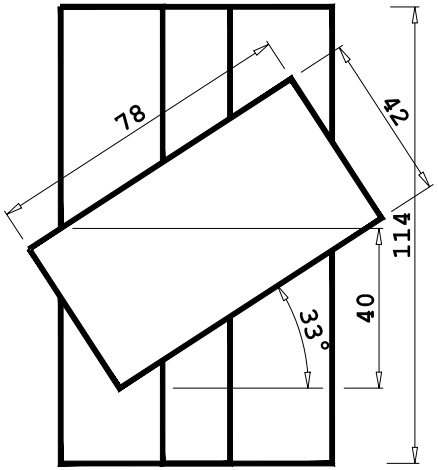
TOPIC:	SUB-TOPIC	APPROACH:
INTERPENETRATION OF SOLIDS	PRISM AND PRISM 11.20	Identify the figure is in 1st angle projection,label one prism with numbers and the other with latters, Terminate the horizontal and vertical edges on the front elevation basing on plan and end elevation, Interconnect the edges of the front elevation with lines of interpenetration in a logical procedure bearing in mind the angle of projection.

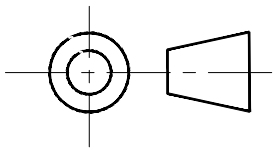


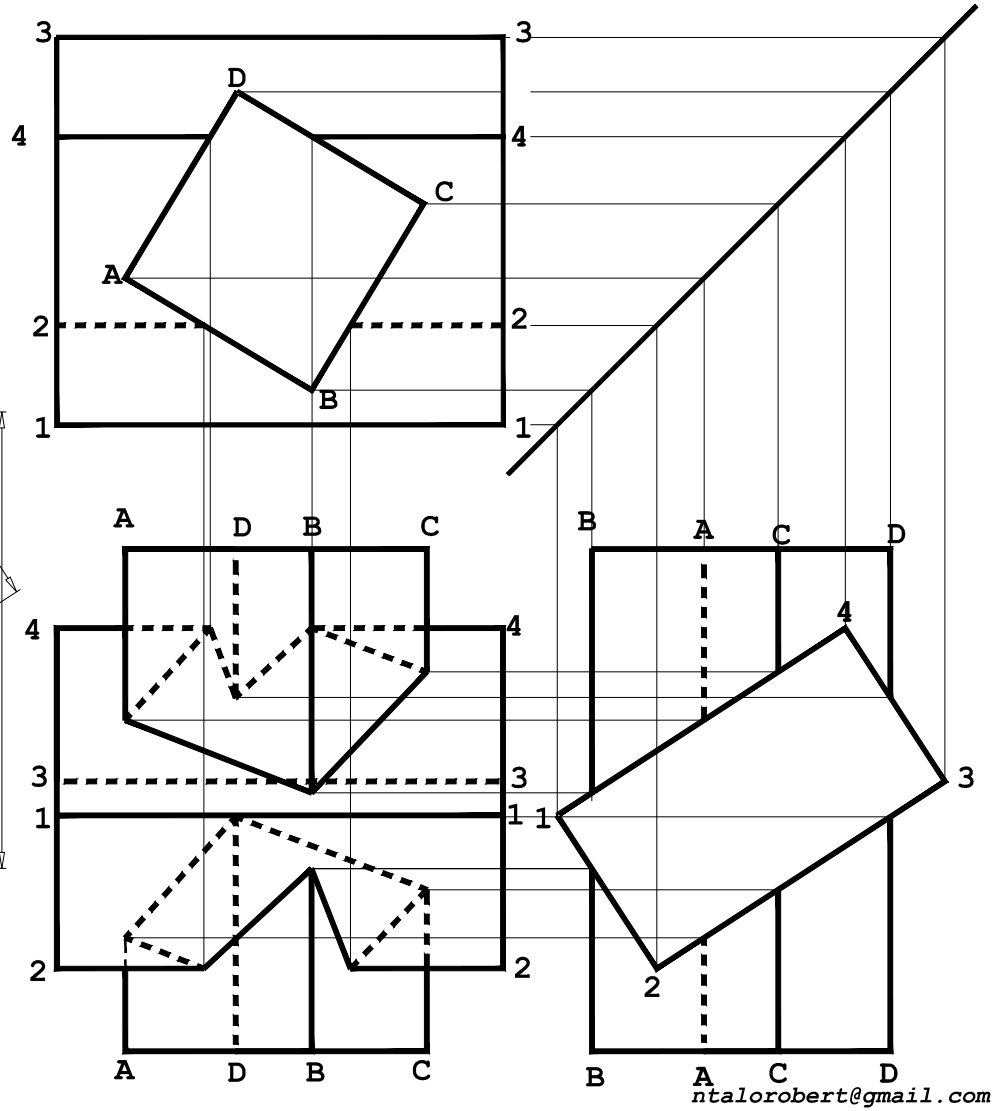
TOPIC:	SUB-TOPIC	APPROACH:
INTERPENETRATION OF SOLIDS	PRISM AND PRISM 11.21	Identify the figure is in 3rd angle projection,label one prism with numbers and the other with latters, Terminate the horizontal and vertical edges on the front elevation basing on plan and end elevation, Interconnect the edges of the front elevation with lines of interpenetration in a logical procedure bearing in mind the angle of projection.







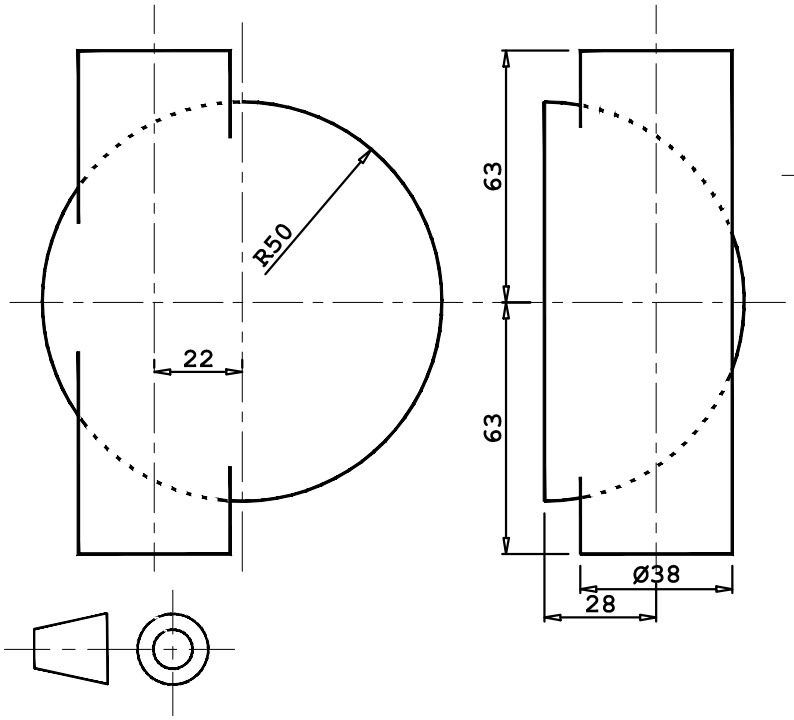


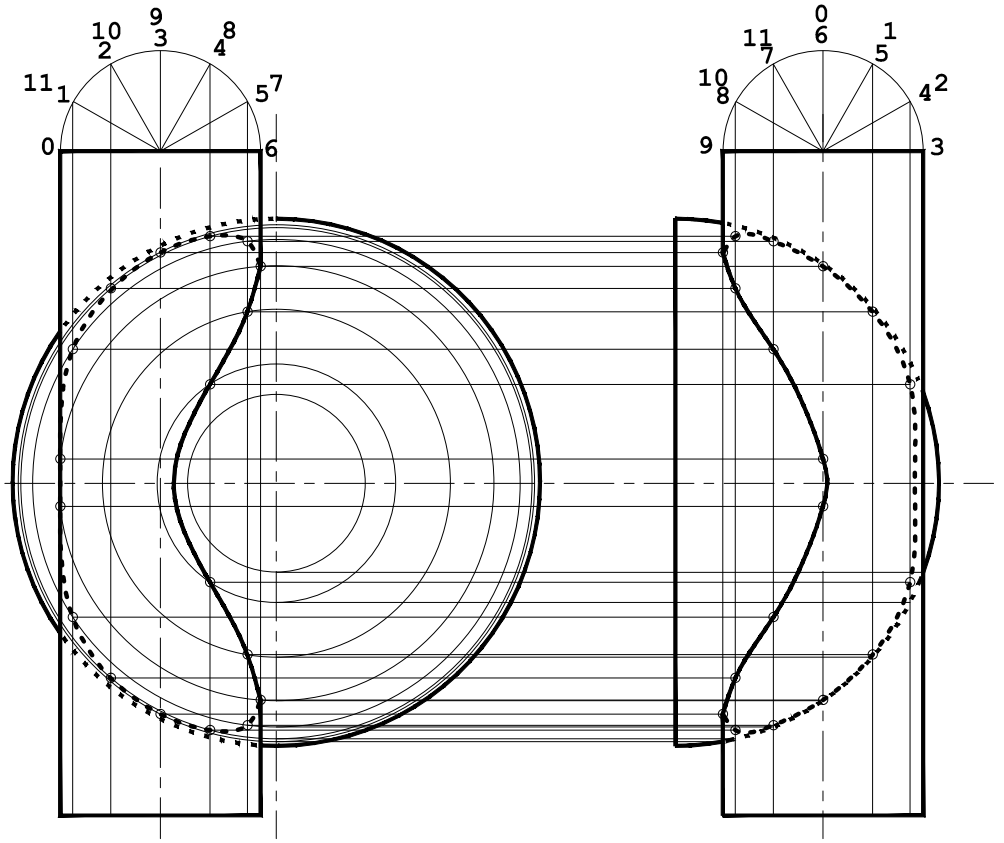


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TOPIC:	SUB-TOPIC	APPROACH:
INTERPENETRATION OF SOLIDS	PRISM AND PRISM 11.22	Identify the figure is in 3rd angle projection,label one prism with numbers and the other with latters, Terminate the horizontal and vertical edges on the front elevation basing on plan and end elevation, Interconnect the edges of the front elevation with lines of interpenetration in a logical procedure bearing in mind the angle of projection.

1. The fig shows incomplete views of a hemisphere and intersecting cylinder. Complete these views showing the curves of intersection. (show hidden details).





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TOPIC:	SUB-TOPIC	STUDENT`S COMMENT
REVISION EXERCISE	INTERPENETRATION SPHERE AND CYLINDER 12.1	

KEY POINTS TO ANSWERING SCENARIOS OF TOPIC 6

When answering a scenario test item on intersection of solids, the learner must begin with a focused introduction identifying the two solids intersecting and their relative positions, explaining the purpose of determining the curve of intersection for manufacturing or construction, and stating the method (sectioning or auxiliary method). The essential materials, tools, and equipment include a drawing board, T-square, set squares, compasses, dividers, scale ruler, French curves, pencils, eraser, A3 paper, and templates. Health and safety awareness requires proper posture, safe handling of sharp instruments, clean work surface, adequate lighting, and proper storage of instruments. The operational procedure involves identifying penetrating solids, selecting appropriate sectioning planes, identifying all generators, using cutting planes systematically to locate intersection points, transferring points accurately between views using projection lines, joining points smoothly using French curves to produce continuous intersection curves, distinguishing visible and hidden portions using appropriate line conventions, including necessary auxiliary views, ensuring all points are located, and maintaining a logical construction procedure. Maintenance recommendations include regular checking and calibration of instruments, proper storage of French curves and templates, periodic pencil sharpening, cleaning of drawing surfaces, and safe handling of completed drawings. Evaluation assesses whether the intersection curve is continuous and accurate, all intersection points are correctly located and transferred, visible and hidden portions are correctly distinguished, the construction procedure is logical and clearly shown, and the drawing provides complete information about the intersection. In conclusion, the learner has successfully determined the curves and lines of intersection between penetrating solids, and the final drawing, clearly distinguishing visible and hidden portions and including necessary auxiliary views, demonstrates comprehensive understanding of spatial relationships and visualization skills, confirming fitness for purpose in providing accurate intersection information for manufacturing, construction, or design visualization.

TOPIC 7: ROOFS

Competency

Learners prepare roof drawings and roof models.

Teaching Focus

Guide learners on

- roof members
- roof pitch
- hips
- valleys
- ridges
- rafters
- purlins
- wall plates
- elevations
- sections.

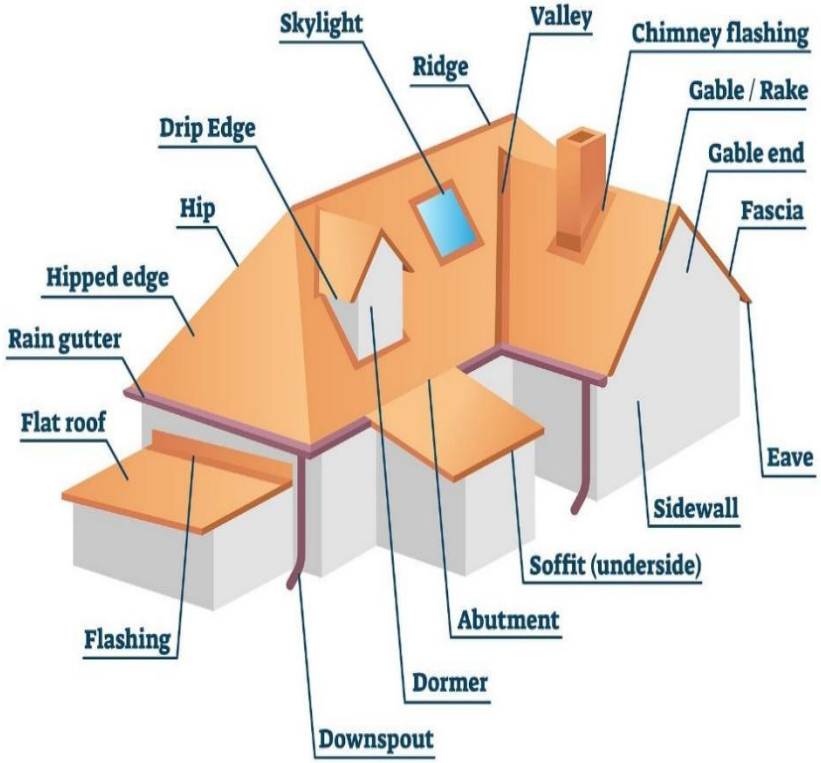
Assessment Focus

Assess learners'

- layout
- geometry
- scales
- roof members
- presentation.

Common Errors

- incorrect roof pitch
- missing members
- poor projection
- incorrect junctions.



7.1 Introduction to Roof Functions and Functional Requirements

A roof is the uppermost structural component of a building designed to enclose the space below and provide protection against atmospheric elements such as rain, sun, wind, and temperature fluctuations. In the Ugandan context, an effectively designed roof must achieve several critical performance standards: structural strength to support its own weight (dead load) and wind pressures (live load), effective water shedding, thermal comfort, durability, and fire resistance. From a technical drawing perspective, students must understand that every line drawn represents a functional member fulfilling these criteria.



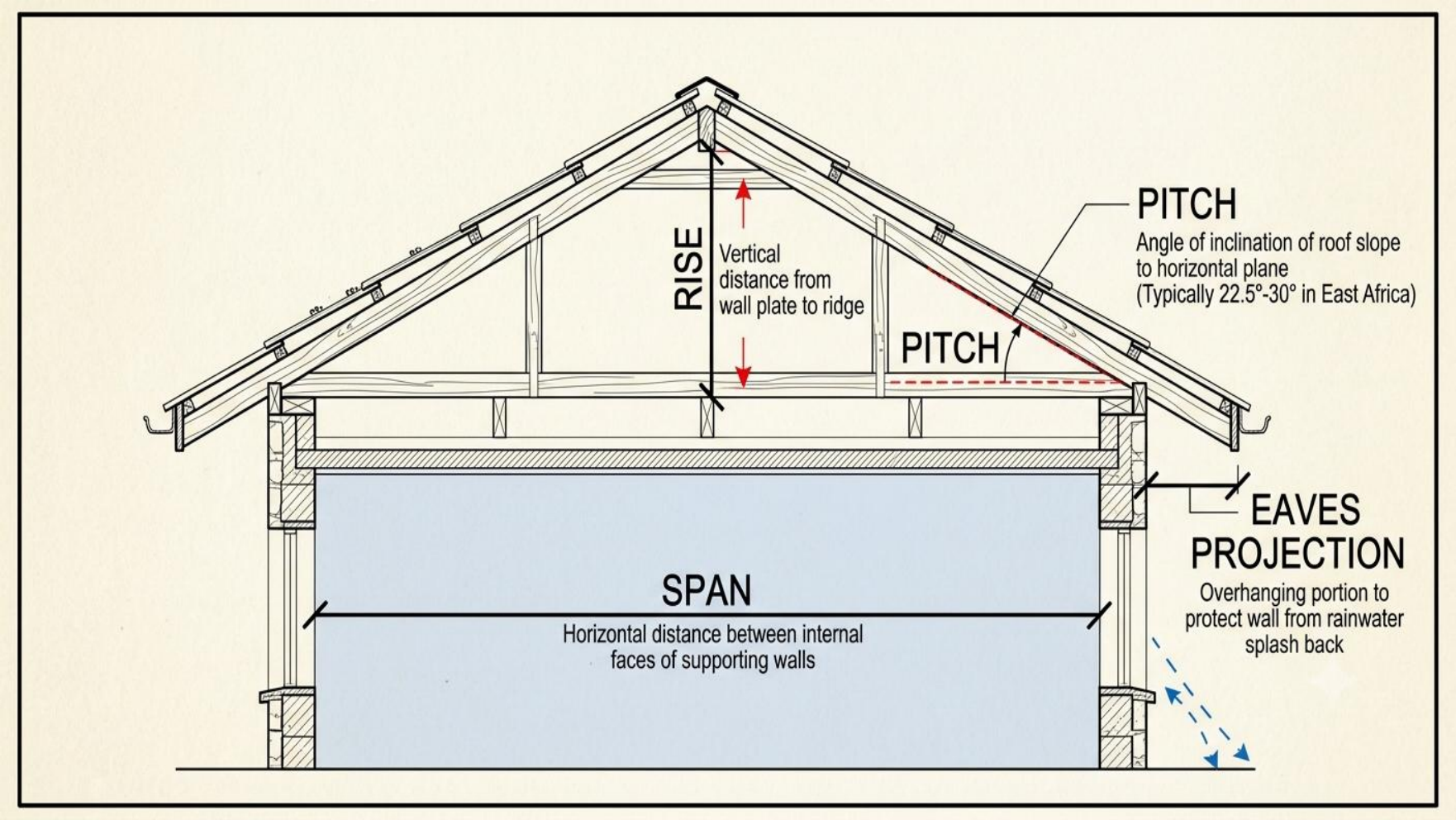
7.2 Classification of Roofs by Geometry and Form

Roofs are broadly categorized into three major types based on their structural form and pitch: flat roofs (pitch less than 10°), pitched or sloping roofs (pitch greater than 10°), and curved roofs. the primary focus is on pitched roofs, which are highly efficient at shedding heavy tropical rainfall. Students must become familiar with common pitched configurations, including the lean-to roof, couple roof, close-couple roof, collar roof, gable roof, and the multi-directional hipped roof.



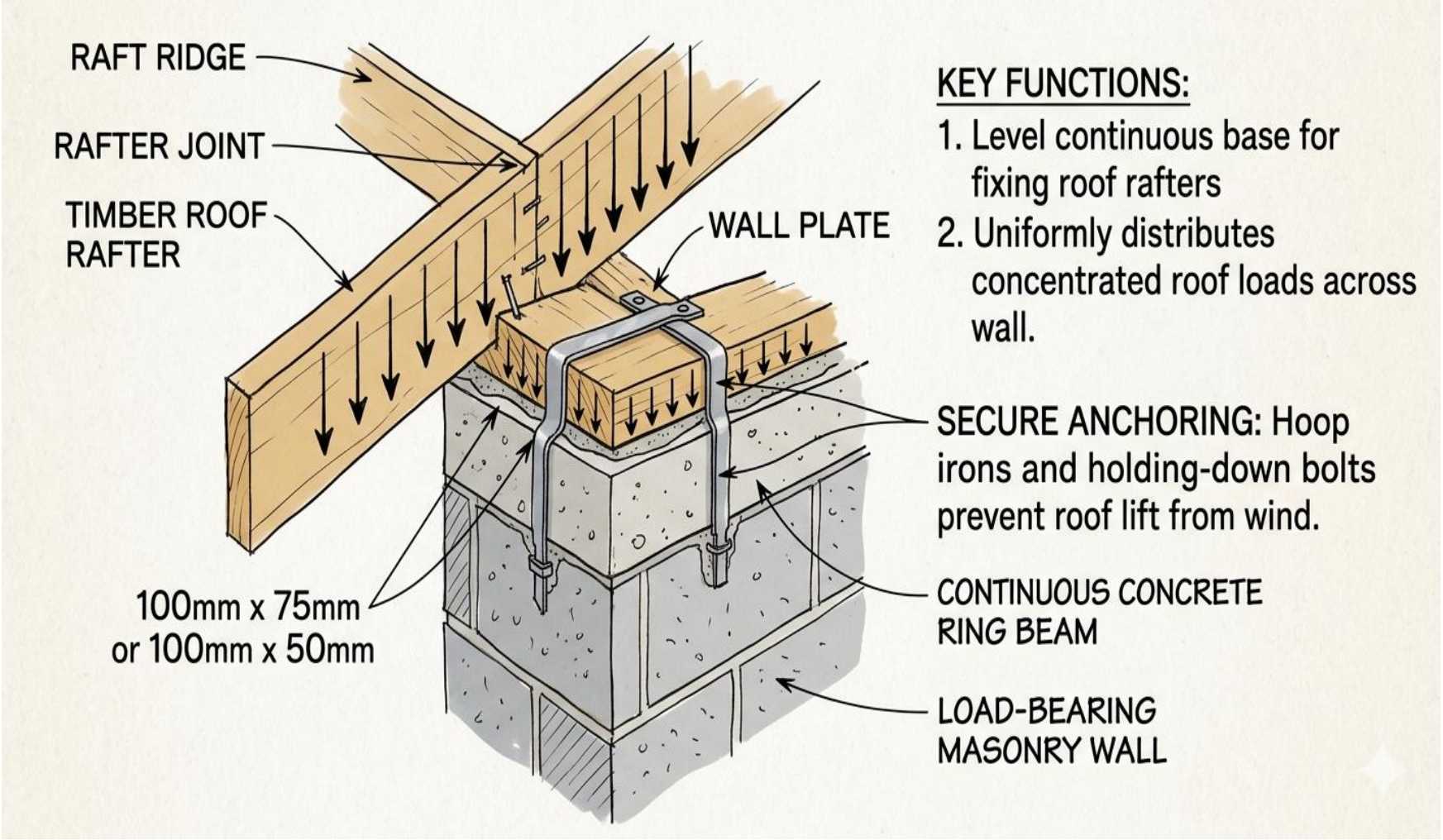
7.3 Understanding Critical Roof Terminologies

Before attempting a sectional architectural drawing, a student must master standard technical terms. The **span** is the horizontal distance between the internal faces of the supporting walls, while the **rise** is the vertical distance from the top of the wall plate to the intersection of the rafters at the ridge. The **pitch** refers to the angle of inclination of the roof slope to the horizontal plane, typically ranging between 22.5°and 30°for corrugated iron or clay tile roofs in East Africa. The **eaves projection** is the overhanging portion of the roof beyond the external wall line, designed to protect the wall finish from rainwater splash back.



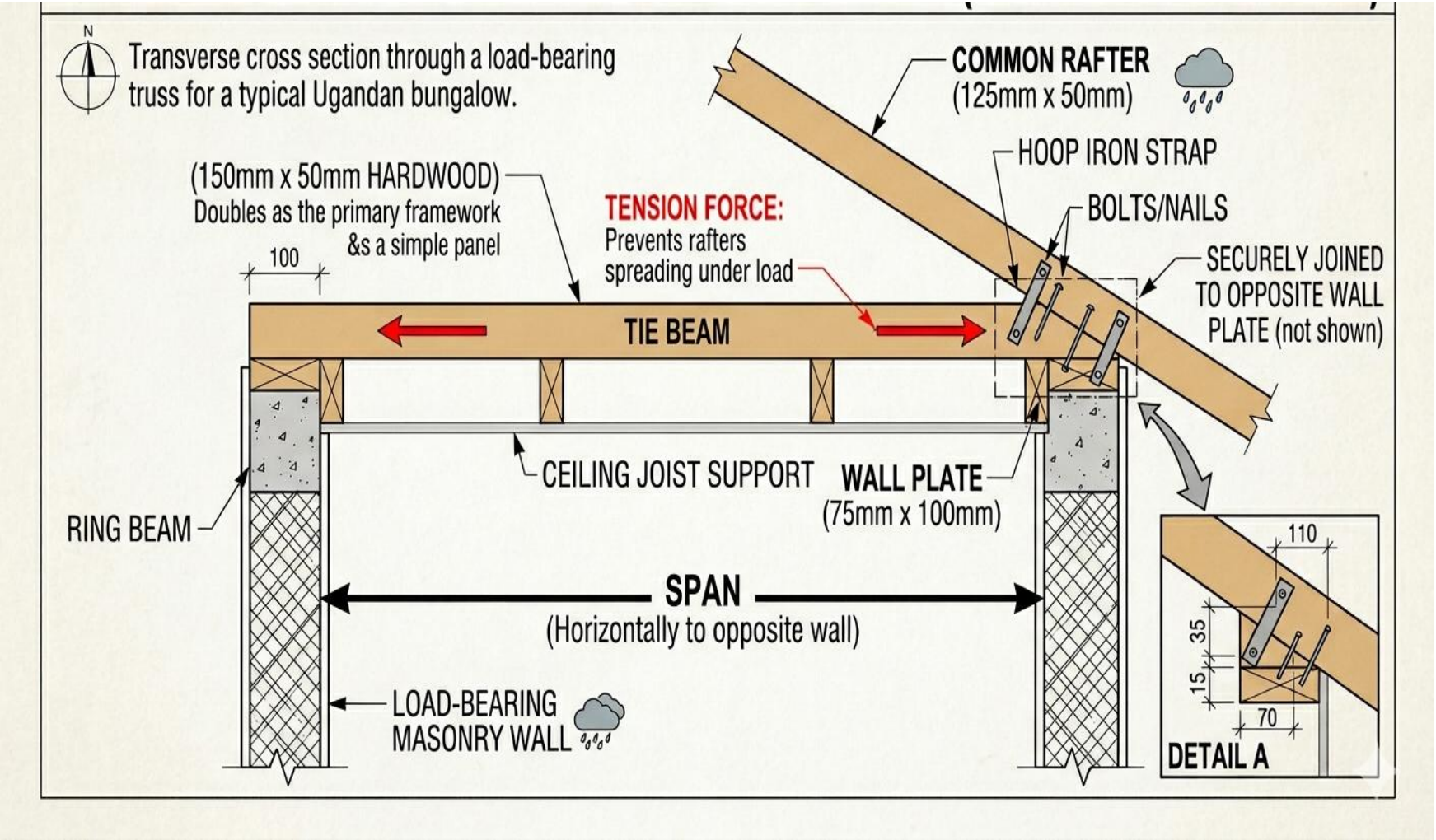
7.4 The Role and Dimensions of the Wall Plate

The construction sequence of a timber pitched roof begins at the top of the load-bearing masonry walls with the installation of the **wall plate**. Typically measuring 100mm x 75mm or 100mm x 50mm, the wall plate is bedded in mortar and securely anchored to the ring beam using mild steel hoop irons or holding-down bolts. Structurally, the wall plate serves two vital purposes: it provides a level, continuous base for fixing the roof rafters, and it uniformly distributes the concentrated downward and outward thrust of the roof load across the load-bearing walls.



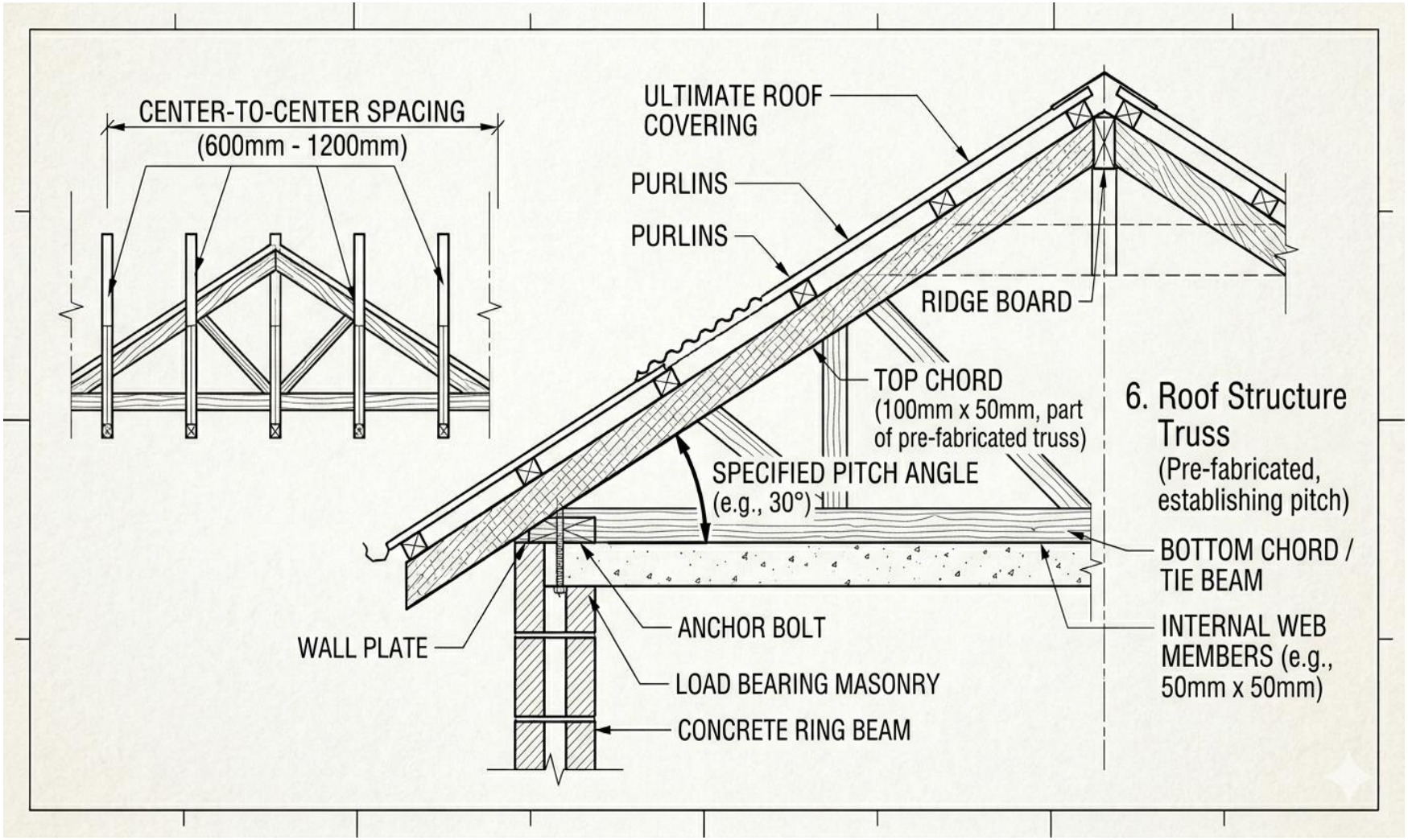
7.5 The Tie Beam and Horizontal Stability

In a functional roof truss, the **tie beam** forms the base of the structural triangle, spanning horizontally from one wall plate to the opposite wall plate. Commonly sized at 150mm x 50mm for residential bungalows, the tie beam acts as a tension member that prevents the inclined common rafters from spreading outward under loads. In structural drawings, the tie beam must be shown securely joined to the wall plate and the foot of the rafter, often doubling as the primary support framework for fixing ceiling joists.



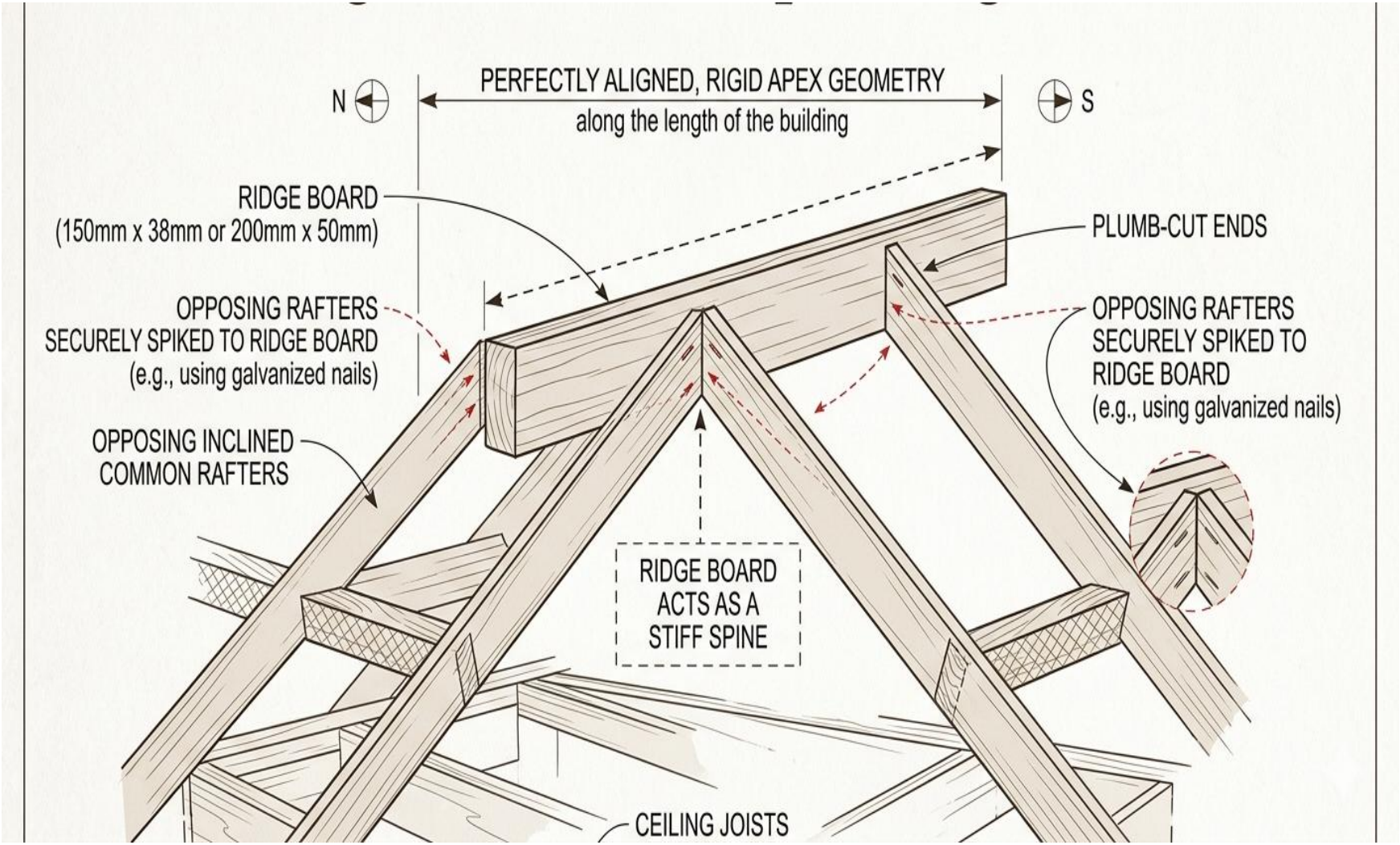
7.6 Common Rafters and the Roof Slope

Common rafters are inclined timber members extending from the wall plate up to the ridge board to establish the pitch and shape of the roof. Spaced at intervals of 600mm to 1200mm center-to-center depending on the roof covering material, these members are typically sized at 100mm x 50mm. In technical sections, common rafters are drawn inclined at the specified pitch angle, and they directly carry the secondary framework of purlins and the ultimate roof covering.



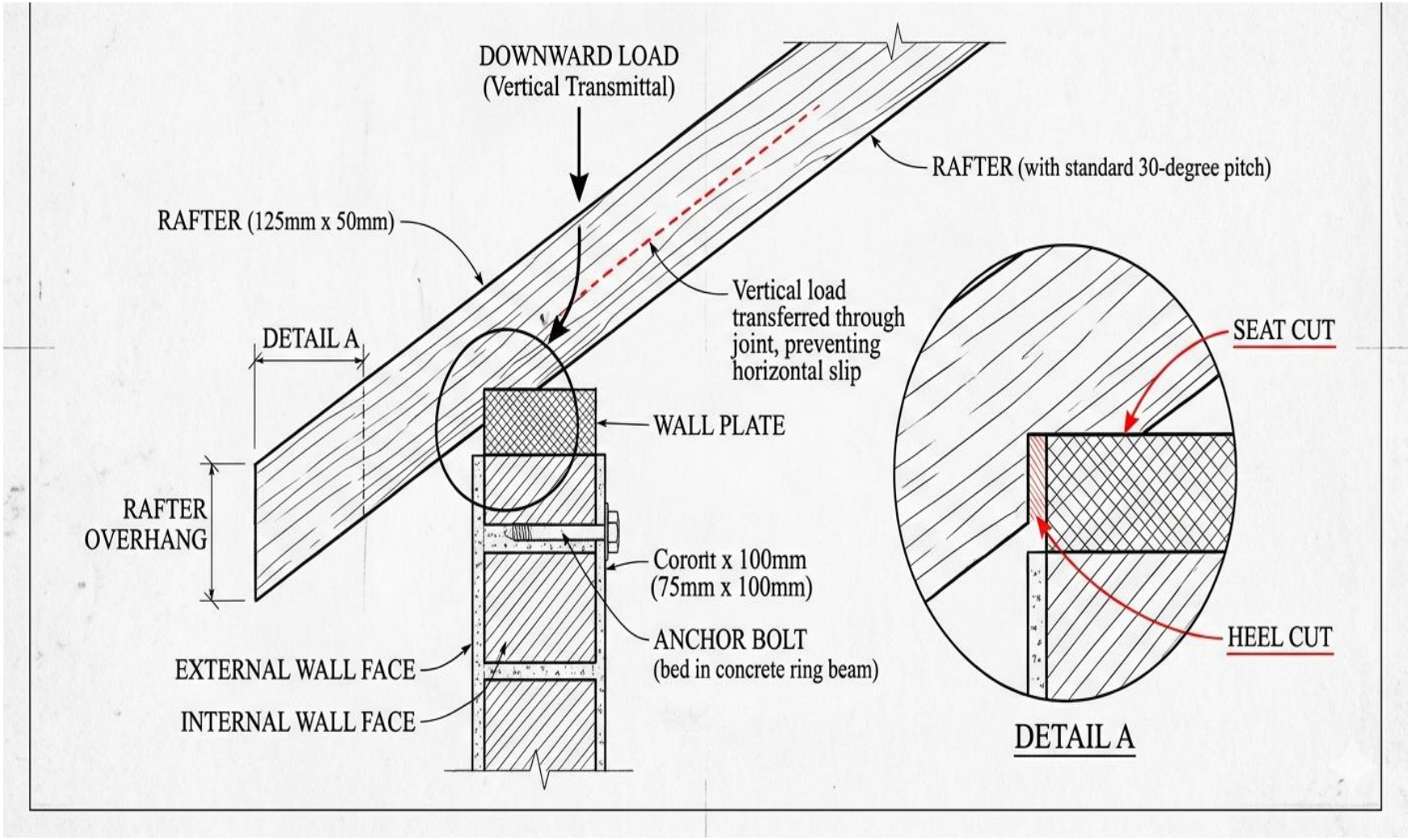
7.7 The Ridge Board and Apex Alignment

At the highest point of a pitched roof, the inclined common rafters meet at a central, horizontal timber member known as the **ridge board**. Usually measuring 150mm x 38mm or 200mm x 50mm, the ridge board runs longitudinally along the apex of the roof structure. It acts as a stiff spine against which the upper plumb-cut ends of opposing rafters are securely spiked, ensuring perfectly aligned, rigid apex geometry along the length of the building.



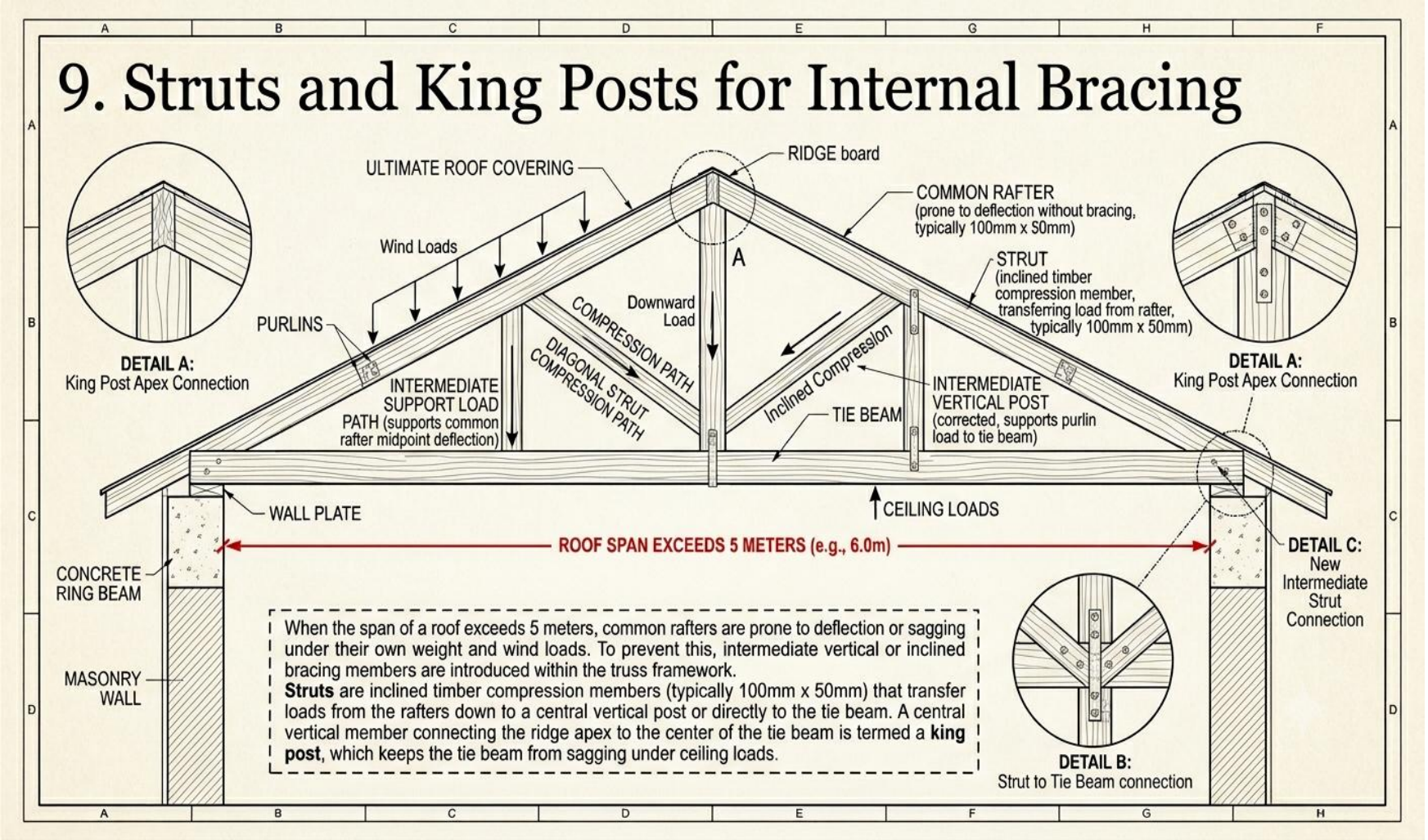
7.8 The Bird's Mouth Joint Construction

To transmit the downward load of the inclined rafter vertically onto the horizontal wall plate without slipping, a specialized carpentry joint called a **bird's mouth joint** is used. This joint consists of a triangular notch cut into the underside of the rafter, allowing it to sit flat on top and against the inner vertical face of the wall plate. Students are frequently required to draw detailed, large-scale sketches of this specific joint to demonstrate their understanding of timber joinery.



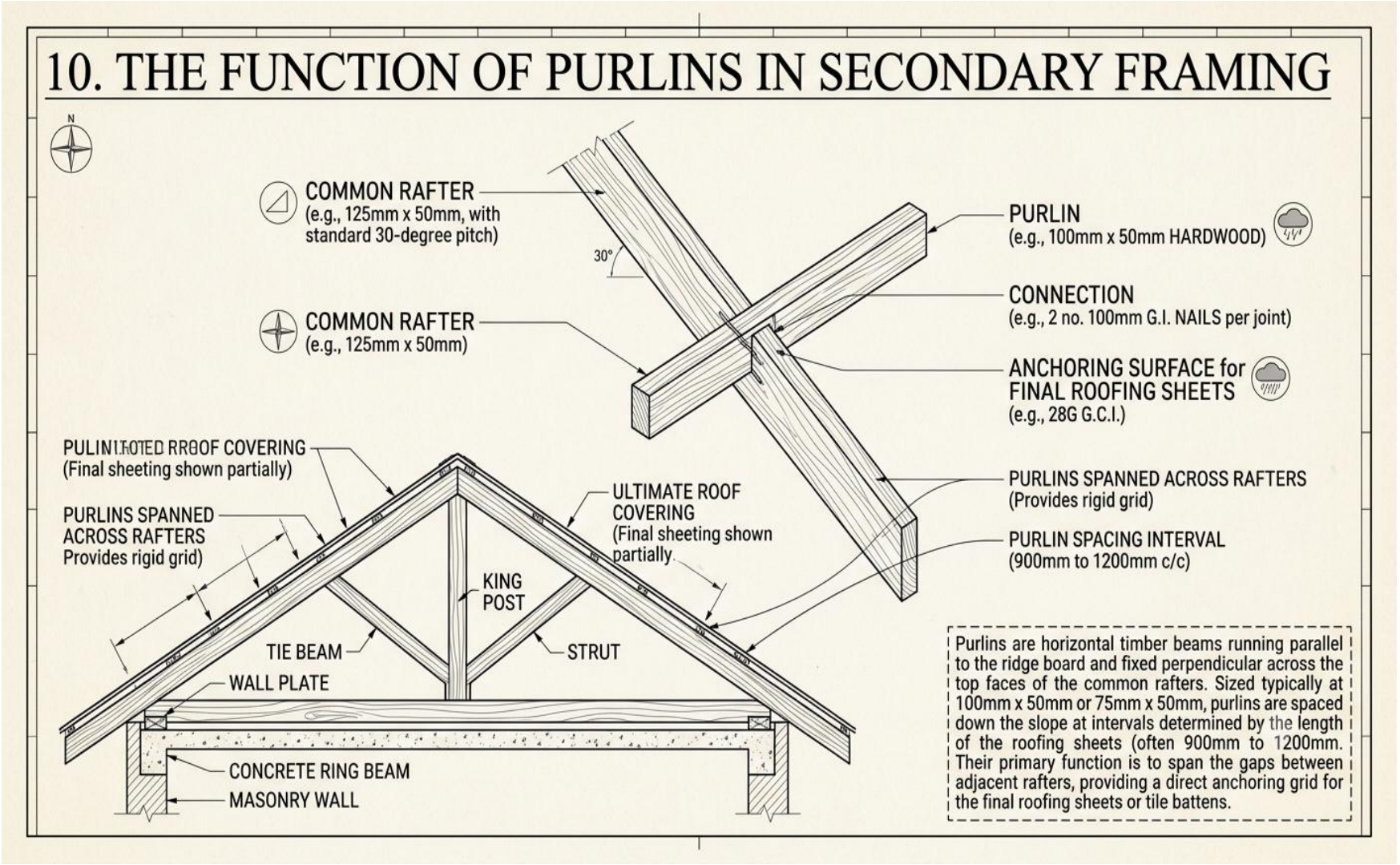
7.9 Struts and King Posts for Internal Bracing

When the span of a roof exceeds 5 meters, common rafters are prone to deflection or sagging under their own weight and wind loads. To prevent this, intermediate vertical or inclined bracing members are introduced within the truss framework. **Struts** are inclined timber compression members (typically 100mm x 50mm) that transfer loads from the rafters down to a central vertical post or directly to the tie beam. A central vertical member connecting the ridge apex to the center of the tie beam is termed a **king post**, which keeps the tie beam from sagging under ceiling loads.



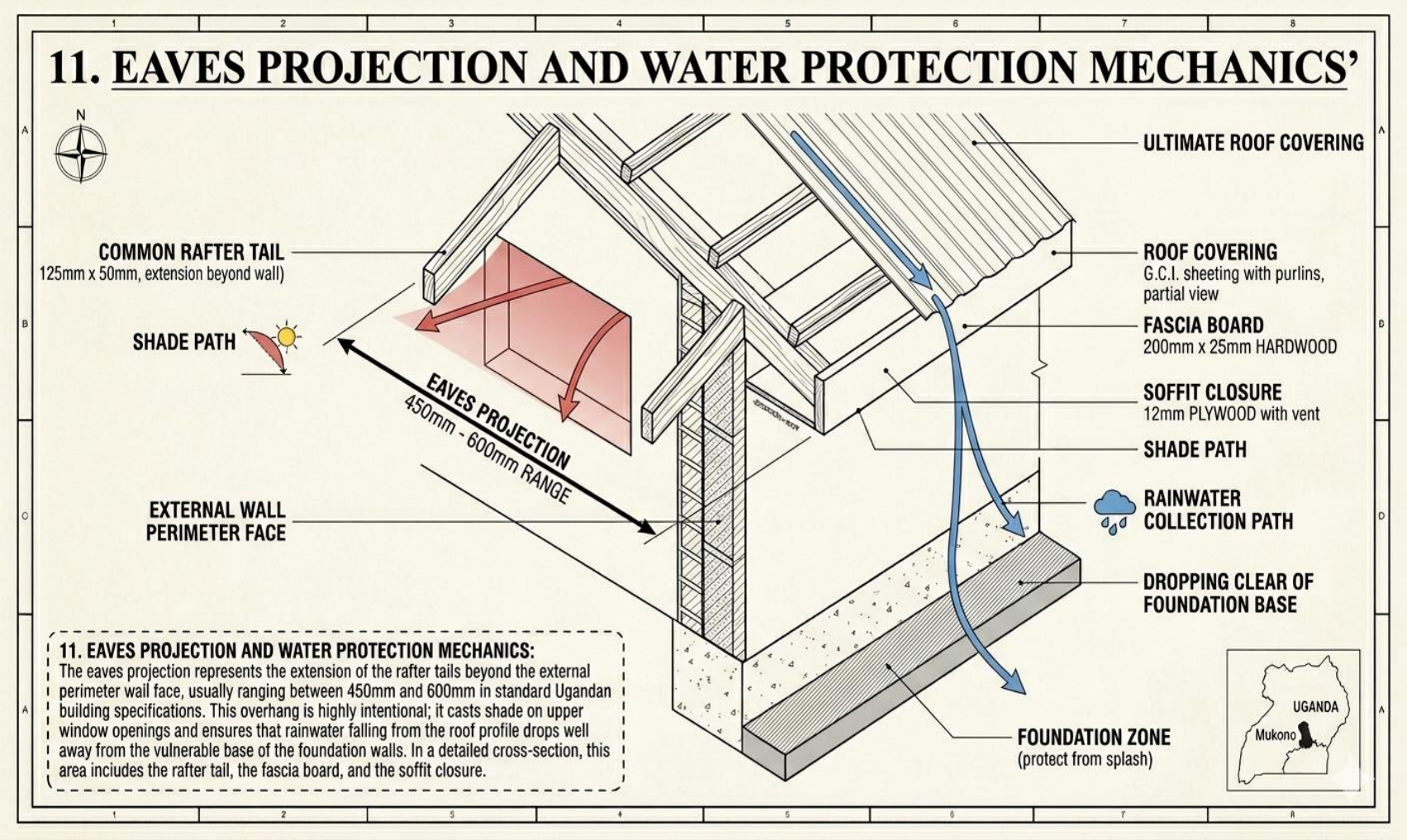
7.10 The Function of Purlins in Secondary Framing

Purlins are horizontal timber beams running parallel to the ridge board and fixed perpendicular across the top faces of the common rafters. Sized typically at 100mm x 50mm or 75mm x 50mm, purlins are spaced down the slope at intervals determined by the length of the roofing sheets (often 900mm to 1200mm. Their primary function is to span the gaps between adjacent rafters, providing a direct anchoring grid for the final roofing sheets or tile battens.



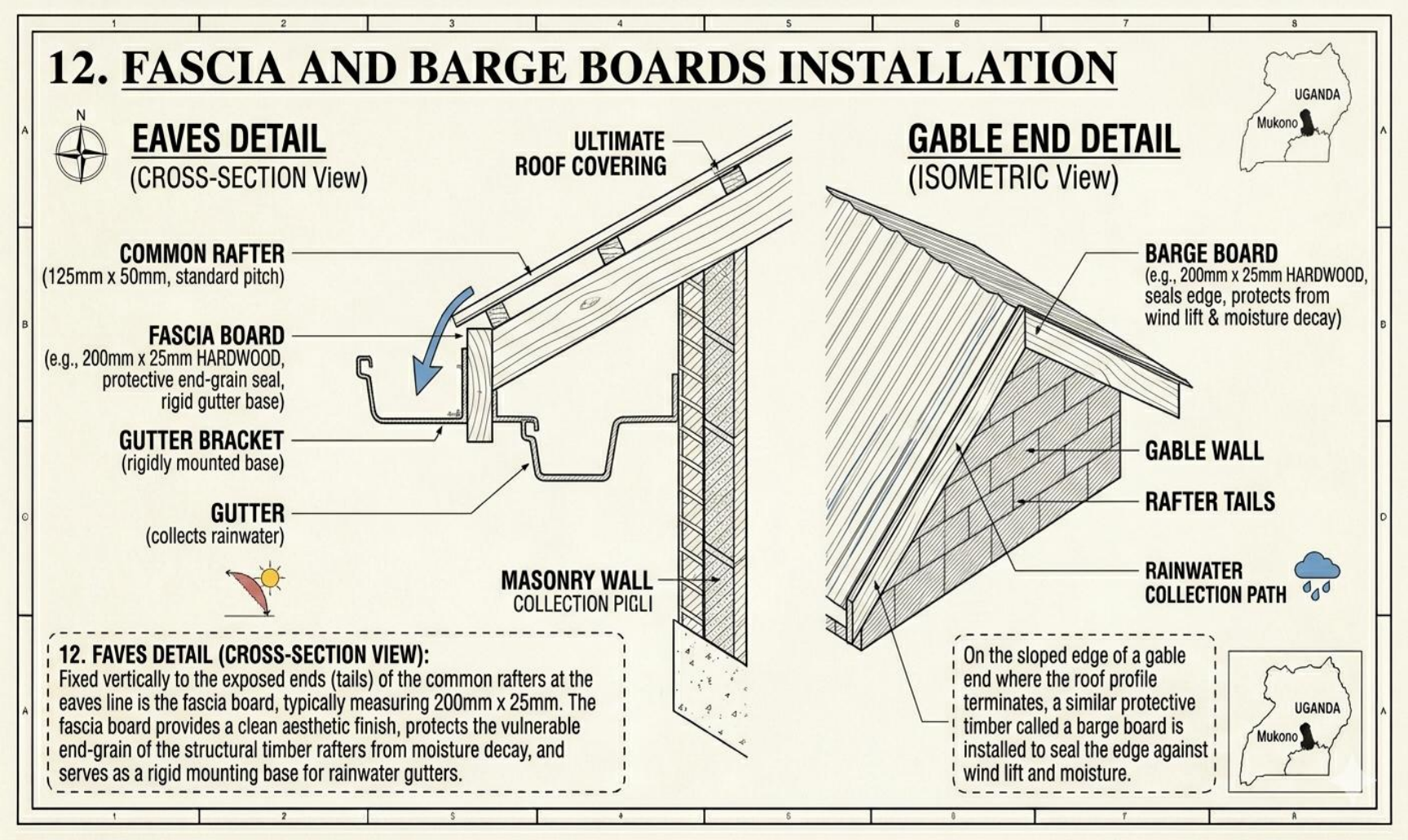
7.11 Eaves Projection and Water Protection Mechanics

The **eaves projection** represents the extension of the rafter tails beyond the external perimeter wall face, usually ranging between 450mm and 600mm in standard Ugandan building specifications. This overhang is highly intentional; it casts shade on upper window openings and ensures that rainwater falling from the roof profile drops well away from the vulnerable base of the foundation walls. In a detailed cross-section, this area includes the rafter tail, the fascia board, and the soffit closure.



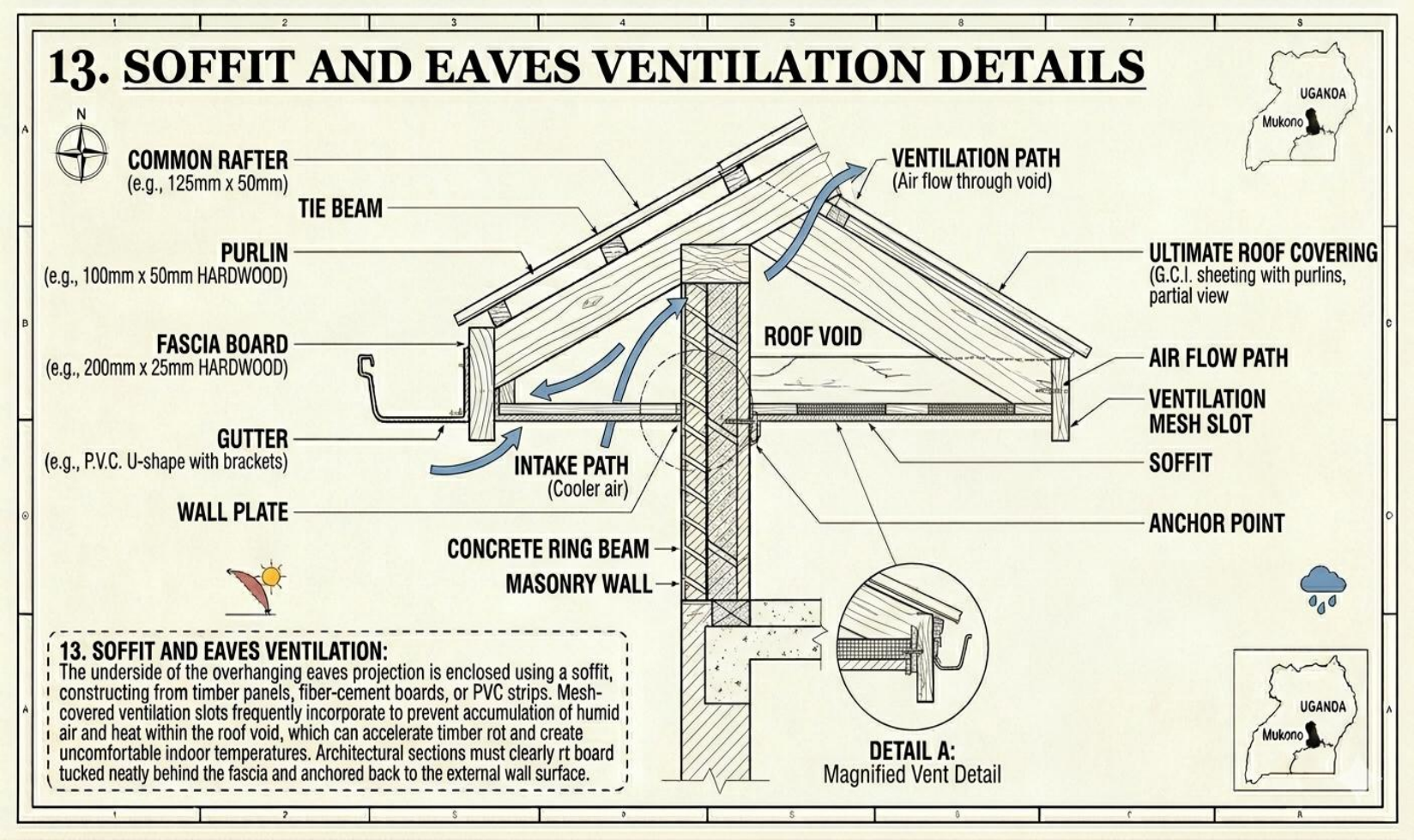
7.12 Fascia and Barge Boards Installation

Fixed vertically to the exposed ends (tails) of the common rafters at the eaves line is the **fascia board,** typically measuring 200mm x 25mm. The fascia board provides a clean aesthetic finish, protects the vulnerable end-grain of the structural timber rafters from moisture decay, and serves as a rigid mounting base for rainwater gutters. On the sloped edge of a gable end where the roof profile terminates, a similar protective timber board called a **barge board** is installed to seal the edge against wind lift and moisture.



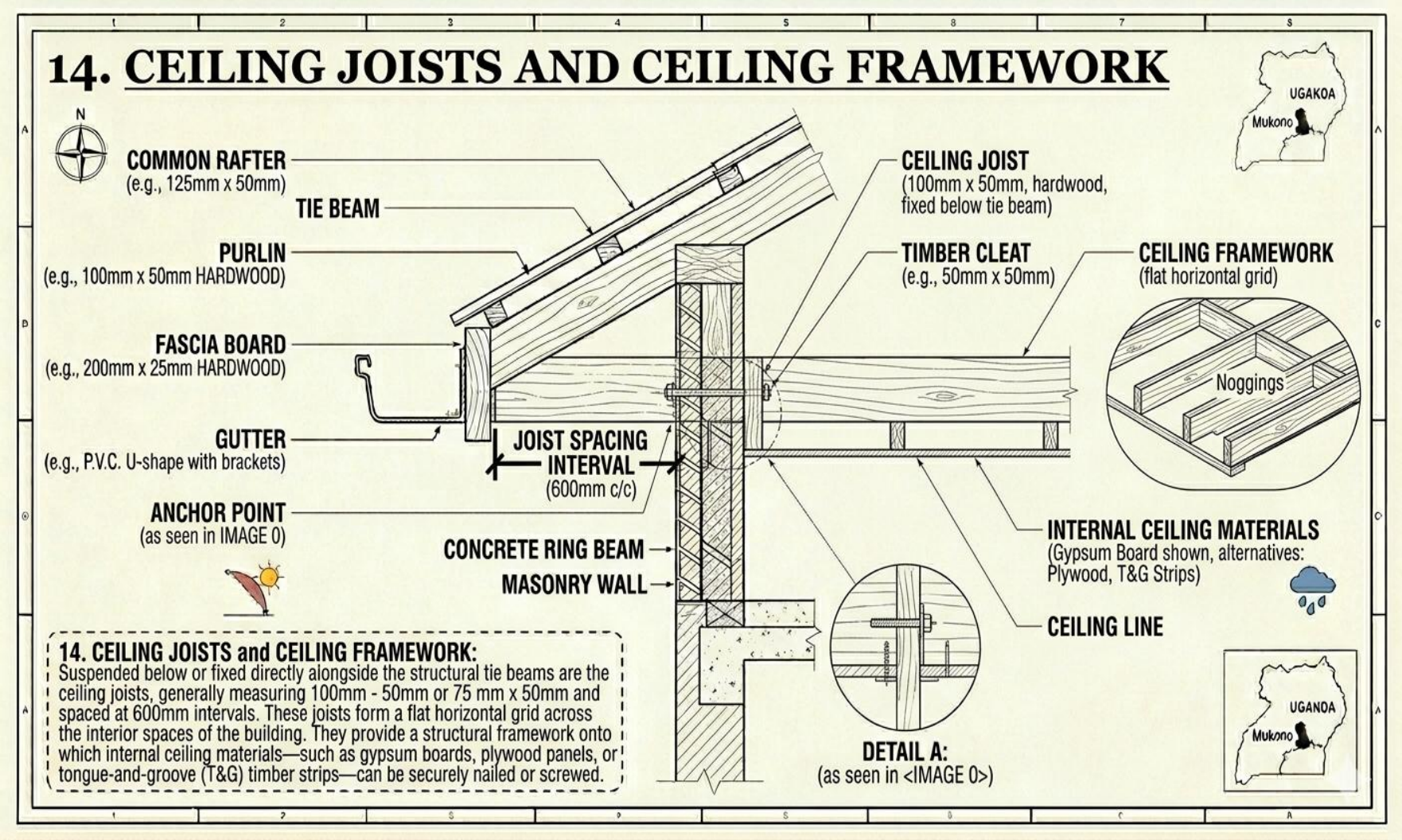
7.13 Soffit and Eaves Ventilation Details

The underside of the overhanging eaves projection is often enclosed using a horizontal lining material known as a **soffit,** which can be constructed from timber panels, fiber-cement boards, or PVC strips. To prevent the accumulation of humid air and heat within the roof void which can accelerate timber rot and create uncomfortable indoor temperatures soffits frequently incorporate mesh-covered ventilation slots. When drafting an architectural section, students must clearly represent the soffit board tucked neatly behind the fascia and anchored back to the external wall surface. (two in one drawing)



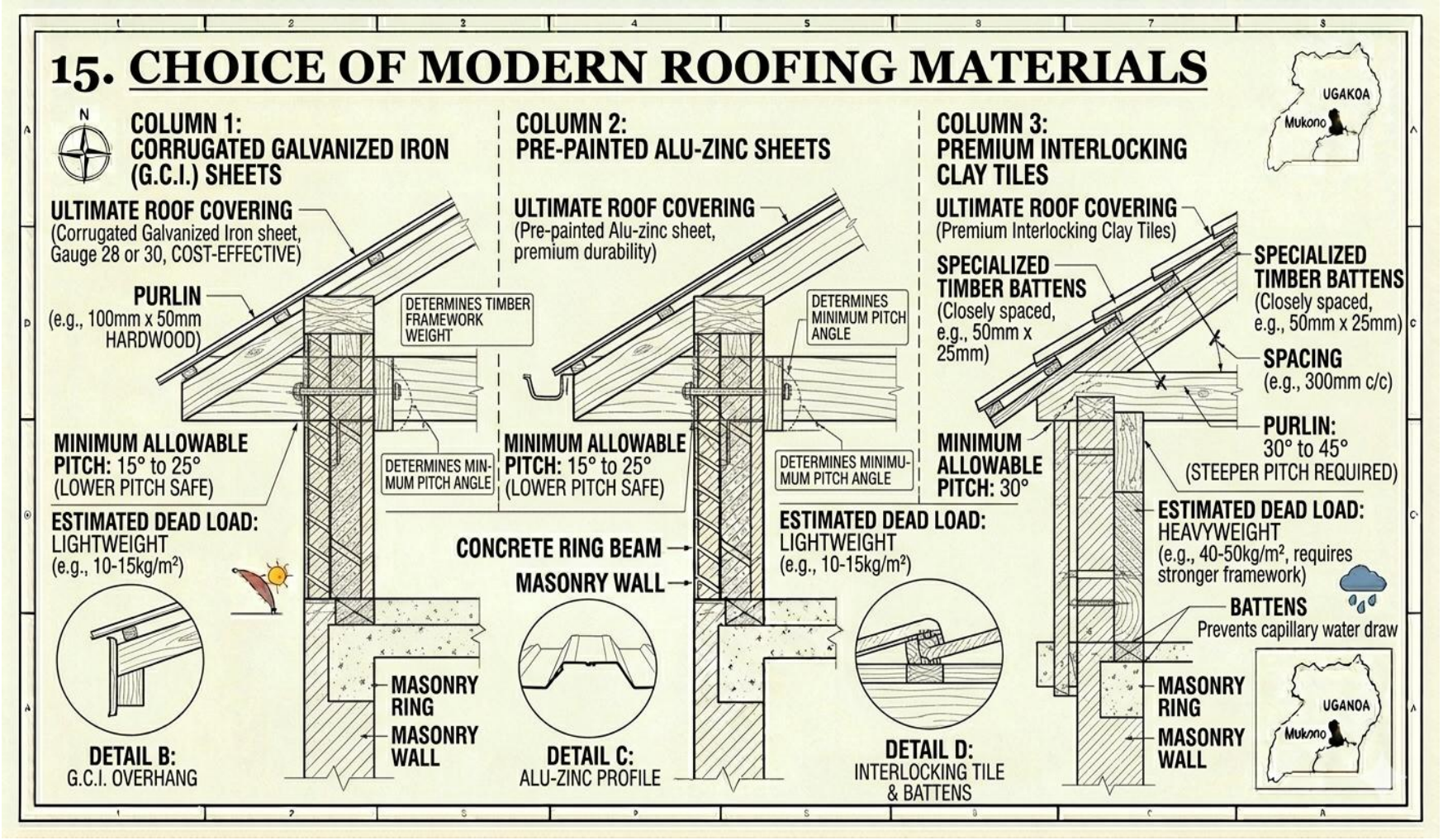
7.14 Ceiling Joists and Ceiling Framework

Suspended below or fixed directly alongside the structural tie beams are the **ceiling joists**, generally measuring 100mm 50mm or 75\ mm x 50mm and spaced at 600mm intervals. These joists form a flat horizontal grid across the interior spaces of the building. They provide a structural framework onto which internal ceiling materials such as gypsum boards, plywood panels, or tongue-and-groove (T&G) timber strips—can be securely nailed or screwed.



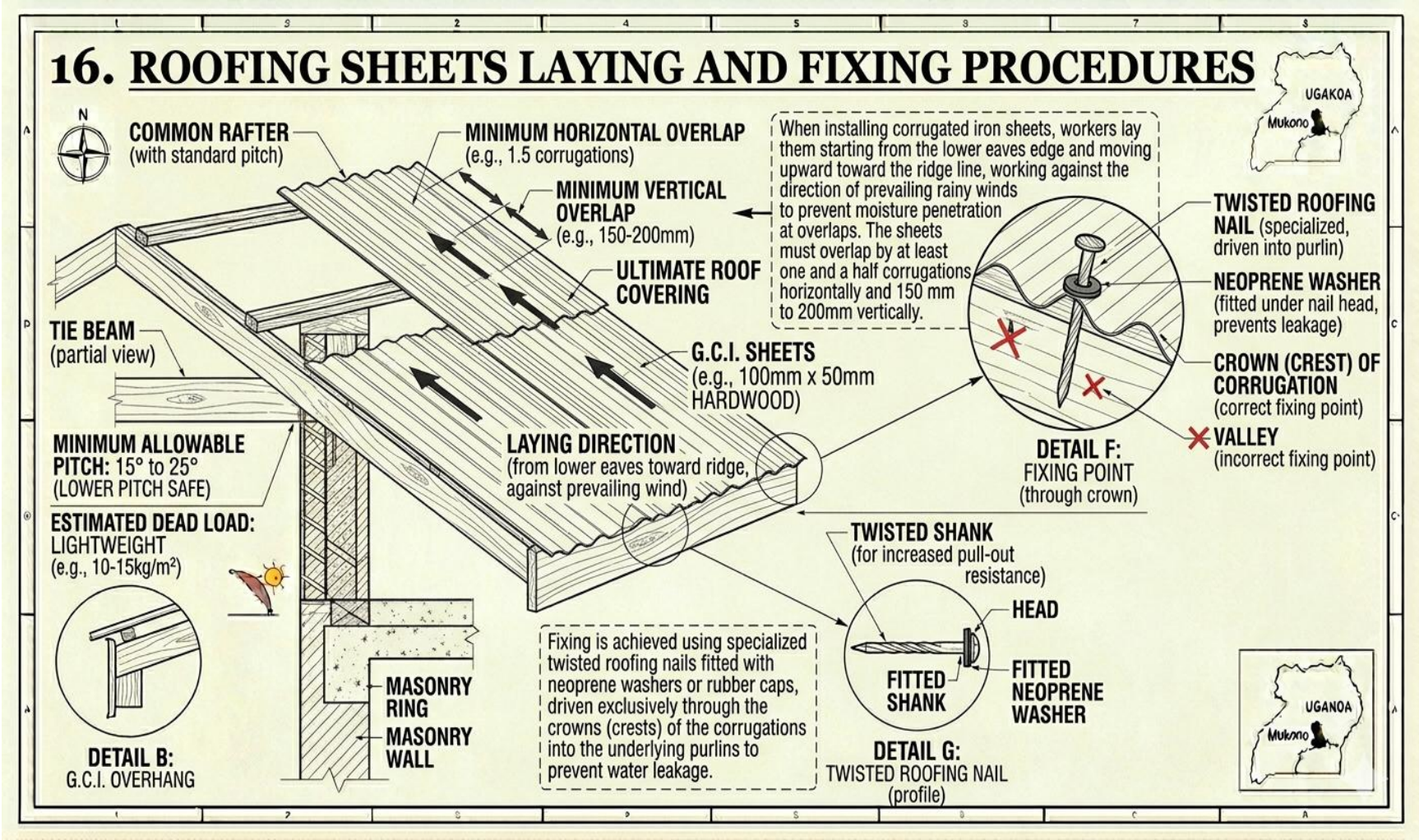
7.15 Choice of Modern Roofing Materials

The selection of the final roof covering determines both the weight of the underlying timber framework and the minimum allowable pitch angle. In contemporary Ugandan construction, options range from cost-effective **corrugated galvanized iron sheets** (gauge 28 or 30) and pre-painted **Alu-zinc sheets**, to premium **interlocking clay or concrete tiles**. While sheet roofing can be laid safely at lower pitches 15° to 25°heavy interlocking clay tiles require a steeper pitch 30° to 45°) and closely spaced, specialized timber battens to prevent water capillary draw and structurally sustain the dead load.



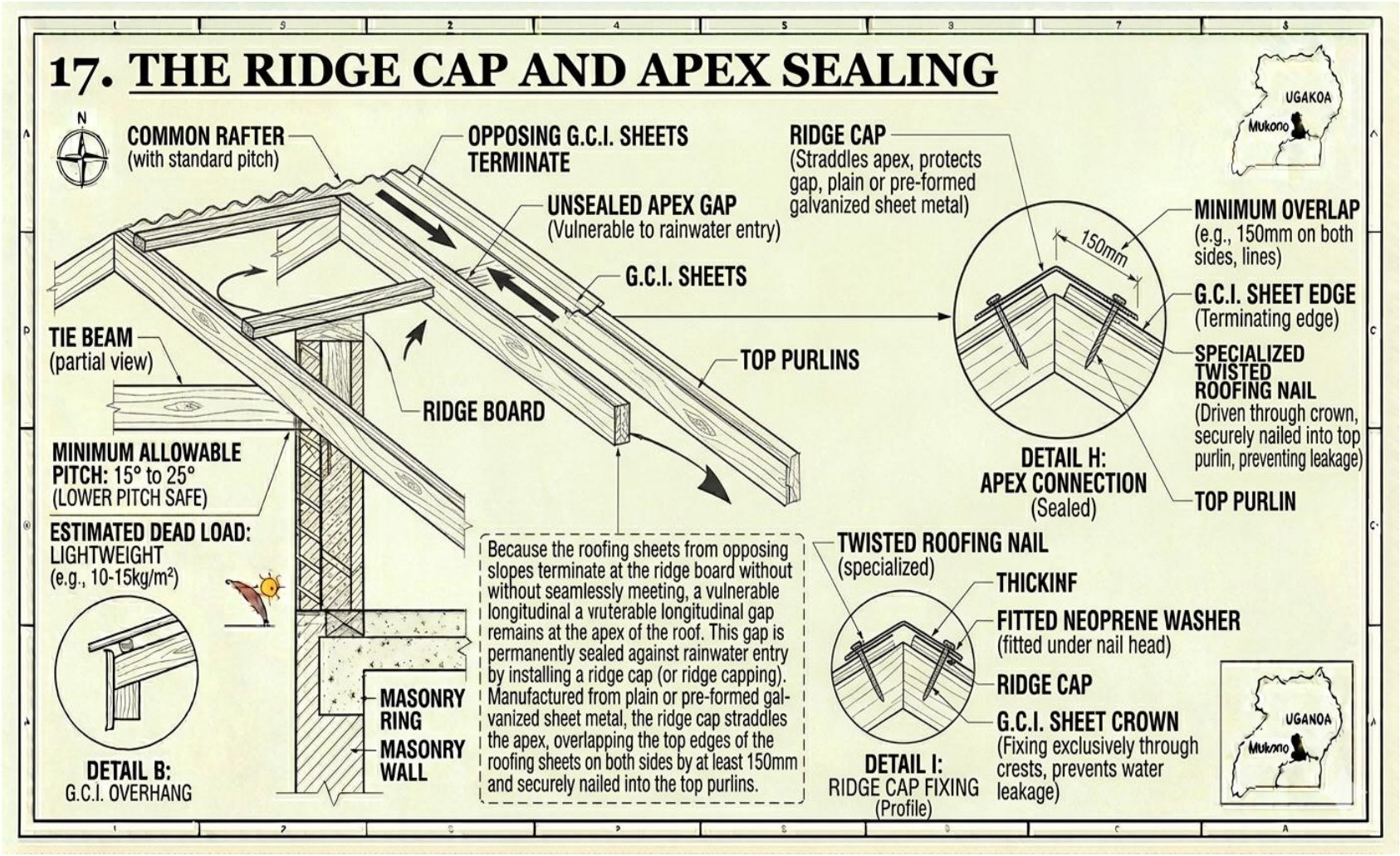
7.16 Roofing Sheets Laying and Fixing Procedures

When installing corrugated iron sheets, workers lay them starting from the lower eaves edge and moving upward toward the ridge line, working against the direction of prevailing rainy winds to prevent moisture penetration at overlaps. The sheets must overlap by at least one and a half corrugations horizontally and 150 mm to 200mm vertically. Fixing is achieved using specialized **twisted roofing nails** fitted with neoprene washers or rubber caps, driven exclusively through the crowns (crests) of the corrugations into the underlying purlins to prevent water leakage.



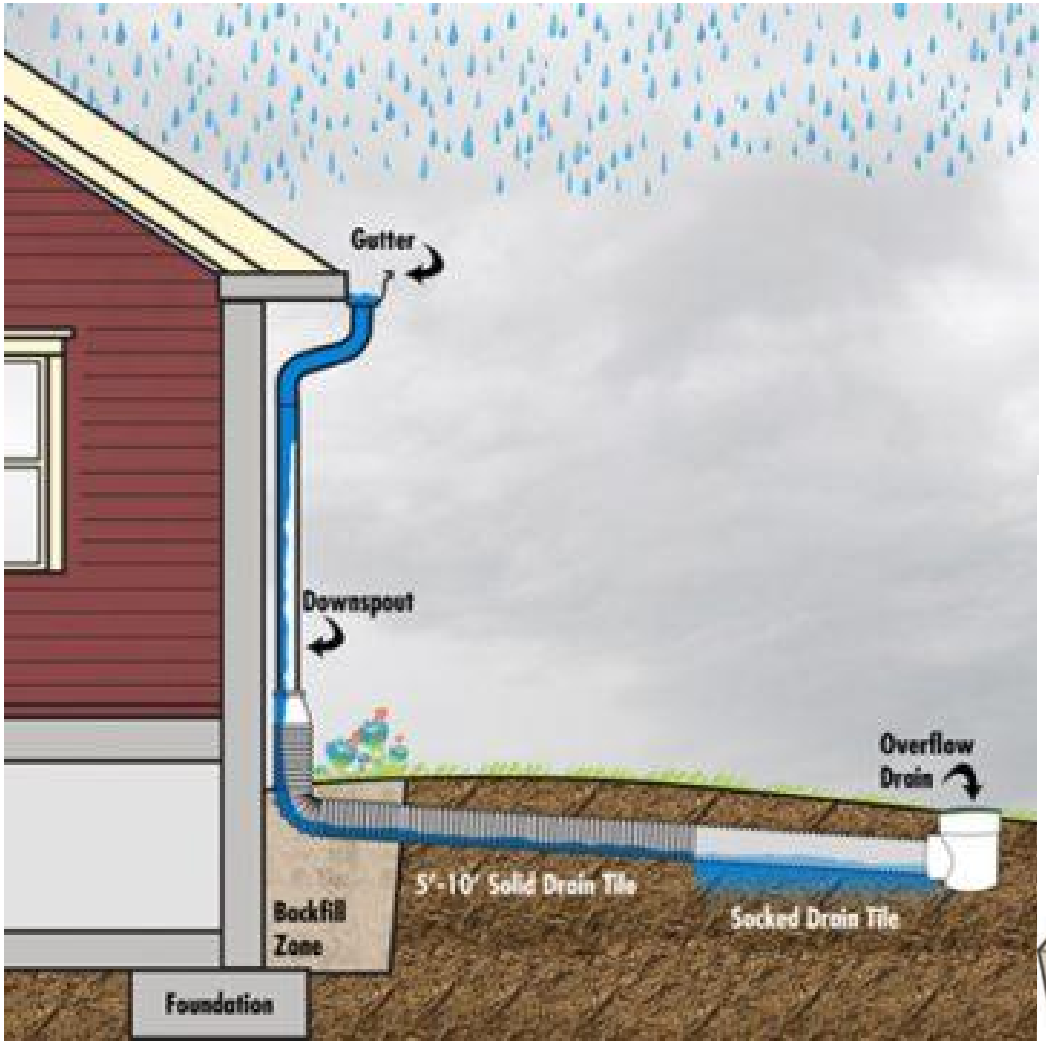
7.17 The Ridge Cap and Apex Sealing

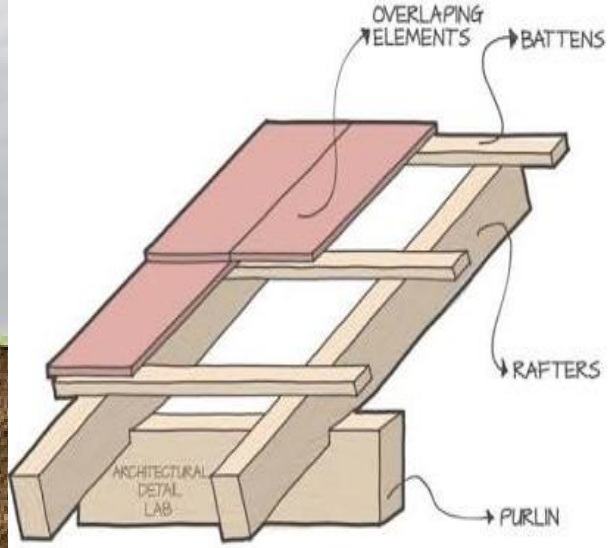
Because the roofing sheets from opposing slopes terminate at the ridge board without seamlessly meeting, a vulnerable longitudinal gap remains at the apex of the roof. This gap is permanently sealed against rainwater entry by installing a **ridge cap** (or ridge capping). Manufactured from plain or pre-formed galvanized sheet metal, the ridge cap straddles the apex, overlapping the top edges of the roofing sheets on both sides by at least 150mm and securely nailed into the top purlins.



7.18 Rainwater Disposal and Guttering Systems

Efficient rainwater disposal is critical to preventing the erosion of the building's apron and foundation walls. Prefabricated **U-shaped or square-profile gutters** (made of PVC or galvanized iron) are securely fixed along the fascia boards with a slight longitudinal fall (gradient) toward disposal points. These gutters collect rainwater run-off from the roof slopes and route it into vertical **downpipes** 75mm to 100mm diameter), which discharge the water into surface drains, soak pits, or rainwater harvesting storage tanks.





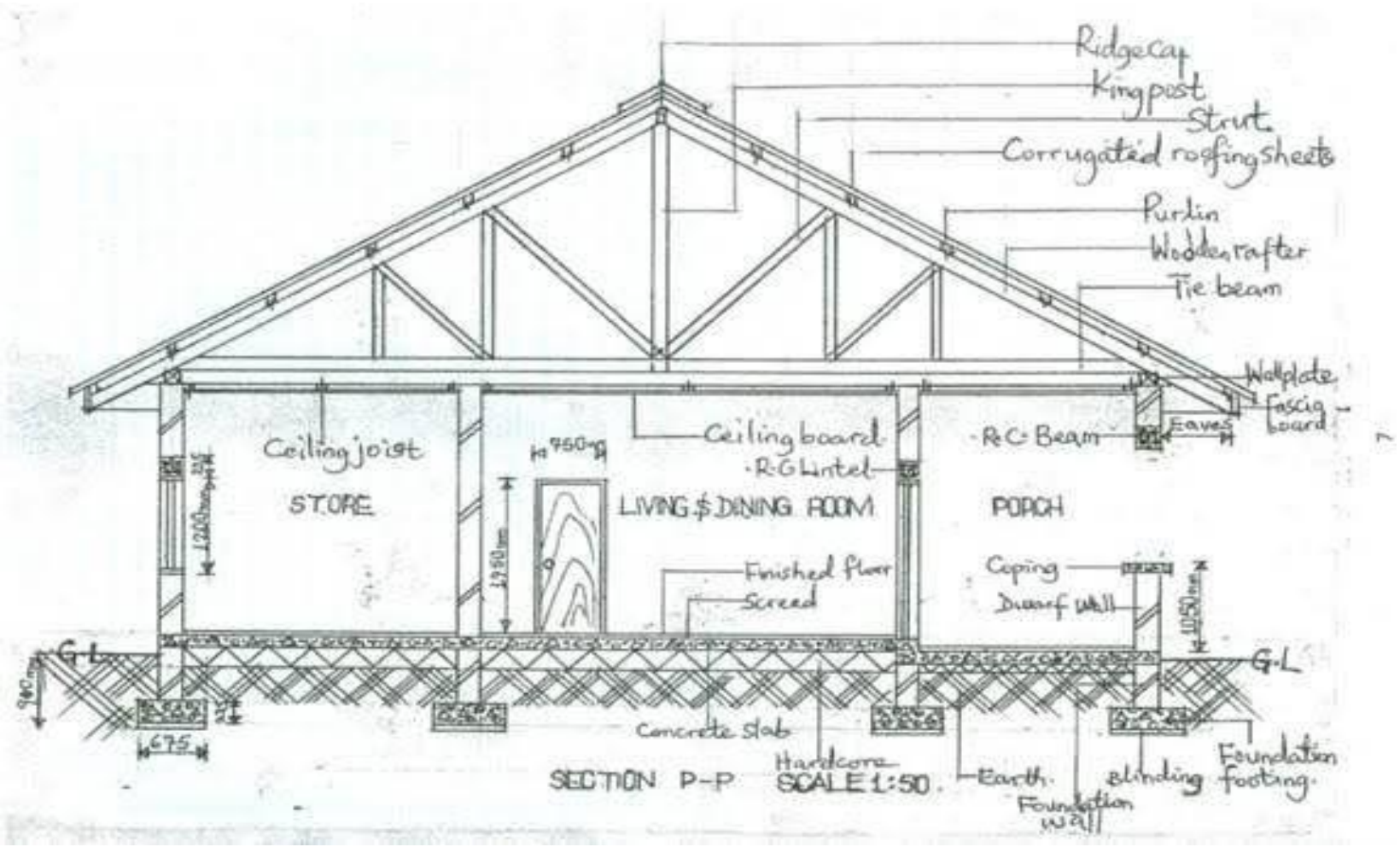
7.19 Timber Preservation and Treatment Practices

Before any structural assembly occurs, all timber members used in roof construction must undergo thorough preservation treatment to protect them from fungal decay and wood-boring insects, such as termites. In Uganda, timber is commonly treated using chemical preservatives like burnt oil, creosote, copper chrome arsenate (CCA) via pressure impregnation or localized manual brushing. In technical drawings, proper material representation includes detailing that timber components remain physically isolated from direct contact with wet masonry mortar by using damp-proof membranes where wall plates sit.



7.20 Essential Drafting Techniques for Roof Sections

In the final step of mastering roof technology for the P720/2 Building Drawing examination, students must apply standard drafting protocols at scales of 1:50 or 1:100. All timber components cut through by the sectional plane must be clearly outlined using sharp, dark profile lines, accompanied by standard timber material symbols (cross-hatching or diagonal grain lines). Detailed annotations must include correct labels detailing the name, material, and cross-sectional dimension of every single member from the 100 X 75mm wall plate up to the 150 X 38mm ridge board ensuring a professional, legible, and structurally compliant engineering presentation.



7.21 KEY POINTS TO ANSWERING SCENARIOS OF TOPIC 7

When answering a scenario test item on roofs, the learner must begin with a focused introduction explaining the roof's function as the uppermost structural component providing protection, identifying the roof type (pitched, gable, hipped, or lean-to), stating the roof pitch (22.5° to 30° for corrugated iron sheets), and explaining the importance of understanding all roof members. The essential materials, tools, and equipment include timber members for wall plates (100mm x 75mm), rafters (100mm x 50mm), ridge boards (150mm x 38mm), tie beams (150mm x 50mm), purlins (100mm x 50mm), struts, king posts, ceiling joists, roofing materials (corrugated iron sheets, Alu-zinc, clay tiles), fixing materials (nails with neoprene washers), guttering systems, ridge caps, measuring tape, spirit level, plumb bob, saws, hammers, and drawing instruments for scales 1:50 or 1:100. Health and safety awareness requires wearing PPE (helmets, safety boots, gloves, safety harnesses), ensuring scaffolding and ladders are properly erected, observing safe manual handling techniques, maintaining good housekeeping, ensuring fall protection systems, following proper cutting procedures, and observing safety precautions with treated timber. The operational procedure involves installing the wall plate bedded in mortar, constructing the roof truss with tie beams, fixing common rafters at specified spacing, installing the ridge board, cutting bird's mouth joints, incorporating struts and king posts for bracing, fixing purlins horizontally, extending eaves projections (450-600mm), installing fascia boards and barge boards, incorporating soffit boards with ventilation, fixing ceiling joists, laying roofing sheets from eaves upward with proper overlaps, fixing sheets through corrugation crests, installing ridge caps, and fixing gutters and downpipes. Maintenance recommendations include regular inspection for damaged sheets, checking loose fixings, inspecting timber for decay or insect attack, ensuring gutters are clear, repairing fascia and barge boards, checking ridge caps, and retreating timber periodically. Evaluation assesses whether the drawing accurately represents all roof members, roof pitch is correctly shown, bird's mouth joint is properly detailed, eaves projections and finishes are correctly represented, dimensions are clear, and a builder could construct the roof correctly. In conclusion, the learner has prepared comprehensive roof drawings accurately representing all structural members and construction details, and the final drawing, including proper detailing of the bird's mouth joint, accurate roof pitch, correct eaves projections with fascia, barge boards, and soffit ventilation, is fit for its intended purpose of guiding roof construction, ensuring a structurally sound, weatherproof, durable roof.

TOPIC 8: BUILDING DRAWING

Competency

Learners prepare complete working drawings.

Teaching Focus

Ensure learners include

- floor plans
- elevations
- sections
- schedules
- dimensions
- annotations
- site layout.

Assessment Checklist

Observe whether learners

✓ interpret the design brief

✓ allocate spaces correctly

✓ use appropriate scales

✓ dimension accurately

✓ apply building conventions.

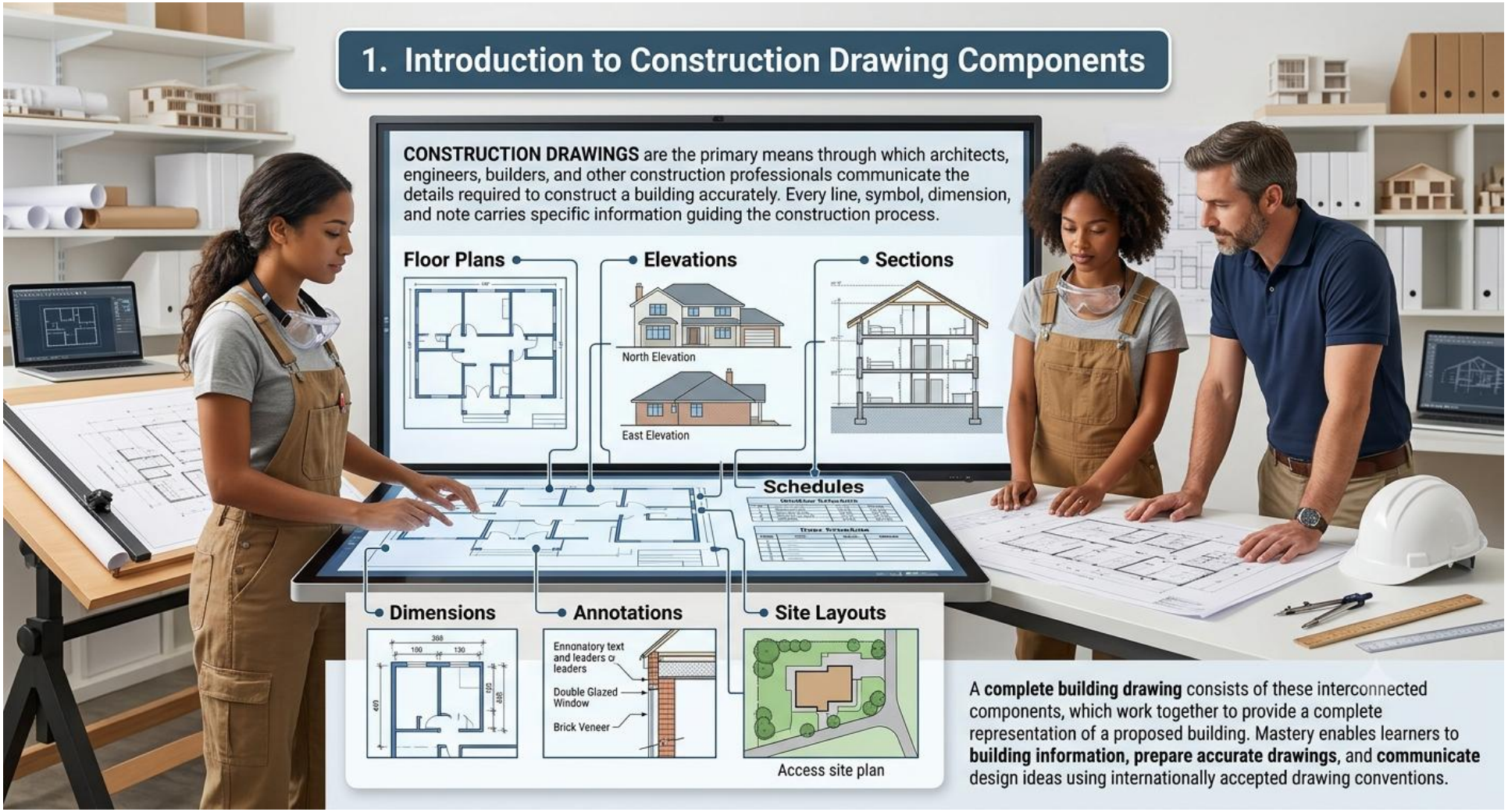
Common Misconceptions

Learners often

- omit schedules
- misplace openings
- draw inconsistent elevations
- forget section symbols.

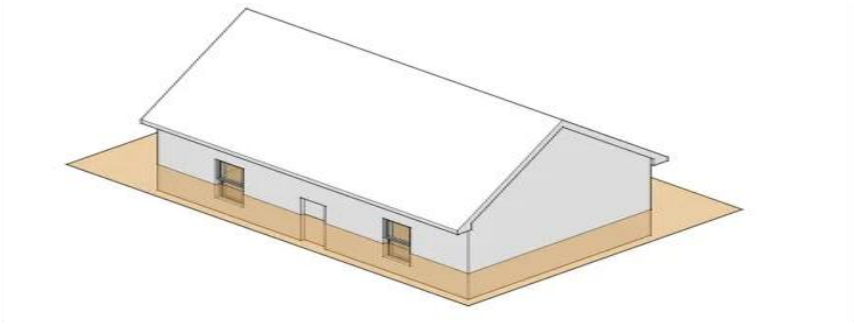
8.1 Introduction to Construction Drawing Components

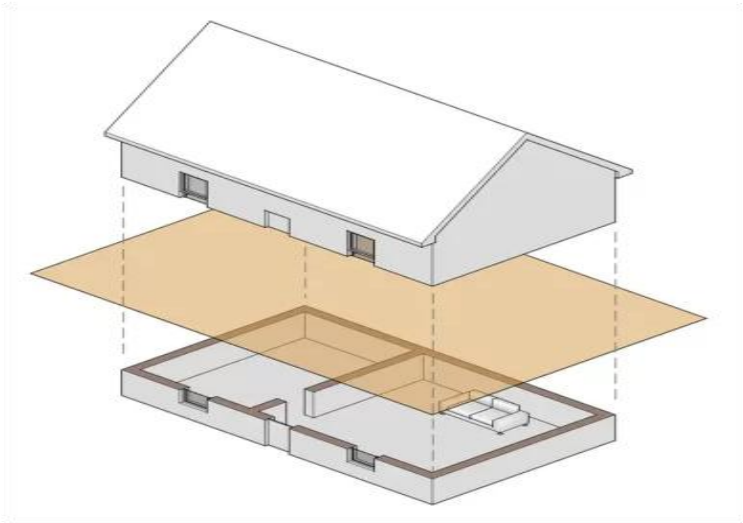
Construction drawings are the primary means through which architects, engineers, builders, and other construction professionals communicate the details required to construct a building accurately. Every line, symbol, dimension, and note included in a drawing carries specific information that guides the construction process., learners should understand that a complete building drawing consists of several interconnected components, including floor plans, elevations, sections, schedules, dimensions, annotations, and site layouts. These components work together to provide a complete representation of a proposed building. Mastery of construction drawing enables learners to interpret building information correctly, prepare accurate drawings, and communicate design ideas using internationally accepted drawing conventions.

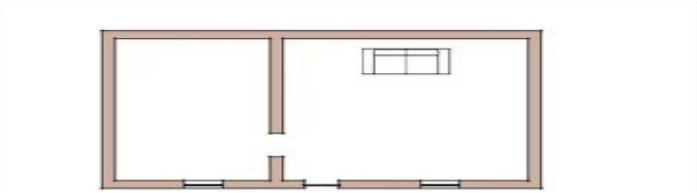


8.2 Understanding Floor Plans

A floor plan is one of the most important architectural drawings because it presents a horizontal section of a building as though it has been cut approximately one metre above the floor level. This view reveals the arrangement of rooms, walls, doors, windows, circulation spaces, sanitary fittings, and built-in furniture. Floor plans enable builders and clients to visualize how spaces are organized before construction begins. Learners should be able to identify different rooms, understand the relationship between spaces, recognize wall thicknesses, locate openings, and interpret architectural symbols used to represent building elements. Accuracy in drawing floor plans requires correct scaling, proper dimensioning, and the use of standard line types and symbols as specified in technical drawing standards.

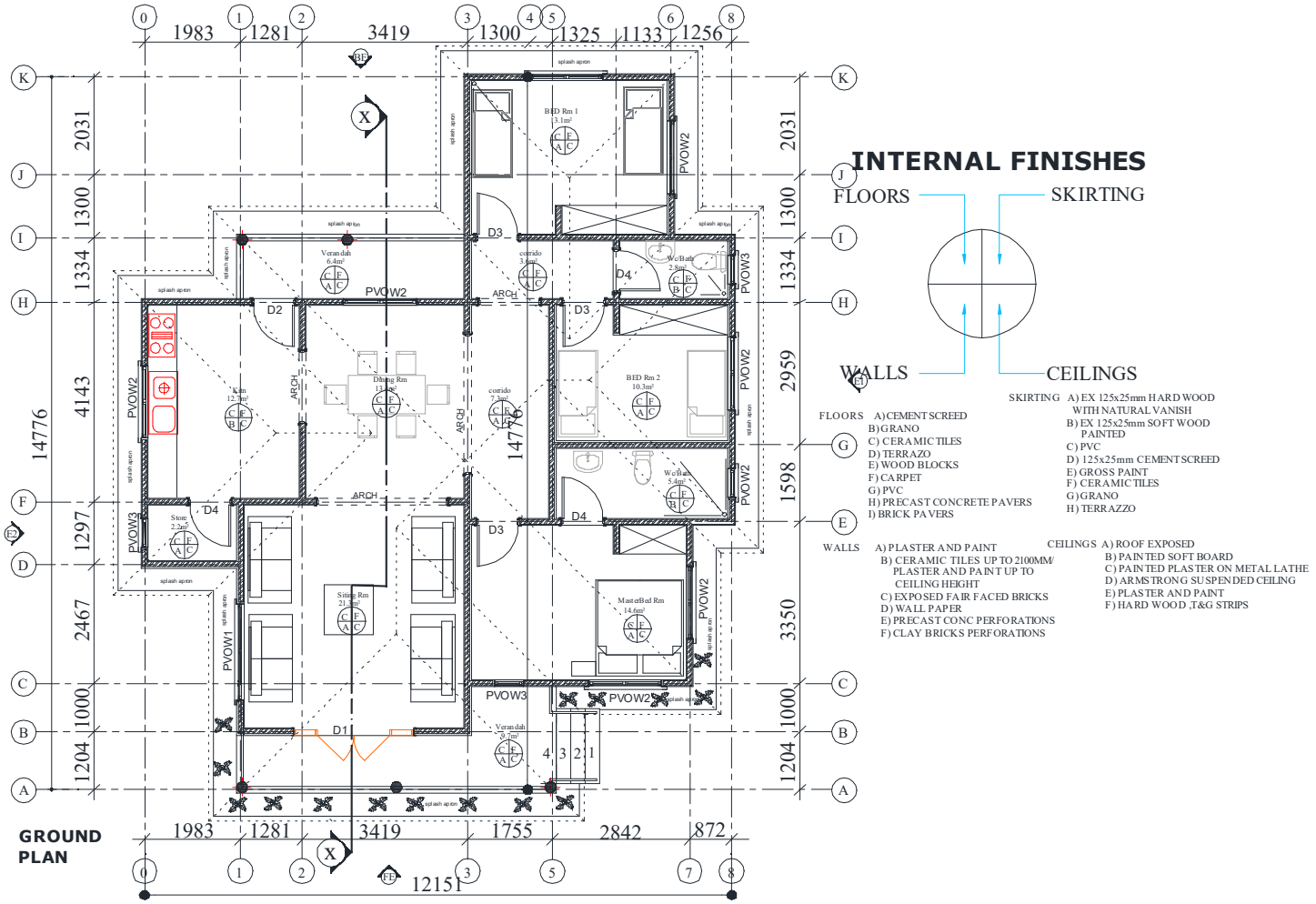






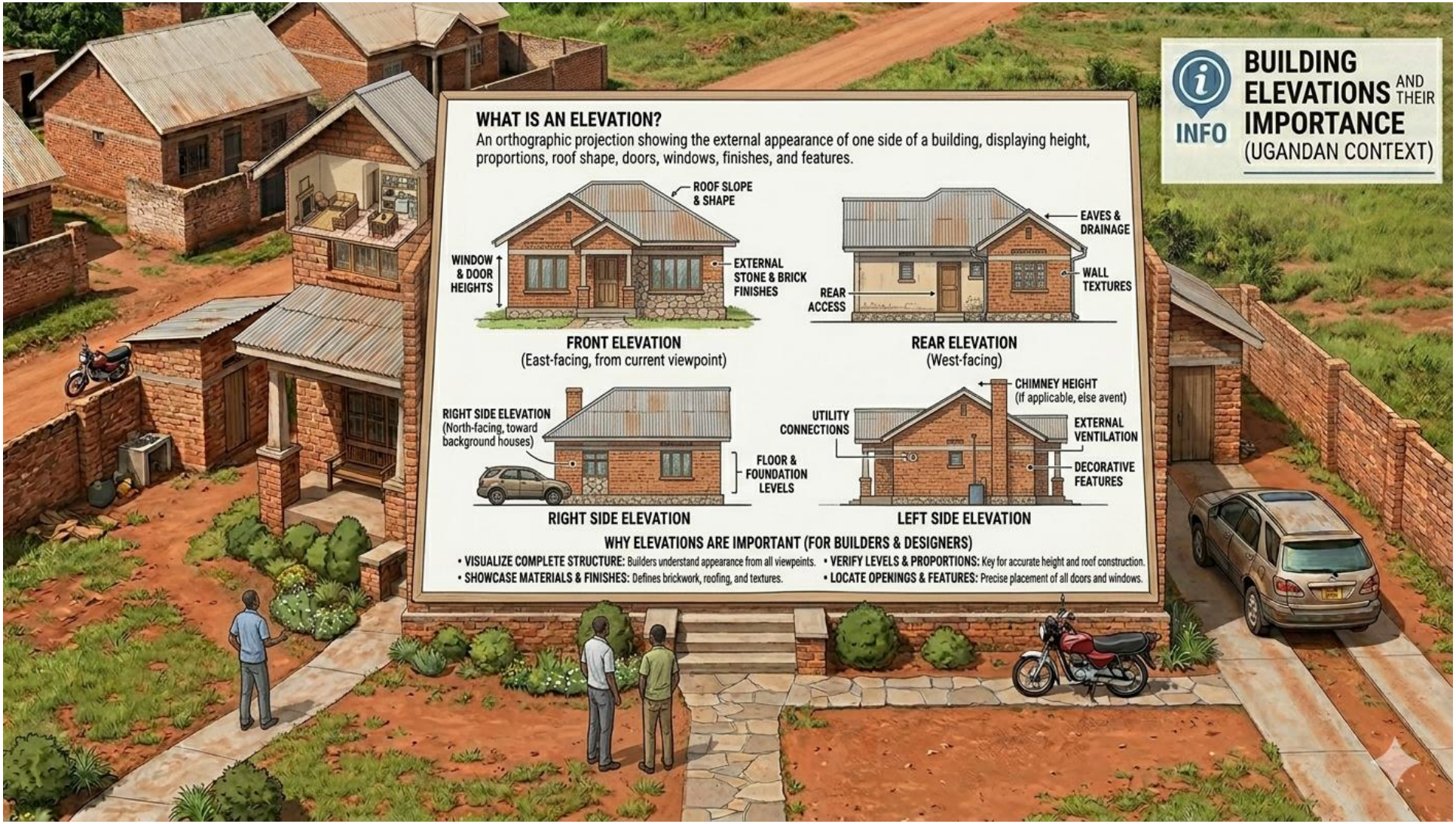
8.3 Reading and Interpreting Floor Plan Information

Beyond identifying rooms and structural elements, learners should develop the ability to interpret all information contained in a floor plan. This includes understanding dimensions, identifying the direction of door swings, recognizing different window types, interpreting furniture layouts, and reading construction notes. Floor plans also indicate circulation routes that show how occupants move through the building efficiently. Proper interpretation allows builders to estimate materials, determine construction sequences, and coordinate the work of different building trades. Learners should appreciate that a floor plan is not merely a sketch but a technical document that provides precise construction information.



8.4 Elevations and Their Importance

An elevation is an orthographic projection showing the external appearance of one side of a building. Unlike floor plans, elevations display the height, proportions, roof shape, doors, windows, external finishes, and decorative features of the building. They help builders understand how the completed structure will appear from different viewpoints, including the front, rear, left side, and right side. Elevations also provide information about floor levels, roof slopes, eaves, window heights, and external materials. Learners should be able to distinguish between various elevations and understand how each contributes to the complete representation of a building.



8.5 Interpretation of Elevation Drawings

Reading elevations requires learners to understand vertical dimensions, reference levels, and architectural details that cannot be observed in floor plans. Elevations illustrate relationships between different building components such as doors, windows, roof coverings, chimneys, fascia boards, gutters, and external wall finishes. Learners should also recognize symbols indicating finished floor levels, ground levels, and roof heights. Accurate interpretation of elevations enables construction personnel to execute external works correctly while ensuring that the finished building conforms to the architect's intended design.



BACK ELEVATION



END ELEVATION 1



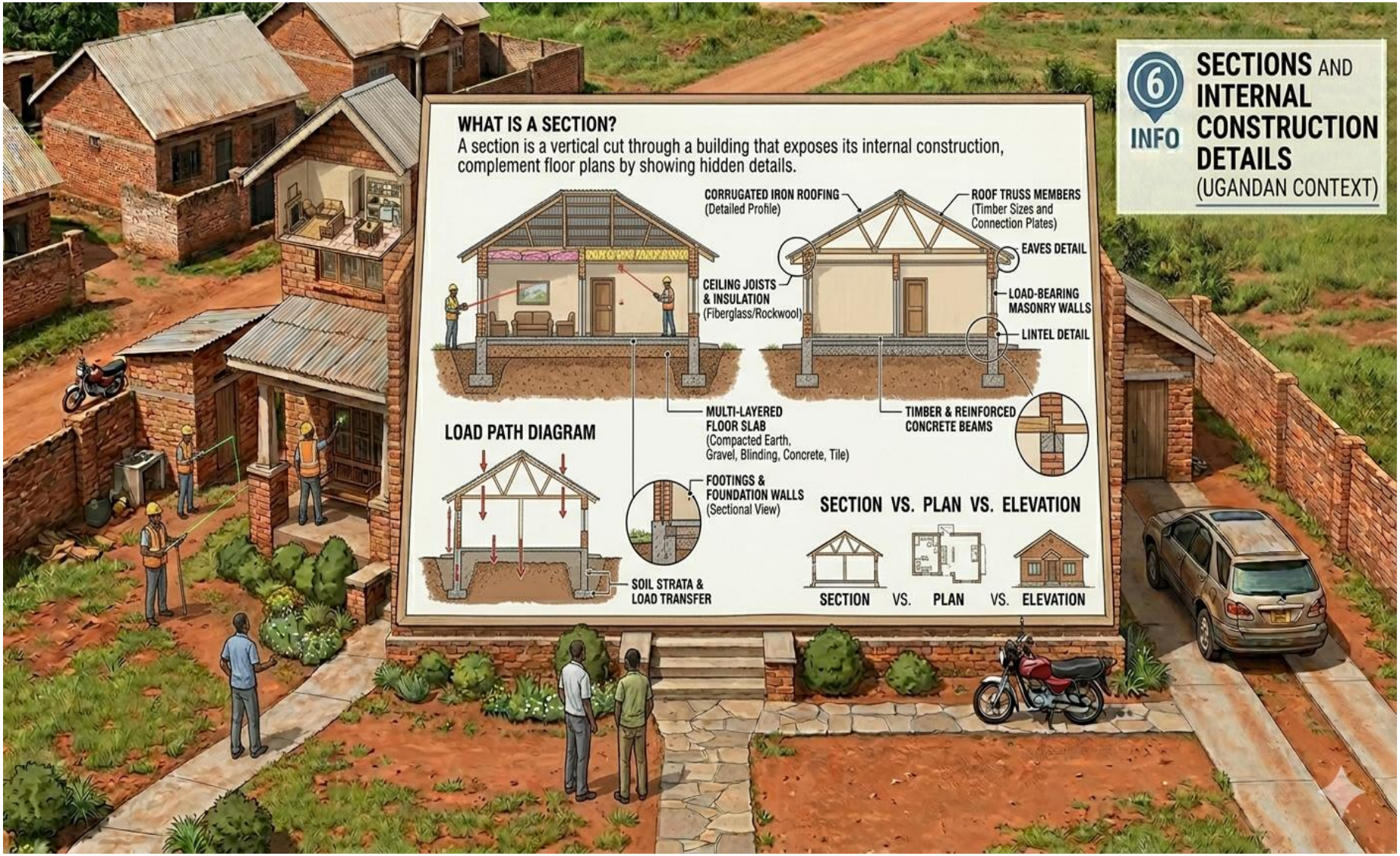
FRONT ELEVATION



END ELEVATION 2

8.6 Sections and Internal Construction Details

A section is created by imagining a vertical cut through a building to expose its internal construction. Unlike floor plans and elevations, sections reveal hidden structural components such as foundations, footings, floor slabs, walls, beams, columns, ceilings, roof members, and insulation materials. Sections provide valuable information about how various building elements are connected and how loads are transferred safely to the ground. Learners should understand that section drawings complement floor plans by providing details that are impossible to represent adequately in horizontal or external views.



8.7 Reading Sectional Drawings

Section drawings enable learners to study construction details in greater depth. They show floor-to-ceiling heights, roof construction, foundation depths, wall composition, ceiling finishes, and relationships between structural components. Learners should understand how cutting planes are indicated on floor plans and how sectional views correspond to specific locations within the building. Correct interpretation of sectional drawings allows builders to understand construction sequences, identify concealed components, and ensure that structural elements are assembled correctly according to design specifications.

ROOF NOTES

35° ROOF PITCH OF GALVANISED IRON SHEETS ON 75X50MM PURLINS ON 50X100MM RAFTERS,STRUTS AND TIES ON 50X150MM TIE BEAMS ON 75 X100MM WALL PLATES AND 23 X225 MM FACIA AND BERGE BOARDS.

CEILING NOTES

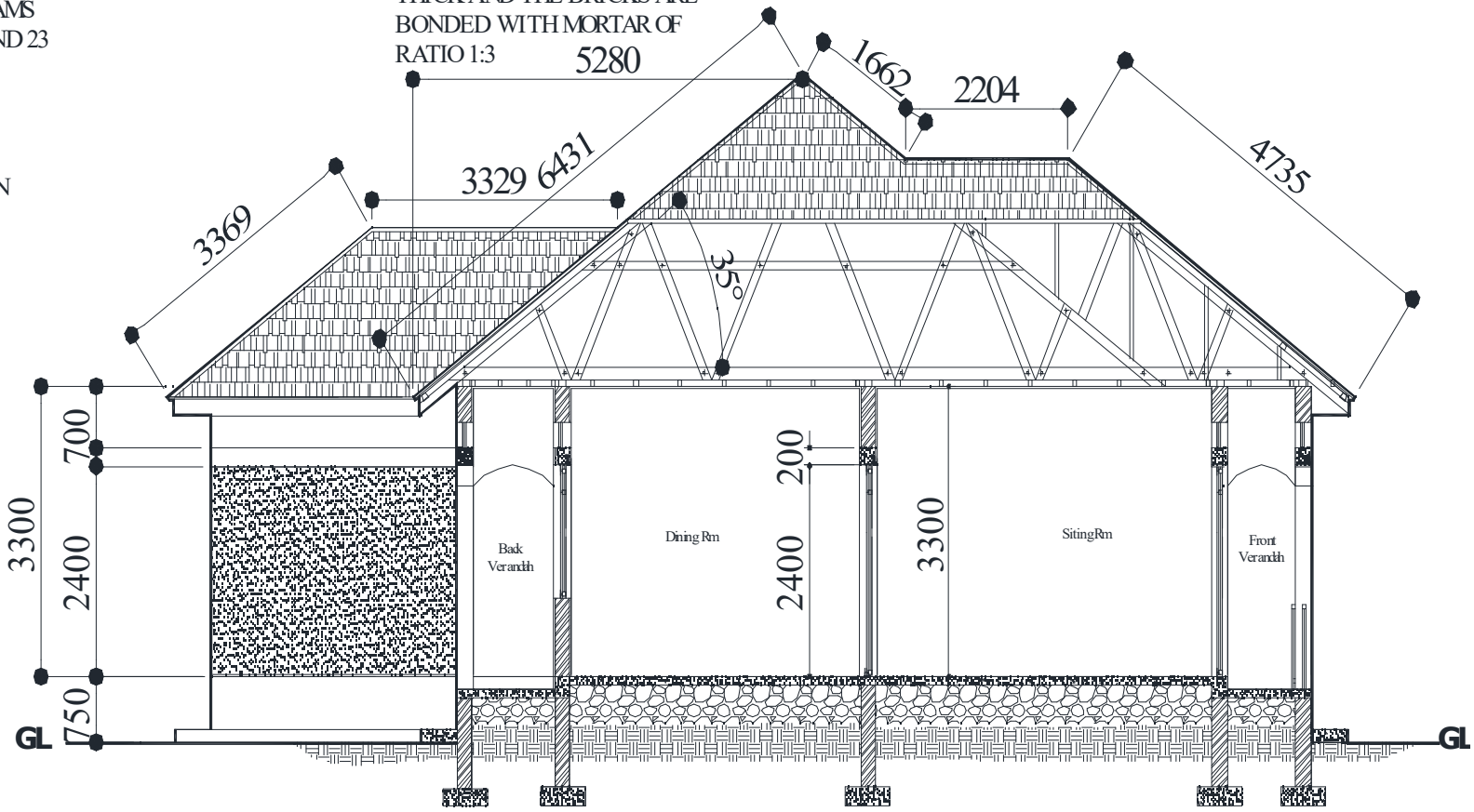
CEMENT /SAND (1:4) MORTAR ON EXPANDED METAL LATHE ON 50X100MM BRANDERINGS AT 600MM C/C ON 50X100 CEILING JOISTS AT 600MM C/C.

FOUNDATION NOTES

100MM HIGH CEMENT SKIRTING ON 12MM THICK CEMENT SAND FLOOR SCREED IN 1:3:6 MIX ON 100MM THICK OVERSITE CONCRETE SLAB IN 1:3:6 MIX ON 300MM COMPACTED APPROVED HARD CORE ON RAMMED MARRUM ON 645X 215MM CONC STRIP FOUNDATION IN 1:4:8 MIX THE FOUNDATION DEPTH TO BE DETERMINED ON SITE BUT SHOULD NOT BE LESS THAN 600MM DEEP.

WALL NOTES

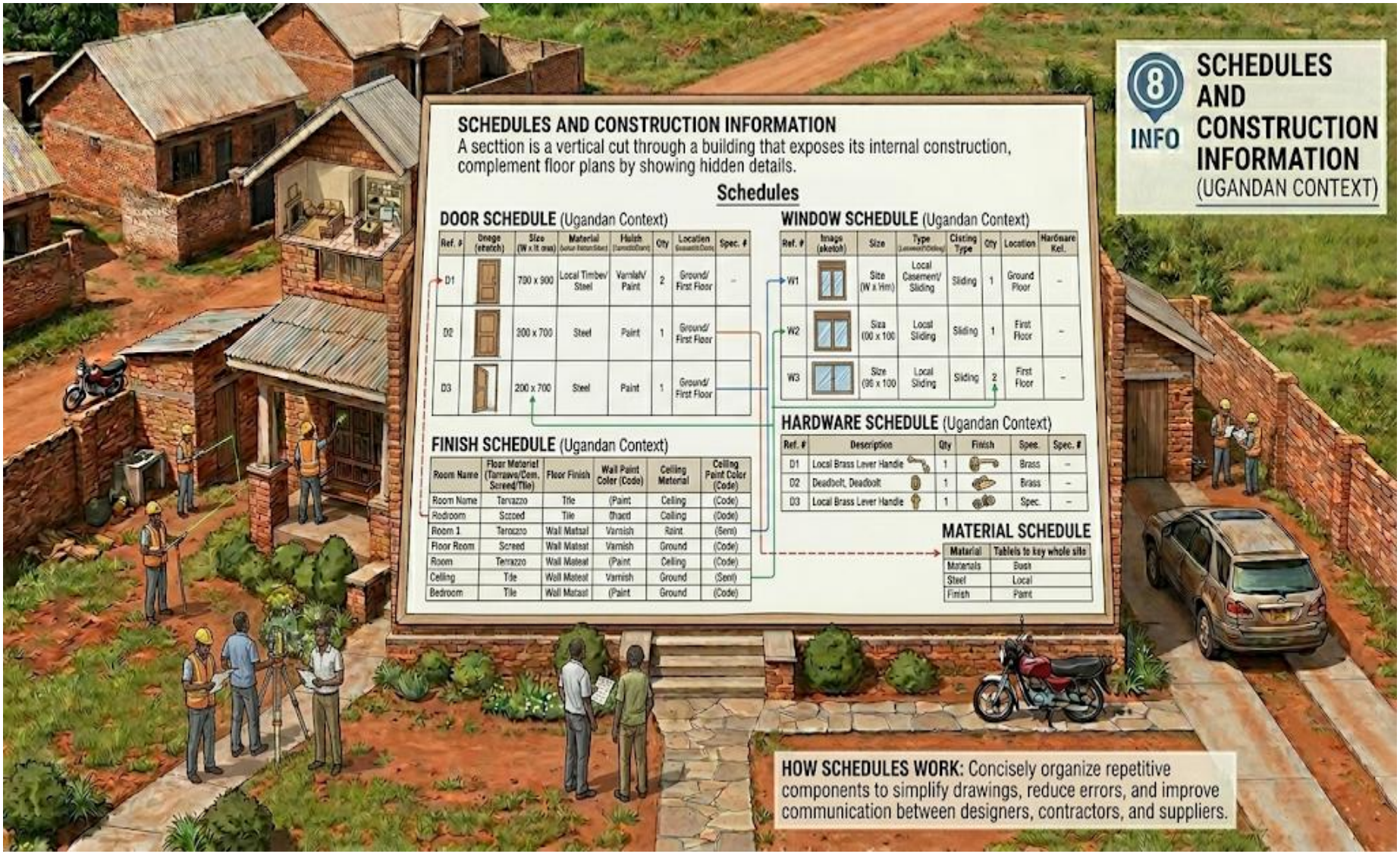
SUBSTRUCTURE WALLS ARE 200MM THICK AND SUPER STRUCTURE WALLS ARE 150MM THICK AND THE BRICKS ARE BONDED WITH MORTAR OF RATIO 1:3



SECTION X-X

8.8 Schedules and Construction Information

Schedules are organized tables included in construction drawings to provide detailed information about repetitive building components. Common schedules include door schedules, window schedules, finish schedules, hardware schedules, and material schedules. Each schedule identifies component sizes, quantities, materials, finishes, locations, and specifications. Instead of repeating the same information throughout the drawing, schedules provide a concise reference that simplifies interpretation and reduces drawing congestion. Learners should understand that schedules improve communication between designers, contractors, and suppliers during construction.



8.9 Interpretation and Use of Schedules

To use schedules effectively, learners must understand how symbols and reference numbers on drawings correspond to entries within the schedule tables. For example, a door labeled "D1" on the floor plan refers to a detailed description within the door schedule specifying its dimensions, material, frame type, finish, and hardware requirements. Window schedules similarly identify glazing type, opening method, frame material, and installation details. Accurate interpretation of schedules enables builders to order the correct materials, reduce construction errors, and maintain consistency throughout the project.

DOOR SCHEDULE					WINDOW SCHEDULE				
MARK	WIDTH	HEIGHT	No REQ	REMARKS	MARK	WIDTH	HEIGHT	No REQ	REMARKS
D1	2500	2400	1	CASEMENT METALIC	PVOW1	2000	1500	1	CASEMENT METALIC
D2	1000	2400	1	METALIC	PVOW2	1500	1500	6	CASEMENT METALIC
D3	900	2400	3	PANEL DOORS	PVOW3	600	1500	5	CASEMENT METALIC
D4	800	2400	3	FLUSH DOORS					

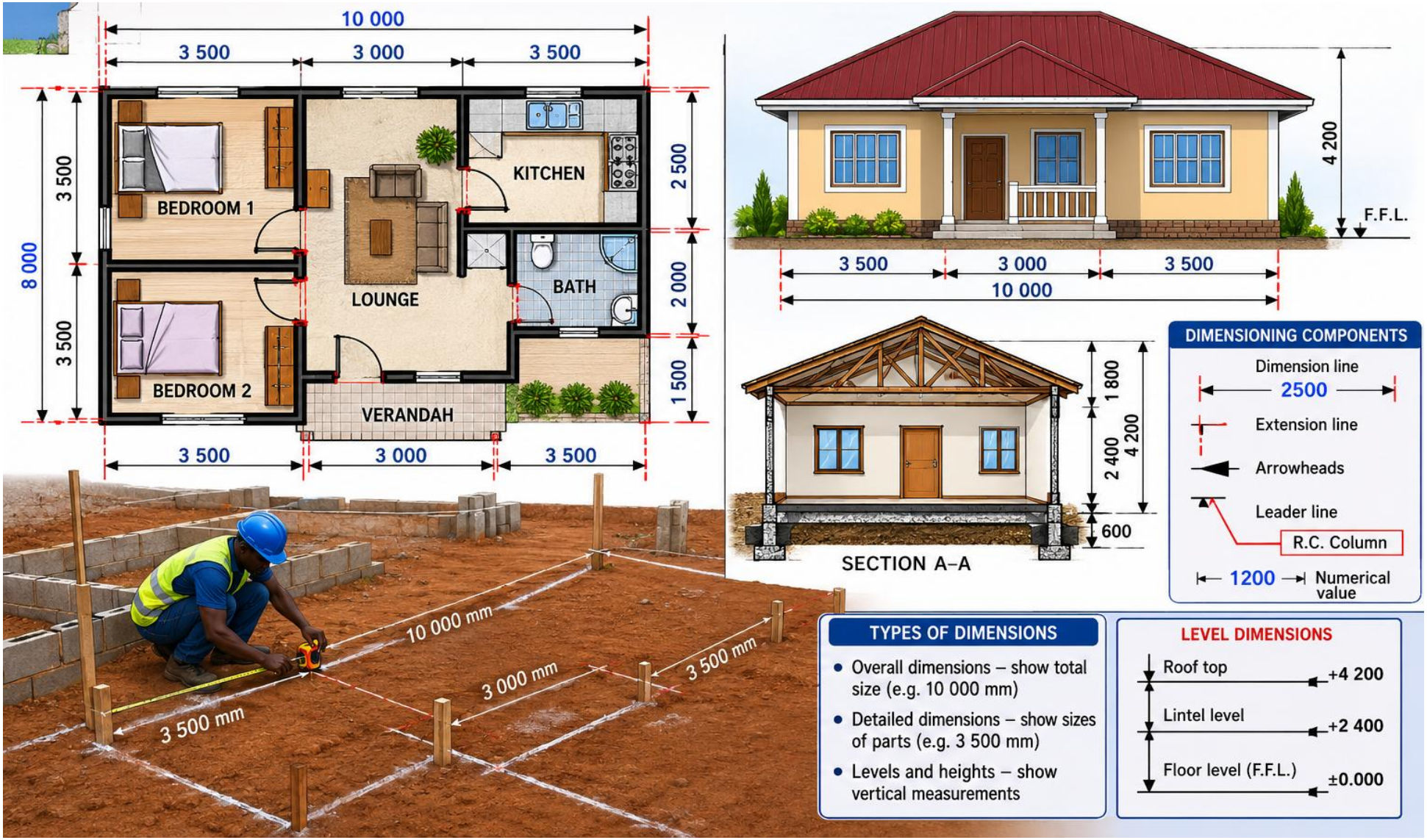
NOTES

1. ALL DIMENSIONS TO BE CHECKED ON SITE , WRITTEN DIMENSIONS TO BE FOLLOWED IN PREFERENCE TO THE SCALED DIMENSIONS.
2. ALL WALLS LESS THAN 200MM THICK TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATE COURSE.
3. ALL REINFORCED CONCRETE WORK IS TO BE IN ACCORDANCE WITH STRUCTUAL ENGINEER`S DETAILS
4. ALL SANITARY WORK TO BE IN ACCORDANCE WITH M.O.H RULES AND REGULATIONS.
5. WHERE DRAINS PASSES UNDER THE BUILDING OR DRIVE WAY AREA,PIPE TO BE OF CAST IRON OR ENCASED IN 150MM OF CONCRETE.
6. ALL WASTE PIPES AND SOIL PIPES ARE TO BE IN DUCTS AND THE BENDS TO HAVE THE CLEANING EYES ACCESIBLE FROM OUT SIDE.
7. ALL WINDOWS AND EXTERNAL GLASED DOORS ON GROUND FLOOR TO HAVE BURGLAR PROOFING TO THE ARCHITECTS DETAIL.
8. ALL DOOR FRAMES TO BE REBATED AND MOULDED AND BE FULL WIDTH OF WALL WITH MOULDED ARCITRAVES TO DETAIL, PROVIDE RUBER STOPS TO ALL DOORS.
9. STAIR CASE AND LOBBY DOORS TO BE SELF CLOSING AND A HALF HOUR FIRE RESISTANT.
10. ALL INTERNAL PLASTER TO BE TWO COATS AND FINISHED WITH A STEEL FLOAT.
11. ALL MANHOLES WITH IN THE BUILDING AREA ,DRIVE WAY AND PARKING TO HAVE HEAVY DUTY AIR TIGHT COVERS AND DOUBLE SEALED.
12. PROVIDE GI 150X100MM RAIN WATER DOWN PIPES AND 125X100MM GI BOX GUTTERS WITH BRACKETS ETC WHERE SHOWN.
13. ALL PAINTING TO BE 3 COATS.
14. A SPLASH APRON OF 500MM ALONG THE PERIMETER OF THE BUILDING.
15. SAMPLES OF FITTINGS , MATERIALS ETC TO BE PRODUCED AND APPROVED BEFORE COMENCING WORK.
16. ALL WINDOWS HAVE PVC SILLS BUILT IN REINFORCED CONCRETE.
17. STEEL TRUSSES /PORTAL FRAMES AND PURLINS TO BE PAINTED WITH 2 COATS OF OIL PAINT.
18. FIRE FIGHTING EQUIPMENT TO BE PROVIDED AND INSTALLED BY BUILDING FIRE CONSULTANTS WHERE SHOWN ON PLAN.
19. THESE ARCHITECTUAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS, ELECTRICAL-MECHANICAL DRAWINGS BILLS OF QUANTITIES AND THE TECHNICAL SPECIFICATIONS.

(ANY DESCRIPANCY SHALL BE REPORTED IMMEDIATELY TO THE ARCHITECT)

8.10 Dimensions in Construction Drawings

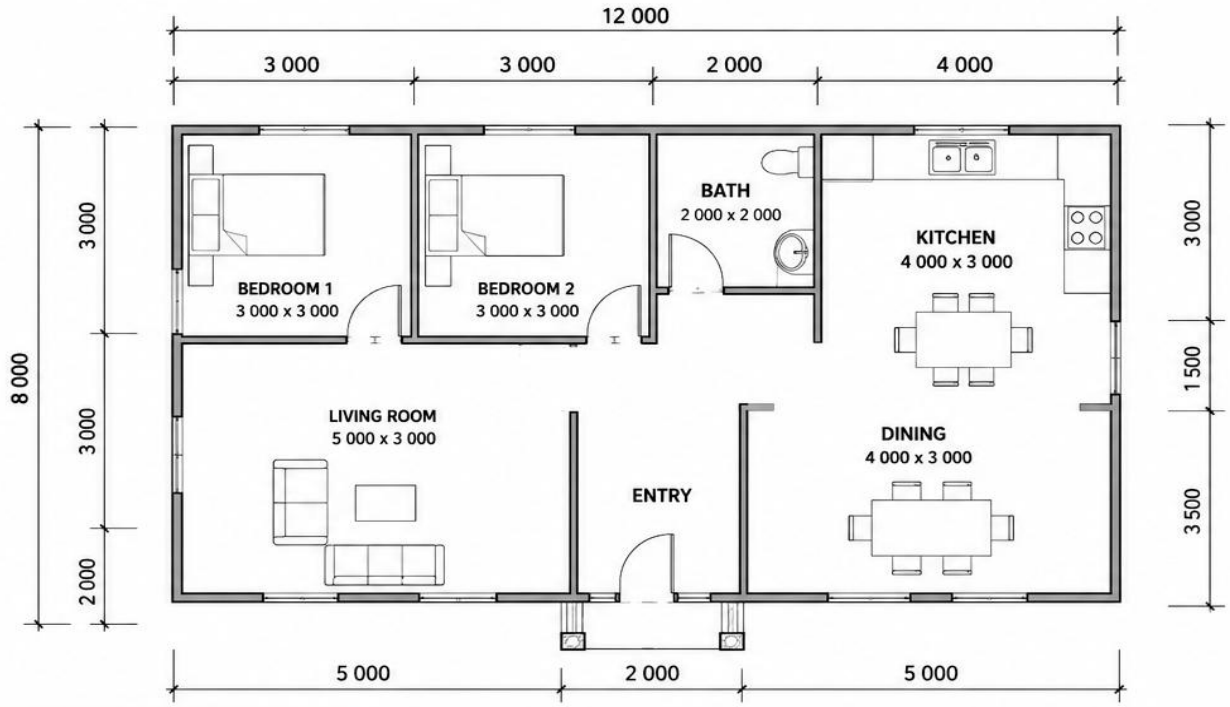
Dimensions communicate the exact size and location of every building component. They eliminate guesswork by specifying lengths, widths, heights, depths, and distances between structural elements. Technical drawing standards require dimensions to be clear, complete, accurate, and easy to read. Learners should understand the functions of dimension lines, extension lines, arrowheads, leader lines, and numerical values. Both overall dimensions and detailed dimensions are necessary to ensure accurate setting out and construction of the building. Proper dimensioning contributes significantly to precision during construction.



8.11 Principles of Correct Dimensioning

Effective dimensioning follows internationally accepted drawing conventions that prevent confusion and construction errors. Learners should avoid duplicating dimensions, overcrowding drawing spaces, or placing dimensions where they may become difficult to read. Horizontal dimensions are generally placed below floor plans, while vertical dimensions appear alongside elevations and sections. Measurements should always reflect the actual building size after considering wall thicknesses, openings, and construction tolerances. Good dimensioning demonstrates technical competence and enhances the usability of construction drawings.

Dimensions communicate the exact size and location of every building component. They eliminate guesswork by specifying lengths, widths, heights, depths, and distances between structural elements. Technical drawing standards require dimensions to be clear, complete, accurate, and easy to read.



DIMENSIONING ELEMENTS

DIMENSION LINE
Shows the extent of the measurement.

EXTENSION LINE
Projects from the object to the dimension line.

ARROWHEAD
Indicates the limit of the measurement.

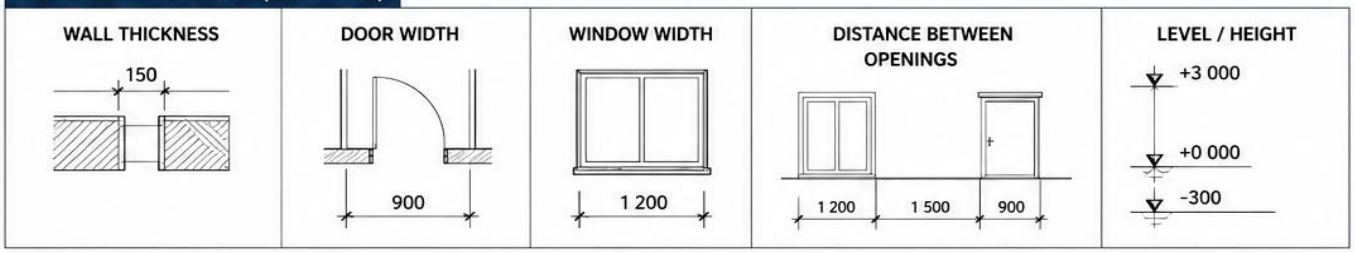
LEADER LINE
Points to a specific feature or note.

3000
NUMERICAL VALUE
Shows the exact size in millimeters.

TYPES OF DIMENSIONS

- **OVERALL DIMENSIONS** – show the total size of the building (e.g., overall length, width, height).
- **DETAILED DIMENSIONS** – show the sizes of individual parts and distances between elements (e.g., room sizes, window locations, wall thickness).

DETAILED DIMENSIONS (EXAMPLES)



IMPORTANCE

Proper dimensioning ensures accurate setting out, prevents errors, reduces rework, saves time and materials, and contributes significantly to precision during construction.

8.12 Annotations and Drawing Notes

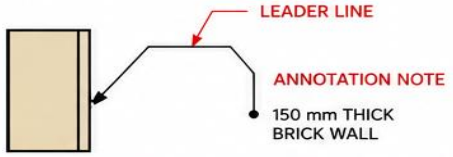
Annotations are explanatory notes added to construction drawings to clarify information that cannot be communicated effectively through lines and symbols alone. They identify materials, construction methods, finishes, specifications, installation instructions, and other important details. Annotations improve communication by ensuring that everyone involved in the project understands the designer's intentions. Learners should develop the ability to write concise, legible notes using standard abbreviations, technical terminology, and properly positioned leader lines that point accurately to the relevant building component.

12. ANNOTATIONS AND DRAWING NOTES

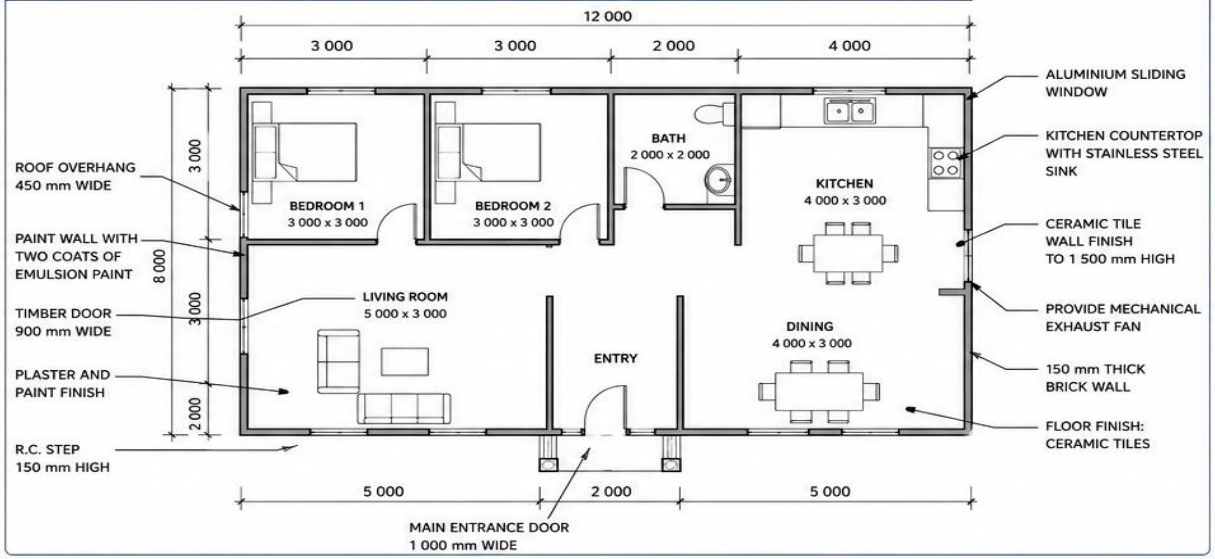
Annotations are explanatory notes added to construction drawings to clarify information that cannot be communicated effectively through lines and symbols alone. They identify materials, construction methods, finishes, specifications, installation instructions, and other important details. Annotations improve communication by ensuring that everyone involved in the project understands the designer's intentions.

WHAT IS ANNOTATION?

An annotation is a written note or label that gives information about a specific part of the drawing. It is connected to the building component using a leader line.



EXAMPLE: FLOOR PLAN WITH ANNOTATIONS



FUNCTIONS OF ANNOTATIONS

- Identify construction materials, finishes and components.
- Provide installation instructions and construction methods.
- Clarify details not fully shown by lines or dimensions.
- Improve communication among all project stakeholders.
- Reduce errors and rework during construction.
- Ensure the building is constructed according to design specifications.

CHARACTERISTICS OF GOOD NOTES

- Clear, legible uppercase lettering.
- Concise and precise.
- Neatly positioned outside the drawing where possible.
- Connected to the correct component with leader lines.
- Use standard abbreviations and technical terms.
- Do not repeat information already shown by dimensions or symbols.

STANDARD ABBREVIATIONS

R.C.	Reinforced Concrete
B.W.	Brick Wall
F.F.L.	Finished Floor Level
C/L	Centre Line
Ø	Diameter
TYP.	Typical
N.T.S.	Not to Scale
U.N.O.	Unless Noted Otherwise
EQ.	Equal
D.P.C.	Damp Proof Course

COMMON INFORMATION INCLUDED IN ANNOTATIONS

	Building materials (brick, concrete, timber, steel, etc.)		Levels, heights and wall thicknesses
	Finishes (plastering, painting, tiling, floor finishes, etc.)		Installation instructions (plumbing, electrical, etc.)
	Door and window types and sizes		Structural details and construction methods
	Roof covering and structural members		Safety and construction requirements

EXAMPLES OF DRAWING ANNOTATIONS

- 150 mm Thick Brick Wall
- Provide Reinforced Concrete Lintel Above Window
- Paint Wall with Two Coats of Exterior Acrylic Paint
- Floor Finish: Non-slip Ceramic Tiles
- Install 100 mm Diameter PVC Drain Pipe
- Roof Covering: Gauge 28 Pre-painted Iron Sheets
- Provide Damp Proof Course at Plinth Level

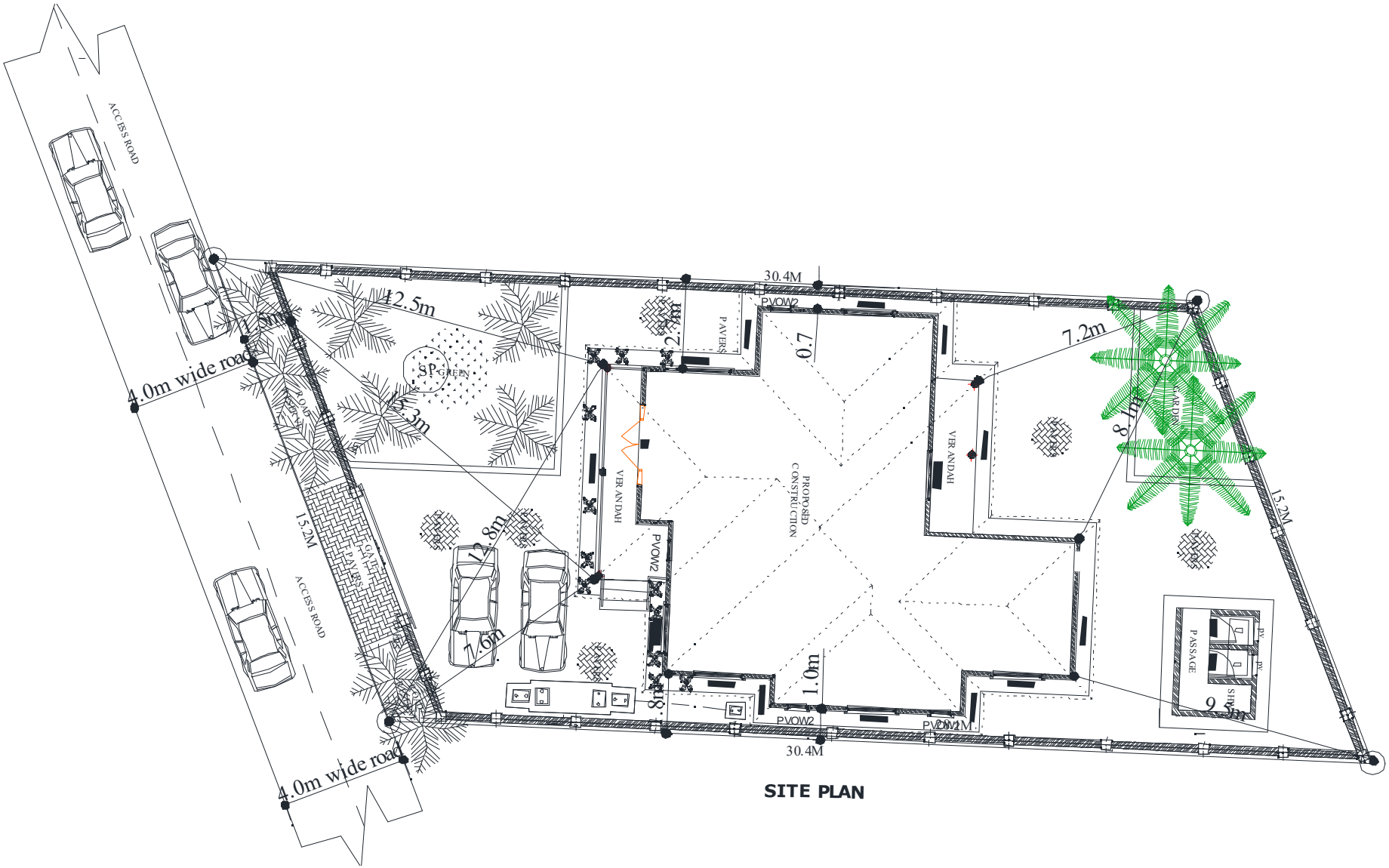
IMPORTANCE OF ANNOTATIONS



Proper annotations ensure that everyone understands the design intent and construction requirements, leading to accurate setting out, quality construction, reduced errors, and successful completion of the project.

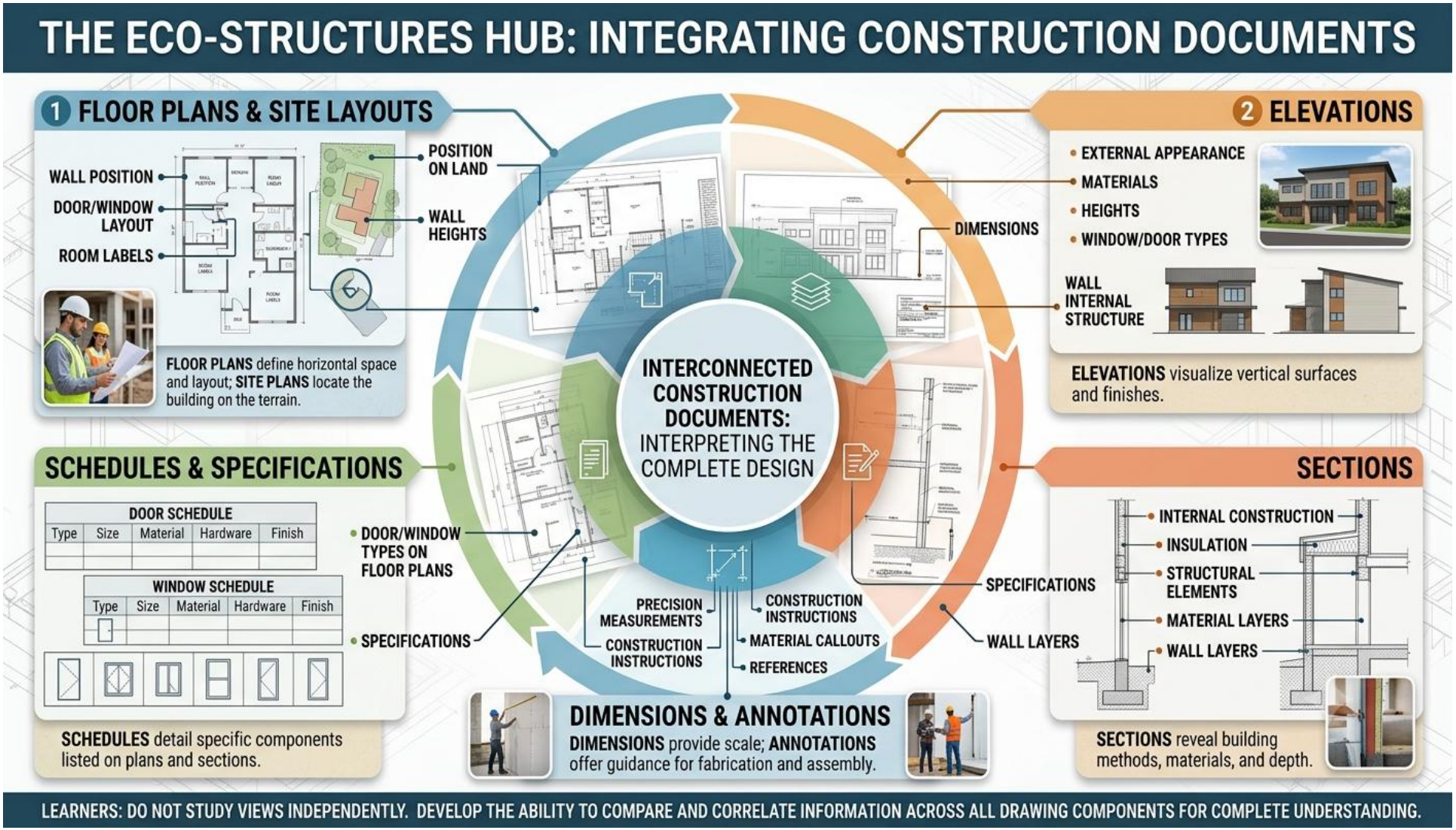
8.13 Site Layout and Site Planning

A site layout, also called a site plan, illustrates the location of a building within its plot and shows its relationship with surrounding features. It includes property boundaries, building setbacks, access roads, walkways, parking spaces, drainage systems, water supply lines, electricity connections, septic tanks, landscaping, and neighbouring structures. Site layouts also indicate the north point to establish building orientation. Learners should understand that proper site planning ensures compliance with planning regulations, promotes efficient land use, facilitates service installation, and contributes to the safety and functionality of the completed development.



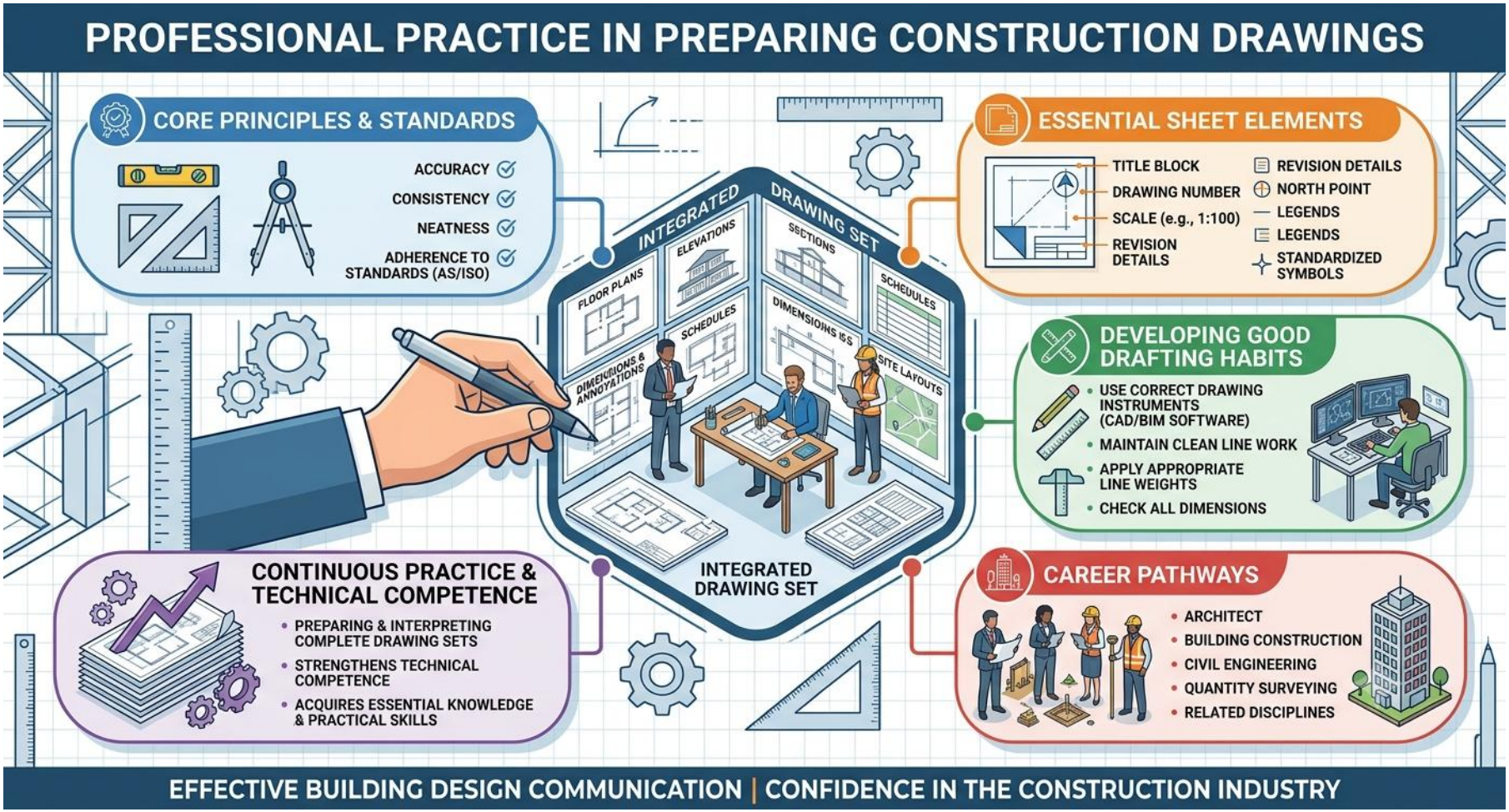
1.14 Relationship Between Construction Drawing Components

Although each drawing component serves a specific purpose, all components are interconnected and must be interpreted together. A floor plan identifies the position of a wall, an elevation shows its external appearance, while a section explains its internal construction. Schedules provide detailed specifications for doors and windows shown on the floor plan, whereas dimensions and annotations provide precise measurements and construction instructions. Site layouts indicate where the entire building is positioned on the land. Learners should therefore avoid studying each drawing independently but instead develop the ability to compare and correlate information across multiple drawing views to gain a complete understanding of the building design.



8.15 Professional Practice in Preparing Construction Drawings

Professional construction drawings require accuracy, consistency, neatness, and strict adherence to recognized drawing standards. Every drawing should include a title block, drawing number, scale, revision details, north point where applicable, legends, and standardized symbols. Learners should develop good drafting habits by using correct drawing instruments or computer-aided design (CAD) software, maintaining clean line work, applying appropriate line weights, and checking all dimensions before finalizing drawings. Continuous practice in preparing and interpreting complete drawing sets strengthens learners' technical competence and prepares them for further studies and professional careers in architecture, building construction, civil engineering, quantity surveying, and related disciplines. By mastering floor plans, elevations, sections, schedules, dimensions, annotations, and site layouts, learners acquire the essential knowledge and practical skills required to communicate building designs effectively and participate confidently in the construction industry.

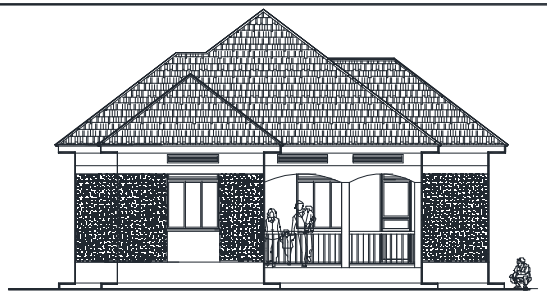


DOOR SCHEDULE

MARK	WIDTH	HEIGHT	No REQ	REMARKS
D1	2500	2400	1	CASEMENT METALIC
D2	1000	2400	1	METALIC
D3	900	2400	3	PANEL DOORS
D4	800	2400	3	FLUSH DOORS

WINDOW SCHEDULE

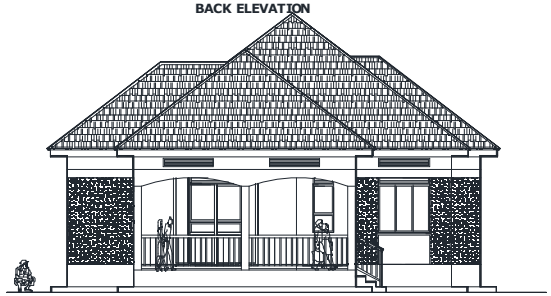
MARK	WIDTH	HEIGHT	No REQ	REMARKS
PVOW1	2000	1500	1	CASEMENT METALIC
PVOW2	1500	1500	6	CASEMENT METALIC
PVOW3	600	1500	5	CASEMENT METALIC



BACK ELEVATION



END ELEVATION 2



FRONT ELEVATION

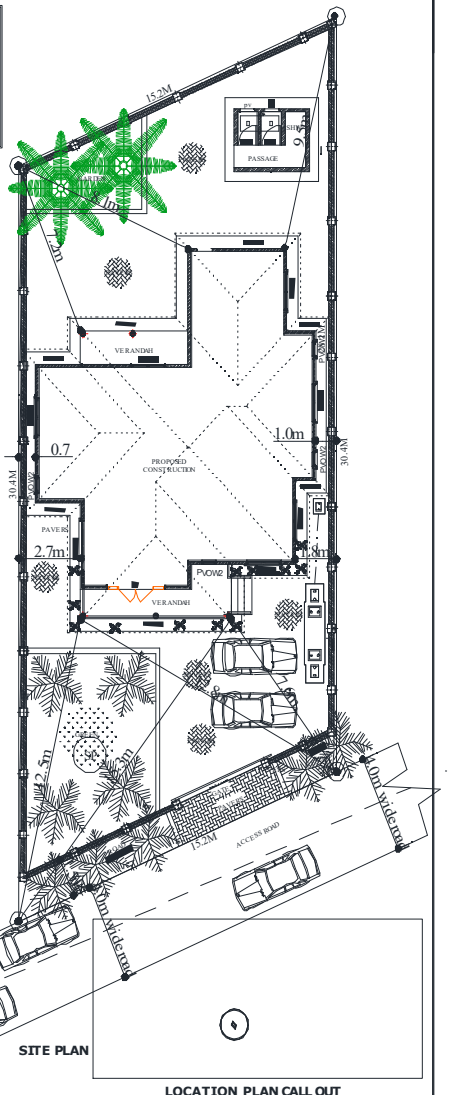


END ELEVATION 1



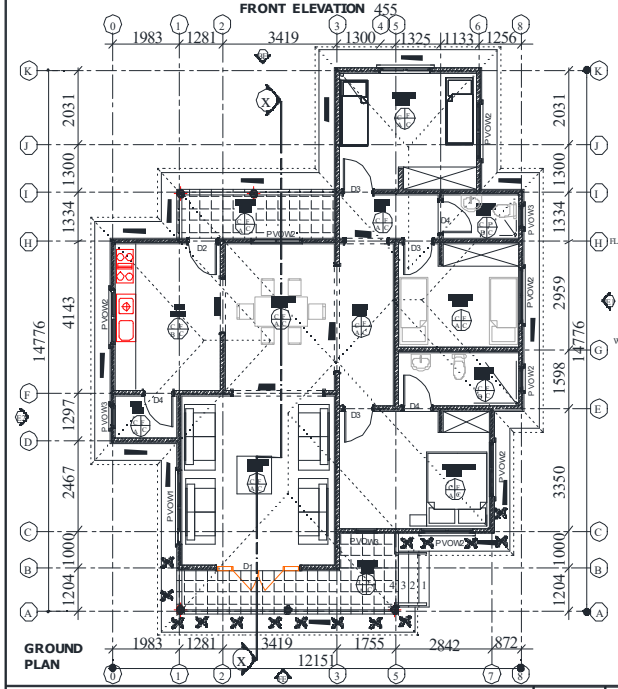
LOCATION PLAN 0.307526, 32.749586

Plot area = 424.2 m²
Plot perimeter = 90.6m
Building area = 134m²
Building perimeter = 54.5m
Ratio of Built up area = 1:3



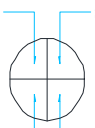
SITE PLAN

LOCATION PLAN CALL OUT



GROUND PLAN

INTERNAL FINISHES



FLOORS
A) CEMENT SCREED
B) GRANO
C) CERAMIC TILES
D) TERRAZO
E) WOOD BLOCKS
F) CARPET
G) PVC
H) PRECAST CONCRETE PAVERS
I) BRICK PAVERS

SKIRTING
A) EX 125x25mm HARDWOOD WITH NATURAL VANISH
B) EX 125x25mm SOFTWOOD PAINTED
C) PVC
D) 125x25mm CEMENT SCREED
E) GROSS PAINT
F) CERAMIC TILES
G) GRANO
H) TERRAZZO

CEILINGS
A) ROOF EXPOSED
B) PAINTED SOFT BOARD
C) PAINTED PLASTER ON METAL LATHE
D) ARMSTRONG SUSPENDED CEILING
E) PLASTER AND PAINT
F) HARD WOOD ,T&G STRIPS

WALLS
A) PLASTER AND PAINT
B) CERAMIC TILES UPTO 200MM PLASTER AND PAINT UPTO CEILING HEIGHT
C) EXPOSED FAIRFACED BRICKS
D) WALL PAPER
E) PRECAST CONC PERFORATIONS
F) CLAY BRICKS PERFORATIONS

ROOF NOTES

35° ROOF PITCH OF GALVANISED IRON SHEETS ON 75X50MM PURLINS ON 50X100MM RAFTERS,STRUTS AND TIES ON 50X150MM TIEBEAMS ON 75 X100MM WALL PLATES AND 23 X225 MM FACIA AND BERGE BOARDS.

CEILING NOTES

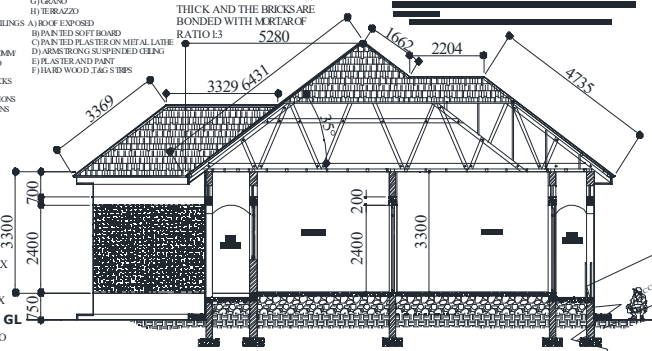
CEMENT / SAND (1:4) MORTAR ON EXPANDED METAL LATHE ON 50X100MM BRANDERINGS AT 600MM C/C ON 50X100 CEILING JOISTS AT 600MM C/C.

WALL NOTES

SUBSTRUCTURE WALLS ARE 200MM THICK AND SUPER STRUCTURE WALLS ARE 150MM THICK AND THE BRICKS ARE BONDED WITH MORTAR OF RATIO 1:3

FOUNDATION NOTES

100MM HIGH CEMENT SKIRTING ON 12MM THICK CEMENT SAND FLOOR SCREED IN 1:3:6 MIX ON 100MM THICK OVERSITE CONCRETE SLAB IN 1:3:6 MIX ON 300MM COMPACTED APPROVED HARDCORE ON RAMMED MARRUM ON 665X 215MM CONC STRIP FOUNDATION IN 1:4:8 MIX THE FOUNDATION DEPTH TO BE DETERMINED ONSITE BUT SHOULD NOT BE LESS THAN 600MM DEEP.



SECTION X-X

NOTES

3		CLIENT:	PROJECT:	DRAWN BY:	DRAWING NO:
2		NTALO ROBERT P.O.BOX ----------MUKONO 0788444815	PROPOSED RESIDENTIAL BUILDINGS TO BE ERECTED ON PLOT NO.------ & BLOCK NO.------ NTALE VILLAGE, NAKISUNGA SUB COUNTY, MUKONO DITRICT.	MR: NTALO ROBERT 0788444815	1/2
1				CHECKED BY:	
0	REVISION NOTES			ARCHITECT	

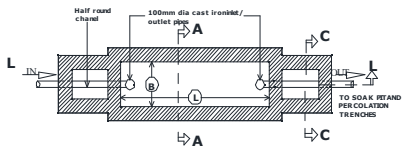
SCALE 1:...

DATE 17/12/2025

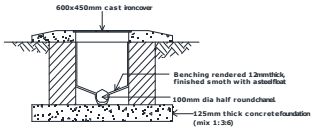
JOB NO 2025/TMF/50

SHEET TITLE :
ARCHITECTUAL WORKING DRAWINGS

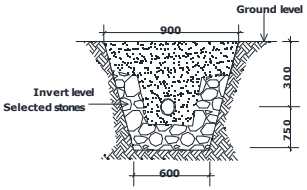
No. OF USERS	L	B	D	CAPACITY IN LITERS	PERCOLATION TRENCHES
	2250	675	900	1417.5	12.2m
15	2250	675	1200	-	14.4m



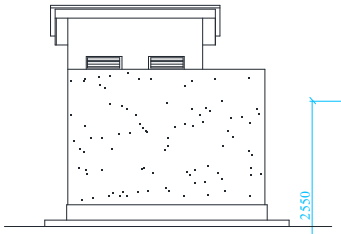
PLAN (SCALE 1:50)



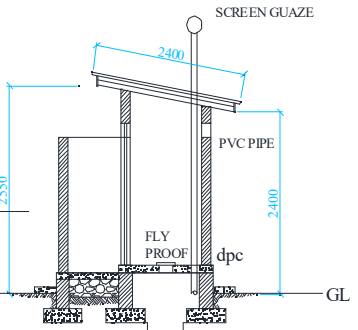
SECTION C-C (SCALE 1:25)



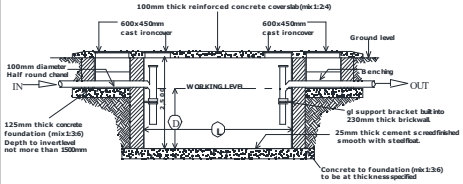
CROSS SECTION THROUGH DRAIN PIPE TRENCH



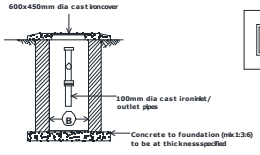
FRONT



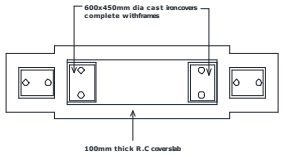
SECTION Z-Z



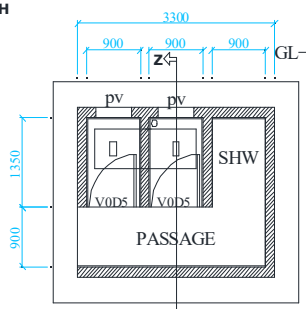
SECTION L-L (SCALE 1:50)



SECTION A-A (SCALE 1:50)

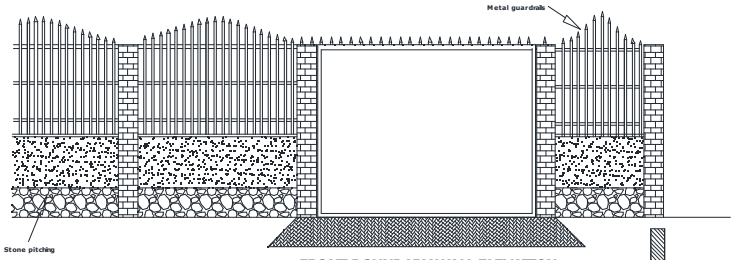


PLAN AT TOP (SCALE 1:50)

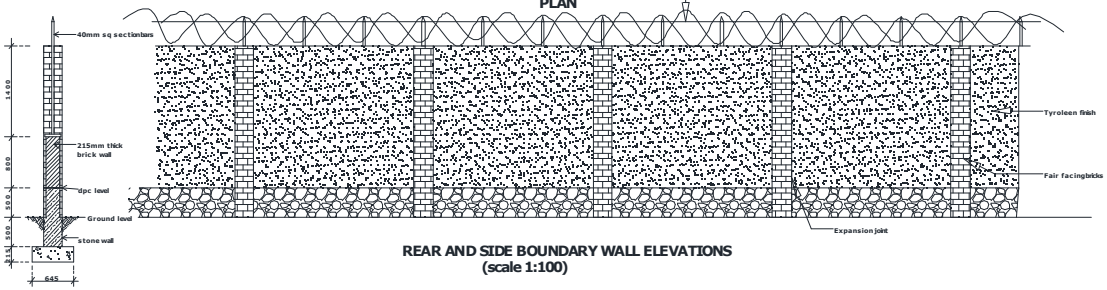


PLAN

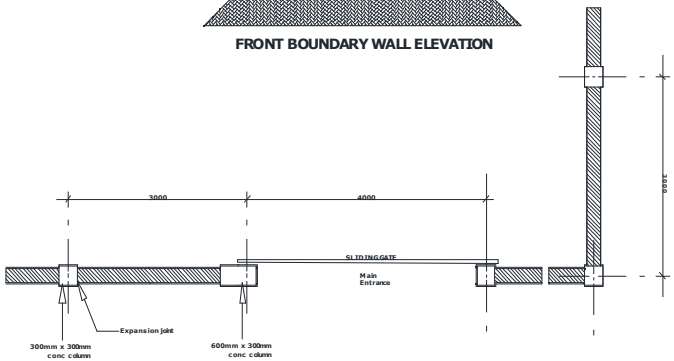
100MM THICK REINFORCED CONC SLAB IN 1:2:4 MIX WITH 12MM STEEL BARS SPACED 150MM C/C 0N CONC STRIP FOUNDATION. 600MM WIDE BY 1700MM LONG BY 15000 MM DEEP OF PIT.



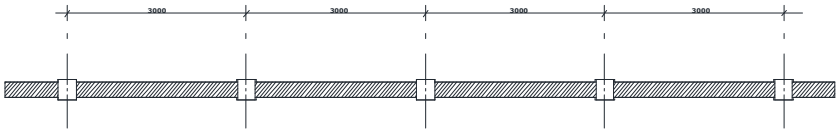
FRONT BOUNDARY WALL ELEVATION



REAR AND SIDE BOUNDARY WALL ELEVATIONS (scale 1:100)



BOUNDARY WALL GROUND PLAN (scale 1:100)



REAR AND SIDE BOUNDARY WALL PLAN (scale 1:100)

NOTES

1. ALL DIMENSIONS TO BE CHECKED ON SITE ,WRITTEN DIMENSIONS TO BE FOLLOWED IN PREFERENCE TO THE SCALED DIMENSIONS.
2. ALL WALLS LESS THAN 200MM THICK TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATE COURSE.
3. ALL REINFORCED CONCRETE WORK IS TO BE IN ACCORDANCE WITH STRUCTURAL ENGINEER `SDETAILS
4. ALL SANITARY WORK TO BE IN ACCORDANCE WITH M.OH.RULES AND REGULATIONS.
5. WHERE DRAINS PASSES UNDER THE BUILDING OR DRIVE WAY AREA ,PIPE TO BE OF CAST IRON OR ENCASED IN 150MM OF CONCRETE.
6. ALL WASTE PIPES AND SOIL PIPES ARE TO BE IN DUCTS AND THE BENDS TO HAVE THE CLEANING EYES ACCESSIBLE FROM OUT SIDE.
7. ALL WINDOWS AND EXTERNAL GLASED DOORS ON GROUND FLOOR TO HAVE BURGLAR PROOFING TO THE ARCHITECTS DETAIL.
8. ALL DOOR FRAMES TO BE REBATED AND MOULDED AND BE FULL WIDTH OF WALL WITH MOULDED ARCITRAVES TO DETAIL, PROVIDE RUBER STOPS TO ALL DOORS.
9. STAIR CASE AND LOBBY DOORS TO BE SELF CLOSING AND A HALF HOUR FIRE RESISTANT.
10. ALL INTERNAL PLASTER TO BE TWO COATS AND FINISHED WITH A STEEL FLOAT.
11. ALL MANHOLES WITH IN THE BUILDING AREA ,DRIVE WAY AND PARKING TO HAVE HEAVY DUTY AIR TIGHT COVERS AND DOUBLE SEALED.
12. PROVIDE GI 150X 100MM RAIN WATER DOWN PIPES AND 125X100MM GI BOX GUTTERS WITH BRACKETS ETC WHERE SHOWN.
13. ALL PAINTING TO BE 3 COATS.
14. A SPLASH APRON OF 500MM ALONG THE PERIMETER OF THE BUILDING.
15. SAMPLES OF FITTINGS ,MATERIALS ETC TO BE PRODUCED AND APPROVED BEFORE COMENCING WORK.
16. ALL WINDOWS HAVE PVC SILLS BUILT IN REINFORCED CONCRETE.
17. STEEL TRUSSES /PORTAL FRAMES AND PURLINS TO BE PAINTED WITH 2 COATS OF OIL PAINT.
18. FIRE FIGHTING EQUIPMENT TO BE PROVIDED AND INSTALLED BY BUILDING FIRE CONSULTANTS WHERE SHOWN ON PLAN.
19. THESE ARCHITECTUAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS, ELECTRICAL-MECHANICAL DRAWINGS BILLS OF QUANTITIES AND THE TECHNICAL SPECIFICATIONS.

(ANY DESCRIPANCY SHALL BE REPORTED IM MEDIATELY TO THE ARCHITECT)

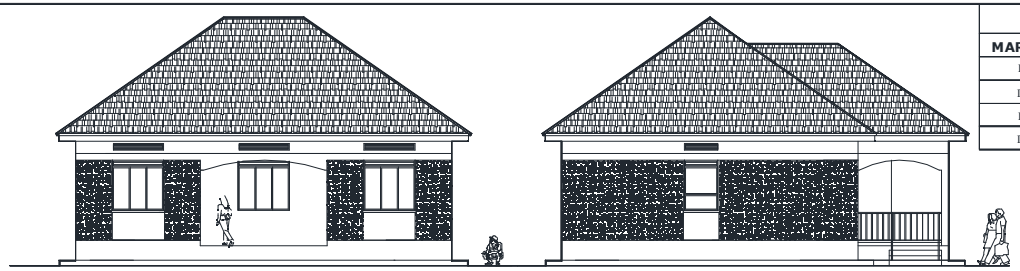
	3		CLIENT: NTALO ROBERT P.O.BOX ————MUKONO 0788444815	PROJECT: PROPOSED RESIDENTIAL BUILDINGS TO BE ERECTED ON PLOT NO.------- & BLOCK NO. ------ NTALE VILLAGE, NAKISUNGA SUB COUNTY, MUKONO DITRICT.	DRAWN BY: MR. NTALO ROBERT
	2				DRAWING NO: 2/2
SCALE 1:.....	1				CHECKED BY: ARCHITECT
DATE 17/12/2025	0	REVISION NOTES			
JOB NO 2025/TMF/50 SHEET TITLE : SEPTIC TANK DETAILS , BOUNDARY DETAILS & PIT LATRINE					

DOOR SCHEDULE

MARK	WIDTH	HEIGHT	No REQ	REMARKS
D1	2500	2400	1	CASEMENT METALIC
D2	1000	2400	1	METALIC
D3	900	2400	3	MATCH BOARDED
D4	800	2400	2	FLUSH DOORS

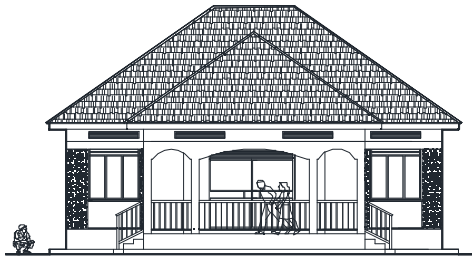
WINDOW SCHEDULE

MARK	WIDTH	HEIGHT	No REQ	REMARKS
VOW1	1500	1500	5	CASEMENT METALIC
VOW2	1000	1500	2	CASEMENT METALIC

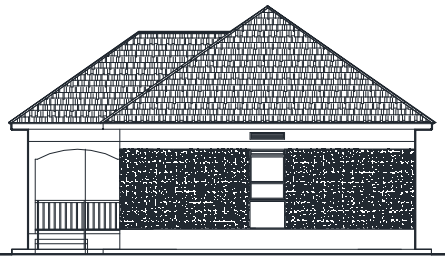


BACK ELEVATION

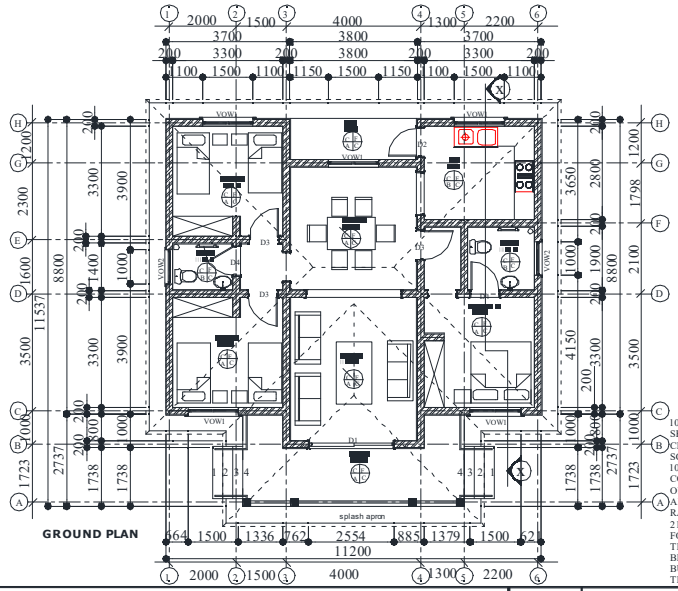
END ELEVATION 2



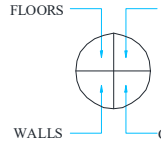
FRONT ELEVATION



END ELEVATION 2



INTERNAL FINISHES

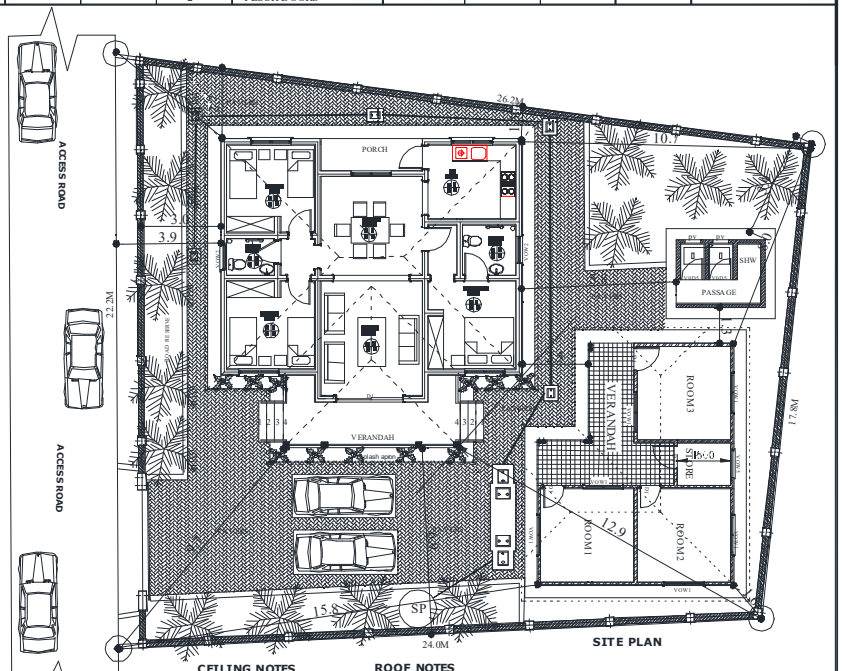


FLOORS A)CEMENT SCREED
B) GRANO
C) CERAMIC TILES
D) TERRAZZO
E) WOOD BLOCKS
F) CARPET
G) PVC
H) PRECAST CONCRETE PAVERS
I) BRICK PAVERS

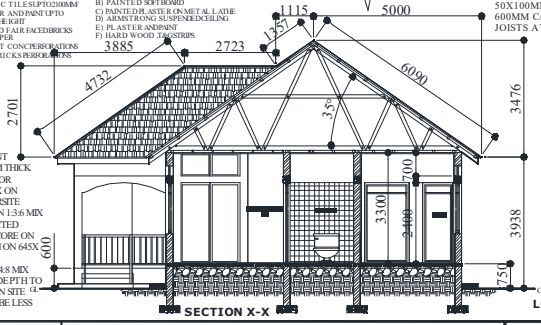
SKIRTING A) EX 125x25mm HARD WOOD WITH NATURAL VANISH
B) EX 125x25mm SOFT WOOD PAINTED
C) PVC
D) 125x25mm CEMENT SCREED
E) GROSS PAINT
F) CERAMIC TILES
G) GRANO
H) TERRAZZO

WALLS A) PLASTER AND PAINT
B) CERAMIC TILES UPTO 2100MM PLASTER AND PAINT UPTO CEILING HEIGHT
C) EXPOSED FAIR FACED BRICKS
D) WALL PAPER
E) PRECAST CONCPERFORATIONS
F) CLAY BRICKS PERFORATIONS

CEILINGS A) ROOF EXPOSED
B) PAINTED SOFT BOARD
C) PAINTED PLASTER ON METAL LATHE
D) ARMSTRONG SUSPENDED CEILING
E) PLASTER AND PAINT
F) HARD WOOD T&G STRIPS



SITE PLAN



SECTION X-X

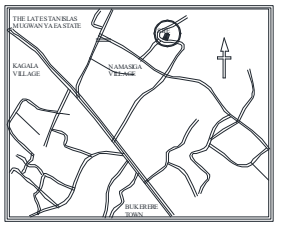
100MM HIGH CEMENT SKIRTING ON 12MM THICK CEMENT SAND FLOOR SCREED IN 1:3:6 MIX ON 100MM THICK OVERSITE CONCRETE SLAB IN 1:3:6 MIX ON 300MM COMPACTED APPROVED HARD CORE ON RAMMED MARRUM ON 645X 215MM CONC STRIP FOUNDATION IN 1:4:8 MIX THE FOUNDATION DEPTH TO BE DETERMINED ON SITE BUT SHOULD NOT BE LESS THAN 600MM DEEP.

CEILING NOTES

CEMENT /SAND (1:4) MORTAR ON EXPANDED METAL LATHE ON 50X100MM BRANDERINGS AT 600MM C/C ON 50X100 CEILING JOISTS AT 600MM OC.

ROOF NOTES

35° ROOF PITCH OF GALVANISED IRON SHEETS ON 75X50MM PURLINS ON 50X100MM RAFTERS,STRUTS AND TIES ON 50X150MM TIE BEAMS ON 75 X100MM WALL PLATES AND 23 X225 MM FACIA AND BERGE BOARDS.



LOCATION PLAN; (BUKERERE NAMASIGA VILLAGE)

NOTES

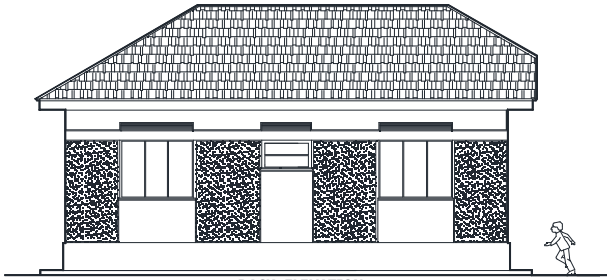
	3		CLIENT: MR.NTALO ROBERT P.O.BOX..... MUKONO 0788444815
	2		
	1		
SCALE 1:... DATE 30/11/2020 JOB NO 2020/TM/54 SHEET TITLE : ARCHITECTUAL WORKING DRAWING	0	REVISION NOTES	PROJECT: PROPOSED RESIDENTIAL BUILDINGS TO BE ERECTED ON PLOT NO..... & BLOCK NO ....., NAMASIGA VILLAGE, BUKERERE TOWN, GOMA SUB COUNTY, MUKONO CENTRAL DIVISION, MUKONO DITRICT.

DRAWN BY: MR: NTALO ROBERT 0788444815

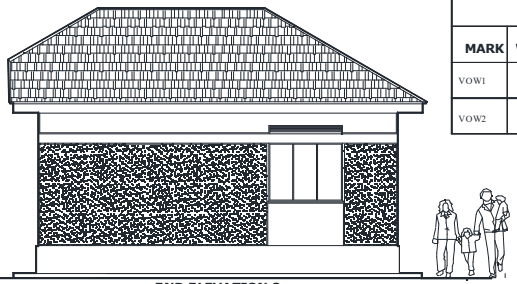
DRAWING NO: 1/3

CHECKED BY: ARCHITECT

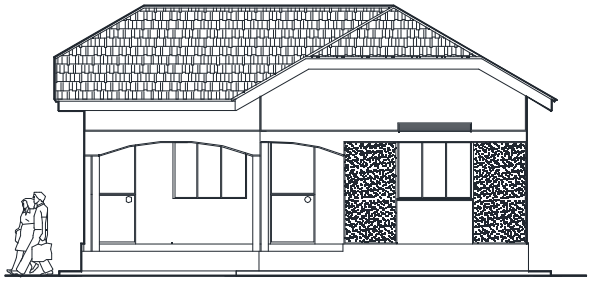
WINDOW SCHEDULE					DOOR SCHEDULE				
MARK	WIDTH	HEIGHT	No REQ	REMARKS	MARK	WIDTH	HEIGHT	No REQ	REMARKS
VOW1	1500	1200	6	CASEMENT METALIC	D1	1000	2100	3	CASEMENT METALIC
VOW2	1000	600	1	CASEMENT METALIC	D2	900	2100	1	CASEMENT METALIC



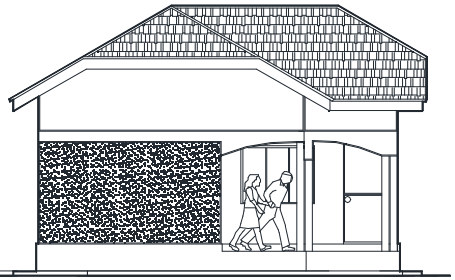
BACK ELEVATION



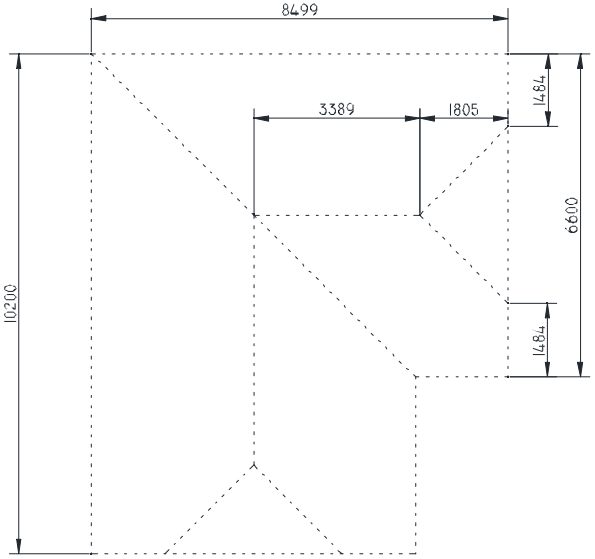
END ELEVATION 2



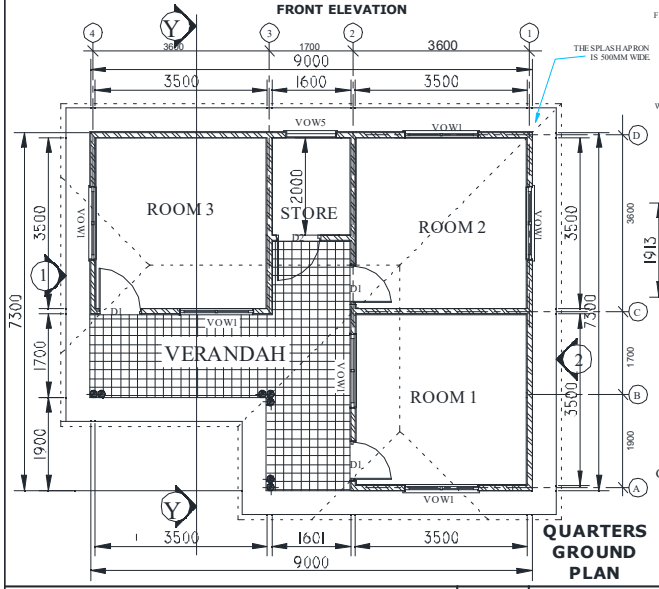
FRONT ELEVATION



END ELEVATION 1

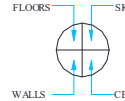


ROOF LINE



QUARTERS GROUND PLAN

INTERNAL FINISHES

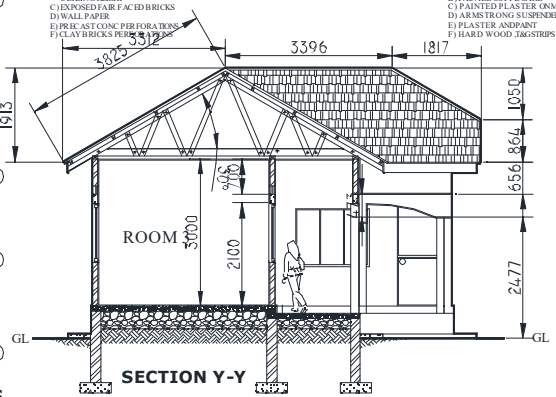


FLOORS A) CEMENTSCREED
B) GRANO
C) CERAMICTILES
D) TERRAZO
E) WOOD BLOCKS
F) CARPET
G) PVC
H) PRECAST CONCRETE PAVERS
I) BRICK PAVERS

WALLS A) PLASTERANDPAINT
B) CERAMIC TILES UPTO2100MM PLASTER AND PAINTUPTO CEILING HEIGHT
C) EXPOSED FAIR FACED BRICKS
D) WALL PAPER
E) PRECAST CONC PERFORATIONS
F) CLAY BRICKS PERFORATIONS

SKIRTING A) EX 125x25mmHARDWOOD WITH NATURALVANISH
B) EX 125x25mm SOFTWOOD PAINTED
C) PVC
D) 125x25mm CEMENTSCREED
E) GROSS PAINT
F) CERAMICTILES
G) GRANO
H) TERRAZZO

CEILINGS A)ROOFEXPOSED
B) PAINTED SOFTBOARD
C) PAINTED PLASTER ONMETALLATHE
D) ARMSTRONG SUSPENDEDCEILING
E) PLASTER ANDPAINT
F) HARD WOOD ,T&GSTRIPS



SECTION Y-Y

FOUDATION NOTES

100MM HIGH CEMENT SKIRTING ON 12MM THICK CEMENT SAND FLOOR SCREEDIN 1:3:6MIXON 100MMTHICK OVERSITE CONCRETE SLAB IN 1:3:6 MIX ON 300MM COMPACTEDAPPROVEDHARDCOREONRAMMEDMARRUMON 645X 215MM CONC STRIP FOUNDATION IN 1:4:8 MIX THE FOUNDATIONDEPTHTOBEDETERMINEDONSITEBUT SHOULD NOT BE LESS THAN600MMDEEP.

ROOF NOTES

30° ROOF PITCH OF GALVANISEDIRONSHEETSON 75X50MM PURLINS ON 50X100MM RAFTERSSTRUTS AND TIES ON 50X150MM TIE BEAMS ON 75X200MMWALL PLATES AND 23 X225 MM FACIA ANDBERGEBOARDS.

CEILING NOTES

CEMENT /SAND (1:4) MORTAR ONEXPANDEDMETAL LATHE ON 50X100MM BRANDERINGSAT600MMC/CON 50X100 CEILING JOISTS AT600MMC/C.

WALLS

THE WALLS ARE 150MM AND 215MMTHICK.

NOTES

2. ALL WALLS LESS THAN 200MM THICK TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATE COURSE.
3. ALL REINFORCED CONCRETE WORK IS TO BE IN ACCORDANCE WITH STRUCTUALENGINEER`S DETAILS
4. ALL SANITARY WORK TO BE IN ACCORDANCE WITH M.O.H RULES AND REGULATIONS.
5. WHERE DRAINS PASSES UNDER THE BUILDING OR DRIVE WAY AREA,PIPE TO BE OF CAST IRON OR ENCASED IN 150MM OFCONCRETE.
6. ALL WASTE PIPES AND SOIL PIPES ARE TO BE IN DUCTS AND THE BENDS TO HAVE THE CLEANING EYES ACCESIBLE FROM OUT SIDE.
7. ALL WINDOWS AND EXTERNAL GLASED DOORS ON GROUND FLOOR TO HAVE BURGLAR PROOFING TO THE ARCHITECTS DETAIL.
8. ALL DOOR FRAMES TO BE REBATED AND MOULDED AND BE FULL WIDTH OF WALL WITH MOULDED ARCTRAVES TO DETAIL, PROVIDE RUBER STOPS TO ALL DOORS.
9. STAIR CASE AND LOBBY DOORS TO BE SELF CLOSING AND A HALF HOUR FIRE RESISTANT.
10. ALL INTERNAL PLASTER TO BE TWO COATS AND FINISHED WITH A STEEL FLOAT.
11. ALL MANHOLES WITH IN THE BUILDING AREA ,DRIVE WAY AND PARKING TO HAVE HEAVY DUTY AIR TIGHT COVERS AND DOUBLE SEALED.
12. PROVIDE GI 150X100MM RAIN WATER DOWN PIPES AND 125X100MM GI BOX GUTTERS WITH BRACKETS ETC WHERE SHOWN.
13. ALL PAINTING TO BE 3 COATS.
14. A SPLASH APRON OF 500MM ALONG THE PERIMETER OF THE BUILDING.
15. SAMPLES OF FITTINGS ,MATERIALS ETC TO BE PRODUCED AND APPROVED BEFORE COMMENCING WORK.
16. ALL WINDOWS HAVE PVC SILLS BUILT IN REINFORCED CONCRETE.
17. STEEL TRUSSES / PORTAL FRAMES AND PURLINS TO BE PAINTED WITH 2 COATS OF OIL PAINT.
18. FIRE FIGHTING EQUIPMENT TO BE PROVIDED AND INSTALLED BY BUILDING FIRE CONSULTANTS WHERE SHOWN ON PLAN.
19. THESE ARCHITECTUAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE STRUCTURAL DRAWINGS, ELECTRICAL-MECHANICAL DRAWINGS BILLS OF QUANTITIES AND THE TECHNICAL SPECIFICATIONS.

(ANY DESCRIPANCY SHALL BE REPORTED IMMEDIATELY TO THE ARCHTECT)

	3		CLIENT: MR.NTALO ROBERT, P.O.BOX..... MUKONO, 0788444815
	2		PROJECT: PROPOSED RESIDENTIAL BUILDINGS TO BE ERECTED ON PLOT NO..... & BLOCK NO ....., NAMASIGA VILLAGE, BUKERERE TOWN, GOMA SUB COUNTY, MUKONO CENTRAL DIVISION, MUKONO DITRICT.
	1		DRAFTED BY: MR: NTALO ROBERT 0788444815
SCALE 1:... DATE 30/11/2020	0	REVISION NOTES	CHECKED BY: ARCHITECT

JOB NO 2020/TM/54

SHEET TITLE : QUARTERS PLAN,SECTION,ELEVATIONS AND ROOF PLAN

DRAWING NO: 2/3

8.16 KEY POINTS TO ANSWERING SCENARIOS OF TOPIC 8

When answering a scenario test item on building drawing, the learner must begin with a focused introduction interpreting the design brief by identifying building type, purpose, and space requirements, explaining that complete working drawings consist of interconnected components (floor plans, elevations, sections, schedules, dimensions, annotations, site layouts), and stating the overall approach to preparing a coordinated set. The essential materials, tools, and equipment include a drawing board, T-square, set squares, scale ruler (1:100 for plans, 1:50 for sections, 1:200 for site layouts), compasses, French curves, pencils, eraser, masking tape, A3 paper, and templates for doors, windows, and sanitary fittings. Health and safety awareness requires proper posture, careful handling of sharp instruments, clean work surface, adequate lighting, proper storage of materials, and observing fire safety measures. The operational procedure involves interpreting the design brief, allocating spaces logically considering circulation, selecting appropriate scales, preparing the floor plan as a horizontal section at approximately one metre above floor level showing room arrangement, wall thicknesses, doors, windows, sanitary fittings, and furniture, dimensioning clearly, drawing elevations for all sides showing external appearance, roof shape, finishes, floor levels, and vertical dimensions, preparing sectional views at indicated cutting planes showing foundation, floor, wall, and roof construction, creating schedules for doors and windows listing sizes, materials, finishes, quantities, and locations, including annotations using standard abbreviations and leader lines, preparing the site layout showing building position, boundaries, setbacks, access, drainage, utilities, and north point, and ensuring consistency across all drawings. Maintenance recommendations include regular checking and calibration of instruments, proper storage of materials, periodic review of completed drawings, maintaining clean drawing surfaces, and safe handling of drawing sets. Evaluation assesses whether the complete set includes all necessary components, spaces are correctly allocated, appropriate scales are used, dimensions are correct, building conventions are consistently applied, drawings are coordinated without inconsistencies, and a builder could construct the building correctly. In conclusion, the learner has successfully prepared a complete set of working drawings comprehensively communicating all information required for construction, and the final drawing set, demonstrating professional competence, is fit for its intended purpose of enabling builders and contractors to accurately construct the building according to the designer's specifications.

END