

ACTIVITY 5: INVESTIGATE HOW SONIA INHERITED SICKLE CELL TRAIT

PART 1 - Directions: Listen as your teacher reads the text that introduces the activity. Work with a partner to read the Family Information. Next, use the Family Information to complete the pedigree chart on the next page. Then, debrief as a class.

Introduction:

You will complete a **pedigree** to track red blood cell **phenotypes** in Sonia's family.

- Color in each shape to show the person's **phenotype** (*shown trait*).



Fully color the shapes for people with sickle cell anemia.



Partially color the shapes for people with sickle cell trait.



Do not color the shapes for people with normal blood cells.

- Write each person's genotype in the box under their shape. Sonia's genotype is completed for you as an example.

SCIENCE NOTE:

Sometimes pedigrees have circles or squares that are *half-shaded* (colored halfway).

Half-shaded shapes show that a person is heterozygous for the trait being tracked (followed).

Family Information:

- Sonia** has sickle cell trait. The circle that *represents* (*stands for*) Sonia is *shaded* (*colored*) halfway to show that she is heterozygous. Sonia's genotype (AS) is filled in for you.
- Sonia has one brother (III-2)**. Sonia's brother has normal red blood cells. Fill in Sonia's brother's genotype in the space below his shape.
- Sonia's mother (II-3)** also has normal red blood cells. Fill in Sonia's mother's genotype.
- Sonia's father (II-2)** has sickle cell trait. Shade his shape halfway. Then, fill in his genotype.
- Sonia's father has an older brother (II-1)** who has sickle cell anemia. Fully shade in his shape. Then, fill in his genotype.
- Sonia's grandmother (I-2)** has sickle cell anemia. Shade in her shape correctly and fill in her genotype.
- Sonia's grandfather (I-1)** has sickle cell trait. Shade in his shape correctly and fill in his genotype.

REMINDER:

Circles are for biological females. Squares are for biological males.

A *shaded* (*colored in*) shape means the person has the trait that is being tracked.

An unshaded shape means the person does not have the trait being tracked.

Horizontal (*sideways*) lines connect people who are married or have children together.

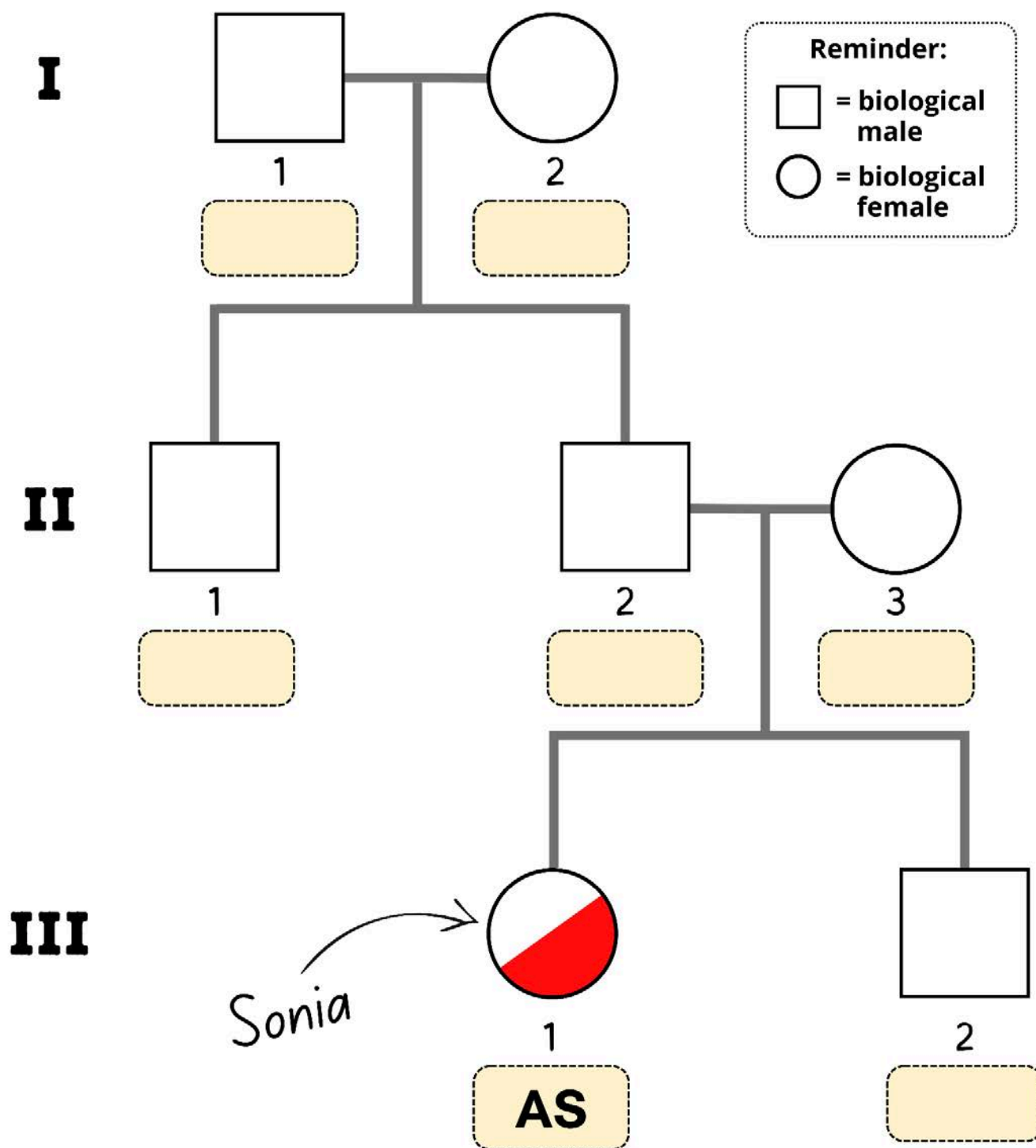
Vertical (*up-and-down*) lines connect children to their parents.

The numbers on the left-hand side of the pedigree count each generation in a family. Each person in a generation is numbered from left to right.

You can identify a person in the pedigree using these numbers. For example, Sonia's father is II-2. Sonia's mother is II-3.

→ **phenotype:** an expressed trait (*shown characteristic*)

→ **genotype:** the combination of alleles for a certain trait; for example AA

Sonia's Family Pedigree Chart

PART 2 - Directions: Work individually or with a partner to analyze your completed pedigree and answer the questions. Then, debrief as a class.

1. How many people in Sonia's family have sickle cell anemia?

☐ 1

☐ 2

☐ 3

☐ 4

2. How many people in Sonia's family (including Sonia) have sickle cell trait?

☐ 1

☐ 2

☐ 3

☐ 4

3. How many people in Sonia's family have normal red blood cells?

☐ 1

☐ 2

☐ 3

☐ 4

1. Sonia has sickle cell trait. Her genotype is AS.

a. From whom did Sonia get her A allele?

☐ Sonia's father (II-2)

☐ Sonia's mother (II-3)

b. From whom did Sonia get her S allele?

☐ Sonia's father (II-2)

☐ Sonia's mother (II-3)

2. Sonia's father has sickle cell trait. His genotype is AS.

c. From whom did Sonia's father get his A allele?

☐ His father (I-1)

☐ His mother (I-2)

d. From whom did Sonia's father get his S allele?

☐ His father (I-1)

☐ His mother (I-2)

REMINDER: An organism has two copies of every gene. A gene is a section of DNA that decides a certain trait. Different versions of a gene are called alleles.

One *allele* (version of a gene) came from the biological mother.

The other *allele* (version of a gene) came from the biological father.