A Bud Begins

Trace mitosis from copied DNA to a new organism

L.8.2A.2 "Create a diagram of mitosis and explain its role in asexual reproduction, which results in offspring with identical genetic information."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline and number the events you would include in a cell-division diagram, in the order they happen. Circle the sentence that explains why the offspring usually has the same genetic information as its parent.

How a Hydra Makes Another Hydra

1. Clinging to a leaf in a pond, a hydra may grow a small bump on its side. The bump becomes a bud, which can develop into a new hydra and break away. No egg or sperm joins the parent in this kind of asexual reproduction. Instead, cells in the parent produce more cells as the bud grows. A drawing of this process needs more than a parent and an offspring. It should show how the cells divide and why the new hydra receives the same genetic information as its parent.

2. Before a hydra cell divides, it copies its DNA. DNA is packed into chromosomes, so each chromosome has two matching copies joined together. During mitosis, the copied chromosomes line up near the cell's middle. The matching copies then pull apart toward opposite sides. A new nucleus forms around each set. Finally, the cell splits into two cells. Each new cell receives a full set of chromosomes with the same genetic information as the original cell. The split into two cells happens after mitosis, but it is part of the complete cell division process.

3. Many rounds of this cell division make enough cells for the hydra's bud to grow. Cells in the bud divide, and the bud eventually separates from the parent. A useful diagram could start with one parent cell, show DNA copying, show chromosomes lining up and separating, and end with two new cells. An arrow can then connect repeated cell divisions to the growing bud and the separate offspring. Because the offspring develops from one parent through these divisions, it usually has genetic information identical to the parent's, unless a DNA change occurs.

2 ANSWER WITH EVIDENCE

Use the passage

1. At the start of a cell-division diagram, what must happen to the DNA before the chromosomes line up?

2. Where should the copied chromosomes appear in your diagram just before their matching copies separate?

3. What two changes should your diagram show after the matching copies move to opposite sides?

4. Write a caption for an arrow from repeated cell divisions to a separate young hydra. Explain why its genetic information usually matches the parent's.

3 YOUR TURN

Your own words

A yeast cell makes a bud that grows into a new yeast cell. In three panels, draw and label DNA copying, chromosome movement during mitosis, and the result for the bud; add one sentence explaining why the new yeast cell usually has the same genetic information as its parent.

ANSWER KEY

A Bud Begins

GRADE 8 · L.8.2A.2

PART 1 · READ AND MARK

Underline and number the events you would include in a cell-division diagram, in the order they happen. Circle the sentence that explains why the offspring usually has the same genetic information as its parent. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	At the start of a cell-division diagram, what must happen to the DNA before the chromosomes line up?	**The cell copies its DNA, leaving each chromosome with two joined, matching copies.**
2	Where should the copied chromosomes appear in your diagram just before their matching copies separate?	**They should line up near the middle of the cell.**
3	What two changes should your diagram show after the matching copies move to opposite sides?	**A nucleus forms around each set of chromosomes, and the cell splits into two cells.**
4	Write a caption for an arrow from repeated cell divisions to a separate young hydra. Explain why its genetic information usually matches the parent's.	**Repeated cell divisions grow the bud until it separates. DNA copying and mitosis give its cells the same genetic information as the parent, unless a DNA change occurs.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Panel 1: A parent yeast cell contains chromosomes with joined copies after DNA copying. Panel 2: The copied chromosomes line up, and their matching copies move to opposite sides. Panel 3: The bud separates as a new yeast cell, with a full chromosome set in each cell. Sentence: DNA copying and mitosis give the new yeast cell the same genetic information as its parent, unless a DNA change occurs.

Accept diagrams that show the correct sequence, even if students combine lining up and separating in one panel. The explanation should connect copied and separated chromosomes to the offspring's usually identical genetic information.