Coral Family Clues

Trace how chromosomes move during two kinds of reproduction.

L.8.2A "Students will demonstrate an understanding of how sexual reproduction results in offspring with genetic variation while asexual reproduction results in offspring with identical genetic information..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline phrases that show how a coral bud keeps its parent's genetic information. Circle phrases that show how a coral larva gets a new combination of genetic information.

Two Ways to Grow a Reef

1 On a reef, a single coral animal, called a polyp, can help build a large colony. Inside each polyp, long DNA molecules are packed into chromosomes. A gene is a section of DNA on a chromosome that carries instructions affecting a characteristic, such as tentacle length. Different versions of genes can influence that length. Polyps in the same colony may share a genetic starting point, yet the reef around them can affect how they grow. To understand how a colony spreads, follow what happens to its chromosomes during reproduction.

2 A coral polyp can make a new polyp by budding. Before a cell divides by mitosis, it copies its DNA. The chromosomes separate so each new cell receives the same genetic information. Repeated cell divisions form a bud, which grows and stays attached to the colony. Because no second parent contributes DNA, the bud and its parent have identical genetic information unless a mutation occurs. Budding can build a colony quickly without a mate, but closely related polyps may share weaknesses when disease or changing conditions strike.

3 Corals can also reproduce sexually. In these animals, meiosis produces egg and sperm cells with half the usual number of chromosomes. During meiosis, matching chromosome pairs exchange DNA segments through crossing over, and different pairs separate independently, called independent assortment. These events give eggs and sperm varied gene combinations. When an egg and sperm from different polyps join, their chromosomes combine in a larva with a new mix of genetic information from two parents. Sexual reproduction takes more time and depends on eggs and sperm meeting, but variation may help some offspring survive a change.

2 ANSWER WITH EVIDENCE

Use the passage

1. How are a gene, DNA, and a chromosome related? Use tentacle length as an example of an inherited characteristic.

2. Why does a bud usually have the same genetic information as its parent polyp? Name the cell process involved.

3. How do crossing over and independent assortment each help give coral eggs and sperm varied gene combinations?

4. If reef conditions change, what is one possible advantage of sexual reproduction over budding? What is one cost of sexual reproduction?

3 YOUR TURN

Your own words

Imagine a tide crawler, an invented animal that can reproduce by budding or by mating. In two panels, sketch and label how chromosomes move during budding and during mating, then add a short caption to each panel explaining whether the offspring's genetic information matches a parent.

ANSWER KEY

Coral Family Clues

GRADE 8 · L.8.2A

PART 1 · READ AND MARK

Underline phrases that show how a coral bud keeps its parent's genetic information. Circle phrases that show how a coral larva gets a new combination of genetic information. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How are a gene, DNA, and a chromosome related? Use tentacle length as an example of an inherited characteristic.	**A chromosome contains DNA, and a gene is a section of that DNA. Different versions of genes can influence a polyp's tentacle length.**
2	Why does a bud usually have the same genetic information as its parent polyp? Name the cell process involved.	**Before mitosis, a cell copies its DNA. Mitosis gives the new cells the same genetic information, and no second parent contributes DNA. A mutation could cause a difference.**
3	How do crossing over and independent assortment each help give coral eggs and sperm varied gene combinations?	**Crossing over exchanges DNA segments between matching chromosomes. Independent assortment separates different chromosome pairs independently, producing varied combinations.**
4	If reef conditions change, what is one possible advantage of sexual reproduction over budding? What is one cost of sexual reproduction?	**Variation from sexual reproduction may help some offspring survive the change. Sexual reproduction takes more time and depends on eggs and sperm meeting.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Panel 1: A cell's chromosomes are copied, then mitosis separates the copies into new cells that form a bud. Caption: The bud has the same genetic information as its parent unless a mutation occurs.
Panel 2: In each parent, matching chromosomes swap segments during crossing over. Different pairs separate independently during meiosis, making eggs or sperm with half the usual number of chromosomes. An egg and sperm join. Caption: The offspring has a new combination of genetic information from both parents.

Accept simple chromosome sketches if labels show copying and mitosis in budding, and crossing over, independent assortment, meiosis, and fertilization in mating. Students need not draw every cell division, but their captions should distinguish identical genetic information from a new combination.