Skin Cell Repair

Read how mitosis replaces cells and what happens when it goes wrong

7.3 "Construct an explanation of how the process of mitosis maintains complex organisms and ensures new cells with identical genetic information. a..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the steps that give both new cells the same genetic information, and circle two ways an error can affect cells or cell division.

How a Scrape Heals

1. When you scrape your knee, the broken surface does not stay open forever. Living skin cells near the scrape divide, making new cells that fill gaps as the area heals. Your skin is part of a complex organism made of many kinds of cells. Keeping that organism working takes more than repair: old skin cells also need to be replaced. Mitosis helps supply new cells for both jobs. For the new skin cells to do their jobs, they need the same genetic instructions as the cells that produced them.

2. Before a skin cell begins mitosis, it copies its DNA. Each copied chromosome has two identical halves joined together. During mitosis, chromosomes line up in the cell's center, and fibers pull the two halves apart. One half of each chromosome moves to each side. Two nuclei form around the separated sets. Then the cell splits into two new cells. Each new cell normally receives a complete set of chromosomes with the same genetic information as the starting cell. That matching information helps new skin cells function like other skin cells.

3. Sometimes the halves of a chromosome do not separate correctly. One new cell may receive an extra chromosome, while the other is missing that chromosome. Because chromosomes carry genetic instructions, those cells may not work normally. A cell with an error might stop dividing, so fewer replacement cells are made. Other errors may lead to cells dividing too often, which can form a harmful growth. The body has ways to detect some errors and stop affected cells from dividing, but these checks do not catch every error.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why must a skin cell copy its DNA before mitosis if both new cells are to have the same genetic information?

2. How does the movement of chromosome halves during mitosis help make the two new cells alike?

3. Explain how mitosis helps your skin both heal a scrape and keep working over time.

4. If the halves of one chromosome do not separate correctly, what might each new cell receive, and how could that affect the cells?

3 YOUR TURN

Your own words

Imagine a young tree has a damaged root tip. Write four or five sentences explaining how mitosis could make replacement cells with identical genetic information, how one chromosome-separation error could affect the new cells or their division, and one question you would ask to investigate that error.

ANSWER KEY

Skin Cell Repair

GRADE 7 · 7.3

PART 1 · READ AND MARK

Underline the steps that give both new cells the same genetic information, and circle two ways an error can affect cells or cell division. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why must a skin cell copy its DNA before mitosis if both new cells are to have the same genetic information?	**Copying DNA provides two identical halves of each chromosome, so each new cell can receive a complete set.**
2	How does the movement of chromosome halves during mitosis help make the two new cells alike?	**One identical half of each chromosome moves to each side, giving each new cell a matching set of genetic information.**
3	Explain how mitosis helps your skin both heal a scrape and keep working over time.	**Mitosis makes new skin cells to fill the scrape and replace old cells. The new cells normally have the genetic information needed to function as skin cells.**
4	If the halves of one chromosome do not separate correctly, what might each new cell receive, and how could that affect the cells?	**One cell may receive an extra chromosome and the other may be missing that chromosome. Their changed genetic information may keep them from working normally.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A young tree can replace cells at its damaged root tip through mitosis. Before mitosis, a dividing cell copies its DNA, and the chromosome halves normally separate so each new cell gets the same genetic information. If the halves of one chromosome fail to separate, one new cell could get an extra chromosome while the other is missing it. Those cells might not work normally, slowing root growth. How many chromosomes do cells near the damaged tip have compared with healthy root cells?

Accept explanations that connect DNA copying and chromosome separation to matching genetic information. For the open task, accept a plausible effect of a separation error and a question that could help investigate it.