Cells Build Cells

Trace growth, DNA copying, and division.

BIO.3 "Develop and use models to explain how events during the cell cycle lead to the formation of new cells and repair of multicellular organisms, including cell growth, DNA replication, separation of chromosomes..."

NAME _____ DATE _____

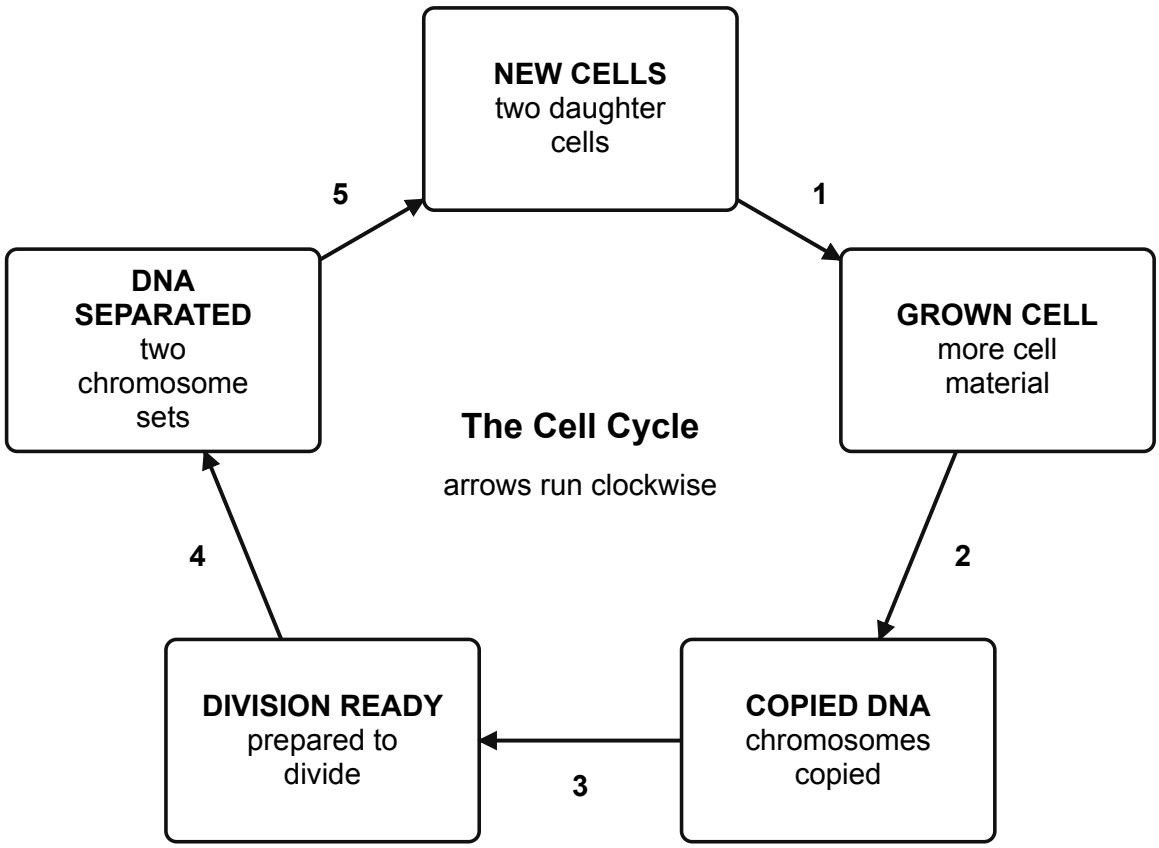
1 LABEL THE MODEL

Word bank below

Label the arrows using the word bank. On separate paper, extend the model with a branch from NEW CELLS showing that some cells specialize for tissue repair. Use your extended model to answer Question 3.

WORD BANK

- Cell growth (G1)
- Chromosomes separate (M)
- Cytokinesis
- Division prep (G2)
- DNA replication (S)



Arrow numbers match the response boxes on the next student section.

Label the arrows

Use the word bank to write the process for each numbered arrow.

Arrow 1	Arrow 2	Arrow 3

Arrow 4	Arrow 5

2 RUN THE MODEL

Use your finished diagram

1. During the S step, how does a DNA molecule become two copies?

2. Which process separates chromosomes? Which splits the cell's contents?

3. Use your added branch to explain how division and specialization can help repair skin. Why should the model say SOME new cells specialize rather than ALL?

3 CHECK IT

Before you turn it in

- [ ] I matched each arrow to a process.
- [ ] I traced the cycle back to new cells.
- [ ] I explained DNA copying and repair.

TEST THE MODEL

After adding your repair branch, what mechanism of tissue repair does your revised model still leave unexplained?

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PART 1 · COMPLETED MODEL

ARROW	FROM	TO	PROCESS
1	NEW CELLS two daughter cells	GROWN CELL more cell material	Cell growth (G1)
2	GROWN CELL more cell material	COPIED DNA chromosomes copied	DNA replication (S)
3	COPIED DNA chromosomes copied	DIVISION READY prepared to divide	Division prep (G2)
4	DIVISION READY prepared to divide	DNA SEPARATED two chromosome sets	Chromosomes separate (M)
5	DNA SEPARATED two chromosome sets	NEW CELLS two daughter cells	Cytokinesis

PART 2 · RUN THE MODEL

1. **The strands separate. Each serves as a template for a new strand, so each copy has one old and one new strand.** (During the S step, how does a DNA molecule become two copies?)
2. **Mitosis separates chromosomes. Cytokinesis splits the cell's contents.** (Which process separates chromosomes? Which splits the cell's contents?)
3. **Division supplies replacement cells; some cells differentiate for specialized skin functions while others can remain dividing progenitors or stem cells. Accept a clearly labelled branch that distinguishes cell production from specialization; not every new cell immediately specializes.** (Use your added branch to explain how division and specialization can help repair skin. Why should the model say SOME new cells specialize rather than ALL?)

TEST THE MODEL (SAMPLE ANSWERS)

- It does not identify the signals controlling when cells divide.
- It does not show how signals change gene activity to produce specialized cell functions.

Read the processes in order starting at NEW CELLS. Students must add their own repair branch on separate paper, not only label the supplied cycle. G1/S/G2 describe interphase, chromosome separation occurs in mitosis, and cytokinesis separates cell contents. The diagram simplifies a lineage of cells; it does not imply both daughter cells always continue cycling.