

## Cell Cycle Control Game Worksheet

- Go to the following website: <http://www.nobelprize.org/educational/medicine/2001/index.html>
- Click on the cell(s) and watch what happens
- After you watch the cells, click "ENTER" to get into the game
- Answer the following questions using the website

1. When do cells divide?
2. How many cells are replaced in our bodies each minute?

Click the arrow to continue

3. Cells divide at different rates.
  - a. Skin cells divide \_\_\_\_\_.
  - b. Liver cells divide \_\_\_\_\_.
  - c. Bone marrow cells divide \_\_\_\_\_.
  - d. Stomach and intestine lining cells divide \_\_\_\_\_.

Click the arrow to continue

4. When a cell dies, what happens?

Click the arrow to continue

5. What are the 2 key molecules that control and coordinate the cell cycle?

Click the arrow to continue. "Enter the "CELL CYCLE CONTROL SYSTEMS" by clicking on the door.

6. The cell here is in the G1 phase. Read the information on the control screen to the RIGHT and select the event that must occur in G1 of the cell cycle.
7. Click the correct activity on the website to proceed. Put a "1" on the line below next to the correct activity.
  - a. Cell destruction \_\_\_\_\_
  - b. Cell growth \_\_\_\_\_
  - c. Cell division \_\_\_\_\_
  - d. Chromosome separation \_\_\_\_\_
  - e. Chromosome duplication \_\_\_\_\_
8. Read the information on the LEFT screen. What 2 things must occur in order for the cell to proceed into the S phase in Checkpoint 1?
9. Check if the cell has grown enough by clicking on the "CELL SIZE." How big did the cell increase during the 1<sup>st</sup> checkpoint? \_\_\_\_\_%
10. Check if the cell has DNA damage by clicking on "GENETIC MATERIAL." Was there DNA damage found? \_\_\_\_YES  
\_\_\_\_NO
11. The cell has now proceeded into the S phase. Read the information on the control screen to the RIGHT and select the event that must occur in S of the cell cycle.

12. Click on the correct activity on the website to proceed. Put a "2" on the line below the correct activity.
- a. Cell destruction \_\_\_\_\_
  - b. Cell growth \_\_\_\_\_
  - c. Cell division \_\_\_\_\_
  - d. Chromosome separation \_\_\_\_\_
  - e. Chromosome duplication \_\_\_\_\_
13. The cell has now proceeded into the G2 phase. Read the information on the control screen to the RIGHT and select the event that must occur in G2 of the cell cycle.
14. Click on the correct activity on the website to proceed. Put a "3" on the line below the correct activity.
- a. Cell destruction \_\_\_\_\_
  - b. Cell growth \_\_\_\_\_
  - c. Cell division \_\_\_\_\_
  - d. Chromosome separation \_\_\_\_\_
  - e. Chromosome duplication \_\_\_\_\_
15. Read the information on the LEFT screen. What 3 things must occur in order for the cell to proceed into the G2 phase in Checkpoint 2?
16. Check if all the DNA was copied correctly by clicking on "ALL GENETIC MATERIAL DUPLICATED." Was all the DNA copied? \_\_\_\_YES \_\_\_\_NO
17. Check if the cell has grown enough by clicking on the "CELL SIZE." Is the cell big enough after the 2<sup>nd</sup> checkpoint to proceed into the M phase? \_\_\_\_YES \_\_\_\_NO
18. Check if the cell has DNA damage by clicking on "GENETIC MATERIAL." Was there DNA damage found? \_\_\_\_YES \_\_\_\_NO
19. What had to happen in order for the cell to get out of the G2 checkpoint?
20. The cell has now proceeded into the M phase. Read the information on the control screen to the RIGHT and select the event that must occur in M of the cell cycle.
21. Click on the correct activity on the website to proceed. Put a "4" on the line below the correct activity.
- a. Cell destruction \_\_\_\_\_
  - b. Cell growth \_\_\_\_\_
  - c. Cell division \_\_\_\_\_
  - d. Chromosome separation \_\_\_\_\_
  - e. Chromosome duplication \_\_\_\_\_
22. Read the information on the LEFT screen. What 1 thing must occur for the cell to proceed into M phase of Checkpoint 3?

23. Check if all the chromosomes are attached to the spindle fibers by clicking on "CHROMOSOMES ATTACHED TO SPINDLES?" Were all the chromosomes attached to spindles? \_\_\_\_ YES \_\_\_\_ NO
24. The cell has now continued through the M phase. Read the information on the control screen to the RIGHT and select the event that must occur in order for the cell to complete the M phase.
25. Click on the correct activity on the website to proceed. Put a "5" on the line below the correct activity.
- a. Cell destruction \_\_\_\_
  - b. Cell growth \_\_\_\_
  - c. Cell division \_\_\_\_
  - d. Chromosome separation \_\_\_\_
  - e. Chromosome duplication \_\_\_\_
26. Why is the cell cycle strictly controlled?

Click the arrow to continue

27. Describe the roles (jobs) of CDK and Cyclins in cell cycle control. When are they ACTIVE? When are they INACTIVE? Use notes!

Click the arrow to continue

28. Describe what happens when the CDK and Cyclins do not work correctly.