



SCIENCE OLYMPIAD
— AT THE —
UNIVERSITY OF FLORIDA

Northern Regional: January 19th, 2019

Heredity B Answer Key

Name(s): _____

Team Name: _____

School Name: _____

Team Number: _____

Rank: _____

Score: _____

1. E
2. C
3. B
4. E
5. C
6. C
7. D
8. E
9. D
10. A
11. A
12. B
13. E
14. E
15. E
16. Cdks need to be free of Cdk inhibitor proteins (CKIs) and associated with cyclins in order to be activated; Bind to cyclin **(1 pt)**
17. Translocation **(1 pt)**
18. Character **(1 pt)**
19. A cross with homozygous recessive to determine if genotype is homozygous dominant or heterozygous **(1 pt)**
20. Genomic totipotency- all somatic cells share the same DNA **(1 pt)**
21. Binary fission and mitosis both are processes by which information is transmitted. Binary fission is the process by which info is transmitted in prokaryotes. Mitosis it in eukaryotes. **(1 pt)**
22. Necrosis is premature cell death caused by external agents like toxins. Apoptosis is programmed cell death. **(1 pt)**
23. C **(1 pt)**
24. A **(1 pt)**
25. D **(1 pt)**
26. D **(1 pt)**
27. B **(1 pt)**
28. A **(1 pt)**
29. F **(1 pt)**
30. A **(1 pt)**
31. I **(1 pt)**
32. D **(1 pt)**
33. G **(1 pt)**
34. B **(1 pt)**
35. C **(1 pt)**
36. J **(1 pt)**

37. H (1 pt)

38. E (1 pt)

39. 1) Prophase: (.25 pts if answer says 'Prophase')

- a. the chromosomes become much more tightly coiled and condensed-each chromosome has two DNA molecules called sister chromatids, joined at a region called the centromere (.25 pts if answer has a.)
- b. centromeres serve as poles toward which the chromosomes move (.25 pts if answer has b.)
- c. the spindle forms between the poles from microtubules-kinetochore microtubules attach to kinetochores on the chromatid centromeres
 - i. sister chromatids attach to kinetochore microtubules from opposite sides so that the two chromatids will move to opposite poles
 - ii. sister chromatids become daughter chromatids after separation (.25 pts if answer has C.i. & .25 pts if answer has D.ii.)

(1 pt)

2) Prometaphase: (.25 pts if answer says 'Prometaphase')

- a. the nuclear envelope breaks down and chromatids attach to the kinetochore microtubules (.25 pts if answer has a.)

3) Metaphase: (.25 pts if answer says 'Metaphase')

- a. the chromosomes line up at the midline of the cell (equatorial plate) (.25 pts if answer has a.)

(1 pt)

4) Anaphase: (.25 pts if answer says 'Anaphase')

- a. the chromatids separate, and the daughter chromosomes move toward the poles (.25 pts if answer has a)

5) Telophase: (.25 pts if answer says 'Telophase')

- a. nuclear envelopes form around each set of chromosomes, and the spindle breaks down and chromosomes become less compact. (.25 pts if answer has a)

(1 pt)

6) Cytokinesis: (.50 pts if answer says 'Anaphase')

- a. In animals: cell membrane pinches in between the nuclei (.25 pts if answer has a.)
- b. In plants: vesicles fuse to form a cell plate (and eventually a cell wall) that divides the cell into two (.25 pts if answer has b.)

(1 pt) Total: 4 pts

40. **Nondisjunction: (.50 pts if answer says 'Nondisjunction'.)**

- a. Homologous pair fails to separate at anaphase I
- b. Sister chromatids fail to separate at anaphase II

(.50 pts if answer has a. or b.)

If answer has both a & b, cannot get more than .50 points

- c. Results in **aneuploidy** (an abnormal number of chromosomes):

(.50 pts if answer has c.)

- i. most human embryos from aneuploidy zygotes do not survive
- ii. the most common human aneuploidy is trisomy 16
- iii. **Trisomy 21 (down syndrome)** is one of the few aneuploidies that allow survival
- iv. Sex chromosome variation: X,45; XXX; XXY; XYY

(.25 pts if one point from i.-iv.) or (.50 pts if two points from i.-iv.)

(2 pts)

Translocation: (1 pt if answer has 'translocation'.)

- a. Portion of chromosome breaks off and attaches to a non-homologous chromosome. (1 pt if answer has a.)

(2 pts) Total: 4 pts

41. **Crossing Over: (1 pt if answer has 'crossing over'.)**

- a. Genetic material is exchanged between nonsister chromatids at the **chiasmata** (where the homologs remain attached).
- b. Any of the four chromatids in the tetrad can participate, and a single chromatid can exchange material at more than one point.
- c. Crossing over results in **recombinant** chromatids and increases genetic variability of the products.

(.50 pts if answer has a.) (.50 pts if answer has b.) (.50 pts if answer has c.)

Independent Assortment: (1 pt if answer has 'independent assortment'.)

- a. Random selection of half the diploid chromosome set to form a haploid gamete

(.50 pts if answer has a.)

Total: 4 pts

TEST TOTAL: 50 POINTS. GRADE TEAMS ____/50