In-class worksheet. Adapted from: <https://www.biointeractive.org/classroom-resources/role-p53-cell-cycle>

Please answer the following questions about the graph. You are in encouraged to work in your groups.



Caption: *Alleles of the* p53 *gene were selectively disrupted in a line of human cells and then monitored after exposure to DNA-damaging gamma (γ) radiation to determine what proportion of the cells entered mitosis (cell division). The shaded squares represent cells with two normal alleles of the* p53 *gene. The half-shaded squares represent cells with one normal and one disrupted allele of the* p53 *gene (note that some of the half-shaded squares are covered by the shaded squares). The unshaded squares represent cells in which both alleles of the* p53 *gene were disrupted. The mitotic index is the proportion of cells undergoing mitosis at a given time.*

1. Draw your own legend for the graph in the space below.

2. What is the dependent variable in the graph? Independent variable?

3. Explain the mitotic index. Why is this important to normal cell function? To cancer cells?

4. What trends do you see in the data above?

5. Which cell line(s) have a properly functioning p53 protein?

6. How many normal alleles of the p53 gene do cells need to function properly? Use evidence from the figure to support your claim.

7. Based on the figure, what role does the p53 protein play in cell division? Why might a cell need to stop dividing?

8. What hypothesis might the authors have had when designed this study?

9. How would you design a follow-up experiment to determine whether other proteins in addition to p53 play a regulatory role in cell division after DNA damage?