Name: _____ Date: _____ Period: _____

The Effects of Electromagnetic Waves Emitted by Cellular Devices on Growth Division of Roots in Lentil Seeds

Read, annotate, and complete each section.

The environment is exposed to electromagnetic radiations as a result of widespread use of cellular devices. This results in a massive increase in electromagnetic pollution. There is a concern of possible adverse effects of cellular phone radiation as a result of the enormous increase in the use of these phones throughout the world. The potential risks of electromagnetic fields (EMF) released by cell phones on living things has been intensely studied, in particular, on plants. Plants are a vital part of every ecosystem on earth because they produce organic compounds release oxygen.

1. (RST.9-10.4.) Explain the meaning of these words using context clues and prefixes/suffixes.

massive: _____

adverse: _____

intensely: _____

An experiment was conducted to determine the effects of electromagnetic radiation by cellular phones on growth of roots in lentil seeds. Seeds in the first petri dish were exposed to electromagnetic radiation while they were inactive, or in state of dormancy. Seeds in the second petri dish were exposed to electromagnetic radiation while active, and in a state of division. Seeds in the third petri dish were not exposed to any electromagnetic radiation.

2. (SIN 301) What was the independent variable, or what the scientist was testing in this experiment?
   a. dormancy
   b. cell phone reception
   c. electromagnetic radiation
   d. root growth

3. (SIN 301) What was the dependent variable, or what was the scientist measuring in the experiment?
   a. dormancy
   b. cell phone reception
   c. electromagnetic radiation
   d. root growth

4. (IOD 202) Which of the following would be the most appropriate title for Figure 1?
   a. Seeds are Growing
   b. The Effect of Root Growth on Electromagnetic Radiation
   c. The Effect of Electromagnetic Irradiation on Root Growth of Lentil Seeds
   d. Lentil Seeds and Electromagnetic Radiation

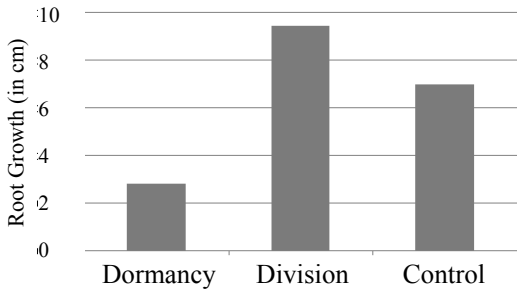

Figure 1

Name: _____ Date: _____ Period: _____

5. (IOD 301) According to Figure 1, which group of lentil seeds were the most negatively impacted by electromagnetic radiation, or had the least amount of growth?
    a. seeds in a state of division
    b. seeds in a state of dormancy
    c. seeds in the control group

Another experiment was conducted to determine the effects of electromagnetic radiation by cell phones on the division of cells in lentil seeds. The experiment and results are summarized in Figure 2.

Experiment	Divided Cells		Abnormal Division Rate (%)
	Normal	Abnormal	
Electromagnetic irradiation applied when seeds are dormant.	132	68	34%
Electromagnetic irradiation applied when seeds are germinating.	187	13	6.95%
No electromagnetic irradiation applied while seeds are dormant and germinating.	195	5	2.56%

Figure 2

6. (IOD 301) How many cells divided normally when electromagnetic radiation was applied to dormant seeds?
    a. 68
    b. 132
    c. 187
    d. 5

7. (IOD 301) Which of the following experimental treatments resulted in the lowest percentage of abnormal division?
    a. seeds that were not exposed to electromagnetic radiation
    b. seeds that were exposed to electromagnetic radiation while germinating
    c. seeds that were exposed to electromagnetic radiation while dormant
    d. there is not enough information provided in Figure 2

8. (EMI 401) Which of the following provides the strongest evidence to support the claim that exposure to electromagnetic radiation has an adverse effect on living things such as plants?
    a. the number of abnormal cells after no electromagnetic radiation was applied to seeds
    b. the number of normal cells after no electromagnetic radiation was applied to seeds
    c. the number of normal cells after electromagnetic radiation was applied to germinated seeds
    d. the number of abnormal cells after electromagnetic radiation was applied to dormant seeds

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Data Representations and Research Summary adapted from:

Akbal, A. (2010). Effects of Electromagnetic Waves Emitted by Mobile Phones on Germination, Root Growth, and Root Tip Cell Mitotic Division of *Lens culinaris*. *Polish Journal of Environmental Studies*. Vol. 21, No.1, 23-29.