

Science Notes
35 Minutes / 40 Questions
7 passages / 5-6 Questions per passage
23-24 correct = 21

- The Science test is the 4th test
- This is where many students lose focus
- 7 sections 4 possible answers
- 3 sections **Data Representation** – tables and graphs usually *Study 1 / Study 2/Study 3*
- Three of these on test with usually 5-6 questions each.
- Questions get harder as you go in each section.
- Data is factual information.
- It is usually organized in tables, graphs, models, or diagrams
- Tables are the most common on the ACT.
- Data represented in an organized way is easier to analyze and interpret.
- 3 sections on **Research Summaries** – lab results usually *Experiment 1 / Experiment 2 / Experiment 3*
- 1 section on **Conflicting Results**
- Usually 7 questions
- Conflicting Results - It usually has two viewpoints labeled *Study 1 and Study 2 or Scientist 1 and Scientist 2*.
- **Conflicting Results is 7 questions. (Do it last) BEST TIP FOR SCIENCE!**

TIPS

- The average student will not have time to finish
- It is not a science test.
- It is a reading test and a test of how well you think analytically.
- Almost all the information you need to know will be provided in the reading passages.
- Do not be alarmed by scientific words you do not understand
- Note trends in the data
 - 1) Direct relationship – both variables go in the same direction.
 - 2) Inverse relationship – one increases and the other decreases.
 - 3) Draw arrows by the charts or tables to show the trend.
- Only 1-4 questions of the 40 require outside knowledge.
- Pay attention to the numbers
 - 1) Notice big changes in the numbers in graphs or tables
 - 2) Notice trends
 - 3) Pay attention to the details and units
- You do not have enough time to read it all.
- Look at the key to a map if you are confused.
- If you do not understand a graph, look at the reading to clarify. Try it without reading.
- An unusual key term is usually italicized – clarify it by reading.

Passage IV

Figure 1 is a diagram of an *RLC circuit*. The circuit has a power supply and 3 components: a resistor (R), an inductor (L), and a capacitor (C).

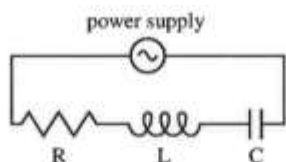


Figure 1

Electric current can flow through the circuit either clockwise (positive current) or counterclockwise (negative current). Figure 2 shows how the electric current in the circuit, I (in amperes, A), and the power supply voltage, V_S (in volts, V), both changed during a 20-millisecond (msec) time interval.

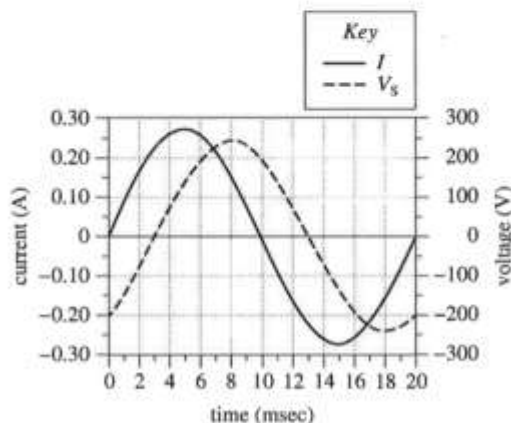


Figure 2

Figure 3 shows how the voltages across the components— V_R , V_L , and V_C , respectively—each changed during the same 20 msec time interval.

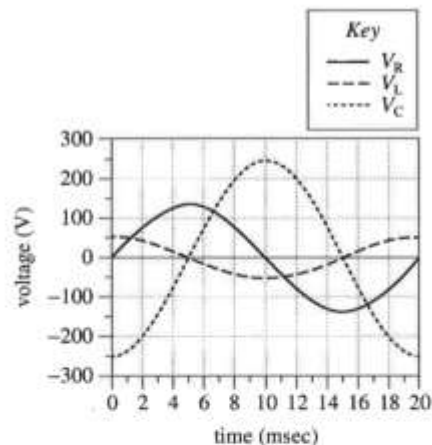


Figure 3

23. According to Figures 2 and 3, which voltage varied the *least* during the 20 msec interval?
- A. V_S
 B. V_R
 C. V_L
 D. V_C
24. *Polarity* refers to whether a voltage is positive or negative (a voltage of 0 V has no polarity and can be ignored). Based on Figures 2 and 3, which 2 voltages were always *opposite* in polarity?
- F. V_R and V_L
 G. V_R and V_S
 H. V_L and V_C
 J. V_L and V_S
25. Based on Figure 2, at which of the following times was the current in the circuit flowing counterclockwise?
- A. 0 msec
 B. 5 msec
 C. 10 msec
 D. 15 msec

21. According to Figure 2, the maximum positive value of V_S was approximately:
- A. 125 V.
 B. 200 V.
 C. 250 V.
 D. 275 V.
22. A *period* is the time required for a wave to complete one full cycle. Based on Figure 3, the period for V_L was:
- F. 5 msec.
 G. 10 msec.
 H. 20 msec.
 J. 40 msec.

26. The table below lists the electric charge (in microcoulombs, μC) stored on the capacitor at 3 different times during the 20 msec interval.

Time (msec)	Charge (μC)
7	0.51
10	0.87
13	0.51

Based on Figures 2 and 3, from time = 7 msec through time = 13 msec, did the charge on the capacitor more likely change in sync with I or with V_C ?

- F. I ; over that time interval, both the charge and I decreased and then increased.
 G. I ; over that time interval, both the charge and I increased and then decreased.
 H. V_C ; over that time interval, both the charge and V_C decreased and then increased.
 J. V_C ; over that time interval, both the charge and V_C increased and then decreased.

Passage 1

A study was conducted to examine whether female *Blattella germanica* (a species of cockroach) prefer to eat cat food, cheese, ham, or peanuts. First, 200 mg of each of the 4 foods was separately placed into a single box. Then, adult female *B. germanica* were added to the box. Figure 1 shows how the mass, in mg, of each food in the box changed over time after the addition of the *B. germanica*. Table 1 shows the percent by mass of carbohydrates, lipids, proteins, and water, respectively, present in each of the 4 foods tested in the study.

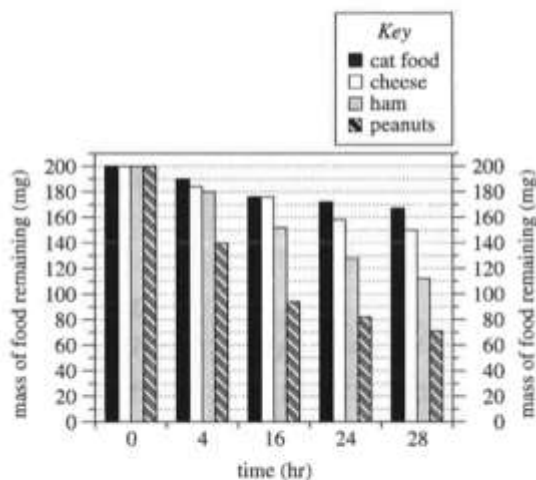


Figure 1

Figure adapted from Prachumporn Lauprasert et al., "Food Preference and Feeding Behavior of the German Cockroach, *Blattella germanica* (Linnaeus)." ©2006 by the Faculty of Science, Chulalongkorn University.

- Consider the 4 foods in order of the percent by mass of proteins, from lowest to highest. From food to food, as the percent by mass of proteins increased, the mass of food remaining at 28 hr:
 - increased only.
 - decreased only.
 - increased and then decreased.
 - decreased and then increased.
- Consider the statement "The *B. germanica* ate the food between 0 hr and 4 hr, between 4 hr and 16 hr, between 16 hr and 24 hr, and between 24 hr and 28 hr." This statement is consistent with the data in Figure 1 for how many of the 4 foods?
 - 1
 - 2
 - 3
 - 4

Food	Percent by mass			
	carbohydrates	lipids	proteins	water
Cat food	1.2	6.0	16.9	66.2
Cheese	0.5	27.7	20.8	48.4
Ham	0.0	18.2	23.6	57.1
Peanuts	15.8	49.6	26.2	6.4

Table adapted from U.S. Department of Agriculture, *USDA National Nutrient Database for Standard Reference*, Release 24, 2011.

- According to Figure 1, the mass of cheese remaining at 4 hr was closest to which of the following values?
 - 140 mg
 - 176 mg
 - 185 mg
 - 190 mg
- Suppose a company wants to use food as bait in a trap designed to capture female *B. germanica*. Based on Figure 1, which of the 4 foods should the company place in the trap to maximize the chance of capturing female *B. germanica*?
 - Cat food
 - Cheese
 - Ham
 - Peanuts
- A student predicted that the *B. germanica* would eat less cat food than ham by the end of the study. Do the data in Figure 1 support this prediction?
 - Yes; at 28 hr, the mass of cat food remaining was about 55 mg greater than the mass of ham remaining.
 - Yes; at 28 hr, the mass of cat food remaining was about 95 mg greater than the mass of ham remaining.
 - No; at 28 hr, the mass of cat food remaining was about 55 mg less than the mass of ham remaining.
 - No; at 28 hr, the mass of cat food remaining was about 95 mg less than the mass of ham remaining.
- Based on Table 1, when 200 mg of each of the 4 foods was placed in the box, water accounted for more than 100 mg of the mass of which food(s)?
 - Peanuts only
 - Cat food and ham only
 - Cheese and peanuts only
 - Cat food, cheese, and ham only