PART A: Answer all questions in this part.

Directions: For each statement or question, write on your separate answer sheet the number of the word or expression that best completes the statement or answers the question.

1 Researchers performing a well-designed experiment should base their conclusions on
   (1) the hypothesis of the experiment
   (2) data from repeated trials of the experiment
   (3) a small sample size to insure a reliable outcome of the experiment
   (4) results predicted before performing the experiment

2 Which statement best describes a scientific theory?
   (1) It is a collection of data designed to provide support for a prediction.
   (2) It is an educated guess that can be tested by experimentation.
   (3) It is a scientific fact that no longer requires any evidence to support it.
   (4) It is a general statement that is supported by many scientific observations.

3 The analysis of data gathered during a particular experiment is necessary in order to
   (1) formulate a hypothesis for that experiment.
   (2) develop a research plan for that experiment.
   (3) design a control for the experiment.
   (4) draw a valid conclusion for that experiment.

4 A scientist is planning to carry out an experiment on the effect of heat on the function of a certain enzyme. Which would not be an appropriate first step?
   (1) doing research in a library
   (2) having discussions with other scientists
   (3) completing a data table of expected results
   (4) using what is already known about the enzyme

5 Why do scientists consider any hypothesis valuable?
   (1) A hypothesis requires no further investigation.
   (2) A hypothesis may lead to further investigation even if it is disproved by the experiment.
   (3) A hypothesis requires no further investigation even if it is proved by the experiment.
   (4) A hypothesis can be used to explain a conclusion even if it is disproved by the experiment.

6 In Texas, researchers gave a cholesterol-reducing drug to 2,335 people and an inactive substitute (placebo) to 2,081. Most of the volunteers were men who had normal cholesterol levels and no history of heart disease. After 5 years, 97 people getting the placebo had suffered heart attacks compared to only 57 people who had received the actual drug. The researchers are recommending that to help prevent heart attacks, all people (even those without high cholesterol) take these cholesterol-reducing drugs. In addition to the information above, what is another piece of information that the researchers must have before support for the recommendation can be justified?
   (1) Were the eating habits of the two groups similar?
   (2) How does a heart attack affect cholesterol levels?
   (3) Did the heart attacks result in deaths?
   (4) What chemical is in the placebo?

7 A biologist reported success in breeding a tiger with a lion, producing healthy offspring. Other biologists will accept this report as fact only if
   (1) research shows that other animals can be crossbred
   (2) the offspring are given a scientific name
   (3) the biologist included a control in the experiment
   (4) other researchers can replicate the experiment

8 Though scientists study the world from differing perspectives, what must all scientists take into account?
   (1) universal laws
   (2) animal behavior
   (3) temperature differences
   (4) the importance of biology

Regents Exam Practice

Correlations

<table>
<thead>
<tr>
<th>1.1.2a</th>
<th>14</th>
<th>1.3.4a</th>
<th>5</th>
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<td>1.1.2b</td>
<td>12</td>
<td>1.3.4c</td>
<td>11</td>
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<td>1.1.4a</td>
<td>2</td>
<td>1.3.5a</td>
<td>7</td>
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<td>1.2.3c</td>
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<td>6</td>
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<td>1.3.1a</td>
<td>3, 15, 16</td>
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PART B

11. A science researcher is reviewing another scientist’s experiment and conclusion. The reviewer would most likely consider the experiment invalid if:
   (1) the sample size produced a great deal of data
   (2) other individuals are able to duplicate the results
   (3) it contains conclusions not explained by the evidence given
   (4) the hypothesis was not supported by the data obtained

12. Which source would provide the most reliable information for use in a research project investigating the effects of antibiotics on disease-causing bacteria?
   (1) the local news section of a newspaper from 1993
   (2) a news program on national television about antigens produced by various plants
   (3) a current professional science journal article on the control of pathogens
   (4) an article in a weekly news magazine about reproduction in pathogens

13. A scientist is investigating a new treatment for a disease that affects thousands of people. Many people with this disease volunteer to be part of the study. Which of the following is an ethical concern that the scientist must address before conducting the study?
   (1) The scientist must ensure that the treatment will be effective.
   (2) The scientist must ensure that the study’s results will not be shared with other scientists.
   (3) The scientist must inform the volunteers about the potential dangers of participating in the study.
   (4) The scientist must demonstrate that the treatment will not cause any side effects.

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9. A student hypothesized that lettuce seeds would not sprout (germinate) unless they were exposed to darkness. The student planted 10 lettuce seeds under a layer of soil and scattered 10 lettuce seeds on top of the soil. The data collected are shown in the table below.

<table>
<thead>
<tr>
<th>Seed Treatment</th>
<th>Number of Seeds Germinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planted under soil</td>
<td>9</td>
</tr>
<tr>
<td>Scattered on top of soil</td>
<td>8</td>
</tr>
</tbody>
</table>

One way to improve the validity of these results would be to:
   (1) conclude that darkness is necessary for lettuce seed germination
   (2) conclude that light is necessary for lettuce seed germination
   (3) revise the hypothesis
   (4) repeat the experiment

10. The diagram below shows a portion of a graduated cylinder. What is the volume of the liquid in this cylinder?

   ![Graduated Cylinder Diagram](image)

   (1) 22 mL
   (2) 24 mL
   (3) 25 mL
   (4) 26 mL
PART C

14 The diagram below illustrates the result of growing a garlic bulb in a cup of distilled water over five days.

Design an experiment consisting of a control and three different experimental groups to test the prediction, “Garlic grows better as the salt concentration of the solution in which it is grown increases.” In your answer, be sure to:

- describe the control to be used in the experiment
- describe the difference between the three experimental groups
- state one type of measurement that should be made to determine if the prediction is accurate
- describe one example of experimental results that would support the prediction

PART D

Base your answers to the questions on the information below and on your knowledge of biology.

A student squeezes and releases a clothespin as often as possible for 2 minutes and then takes his pulse for 20 seconds. After a 2-minute rest, he repeats the procedure. This pattern is repeated one more time. The student’s 20-second pulse counts were 23, 26, and 21.

15 Complete the “Pulse/Min” column in the data table below for all three trials as well as the average pulse rate per minute.

<table>
<thead>
<tr>
<th>Trial</th>
<th>20-Second Pulse Counts</th>
<th>Pulse/Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>70</td>
</tr>
</tbody>
</table>

16 What additional data should the student have collected in order to determine the effect of squeezing a clothespin on his pulse rate?