1. Josephine is heating some test tubes with chemicals in them during a laboratory activity.

Which is a safety Josephine should follow when heating liquids in the test tubes?

A. Place a stopper on top of each test tube while heating.
B. Fill a test tube more than \( \frac{1}{2} \) full when heating them.
C. Occasionally look into the open end of the heated test tubes to see if liquid is boiling.
D. Keep the electrical cord of the hot plate away from water and the heating surface.

2. Mark wanted to see what would happen to an inflated balloon that was put into the freezer for several minutes and then removed. The table shows the results of his experiment at several points in time.

<table>
<thead>
<tr>
<th>Time point</th>
<th>Balloon kept at room temperature</th>
<th>Balloon placed in freezer &amp; then removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 minutes</td>
<td>15 cm</td>
<td>15 cm</td>
</tr>
<tr>
<td>3 minutes</td>
<td>15 cm</td>
<td>14 cm</td>
</tr>
<tr>
<td>5 minutes</td>
<td>15 cm</td>
<td>13.5 cm</td>
</tr>
<tr>
<td>7 minutes</td>
<td>15 cm</td>
<td>? cm</td>
</tr>
</tbody>
</table>

What would happen to the balloon if it was left in the freezer for 7 minutes and then removed?

A. The balloon would be 14.5 cm.
B. The balloon would be 13 cm.
C. The balloon would pop when it was removed.
D. The size of the balloon would not change.
3. Natalie wants to determine how different concentrations of fertilizer affect plant growth. The table shows the data for her experiment at the end of 6 weeks.

<table>
<thead>
<tr>
<th>Concentration of Fertilizer</th>
<th>Amount of Plant Growth (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>2.5</td>
</tr>
<tr>
<td>2%</td>
<td>3.3</td>
</tr>
<tr>
<td>4%</td>
<td>3.0</td>
</tr>
<tr>
<td>6%</td>
<td>2.0</td>
</tr>
<tr>
<td>10%</td>
<td>0*</td>
</tr>
<tr>
<td>25%</td>
<td>0*</td>
</tr>
</tbody>
</table>

*Plants in this group died

What conclusion does the data support?

A. Fertilizer concentration has no effect on the amount of plant growth.

B. Water is the best nutrient for plants, and fertilizers should be avoided.

C. Plant growth increases steadily as the concentration of fertilizer applied to each group increases.

D. Plant growth increases at certain concentrations but can be harmful in high concentrations.

4. The graphs below show the results of a controlled experiment which measured the population of one type species of bacteria which had been grown in four containers under identical conditions. Different antibiotics were added to three of the four containers.

Antibiotics are chemicals that kill bacteria. Some bacteria are resistant to antibiotics. Over time, bacteria resistant to antibiotics reproduce and create populations of bacteria that are not affected by antibiotics.

Use the graph to answer question

Which container in the experiment was considered the control group?

A. container with Antibiotic A added

B. container with Antibiotic B added

C. container with Antibiotic C added

D. container with no antibiotic added

5. Why are multiple trials conducted during an experiment?

A. to reduce the effects of any inaccurate results

B. to make it easier to graph the results

C. to make sure directions are followed

D. to reduce the equipment needed
6. The diagram below shows water in a graduated cylinder.

![Graduated Cylinder Diagram]

A student states that the graduated cylinder contains 150 ml of water. Which best describes this statement?

A. qualitative prediction
B. qualitative observation
C. quantitative observation
D. quantitative prediction

7. The diagram shows water in a graduated cylinder. A student states that the graduated cylinder contains 150 mL of water.

![Graduated Cylinder Diagram]

Which *best* describes this statement?

A. qualitative prediction
B. qualitative observation
C. quantitative observation
D. quantitative prediction
8. Caroline tested the rate of evaporation for four liquids by placing 100 mL of each liquid into separate Petri dishes. She waited 24 hours before measuring the amount of liquid left in the dish. The results are shown in the table.

<table>
<thead>
<tr>
<th>Dish</th>
<th>Volume after 24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>85 mL</td>
</tr>
<tr>
<td>2</td>
<td>90 mL</td>
</tr>
<tr>
<td>3</td>
<td>15 mL</td>
</tr>
<tr>
<td>4</td>
<td>100 mL</td>
</tr>
</tbody>
</table>

Which description represents quantitative data collected by Caroline?

A. After 24 hours, 15 mL of alcohol remained in dish 3.
B. She placed 100 mL of each liquid into four different dishes.
C. Four liquids were used in the experiment.
D. Alcohol evaporates more quickly than oil after 24 hours.

9. This graph shows the phosphates in Marchland River.

How does the level of phosphates change between Week 1 and Week 5?

A. It increases.
B. It decreases.
C. It stays the same.
D. It fluctuates dramatically.
10. This graph shows the dissolved oxygen in Redland River.

How does the level of dissolved oxygen change between Week 1 and Week 6?

A. It increases.
B. It decreases.
C. It stays the same.
D. It fluctuates dramatically.

11. Four different lab groups collected data from an experiment that they conducted in class. Which group collected quantitative data during the experiment?

A. Group L saw a mixture of grey wispy clouds and white puffy clouds.

B. Group M saw the following:

C. Group N saw a cirrus cloud at 50km and a cumulus cloud at 100km.

D. Group O saw clouds, felt cold and was expecting rain.
12. NASA rovers on Mars discover numerous smoothly rounded rocks containing iron that also show clear signs of oxidation (rusting). The rocks are discovered in a flat, open, completely dry valley, with no evidence of significant craters in the area. What inference may NASA scientists draw from this observation?

A. Nitrogen gas must have made up most of Mars' atmosphere long ago.
B. The rock likely formed when Mars and Earth collided billions of years ago.
C. This rock was likely brought to Mars by a comet.
D. Water once flowed freely in this area of Mars.

13. Science equipment is often used to take measurements during an experiment.

Which measurement would be taken using this instrument?

A. force
B. length
C. pressure
D. volume

14. Zoe is studying plant cells and wants to view the nucleus of an onion cell. Which tool would enable Zoe to view the nucleus most clearly?

A. 
B. 
C. 
D. 

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15. A scientific instrument is shown in the diagram.

For what purpose should this tool be used?

A. to measure the mass of an object  
B. to measure the volume of an object  
C. to measure the length of an object  
D. to measure the temperature of an object

16. Faith uses color filters to study how they block certain wavelengths of light and transmit others. She looks at different colored objects with help of the color filters. What safety measure should she follow to conduct a good investigation?

A. Color filters should not be scraped across each other.  
B. Never look through the color filter with bare unprotected eyes.  
C. Wear an apron when conducting the investigation.  
D. Wear rubber boots while performing the experiment.

17. Which objective would be used to locate a specimen on a microscope slide?

A. 4x  
B. 10x  
C. 40x  
D. 100x

18. Students tested the effect of exercise on pulse rate. They measured their pulse rates at rest, after walking, and after climbing stairs. The results are shown in the table.

<table>
<thead>
<tr>
<th>Student</th>
<th>Resting pulse</th>
<th>Pulse after walking</th>
<th>Pulse after climbing stairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
<td>66</td>
<td>112</td>
</tr>
<tr>
<td>2</td>
<td>71</td>
<td>81</td>
<td>115</td>
</tr>
<tr>
<td>3</td>
<td>83</td>
<td>96</td>
<td>120</td>
</tr>
<tr>
<td>4</td>
<td>72</td>
<td>89</td>
<td>118</td>
</tr>
<tr>
<td>5</td>
<td>68</td>
<td>77</td>
<td>114</td>
</tr>
</tbody>
</table>

Which conclusion is logical based on the students' data?

A. Students who exercise regularly have a lower pulse than students who do not exercise.  
B. Some exercise will cause pulse to increase, while other types cause it to decrease.  
C. The type of exercise has an effect on how much the pulse increases after activity.  
D. There is no measurable relationship between different types of exercise and a student's pulse.
19. Many scientists accept the theory that excess carbon dioxide emissions from cars and industry form a layer of gas in the upper atmosphere that traps heat. The result is an increase in the average temperature on Earth.

Which observation supports this theory?

A. The summer of 2008 was one of the hottest seasons on Earth in recorded history.

B. Carbon dioxide gas is produced when fossil fuels are burned, a process that produces heat.

C. Carbon dioxide in the upper atmosphere reflects heat radiated from Earth’s surface.

D. Radiation on Earth’s surface is increasing and has created a hole in the ozone layer.

20. Students gathered data to analyze their water consumption. The table shows the range of averages for the class. The students discussed the data to reach conclusions.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Average Water Used (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking shower</td>
<td>50-77</td>
</tr>
<tr>
<td>Taking bath</td>
<td>96-116</td>
</tr>
<tr>
<td>Washing hands</td>
<td>4-8</td>
</tr>
<tr>
<td>Flushing toilet</td>
<td>19-27</td>
</tr>
<tr>
<td>Brushing teeth</td>
<td>19-39</td>
</tr>
<tr>
<td>Washing dishes by hand</td>
<td>20-77</td>
</tr>
<tr>
<td>Automatic dishwasher</td>
<td>27-58</td>
</tr>
</tbody>
</table>

Which statement from their discussion describes skepticism about the data?

A. Joe agrees with the data because it supports the data he collected.

B. Kelsey concludes that taking showers conserves more water than taking baths.

C. Carlos wonders if the dishwashing data is accurate since the range is so large.

D. Michelle recognizes that washing hands uses the least amount of water.