Student Name ________________________________________________________________

School Name ______________________________________________________________

The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Print your name and the name of your school on the lines above.

The questions on this test measure your knowledge and understanding of science. The test has two parts. Both parts are contained in this test booklet.

**Part I** consists of 45 multiple-choice questions. Record your answers to these questions on the separate answer sheet. Use only a No. 2 pencil on your answer sheet.

**Part II** consists of 40 open-ended questions. Write your answers to these questions in the spaces provided in this test booklet.

You may use a calculator to answer the questions on the test if needed.

You will have two hours to answer the questions on this test.

**DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.**

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THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
ALBANY, NEW YORK 12234

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Part I

DIRECTIONS

There are 45 questions on Part I of the test. Each question is followed by four choices, numbered 1 through 4. Read each question carefully. Decide which choice is the best answer. On the separate answer sheet, mark your answer in the row of circles for each question by filling in the circle that has the same number as the answer you have chosen.

Read the sample question below.

Sample Question

Earth gets most of its light from

(1) the stars
(2) the Sun
(3) the Moon
(4) other planets

The correct answer is the **Sun**, which is choice number **2**. On your answer sheet, look at the box showing the row of answer circles for the sample question. Since choice number **2** is the correct answer for the sample question, the circle with the number **2** has been filled in.

Answer all of the questions in Part I in the same way. Mark only one answer for each question. If you want to change an answer, be sure to erase your first mark completely. Then mark the answer you want.

You will not need scrap paper. You may use the pages of this test booklet to work out your answers to the questions.

You may use a calculator if needed.

When you are told to start working, turn the page and begin with question 1. Work carefully and answer all of the questions in Part I.

When you have finished Part I, go right on to Part II. Answer all of the questions in Part II.
1. Which cell structure do nutrients pass through to enter a cell?
   (1) cell membrane (2) chloroplast (3) cytoplasm (4) nucleus

2. A group of tissues that work together to perform a specific function is called
   (1) an organ (2) an organism (3) a system (4) a cell

3. When food is being mechanically digested, it is being
   (1) changed into another substance (2) made smaller in size (3) converted into energy (4) excreted from the body

4. The primary purpose of which human organ system is to produce hormones that regulate body functions?
   (1) skeletal (2) muscular (3) circulatory (4) endocrine

5. Which gas is used by humans in the process of cellular respiration?
   (1) methane (2) nitrogen (3) oxygen (4) carbon dioxide

6. Which process occurs during the growth and development of a fertilized human egg?
   (1) cell division (2) natural selection (3) germination (4) evolution

7. The diagram below represents two flies. They look similar but they can *not* sexually reproduce with each other and produce offspring.

   ![Diagram of two flies]

   This means that the two flies most likely belong to
   (1) the same kingdom and same species (2) the same kingdom, but different species (3) different kingdoms, but same species (4) different kingdoms and different species

8. Abnormal cell division results in
   (1) cancer (2) homeostasis (3) metabolism (4) microbes

9. The carbohydrates, proteins, and minerals that are vital to an organism’s survival are found in
   (1) oxygen (2) carbon dioxide (3) food (4) water

10. During the process of photosynthesis, green plants produce
    (1) sunlight (2) methane (3) nitrogen (4) sugar
Base your answers to questions 11 and 12 on the graphs below and on your knowledge of science. The graphs show the populations of rabbits with four different fur colors in one area. Graph A represents the population of rabbits 10 years ago. Graph B represents the population of rabbits today.

![Population of Rabbits 10 Years Ago](image1)

![Population of Rabbits Today](image2)

11 At the end of the 10-year period, which color of rabbit appears to be best adapted to its environment?

(1) white  
(2) tan  
(3) gray  
(4) black

12 Variations in traits, such as the fur color of rabbits, may be caused by

(1) sexual reproduction  
(2) a decrease in air pollution  
(3) dynamic equilibrium  
(4) adequate resources

13 The diagram below represents changes in the types of plants growing in the same area during four different time periods. Different types of plants have been labeled for each time period.

![Diagram of Plant Changes](image3)

This change in plant types over time is an example of

(1) ecological succession  
(2) urban growth  
(3) selective breeding  
(4) genetic engineering
14 The diagram below represents the life cycle of a frog.

This diagram shows that, in frogs,
(1) methods of sexual reproduction depend on the species
(2) metabolism is the sum of all chemical reactions
(3) body structures change during development
(4) offspring always look like the adult

15 The diagram below represents a partial food web.

Which organisms in this food web decompose materials and recycle wastes?
(1) green plants    (3) bacteria
(2) mice           (4) foxes

16 All of the plants and animals living in the same area make up a
(1) population    (3) species
(2) community     (4) habitat

17 Which change would most likely cause a decrease in the number of squirrels living in an area?
(1) a decrease in the number of predators
(2) a decrease in competition between the squirrels
(3) an increase in available food
(4) an increase in the number of forest fires

18 The passage below describes how a catalytic converter in a car works.

How a Catalytic Converter Works
Gases produced by a car’s engine flow through the catalytic converter, which contains metals. These metals start a chemical reaction that makes the gases released by the car less harmful to the environment.

The catalytic converter most likely was developed in response to
(1) the demand for more energy-efficient cars
(2) the demand for increased car engine power
(3) a need for lower-priced cars
(4) a need to reduce air pollution

19 The formation of rock fragments and soil is most likely the result of
(1) weathering    (3) convection cells
(2) gravity       (4) hazardous weather

20 All matter is made up of
(1) cells        (3) molecules
(2) atoms        (4) compounds
21 The weather map below shows a low-pressure system over the eastern United States. Points A, B, C, and D represent locations on Earth’s surface.

![Weather Map](image-url)

Which location is most likely experiencing rainy, unstable weather conditions?

(1) A  
(2) B  
(3) C  
(4) D

22 In New York State there is a greater chance of precipitation falling as snow in January than in March, because in January the Northern Hemisphere is tilted

(1) toward the Sun, and temperatures are warmer  
(2) toward the Sun, and temperatures are colder  
(3) away from the Sun, and temperatures are warmer  
(4) away from the Sun, and temperatures are colder

23 Point X on the map below represents a location in New York State.

![Map of New York State](image-url)

What is the approximate latitude and longitude of location X?

(1) 42.5° N, 77.5° E  
(2) 42.5° N, 77.5° W  
(3) 42.5° S, 77.5° E  
(4) 42.5° S, 77.5° W
24 The photograph below shows a large, deep channel that formed as a result of running water that removed the soil.

Which process was responsible for the removal of the soil?

(1) deposition  
(2) erosion  
(3) faulting  
(4) tilting

25 The photograph below shows a test for a mineral property.

Which mineral property is being tested?

(1) density  
(2) texture  
(3) streak  
(4) reaction to acid
The graph below shows how water temperature affects the solubility of four different substances.

![Solubility Curves of Four Substances](image)

The solubility of which substance is least affected by the temperature of the water?

1. NaNO₃
2. KNO₃
3. NaCl
4. SO₂

27. The movement of the liquid in a thermometer shows changes in temperature. An increase in temperature indicates the molecules in the liquid

1. moved slower and closer together
2. moved faster and spread farther apart
3. contracted in size when heated
4. expanded in size when heated

28. Which diagram represents folded rock layers?

![Folded Rock Layers](image)
29 A portion of the Periodic Table of the Elements is shown below. The table provides a separate box for each chemical element, with all the elements in one vertical column having similar properties.

### Portion of the Periodic Table of the Elements

<table>
<thead>
<tr>
<th>Groups</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
</tr>
</tbody>
</table>

**KEY**
- approximate atomic mass
- symbol
- name
- atomic number

Which element is a noble gas?

1. Ag
2. Ge
3. Cl
4. Kr

30 The diagram below represents the same pendulum in four different positions.

![Diagram of a pendulum in four positions](image)

At which position does the ball have the most potential energy?

1. 1
2. 2
3. 3
4. 4

31 One characteristic that salt water and sugar-water have in common is, at room temperature, they are

1. gases
2. solids
3. mixtures
4. elements
32 The diagram below represents parts of a power facility that are used to produce electricity.

What is the major source of energy for the production of electricity in this facility?

(1) nuclear power  
(2) prevailing winds  
(3) moving water  
(4) burning coal

33 The illustration below represents balloon A, which has an electrical charge.

Balloon A would be most attracted to which balloon?

(1)  
(2)  
(3)  
(4)
34 The diagram below represents a beaker of water being heated by a flame. The arrows represent heat transfer occurring in the beaker.

Which process is represented by the arrows in the diagram?
(1) condensation (3) convection
(2) conduction (4) radiation

35 The diagram below represents energy transformations in a moving electric toy car.

Which form of energy is the original source of power for this car?
(1) electrical (3) sound
(2) mechanical (4) light
36 The diagram below represents a bar magnet. Six locations, A through F, are labeled on the magnet.

<table>
<thead>
<tr>
<th>North</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>South</th>
</tr>
</thead>
</table>

Which two locations on the magnet would have the greatest attractive forces?

(1) A and F  
(2) B and E  
(3) C and D  
(4) D and F

37 The Law of Conservation of Energy states that energy cannot be created or destroyed, but energy can change

(1) its total mass  
(2) its total volume  
(3) from one form to another  
(4) from one state of matter to another

Base your answers to questions 38 and 39 on the diagram below and on your knowledge of science. The diagram represents a person using a spring scale to pull a wooden block up a ramp.

38 The plastic straws were placed under the wooden block to

(1) decrease the mass of the block  
(2) decrease the amount of friction  
(3) increase the surface area of the ramp  
(4) increase the gravitational attraction of the block

39 The ramp would be classified as which type of simple machine?

(1) a lever  
(2) a pulley  
(3) a wheel and axle  
(4) an inclined plane
40 The diagram below represents liquid water in a pan on a hot plate. The liquid water is boiling and changing into water vapor.

![Diagram of liquid water boiling into water vapor]

The process of boiling is considered to be a

(1) chemical change, because a new substance is formed
(2) chemical change, because a new substance is not formed
(3) physical change, because a new substance is formed
(4) physical change, because a new substance is not formed

Base your answers to questions 41 and 42 on the partial nutrition label below and on your knowledge of science. The label shows some nutritional information for a box of macaroni and cheese.

**Macaroni and Cheese**

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>Calories: 250</th>
<th>Calories from Fat: 110</th>
</tr>
</thead>
</table>

**Serving Size:** 1 cup  
**Servings Per Container:** 2

41 The Calories on a food label indicate the amount of energy the food contains in one serving. Which form of energy is contained in food?

(1) chemical  
(2) mechanical  
(3) electrical  
(4) light

42 Nutritious food choices have less than 30% of their Calories from fat per serving. The equation used to calculate the percent of Calories from fat is given below.

\[
\% \text{ Calories from Fat} = \frac{\text{Calories from Fat}}{\text{Calories}} \times 100
\]

What is the percent of Calories from fat in one serving of this macaroni and cheese?

(1) 14%  
(2) 23%  
(3) 36%  
(4) 44%
43 The data table below shows the number of bacteria in two samples, A and B, growing in a laboratory over a five-hour period. Data were collected every half hour.

<table>
<thead>
<tr>
<th>Elapsed Time in Hours</th>
<th>Number of Bacteria in Sample A</th>
<th>Number of Bacteria in Sample B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1.0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>1.5</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>2.0</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>2.5</td>
<td>32</td>
<td>4</td>
</tr>
<tr>
<td>3.0</td>
<td>64</td>
<td>8</td>
</tr>
<tr>
<td>3.5</td>
<td>128</td>
<td>8</td>
</tr>
<tr>
<td>4.0</td>
<td>256</td>
<td>16</td>
</tr>
<tr>
<td>4.5</td>
<td>512</td>
<td>16</td>
</tr>
<tr>
<td>5.0</td>
<td>1024</td>
<td>32</td>
</tr>
</tbody>
</table>

If the pattern of growth continues, how many bacteria will be in sample B when six hours have elapsed?

(1) 32  
(2) 64  
(3) 1024  
(4) 2048

44 The diagram below represents a graduated cylinder containing water before and after a rock suspended on a string is lowered into it.

![Graduated Cylinder Diagram]

What is the approximate volume of the rock suspended in the graduated cylinder?

(1) 50 mL  
(2) 100 mL  
(3) 250 mL  
(4) 300 mL
45 The data table below shows information gathered from a science experiment. Time was measured in seconds (s) and distance was measured in meters (m).

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>28</td>
</tr>
<tr>
<td>20</td>
<td>46</td>
</tr>
</tbody>
</table>

Which grid is correctly designed to show these data in a line graph?

(1)  
(2)  
(3)  
(4)
Base your answers to questions 46 through 48 on the information below and on your knowledge of science.

A student is setting up an experiment. The student has twenty identical young plants and will try to answer this question: How does the amount of water given to these plants each day affect how tall the plant will grow?

46 State an appropriate hypothesis for this experiment. [1]

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

47 Identify one condition, other than identical young plants, that should be held constant during the experiment. [1]

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

48 Identify one measurement tool needed for this experiment and describe the type of data measured by this tool. [1]

Measurement tool: __________________________________________________________________________

Type of data measured by tool: ____________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Base your answers to questions 49 through 51 on the data table below and on your knowledge of science. The data table shows the average number of Calories needed daily by adult men of different weights, measured in pounds (lb), to maintain a steady weight. All of the men performed moderate levels of physical activity each day.

<table>
<thead>
<tr>
<th>Weight of Adult Men (lb)</th>
<th>Average Number of Calories Needed Daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>132</td>
<td>2250</td>
</tr>
<tr>
<td>154</td>
<td>2450</td>
</tr>
<tr>
<td>176</td>
<td>2650</td>
</tr>
<tr>
<td>198</td>
<td>2850</td>
</tr>
<tr>
<td>220</td>
<td>3050</td>
</tr>
<tr>
<td>242</td>
<td>3250</td>
</tr>
</tbody>
</table>

49 On the graph below, use an X to plot the average number of Calories needed daily for each of the men's weights given on the data table. Connect the Xs with a solid line. [1]
50 Describe the general relationship between the weight of adult men and the average number of Calories needed daily to maintain a steady weight. [1]

51 A 154-lb adult man performs a moderate level of physical activity and regularly consumes 2700 Calories a day. State whether the weight of the man will most likely decrease, increase, or remain the same. Use information from the data table to explain your answer. [1]

The weight of the man will ________________________________

Explanation: ________________________________

52 In guinea pigs, the gene for black fur, B, is dominant over the gene for white fur, b. Complete the Punnett square below to show the results of one possible cross between two guinea pigs with black fur. [1]
53 The diagram below represents the reproduction of a single-celled organism.

![Diagram of asexual reproduction]

Give one piece of evidence from the diagram that indicates that this organism reproduces asexually. [1]

Base your answers to questions 54 and 55 on the diagrams below and on your knowledge of science. The diagrams represent a rabbit and an owl. Rabbits eat only plants and typically feed during the day in open areas such as fields and meadows. Owls eat only rabbits and other small animals and hunt mainly at night.

![Rabbit and Owl diagrams]

54 Identify one physical adaptation represented in the diagram that helps the rabbit survive in its environment. Describe how this adaptation helps the rabbit to survive. [1]

Physical adaptation: 

Description: 

55 Organisms are classified as carnivores, omnivores, producers, or herbivores. Identify the classification of the rabbit and the owl based on how they obtain their food. [1]

Rabbit: 

Owl: 

__________
Base your answers to questions 56 and 57 on the energy pyramid below, which shows feeding relationships between organisms in a section of the Hudson River near Albany, New York. Some specific examples of organisms in the pyramid are provided.

![Energy Pyramid Diagram]

56 Explain why the bottom of the energy pyramid is larger than the top. [1]

57 Explain why invertebrates are placed directly above the phytoplankton in this energy pyramid. [1]

The diagram below represents the formation of a multicellular organism at different stages of early development. The stages are labeled A through E. The sperm and egg are labeled in stage A.

58 Identify the sexual reproductive process that is occurring at stage B. [1]
59 The diagram below represents a magnified cross section of human skin. The skin is an organ in the human excretory system. Two structures in the skin are labeled.

**Human Skin**

Pore

Sweat gland

Describe *one* way the release of sweat allows the skin to function as part of the human excretory system. [1]

Base your answers to questions 60 and 61 on the diagram below and on your knowledge of science. The diagram represents a structure found in the nucleus of a cell. Some genes are represented by dark bands. Other genes are represented by white bands.

**Genetic Material**

60 Identify the name of the structure represented in the diagram that is composed of genes. [1]

61 Genes are composed of hereditary material. Identify this hereditary material. [1]
Base your answers to questions 62 through 64 on the diagram below and on your knowledge of science. The diagram represents a green plant with a flower.

62 Describe one function of the roots.  [1]

63 Identify one plant structure in this diagram that mainly carries out photosynthesis.  [1]

64 Seeds are produced during sexual reproduction. Describe one function of the seeds produced by plants.  [1]
The chart below lists the names of several human diseases and their causes.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>anemia</td>
<td>lack of iron in diet</td>
</tr>
<tr>
<td>athlete’s foot</td>
<td>invading fungus</td>
</tr>
<tr>
<td>botulism</td>
<td>bacteria in uncooked food</td>
</tr>
<tr>
<td>diabetes</td>
<td>malfunctioning pancreas</td>
</tr>
<tr>
<td>hemophilia</td>
<td>inherited trait</td>
</tr>
</tbody>
</table>

Identify two diseases listed on the chart that are the result of damage by infection from another organism. [1]

Base your answers to questions 66 and 67 on the diagram below and on your knowledge of science. The diagram represents the orbits of Earth and Halley’s Comet around the Sun in our solar system. The position of Halley’s Comet in 1986 is represented.

66 State the number of days it takes Earth to complete one orbit around the Sun. [1]

_________________________ days

67 Explain why Halley’s Comet is part of our solar system. [1]

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Base your answers to questions 68 through 70 on the diagrams below and on your knowledge of science. Numbers 1 through 8 on diagram A represent positions of the Moon in its orbit around Earth. Diagram B represents the Moon's phases observed from Earth's Northern Hemisphere when the Moon is at the position shown.

### Diagram A

![Diagram A](image)

### Diagram B

![Diagram B](image)

68 It takes the Moon approximately 30 days to complete one cycle of the phases. Determine the number of days between the First Quarter Moon phase and the Last Quarter Moon phase. \[1\] ________ days

69 Identify one Moon position where an eclipse would most likely occur. \[1\]

Position number: __________

70 Identify another natural cyclic event, other than phases and eclipses, that is caused by the Moon’s gravitational pull on Earth. \[1\]

__________
Base your answers to questions 71 through 73 on the diagram below and on your knowledge of science. The diagram represents four different layers of Earth’s atmosphere above Earth’s surface, measured in kilometers (km). The horizontal dashed lines represent the boundary between each atmospheric layer. The air temperature line represents the relationship between altitude (km) and air temperature measured in degrees Celsius (°C).

71 More than 50% of the gas molecules in Earth’s atmosphere are found in the troposphere layer. Identify the force responsible for pulling these molecules closer to Earth’s surface. [1]

72 The greatest concentration of ozone gas is located at an altitude between 20 and 30 kilometers. Identify the layer of Earth’s atmosphere in which the greatest concentration of ozone gas is located. [1]

73 Calculate the temperature difference from the bottom of the mesosphere to the top of the mesosphere as shown on the air temperature line. [1]

°C
Base your answers to questions 74 and 75 on the table below and on your knowledge of science. The table shows Mohs hardness scale, which is commonly used to identify minerals. The softest mineral, talc, has a value of 1. The hardest mineral, diamond, has a value of 10. The approximate hardresses of some common objects are listed next to Mohs scale.

<table>
<thead>
<tr>
<th>Mohs Hardness Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral</td>
</tr>
<tr>
<td>Talc</td>
</tr>
<tr>
<td>Gypsum</td>
</tr>
<tr>
<td>Calcite</td>
</tr>
<tr>
<td>Fluorite</td>
</tr>
<tr>
<td>Apatite</td>
</tr>
<tr>
<td>Feldspar</td>
</tr>
<tr>
<td>Quartz</td>
</tr>
<tr>
<td>Topaz</td>
</tr>
<tr>
<td>Corundum</td>
</tr>
<tr>
<td>Diamond</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardness of Common Objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fingernail (2.5)</td>
</tr>
<tr>
<td>Iron nail (4.5)</td>
</tr>
<tr>
<td>Glass (5.5)</td>
</tr>
<tr>
<td>Steel file (6.5)</td>
</tr>
</tbody>
</table>

74 Identify one mineral on Mohs hardness scale that would be soft enough for an iron nail to scratch. [1]

75 Explain why the property of hardness is usually better to use to identify a mineral instead of the color of the mineral. [1]
Base your answers to questions 76 and 77 on the diagram below and on your knowledge of science. The diagram represents a cross section of exposed rock layers A through F that contain fossils. The rock layers have not been overturned.

76 Identify the letter of the layer that contains the oldest fossil. Explain why you selected that layer. [1]

Layer: ________________________________

Explanation: ________________________________

______________________________

77 Explain why the study of fossils is important to scientists. [1]

______________________________

______________________________

78 Describe the best method for separating small pieces of iron from a mixture of sand and iron when the particles of sand and iron are identical in size. [1]

______________________________
Base your answers to questions 79 and 80 on the chart below and on your knowledge of science. The chart shows the Enhanced Fujita Scale, which is used to measure the strength of a tornado.

### Enhanced Fujita Scale

<table>
<thead>
<tr>
<th>Rating</th>
<th>Estimated Wind Speeds in Miles per Hour</th>
<th>Typical Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF0</td>
<td>65–85</td>
<td>• branches broken</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• chimneys damaged</td>
</tr>
<tr>
<td>EF1</td>
<td>86–110</td>
<td>• cars pushed off roads</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• shingles torn from roofs</td>
</tr>
<tr>
<td>EF2</td>
<td>111–135</td>
<td>• roofs torn from some buildings</td>
</tr>
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<td></td>
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<td>• some trees torn from ground or split</td>
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<tr>
<td>EF3</td>
<td>136–165</td>
<td>• walls and roofs torn from buildings</td>
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<tr>
<td></td>
<td></td>
<td>• most trees uprooted</td>
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<tr>
<td>EF4</td>
<td>166–200</td>
<td>• cars thrown</td>
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<td>• houses collapsed</td>
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<tr>
<td>EF5</td>
<td>200+</td>
<td>• houses collapsed and torn from foundations</td>
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<td></td>
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<td>• reinforced-concrete buildings damaged</td>
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79 The wind speed of a tornado was estimated to be 100 miles per hour. Identify its rating on the Enhanced Fujita Scale and describe one type of damage that most likely occurred. [1]

Rating: ________________

Type of damage: __________________________________________

80 Describe one action that residents of an area should take when a tornado is approaching. [1]

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________
Base your answers to questions 81 through 83 on the information and map below, and on your knowledge of science. The map shows the location of Mount Pinatubo, a volcano in the Philippines. The dark area represents the direction and location of the volcanic ash that spread out over the next several months following its eruption.

Mount Pinatubo in the Philippines erupted in 1991. During the eruption, ash particles were spread high into the atmosphere, and eventually circled the globe. The ash particles produced pollution that affected the climate and human health. Over time, the particles blocked some of the Sun's energy from reaching Earth.

81 Describe the effect the ash cloud had on Earth's global temperatures. [1]

82 Identify the general compass direction in which the volcanic ash traveled away from Mount Pinatubo. [1]

83 Based on the Theory of Plate Tectonics, where are most volcanoes, like Mount Pinatubo, found? [1]
Base your answers to questions 84 and 85 on the diagram below and on your knowledge of science. The diagram represents a model of six particles of a substance. The substance is in a solid phase and has been placed in a closed container.

84 Use the empty closed-container below to draw a model of these six particles as they would look when the substance is in the gas phase. [1]

85 List the three phases of matter in order from the greatest attractive forces between particles to the least attractive forces between particles. [1]
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