Ohio Achievement Test
Grade 5 Science

May 2007

Answer Key
and
Scoring Guidelines

Grade 5 Science
Answer Key
May 2007

Item No.	Type	Content Standard	Content Standard Benchmark	Key
1	Multiple Choice	Physical Sciences	F	A
2	Multiple Choice	Life Sciences	C	A
3	Multiple Choice	Life Sciences	C	B
4	Multiple Choice	Life Sciences	B	D
5	Multiple Choice	Life Sciences	A	D
6	Extended Response	Earth and Space Sciences	B	E
7	Multiple Choice	Earth and Space Sciences	A	C
8	Multiple Choice	Scientific Processes	B	B
9	Multiple Choice	Physical Sciences	A	B
10	Multiple Choice	Physical Sciences	B	C
11	Extended Response	Scientific Processes	A	E
12	Multiple Choice	Physical Sciences	C	B
13	Multiple Choice	Physical Sciences	D	C
14	Multiple Choice	Life Sciences	A	B
15	Multiple Choice	Earth and Space Sciences	A	B
16	Short Answer	Scientific Processes	C	S
17 – 22	**Field test questions not used in student score**			
23	Multiple Choice	Earth and Space Sciences	A	C
24	Multiple Choice	Life Sciences	C	B
25	Multiple Choice	Physical Sciences	B	C
26	Multiple Choice	Scientific Processes	A	D
27	Short Answer	Physical Sciences	F	S
28	Multiple Choice	Physical Sciences	F	D
29	Multiple Choice	Scientific Processes	C	A
30	Multiple Choice	Scientific Processes	C	C
31	Multiple Choice	Scientific Processes	B	C
32	Short Answer	Scientific Processes	C	S
33	Multiple Choice	Physical Sciences	E	C
34	Multiple Choice	Earth and Space Sciences	A	C
35	Multiple Choice	Physical Sciences	C	B
36	Multiple Choice	Life Sciences	A	B
37	Multiple Choice	Scientific Processes	A	D
38	Short Answer	Life Sciences	C	S
39	Multiple Choice	Earth and Space Sciences	D	B
40	Multiple Choice	Earth and Space Sciences	A	B
41	Multiple Choice	Earth and Space Sciences	C	D
42	Multiple Choice	Earth and Space Sciences	C	A
43	Multiple Choice	Earth and Space Sciences	B	C
44	Multiple Choice	Life Sciences	C	A

Limited = 0-12; Basic = 13-23; Proficient = 24-29; Accelerated = 30-37; Advanced = 38-48
Multiple Choice = 1 point; Short Answer = 2 points; Extended Response = 4 points

6. The picture shows a stream flowing through a desert canyon. The canyon was shaped by natural processes.

In your **Answer Document**, identify a slow process that could have helped shape the canyon. Describe evidence of this process shown in the picture.

Then, identify a rapid process that could have helped shape the canyon. Describe evidence of this process shown in the picture. (**4 points**)

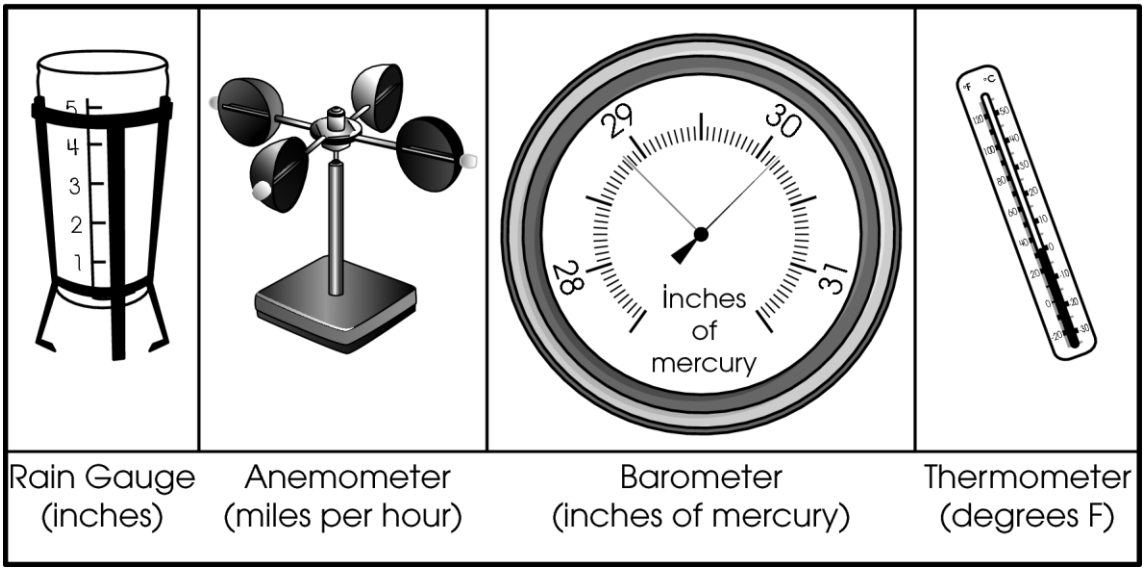
Scoring Guidelines

Points	Student Response
4 point	The response provides the correct identification of one slow process **AND** one rapid process that have shaped the canyon **AND** a correct description of evidence from the picture of the action of both processes. **Exemplar Response:** One slow natural process is the constant erosion of the canyon by water and wind. Evidence of this process is the exposed face of the canyon wall. One rapid process is the landslide. The evidence for the landslide is the large rocks along the bottom of the cliffs. **Sample Response:** Acceptable slow processes include: • Erosion, exposed rock layers on cliff faces or canyon walls. • Erosion, evidenced by sand deposited along the river. • Weathering of rocks (by wind or water), evidenced by rocks breaking down to smaller rocks. This could be interpreted from the pebbles and sand at the bottom of the slopes. • Wind, evidenced by rounded off edges of canyon surface. Acceptable fast processes include: • Landslides (mudslides, rockslides) evidenced by large rocks at the bottom of the cliff. • Volcanic eruptions evidenced by the dark layers which could indicate a volcanic ash. • Earthquake could have caused the rocks to fall off the cliffs. Seasonal floods, which may have altered the river as evidenced by deposition or large rocks at the base of the cliffs.
3 point	The response provides the correct identification of one slow process **AND** one rapid process that have shaped the canyon **AND** a correct description of evidence from the picture of the action of one of the processes. **Sample Response**: There was a landslide, which was a fast process. The large rocks at the bottom of the cliffs are evidence that a landslide occurred. Erosion caused by the river was a slow process.
2 point	The response provides the correct identification of one slow process and one rapid process that have shaped the canyon **OR** a correct identification of one process and a correct description of evidence from the picture of the action of this process. **Sample Response**: The landslide was a fast process. You can tell a landslide occurred because of the pile of boulders at the base of the cliff.

1 point	The response provides the correct identification of one slow process **OR** one rapid process that have shaped the canyon. **Sample Response**: A slow process is erosion as evidenced by the canyon walls.
0 point	The response fails to demonstrate any understanding of the processes that formed the canyon. The response does not meet the criteria required to earn one point. The response indicates inadequate or no understanding of the task and/or the idea or concept needed to answer the item. It may only repeat information given in the test item. The response may provide an incorrect solution/response and the provided supportive information may be very irrelevant to the item, or possibly, no other information is shown. The student may have written on a different topic or written, “I don't know.” **Sample Response**: The canyon with its many layers was shaped by natural processes.

11. Students plan to set up a simple weather station. They have the tools shown to collect weather data.

Weather Tools



In your **Answer Document**, describe where two of these tools should be located to obtain accurate measures.

Explain why each location is important. (**4 points**)

Scoring Guidelines

Points	Student Response
4 point	The response provides correct descriptions of where two instruments must be located to collect weather data **AND** explains why each location is important to accurately collect weather data. **Exemplar Response:** The anemometer works when wind blows into the cups. It needs to be outside, on a pole or on top of the building where wind can hit it. The rain gauge collects rain water. It must be placed outside in the open where rain can reach it. **Sample Response:** **Anemometer**: An anemometer must be placed outside where the wind can reach it. Accurate measurements depend upon placement of the anemometer in the open; an anemometer must be placed away from buildings and trees that could block the wind. **Barometer**: A barometer can be used inside or outside buildings. Having the instrument in the classroom makes it easy for students to read. **Rain gauge**: A rain gauge must be placed outside so that it can collect rainwater as it falls. In order to get an accurate measurement it must be placed away from buildings or anything else that would prevent the rain from falling into the gauge. **Thermometer**: Thermometers are placed outside to measure temperature for weather. They need

	to be placed where the sun does not shine directly on them because this would result in higher than actual temperature readings.
3 point	The response provides correct descriptions of where two instruments must be located to collect weather data and explains why the location is important for the accurate collection of data by one of the instruments **OR** a correct description of where one instrument must be located to collect weather data and explains why the location is important for the accurate collection of data by two of the instruments. **Sample Response**: The rain gauge collects rain water so it must be placed outside. The thermometer needs to be placed outside, but away from places that are always in the deep shade or direct sun. Placing the thermometer in the sun would make it record a higher than actual temperature.
2 point	The response provides correct descriptions of where two instruments must be located to collect weather data **OR** explains why the location of two instruments is important to accurately collect weather data (without providing descriptions of the actual locations) **OR** a correct description of where one instrument must be located to collect weather data and explains why the location is important for the accurate collection of data by the instrument. **Sample Response**: The rain gauge collects rain water so needs to be placed outside away from buildings where it receives direct rain fall.
1 point	The response provides a correct description of where one instrument must be located to collect weather data **OR** explains why the instrument's location is important to accurately collect weather data. **Sample Response**: An anemometer must be placed outside in the open. **OR** The rain gauge must be placed outside away from buildings or trees.
0 point	The response fails to demonstrate any understanding of the importance of location for a weather tool to accurately collect data. The response does not meet the criteria required to earn one point. The response indicates inadequate or no understanding of the task and/or the idea or concept needed to answer the item. It may only repeat information given in the test item. The response may provide an incorrect solution/response and the provided supportive information may be very irrelevant to the item, or possibly, no other information is shown. The student may have written on a different topic or written, “I don't know.” **Sample Response**: A rain gauge is used to measure rainfall.

16. A teacher demonstrates how ice changes states. Two students record how long it takes for ice to change to steam, as shown.

3, 10, 27, 45, 57, 100

Student 1

Time (minutes)	Temperature (°C)
1	3
2	10
3	27
4	45
5	57
6	100

Student 2

In your **Answer Document**, explain why student 2's record is more understandable than student 1's record.

Then, explain why accurate and understandable records are important. (**2 points**)

Scoring Guidelines

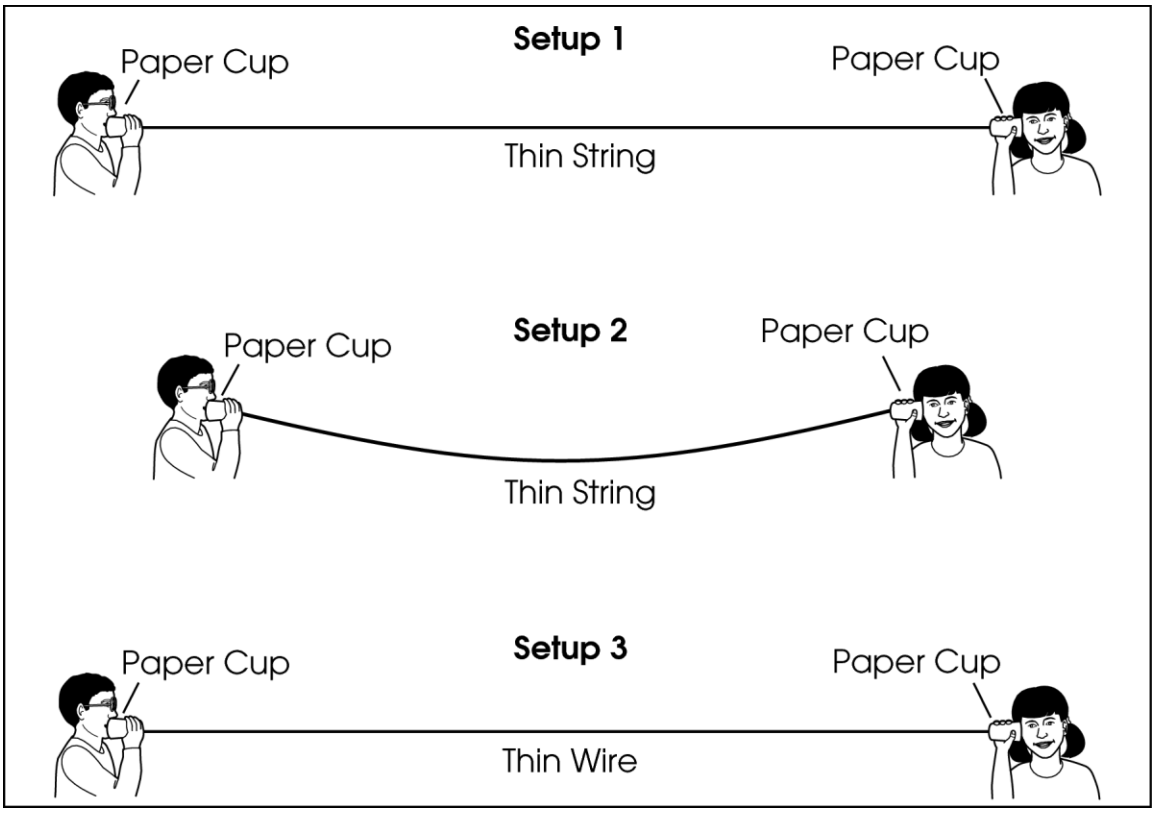
Points	Student Response
2 point	The response provides an explanation of why student 1's records are not as easy to understand as are the records kept by student 2 or an explanation of why the records kept by student 2 are easier to understand **AND** provides an explanation of the importance of recording data in an accurate and understandable manner. **Exemplar Response:** Student 1 only wrote down numbers. There is no way to know what the numbers mean. You have to have good records so you can describe the observations and measurements made during the experiment. **Sample Response:** Possible explanations of why student 1's records are not as easy to understand/are not as informative as the records kept by student 2: • Student 1 only wrote down the numbers and without the units there is no way to know what the numbers mean. • Student 1 did not record the scale used for temperature. • Student 1 did not state the times when the temperatures were taken. • Recording temperature without recording the times does not communicate the rate at which the temperature changed. Possible explanations of why understandable records are important: • Students need understandable data so that they can compare observations and measurements, make conclusions, or replicate the experiment. Without labels, students may not understand what the numbers mean when they look at them on another day.

1 point	The response provides an explanation of why student 1's records are not as easy to understand as are the records kept by student 2 **OR** an explanation of why the records kept by student 2 are easier to understand **OR** provides an explanation of the importance of recording data in an accurate and understandable manner. **Sample Response**: Without labels, students may not understand what the numbers mean when they look at them on another day.
0 point	The response fails to demonstrate any understanding of the importance of keeping accurate and understandable records. The response does not meet the criteria required to earn one point. The response indicates inadequate or no understanding of the task and/or the idea or concept needed to answer the item. It may only repeat information given in the test item. The response may provide an incorrect solution/response and the provided supportive information may be very irrelevant to the item, or possibly, no other information is shown. The student may have written on a different topic or written, “I don't know.” **Sample Response**: It is important to keep accurate and understandable records. Student 2 kept more understandable records than student 1.

Model Telephone

Two students want to find out what affects the sounds heard through model telephones. They investigate the materials used and the tightness of the material connecting the cups.

Their first three setups are shown. They use the same length of string or wire in each setup. The boy repeats the same sounds at the same volume for each setup.



They record results of the three setups in the table below.

Model Telephone Investigation

Setup	Description of Sound Heard
1	Sound is Muffled
2	No Sound is Heard
3	Sound is Clear

27. Look at the picture and the table for the Model Telephone Investigation.

In your **Answer Document**, explain why the sound was heard in setup 1.

Then, describe what happened to the sound energy in setup 2. (**2 points**)

Scoring Guidelines

Points	Student Response
2 point	The response shows an understanding of how sound travels by explaining that "sound waves" moving or the "vibrating" string transferring the sound in Set-up 1 but not in Set-up 2 **AND** provides a description of how the sound energy was absorbed by the loose string in Set-up 2. **Exemplar Response:** The sound was heard in Set-up 1 because the string was tight and vibrated. The string was loose in Set-up 2. Sound energy was absorbed by the string in Set-up 2 because it couldn't vibrate. **Sample Response:** Acceptable explanations of why the sound was heard in setup 1: • The sound was heard in Set-up 1 because the string was tight and vibrated. • The string was stretched tight in Set-up 1, but not in Set-up 2. The string must be tight enough to vibrate in order to transmit sound. • Sound waves could travel on the tight string in Set-up 1. Acceptable descriptions of what happened to the sound energy in setup 2: • The string was loose in Set-up 2. Sound energy was absorbed by the string in Set-up 2 because it couldn't vibrate. • The sound energy was absorbed by the loose line in Set-up 2. The string in Set-up 2 was too loose to vibrate and carry the sound waves.
1 point	The response explains why sound was transmitted in Set-up 1 but not in Set-up 2. **OR** The response explains what happened to the sound energy in Set-up 2. **Sample Response**: The sound was heard in Set-up 1 because the string was tight and vibrated, so the sound was transferred.
0 point	Response does not demonstrate any understanding that sound is transmitted by vibrations. The response does not meet the criteria required to earn one point. The response indicates inadequate or no understanding of the task and/or the idea or concept needed to answer the item. It may only repeat information given in the test item. The response may provide an incorrect solution/response and the provided supportive information may be very irrelevant to the item, or possibly, no other information is shown. The student may have written on a different topic or written, "I don't know." **Sample Response**: Sound was heard in Set-up 1 but not in Set-up 2.

32. Students study how water changes from liquid to gas. These are the steps in the class investigation.

Materials: electric heating coil, beaker and thermometer

Procedure:

1. Pour one liter of water into the beaker.
2. Place the thermometer in the water.
3. Record the temperature of the water.
4. Place the beaker on the heating coil.
5. Turn on the heating coil.
6. Record the temperature of the water every minute for 10 minutes.

In your **Answer Document**, identify one possible safety hazard in this investigation.

Also describe one way to make sure this is a safe investigation. (**2 points**)

Scoring Guidelines

Points	Student Response
2 point	The intent of this item is for students to identify a potential safety hazard and describe one way to make sure that the investigation is safe. The response provides the identification of a potential safety hazard **AND** a description of one way to make sure the experiment is safe. **Exemplar Response:** Heating coil can burn skin. Keep a safe distance from the heating coil. **Sample Response:** • Experiment could be set up incorrectly. Have the teacher check the set-up first. • Use potholders or kitchen gloves to avoid being burned. • Keep glass beakers away from the edge to avoid being knocked over and broken. This will prevent cuts. • To avoid being shocked stay away from wet surfaces and dry hands before plugging things in to sockets. • Keep thermometers from touching the bottom of the beaker during heating so that the thermometer does not break. • Heating coil can burn skin. Let the teacher conduct the investigation. When reading the thermometer while the beaker is on the heating coil, use a thermometer with large numbers so that they can be read from a distance. Do not touch the thermometer while the beaker is on the heating coil.
1 point	The response provides the identification of a potential safety hazard **OR** a description of one way to make sure the investigation is safe without describing the associated safety hazard. **Sample Response**: The students may get burned.

0 point	The response fails to demonstrate any understanding of the safety hazards involved in the investigation. The response does not meet the criteria required to earn one point. The response indicates inadequate or no understanding of the task and/or the idea or concept needed to answer the item. It may only repeat information given in the test item. The response may provide an incorrect solution/response and the provided supportive information may be very irrelevant to the item, or possibly, no other information is shown. The student may have written on a different topic or written, “I don't know.” **Sample Response**: The students are conducting an investigation.

38. In your **Answer Document**, describe two ways that a forest fire would affect the black bear. (**2 points**)

Scoring Guidelines

Points	Student Response
2 point	The response provides correct descriptions of two ways a forest fire would affect the black bear's survival in its habitat. **Exemplar Response:** The black bear would have less food to eat because the small animals would have run away. The bear would have to move to another part of the forest because his home is burned. **Sample Response**: • Acceptable affects of the fire on the black bear include: • The black bear would have less food to eat because the small animals would have run away. • The bear would move to another part of the forest because its home/habitat/area where it lives is burned. The fire would burn plants that are a food source.
1 point	The response provides a correct description of one way a forest fire would affect the black bear's survival in its habitat. **Sample Response**: The bear could get caught in the fire and die.
0 point	The response fails to demonstrate any understanding of how a forest fire could affect a black bear. The response does not meet the criteria required to earn one point. The response indicates inadequate or no understanding of the task and/or the idea or concept needed to answer the item. It may only repeat information given in the test item. The response may provide an incorrect solution/response and the provided supportive information may be very irrelevant to the item, or possibly, no other information is shown. The student may have written on a different topic or written, "I don't know." **Sample Response**: A fire burns the forest and affects the black bear.