Third Grade "Light and Optics" Assessment

1a. Light travels at an amazingly high speed. How fast does it travel?
   a. 186,000 miles per second
   b. 186,000 miles per hour

1b. Light travels at an amazingly high speed. How fast does it travel?
_____

1c. Describe the speed of light.
_____
_____
_____
_____

2a. How does light travel?
   a. around corners
   b. in straight lines

2b. Light travels in _____. When it hits an object, a _____ forms on the other side of the object where the light has been blocked.
   a. sections; shadow
   b. straight lines; gap
   c. straight lines; shadow
   d. sections; gap

2c. Explain what happens when light hits an object like a wall.
_____
_____
_____

3a. Light is allowed to pass right through _____objects, while NO light is allowed to pass through _____ objects.
   a. transparent; opaque
   b. opaque; transparent

3b. Light is allowed to pass right through _____objects, while NO light is allowed to pass through _____ objects.

3c. Explain what happens when light hits a clear window and a wooden door.
_____
_____
_____

4a. For the following list of objects, mark T if an object is transparent (allowing light to pass through) and mark O if an object is opaque (allowing NO light to pass through):

_____clear window _____book
_____piece of wood _____glass of water
_____desk _____piece of aluminum foil

4b. For the following list of objects, mark T if an object is transparent and mark O if an object is opaque:

_____clear window _____book
_____piece of wood _____glass of water
_____desk _____piece of aluminum foil

4c. Define “transparent” and “opaque” and give three examples of each.

_____
_____
_____

5a. A bouncing of light off a surface is called _____.

a. refraction
b. reflection

5b. A bouncing of light off a surface is called _____.

5c. Explain what happens when light hits a book.

_____
_____
_____

6a. When light rays hit a mirror, the light _____off the mirror and reflects back the image standing in front of it.

a. bends
b. bounces

6b. When light rays hit a mirror, the light _____off the mirror and reflects back the image standing in front of the mirror.

a. bends
b. bounces
c. skims
d. waxes

6c. Explain what happens when you see yourself in a mirror.

_____
_____
_____

7a. A plane mirror is _____, while both a concave mirror and a convex mirror are _____.
a. flat; curved
b. curved; flat

7b. Name three types of mirrors:
1. _____
2. _____
3. _____

7c. Describe how a plane mirror differs from a convex or a concave mirror.
_____
_____
_____

8a. Mirrors are used for reflection in instruments such as _____and _____.
a. stethoscopes; thermometers
b. telescopes; microscopes

8b. Mirrors are used for reflection in instruments such as _____and _____.
a. stethoscopes; thermometers
b. telescopes; stethoscopes
c. stethoscopes; microscopes
d. telescopes; microscopes

8c. Name two instruments in which mirrors are used for reflection.
_____
_____

9a. A glass triangle that separates light into a band of colors is called a _____.
a. prism
b. spectrum

9b. A glass triangle that separates light into a band of colors is called a _____.

9c. Explain what happens to light when it travels through a prism.
_____
_____
_____

10a. A _____ is the name given to the band of colors made when light passes through a prism.
a. rainbow
b. spectrum

10b. A _____ is the name given to the band of colors made when light passes through a prism.

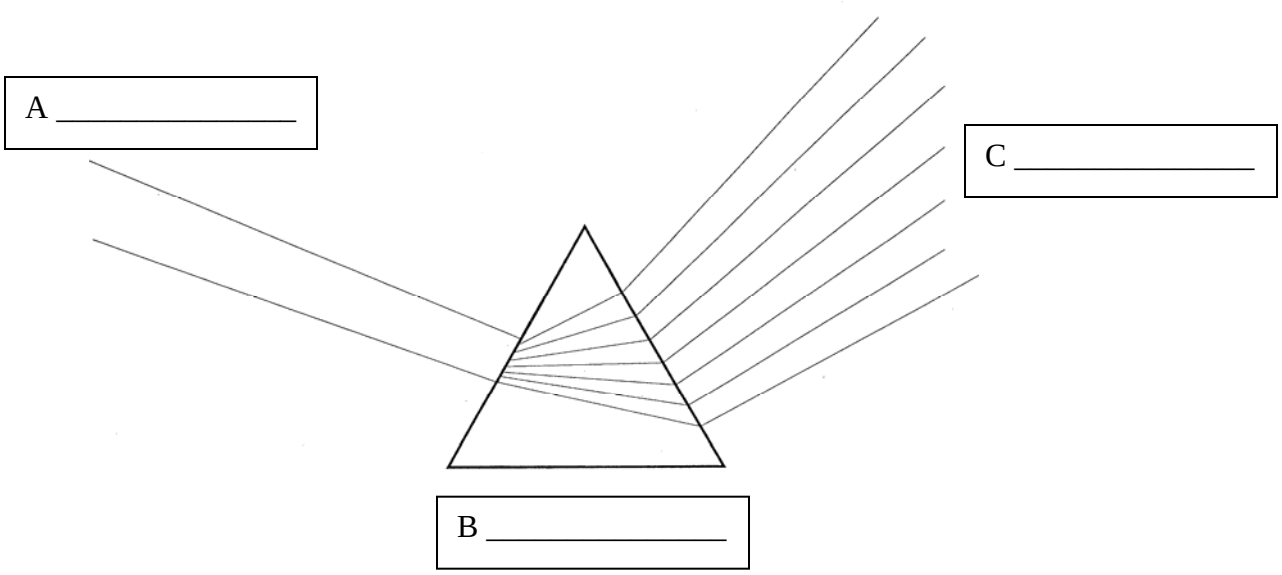
10c. Explain what a spectrum is and how it is created.

_____

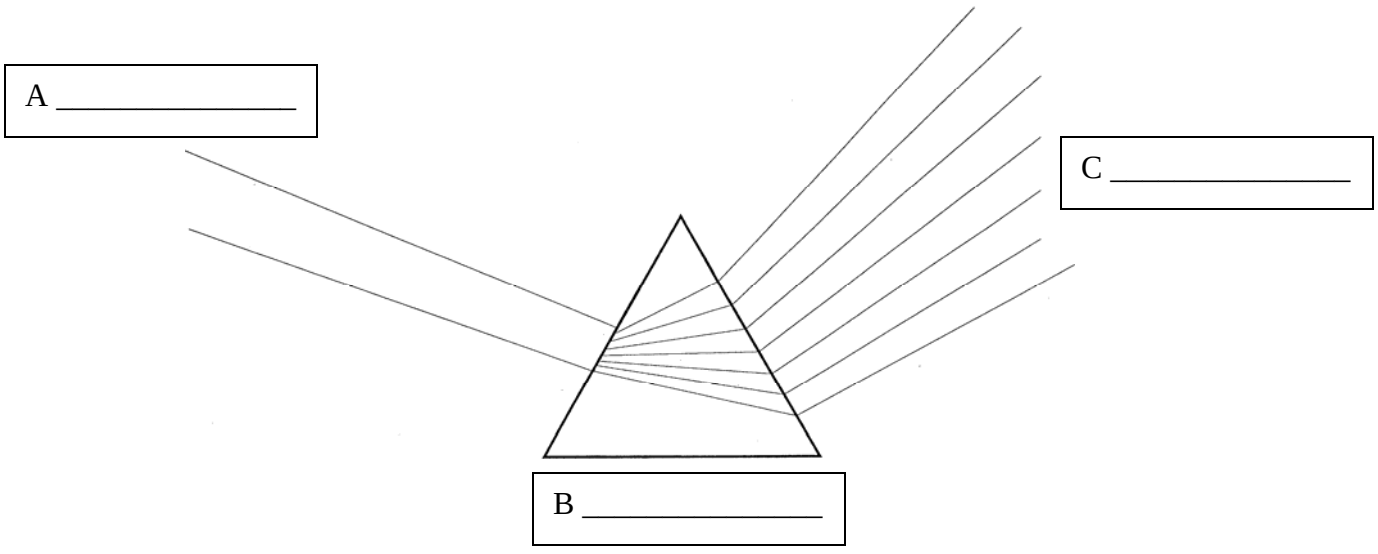
_____

_____

11a. Use the following terms to label the drawing at points A, B, and C: white light, spectrum, prism. Use correct spelling.



11b. Label the following drawing of the colors of light at points A, B, and C:



11c. Draw, color, and label a picture of the colors of light. Include the following terms: prism, spectrum, white light

12a. When light travels through a lens it _____.
a. breaks up
b. bends

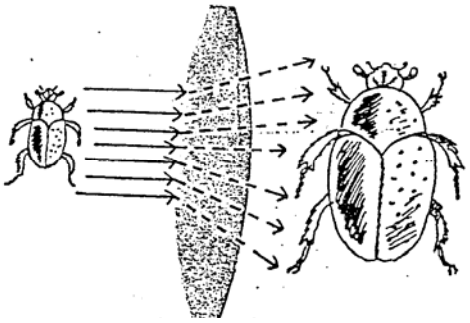
12b. When light travels through a lens it _____.

12c. Explain how light is affected when it travels through a lens.
_____
_____
_____

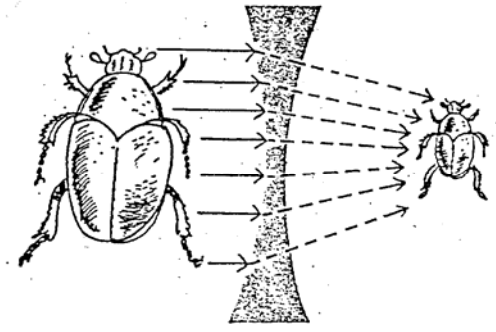
13a. Lenses change the way things look. Images look smaller than they really are through a _____ lens. Images are magnified, or look larger, through a _____ lens.
a. convex; concave
b. concave; convex

13b. Lenses change the way things look. Images look smaller than they really are through a _____ lens. Images are magnified, or look larger, through a _____ lens.

13c. Label the following lenses. Explain what happens through each lens.



_____



_____

_____
_____
_____

14a. Check the instruments below in which lenses play an important part:
_____ magnifying glass
_____ camera
_____ stethoscope
_____ telescope
_____ binoculars
_____ microscope

14b. List three instruments (not musical) in which lenses play an important part.
1. _____
2. _____
3. _____

14c. From the following list choose one instrument and explain what happens through the lens in the instrument: magnifying glass, camera, microscope, telescope, binoculars.
_____
_____
_____

The following Colorado Model Content Standards are covered in this assessment by the questions indicated:

Questions 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 9a, 9b, 9c, 10a, 10b, 10c, 12a, 12b, 12c, 13a, 13b, 13c: Standard K-4.1.a asking questions and stating predictions (hypotheses) that can be addressed through scientific investigation

Questions 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 9a, 9b, 9c, 10a, 10b, 10c, 12a, 12b, 12c, 13a, 13b, 13c: Standard K-4.1.b selecting and using simple devices to gather data related to an investigation *(for example, length, volume, and mass measuring instruments, thermometers, watches, magnifiers, microscopes, calculators, and computers)*

Questions 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 9a, 9b, 9c, 10a, 10b, 10c, 12a, 12b, 12c, 13a, 13b, 13c: Standard K-4.1.c using data based on observations to construct a reasonable explanation

Questions 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 9a, 9b, 9c, 10a, 10b, 10c, 12a, 12b, 12c, 13a, 13b, 13c: Standard K-4.1.d communicating about investigations and explanations

Questions 3a, 3b, 3c, 4a, 4b, 4c, 6a, 6b, 6c, 7a, 7b, 7c, 9a, 9b, 9c, 10a, 10b, 10c, 12a, 12b, 12c, 13a, 13b, 13c: Standard K-4.2.1.a examining, describing, classifying, and comparing tangible objects in terms of common physical properties *(fir example, state of matter, size, shape, texture, flexibility, color)*

Questions 1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 8a, 8b, 8c:

Standard K-4.2.2.a recognizing that energy *(for example, light, heat, motion, sound, mechanical)* can affect common objects and is involved in common events

Questions 13a, 13b, 13c: Standard K-4.2.2.b making observations and gathering data on quantities associated with energy, movement, and change *(for example, distances for a bean-launcher, time for a melting ice cube)*

Questions 8a, 8b, 8c, 11a, 11b, 11c, 13a, 13b, 13c, 14a, 14b, 14c: Standard K-4.2.2.c Comparing quantities associated with energy movement and change by constructing simple diagrams or charts *(for example, graph of launch distances, chart of melting time)*

Questions 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 7a, 7b, 7c, 9a, 9b, 9c, 10a, 10b, 10c, 12a, 12b, 12c, 13a, 13b, 13c: Standard K-4.2.3.a observing and describing parts of system *(for example, water in a closed jar, water in an open jar, a plant terrarium)*

Answer Key

1a. a. 186,000 miles per second
1b. 186,000 miles per second
1c. Acceptable answers could include:
-amazingly high speed
-186,000 miles per second
-travels through space in a vacuum
-travels faster than sound

2a. b. in straight lines
2b. c. straight lines; shadow
2c. Acceptable answers could include:
-light travels in straight lines
-light cannot bend
-when light hits an object a shadow forms on the other side of the object

3a. a. transparent; opaque
3b. transparent; opaque
3c. Acceptable answers could include:
-clear window-the window is transparent so light can pass right through it
-wooden door-the door is opaque so light cannot pass through it; a shadow is formed on the other side of the door

4a. clear window-T
piece of wood-O
desk-O
book-O
glass of water-T
piece of aluminum foil-O
4b. Same answers as 4a
4c. transparent-allows light to pass right through (examples will vary)
opaque-allows NO light to pass through (examples will vary)

5a. b. reflection
5b. reflection
5c. Acceptable answers could include:
-light comes from sun or light bulb
-when it hits the book it bounces back or is reflected back
-enters our eyes and we end up being able to see

6a. b. bounces
6b. b. bounces
6c. Acceptable answers could include:
-as you stand in front of a mirror the light rays hit the mirror and bounce back, reflecting your image to you

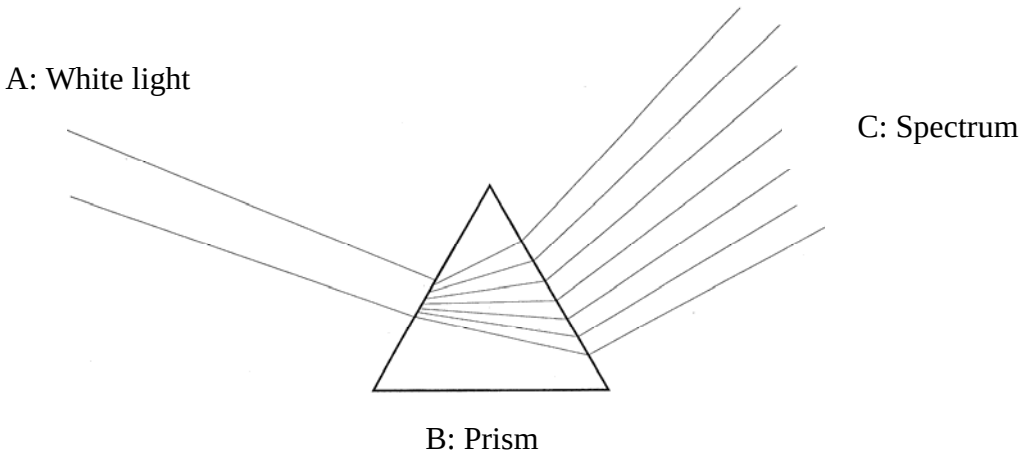
7a. a. flat; curved
7b. In any order: plane, convex, concave
7c. plane mirror-flat
convex and concave mirrors-curved

8a. b. telescopes; microscopes
8b. d. telescopes; microscopes
8c. In any order: microscopes, telescopes

9a. a. prism
9b. prism
9c. Acceptable answers could include:
-the prism separates the light into bands of color
-Roy G. Biv is the acronym for the order of colors in the band: red, orange, yellow, green, blue, indigo, violet

10a. b. spectrum
10b. spectrum
10c. Acceptable answers could include:
-spectrum-the band of colors made when light passes through a prism

11a.

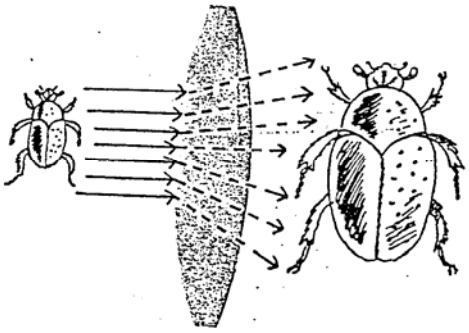


11b. See 11a
11c. See 11a

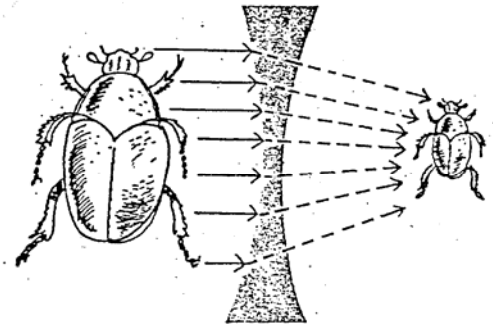
12a. b. bends
12b. bends
12c. Acceptable answers could include:
-light bends

13a. b. concave; convex
13b. concave; convex

13c.



Convex Lens



Concave Lens

Acceptable answers could include:
-concave-lens through which images look smaller than they really are
-convex-lens through which images look larger than they really are

14a. The only one NOT checked is stethoscope

14b. Any three of the following is acceptable: magnifying glass, camera, microscope, telescope, binoculars

14c. Acceptable answers could include:
-magnifying glasses and microscopes make things look larger
-telescopes, binoculars, and cameras make things look smaller