

## Unit Review Answers (Student textbook pages 362–364)

### Connect to the Big Ideas

1. Answers may vary. Technologies that make use of light: Communications technologies make use of light transmitted through optical cables to carry information; photography is based on capture of images in permanent or semi-permanent form.

Technologies that make use of colour: Televisions use colour sources to produce images on an attached screen; movie projectors combine different coloured light to produce images on a distant screen.

2. Students should include a diagram to illustrate each situation.

a) when white light strikes a lemon, yellow light is reflected and the remaining colours are absorbed.

b) When light strikes a flat mirror, it will reflect at an angle equal to the angle of incidence.

c) When light strikes a concave mirror, it will reflect through the focus.

d) When light strikes a clear glass window, some light will reflect like a mirror, some light will be transmitted, and some light will be absorbed.

e) When light strikes a red brick wall, the red light will reflect off the bricks. The remaining colours of light will be absorbed.

f) The light will refract, or bend, toward the normal.

3. Answers will vary, perhaps including some of the following:

a) Five human-made sources of light:

i) Incandescent light bulb

ii) Glow stick

iii) Computer screen

iv) Television screen

v) Movie projector

b) i) Incandescent Light bulb—converts electrical energy to heat energy to light

ii) Glow stick—converts chemical energy into light

iii) Computer screen—converts electrical energy into light

iv) Television screen—converts electrical energy into light

v) Movie projector—converts electrical energy to heat energy to light

### Knowledge and Understanding

4. a) F. An opaque material lets no light through, and no image is visible.

b) F. A convex mirror causes light rays to diverge.

c) T

d) F. A luminescent light source does not produce light because it is hot.

e) T

f) F. Concave mirrors never form images that are upright, virtual, and smaller than the object.

g) T

h) T

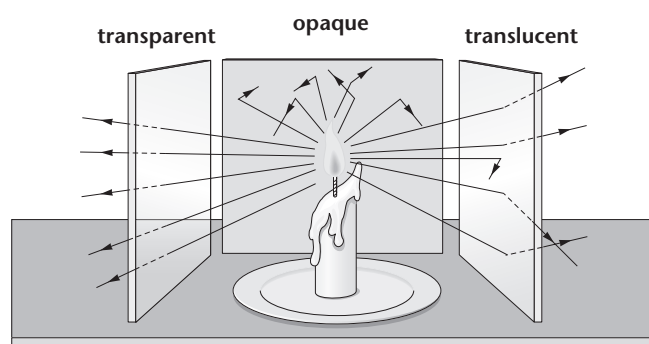
5. a) microwaves—wavelengths longer than visible light

b) X rays—wavelengths shorter than visible light

c) infrared—wavelengths longer than visible light

d) ultraviolet—wavelengths shorter than visible light

6. Diagrams should be similar to the following:



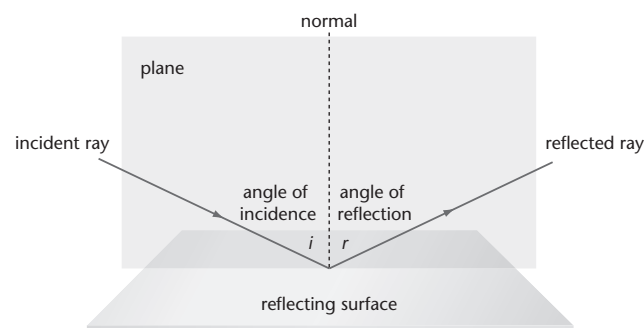
7. a) Green light and blue light combine to produce cyan coloured light.

b) Cyan is the additive secondary colour.

8. Answers may vary. Subtractive primary colours are used by colour printers.

9. Leaves are green because they absorb red and blue, but reflect green light.

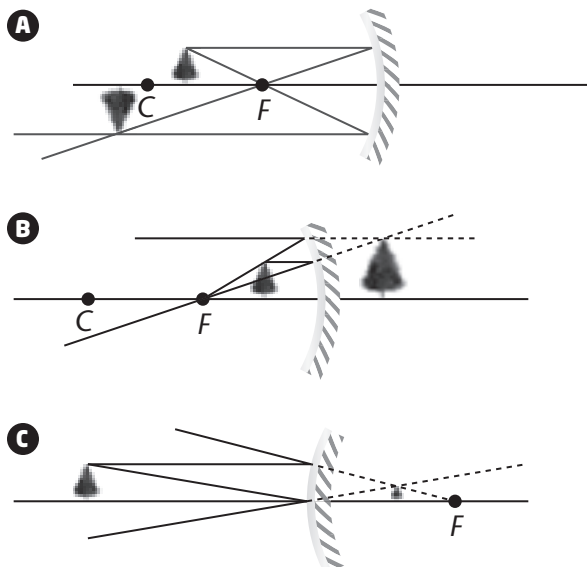
10. a)



b) The angle of incidence is equal to the angle of reflection, as measured from the normal, and all three lines occur on the same plane (or flat surface). The angle of reflection is on the opposite side of the normal from the angle of incidence.

11. Make-up and shaving mirrors are commonly concave mirrors, which produce large upright images for objects less than one focal length from the mirror.

12. a), d)



b) Concave mirrors form upright images when the object is between  $F$  and the mirror, and inverted images when the object is farther from the mirror than  $F$ .

c) Images in convex mirrors are virtual, upright, smaller than the object, and closer to the mirror.

13. When light travels from a medium with a faster speed of light to a medium with a slower speed of light, it refracts toward the normal.

14. Converging lenses refract rays of light toward a focus; diverging lenses refract rays of light so that they spread out as if they originated from a focus on the opposite side of the lens.

15. Place the eraser between  $F$  and  $2F$ .

### Thinking and Investigation

16. The disk will appear blue.

17. Diagrams should show red and green light pass through the yellow filter while blue light is absorbed. Red light passes through the magenta filter while green light is absorbed. Red will appear on the screen.

18. The camera should be focussed at 2 m.

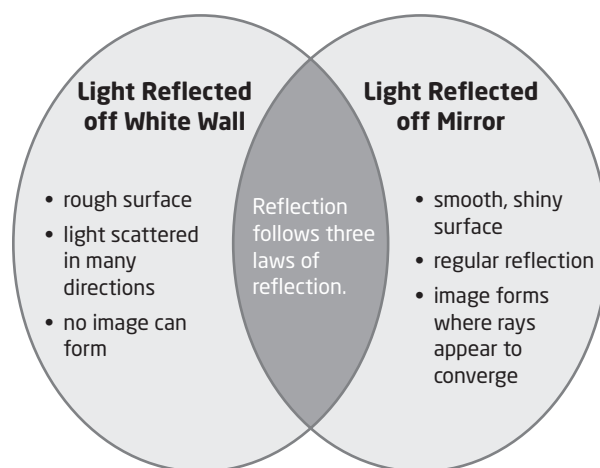
19. The real image is inverted and not visible unless captured on a screen.

20. The actual image is inverted, but our brains interpret these images as upright.

21. The flashlight is shone variously at the five numbers, but its angle must be adjusted up or down to light up the numbers.

### Communication

22.



23. Students should draw a diagram similar to Figure 4.41 on page 338 of the student textbook.

24. Black print on a page absorbs all light. White light reflects from the page around the print and provides a contrast.

### Application

25. Bees must be able to perceive ultraviolet light.

26. The cyan tie will reflect blue and green, but absorb red. Therefore, the tie will appear black in red light because no colours are reflected from it.

27. Magenta filters transmit blue and red. Yellow filters transmit red and green. By combining the magenta and yellow filters, only red light will be transmitted.

28. The student will see the light appearing to come from a position to the right of where it actually is.

29. You could try to shape the ice into a converging lens that will focus the rays of light into a small area, concentrating the rays of the Sun and possibly igniting the leaves like a magnifying glass.

### Literacy Test Prep

#### Multiple Choice

30. b)

31. c)

32. a)

33. d)

#### Written Answer

34. Solar cooking enables people to cook without burning fuels. As a result, people in developing nations like Tanzania can avoid breathing the smoke from wood or kerosene fires, which is an obvious health benefit. This limits the use of wood and avoids the environmental problem of deforestation. Additionally, solar cooking requires no additional consumption of fuels, which is another environmental benefit.