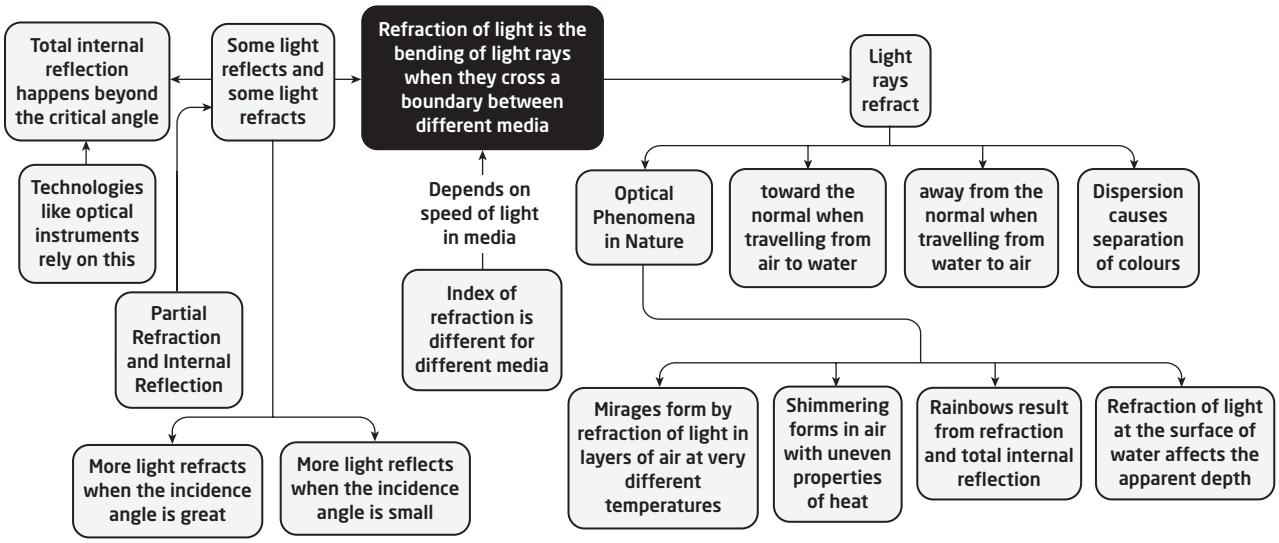
Chapter Review Answers (Student textbook pages 482 to 483)

Please also see **BLM 11-14 Chapter 11 Review (Alternative Format).**

Make Your Own Summary



Reviewing Key Terms

1. index of refraction

2. dispersion

3. critical angle

4. shimmering

5. mirage

Knowledge and Understanding

6. It slows down, refracting closer to the normal.

7. Yellow light is used as the standard for comparison.

8. See Figure 11.16B from page 462 of the student textbook.

9. By comparing the indices of refraction for the two media. When entering a medium with a smaller index of refraction, the angle of refraction will be smaller than the angle of incidence, and vice versa.

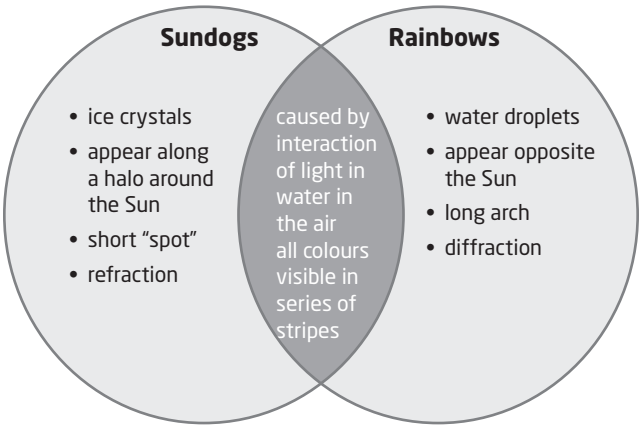
10. Temperature and pressure are included because they affect the index of refraction.

11. The angle of incidence.

12. The angle of refraction will increase at the same rate as the angle of incidence until the critical angle is passed (the angle of refraction is 90°), at which point all light will be reflected.

13. White light is a combination of all colours of light, each colour has a different wavelength or speed and is refracted at a different angle.

14. Example:



15. The coin looks as though it is higher than it really is.

Thinking and Investigating

16. No, because light would pass straight through the cube, without refraction.

17. **a.** $n = 1.52$

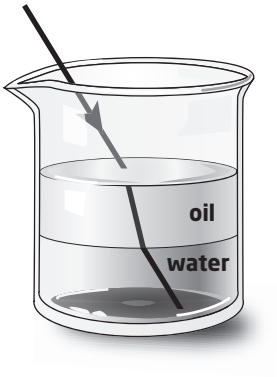
b. 1.24×10^8 m/s

c. 2.04×10^8 m/s

d. 1.92, zircon

18. A small critical angle allows light to travel the greatest distance between reflections within the optical fibre. If the critical angle were increased, bends in the fibre would be more likely to let light escape.

19.



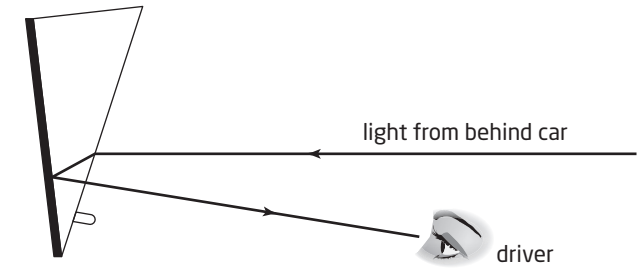
20. You would have to know the speed of light in a vacuum and in Earth's atmosphere, and that light travels in a straight line.

21. Example: Shine a laser light at the sheet of glass at larger and larger angles of incidence until no light is reflected, but shoots out the other edge of the glass, then measure that angle.

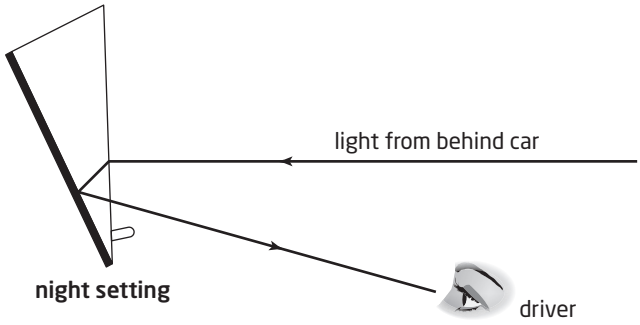
Communication

22. Any two of: retroflectors, binoculars, fibre optic cables, telescopes, microscopes

23.



day setting

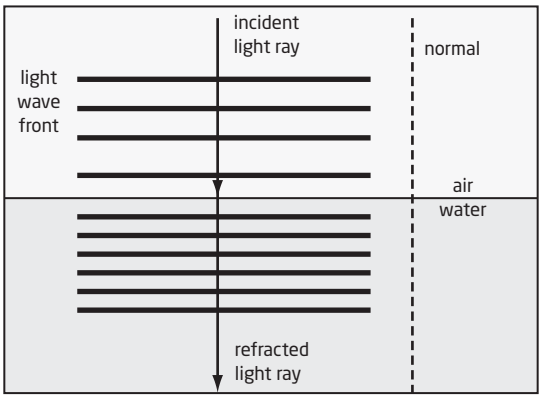


night setting

24. Light is reflected 90° twice (by each angled back edge) then exits the prism at 180° to the angle of incidence. See Figure 11.19B from page 465 of the student textbook.

25. Explain that the water is most likely a mirage caused by light being refracted by the hot air over the desert. Air's index of refraction changes with temperature because cold air is denser than warm air. So, the higher the temperature, the lower the index of refraction, and the light is refracted each time it crosses a temperature boundary

26. No refraction occurs when a light wave travels parallel to the boundary (along the normal), but the wavelength does shorten (speed slows) when it enters a medium with a higher index of refraction.



27. Light reflected from the coin refracted toward the viewer when it crossed from water into air.

Application

28. Any two of: aeronautic engineer, telecommunications technician or designer, medical technician or doctor, jeweller, fisher, or industrial designer

29. The prisms (in a spectrograph, for example) separated light from the star into its different wavelengths (like a rainbow) allowing astronomers to evaluate the ratio of wavelengths (radiation) emitted from the star.