Refraction

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1. What is refraction?

The bending effect of light when it crosses a boundary between two different media is called refraction.

2. What is a medium or media?

Any substance light rays travel through is called a medium

3. What are examples of mediums?

Air, Water, Glass, Diamond

4. Draw Figure 4.35 image B. Make sure it is fully labelled.

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5. Why does light refract?

Light refracts because light travels at different speeds in different media

6. What happens when the car travels from the pavement into the mud?

When the tires enter the mud, they move more slowly than they did on the pavement

7. How does the direction of the car change?

the path of the travelling car bends toward the dashed line - normal

8. What happens when the car travels from the mud to the pavement?

When the tires enter the smooth pavement, they move more quickly than they did on the mud

9. How does the direction of the car change?

the path of the travelling car bends away from the dashed line

From your own knowledge

(Light travels more slowly in material that has a higher density)

10. If light is travelling in the air and then enters water what happens to its speed?

Water is more dense so the light travels more slowly

11. If light is travelling in the water and then enters the air what happens to its speed?

Air is less dense so the speed of the light increases

12. Complete the Bending Light worksheet.

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13. What is total internal reflection?

The condition in which no light can escape the medium because the angle of incidence is larger than the critical angle

14. What is the critical angle?

When the angle of incidence gets so large that the angle of refraction is 90°, the refracted ray skims the surface of the medium. When this occurs, the angle of incidence is called the critical angle, because the angle of refraction cannot get any larger

15. Draw the four images A, B, C, and D and explain what is occurring in each diagram

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16. What is a Fibre optic (or optical fibre)

a tiny glass fibre called the core that is about the size of a human hair covered by a cladding (protective coating) made of a different type of glass covers the core

17. How can light travel in the core of the optical fibre?

light that enters the core and reaches the boundary between the core and the cladding at an angle greater than the critical angle will be totally internally reflected

18. What are the benefits of using optical fibres?

By sending light in pulses, optical fibres can carry information long distances at nearly the speed of light. Optical fibres are more practical for sending signals than copper wires for several reasons.

- The signals are not affected by electrical storms as copper wires are.
- Fibre optic cables can carry many more signals over longer distances than copper cables.
- Fibre optic cables are smaller and lighter than copper cables

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