N5 Refraction

N5 PHYSICS- WAVES TOPIC

Why?

Refraction- definition

- **Refraction** is the **reduction** in speed and wavelength as a wave moves into a more optically dense material. This often involves a change of direction. (frequency stays the same)

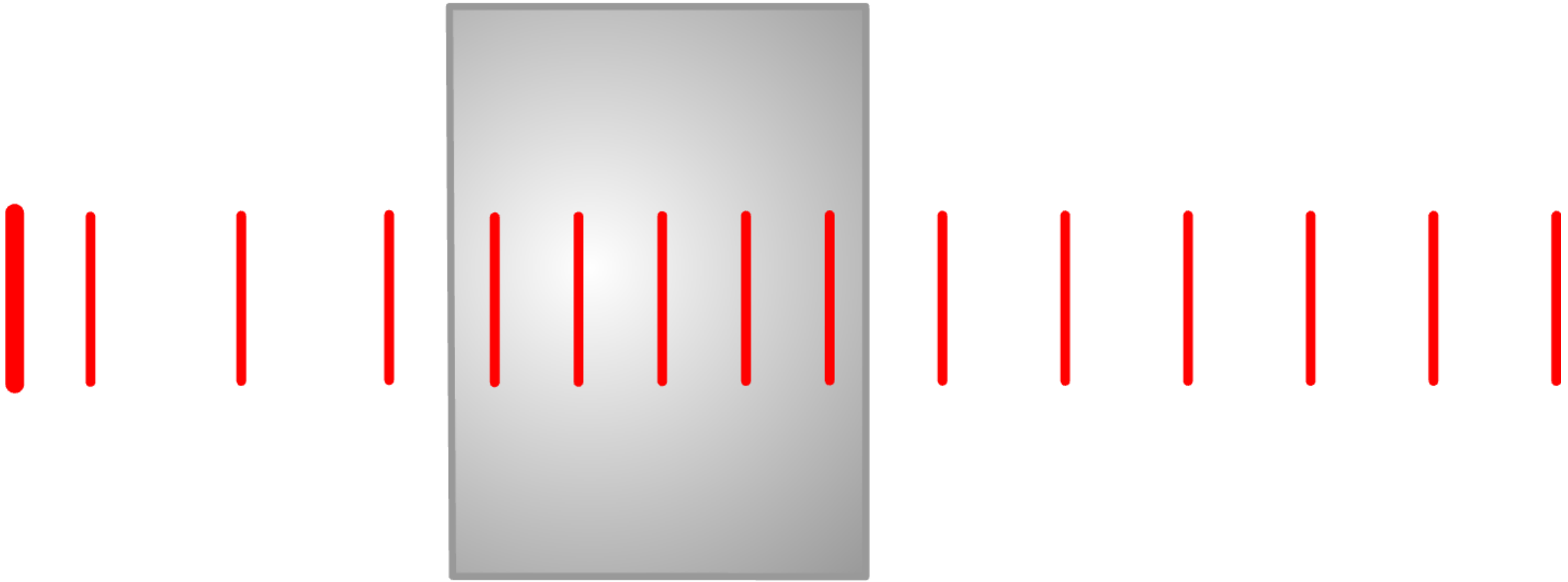
Refraction is the **increase** in speed and wavelength as a wave moves into a less optically dense material. This often involves a change of direction. (frequency stays the same)

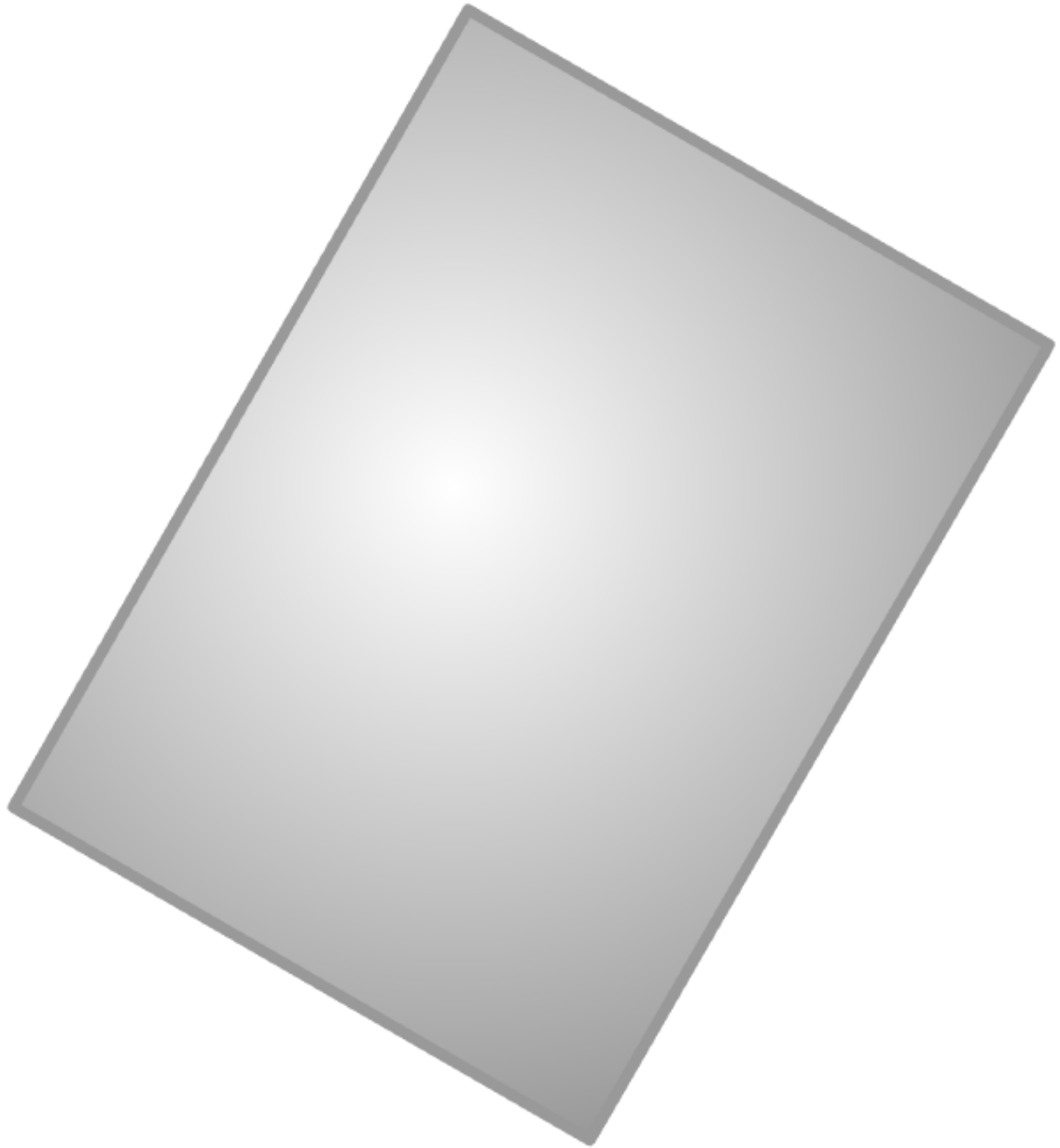
IMPORTANT NOTE

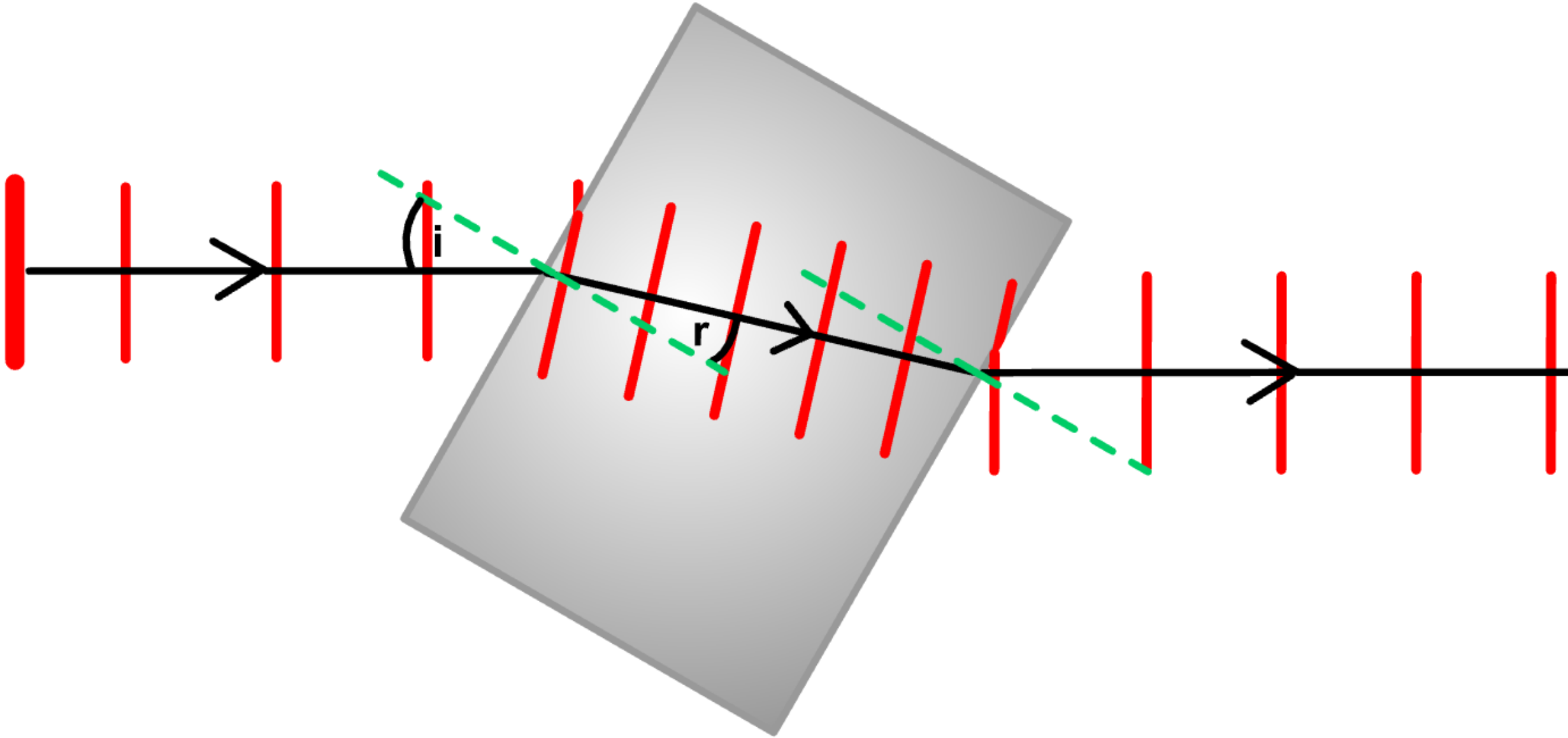
- **Never** use the term **bending** with the term **refraction**. ✗
- Please note bending does not occur with refraction, but there is often a change in direction of the wave

Bending

changing direction



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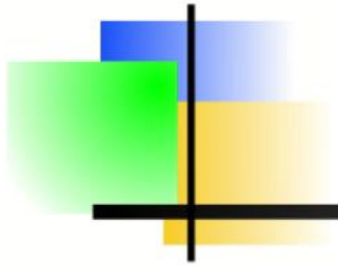


Interactive summary

Introduction

Refraction

Example problem

Refraction through blocks and prisms

Optical fibre

Critical angle and total internal reflection

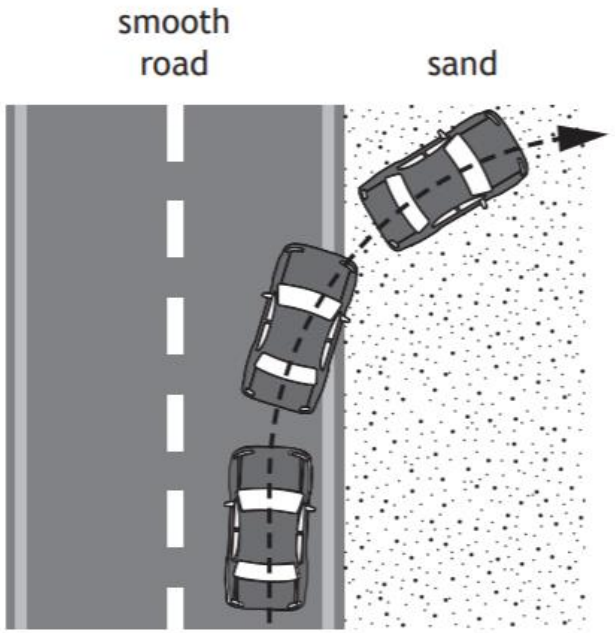
REMEMBER

- All angles are measured from the normal.
- The angle of incidence is the angle in the air.

Try this OEQ

- Jot down a few bullet points before you start.

11. The use of analogies from everyday life can help better understanding of physics concepts. A car moving from a smooth surface to a rough surface, eg from a road to sand, can be used as an analogy for the refraction of light.



Use your knowledge of physics to comment on this analogy.

https://www.youtube.com/watch?v=zarxpu43-ls

- Quite a good video but he wrongly says refract and bend in the same sentence, instant trouble at N5!

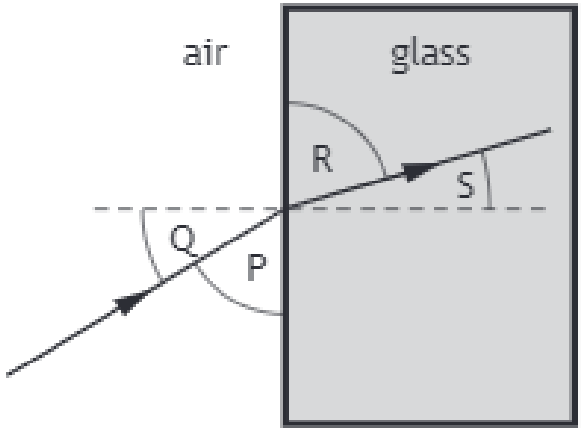
https://www.youtube.com/watch?v=zarxpu43-ls

Past paper questions

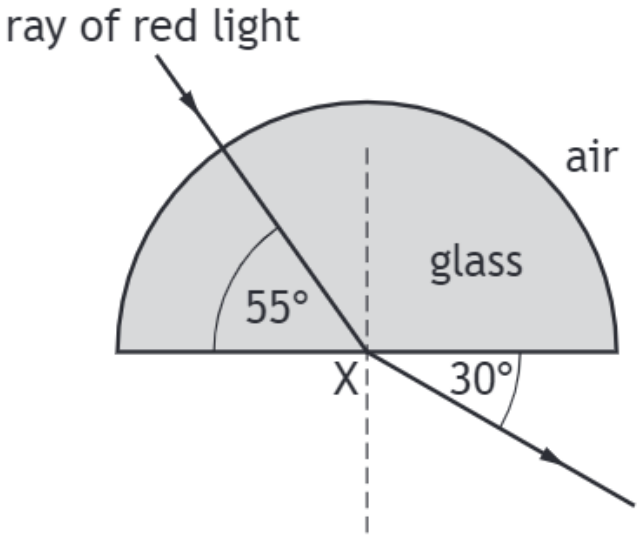
	2014		2015		2016		2017		SPQ		2018		2019	
	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2
Refraction of light		4b		5a-c	11	6	12		21			11c	20	11

PPQ- state the angle of incidence and angle of refraction

The diagram shows the path of a ray of red light as it passes from air into a glass block.



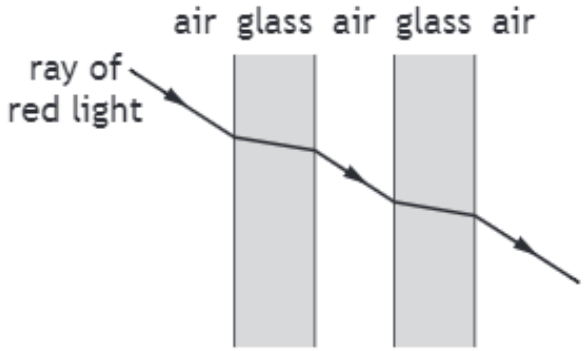
A ray of red light passes through a glass block as shown.



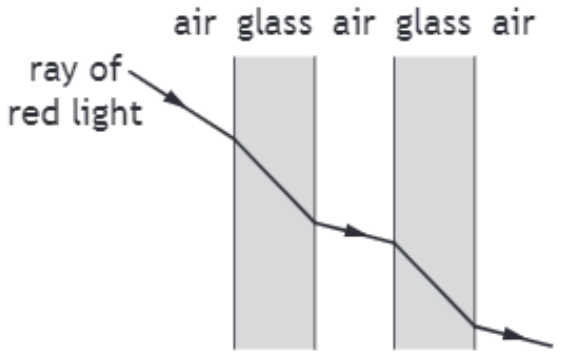
11. A ray of red light passes through a double glazed window.

Which diagram shows the path of the ray as it passes through the window?

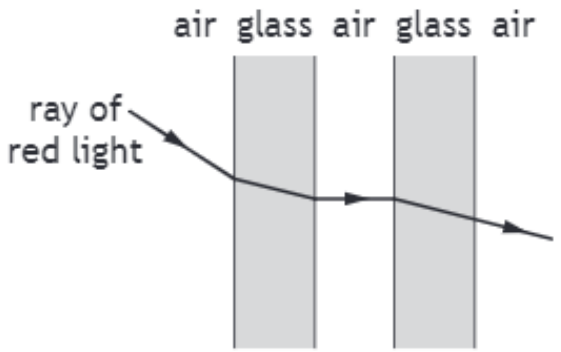
A



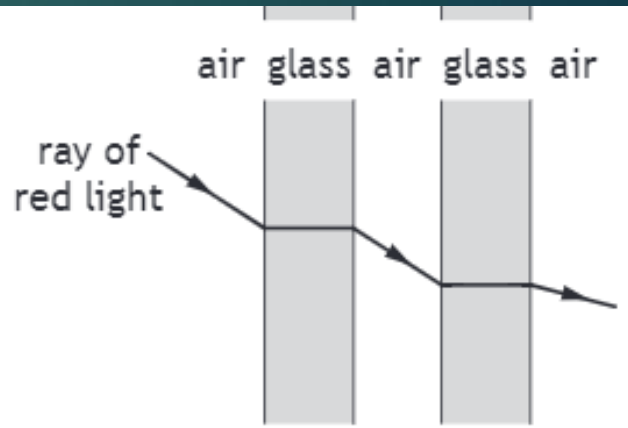
B



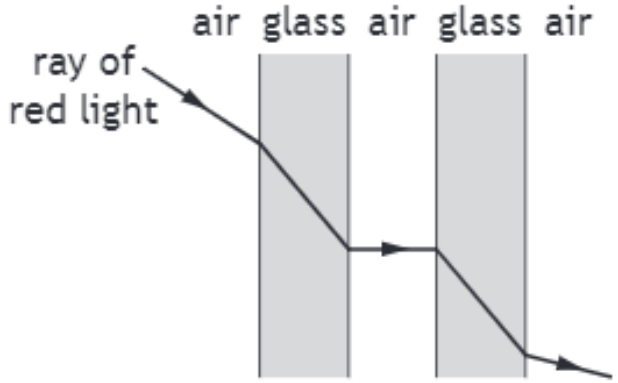
C



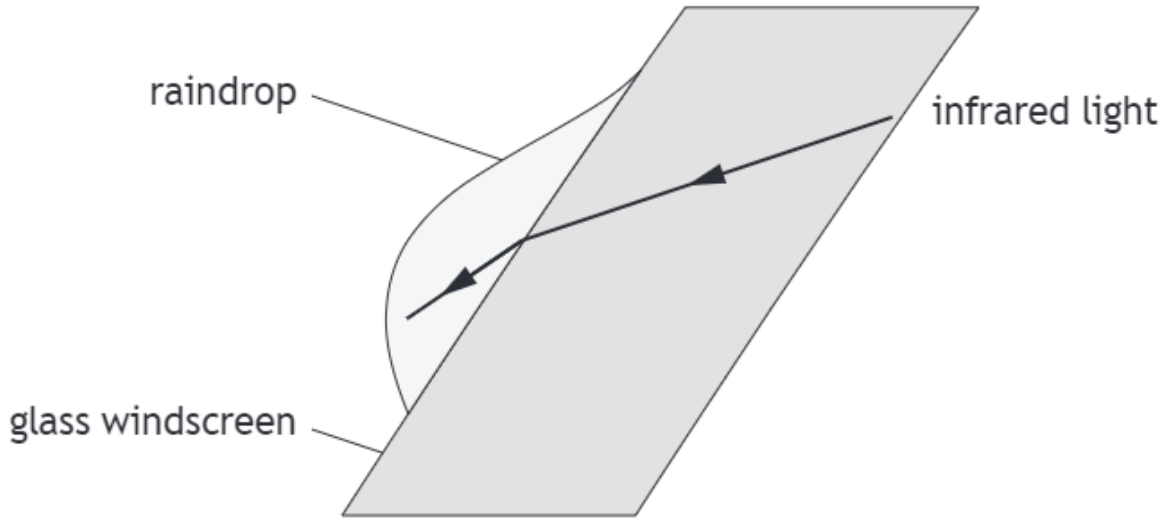
D



E



(c) Some of the infrared light is refracted when travelling from the glass windscreen into a raindrop.



(i) On the diagram, draw and label:

(A) a normal; 1

(B) an angle of incidence i and an angle of refraction r. 1

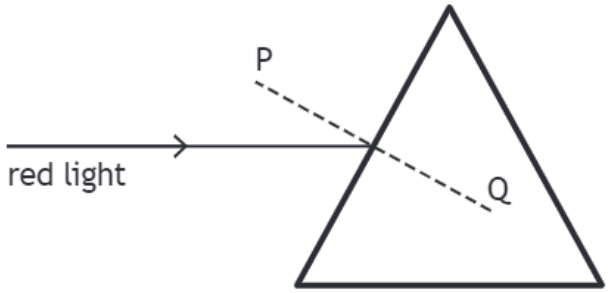
(An additional diagram, if required, can be found on *page 44*.)

(ii) State whether the wavelength of the infrared light in the raindrop is less than, equal to or greater than the wavelength of the infrared light in the glass.

You **must** justify your answer. 2

A student carries out an experiment to investigate the effect of different shaped glass blocks on the path of a ray of light.

(a) The student directs a ray of red light at a triangular glass block as shown.



(i) Complete the diagram above to show the path of the ray of red light through and out of the glass block.

(An additional diagram, if required, can be found on *page 39*)

(ii) The diagram shows a dashed line PQ.

State the name given to this line.

(iii) **On the diagram above**, label an angle of incidence i. **1**

(b) The student replaces the triangular glass block with a rectangular block made of the same material. The path of the ray of red light is as shown.

State whether the wavelength of the red light in this block is less than, the same as, or greater than the wavelength of the red light in the triangular glass block in (a).

Justify your answer. **2**