AS Level Physics

Chapter 5 – Waves and Particle Nature of Light

5.5.2 Optics (Edexcel Only)

Worked Examples

Optics

Exam Style Question 1

A converging lens of power $10\ D$ produces a magnified image of a small object. The image is $0.25\ m$ from the centre of the lens and is the same way up as the object.

(i) State one other property of the image.

(ii) Determine the focal length of the lens.

(iii) Show that the object should be placed approximately $0.07\ m$ from this lens for the image to be formed.

(iv) Draw a ray diagram below to show how this image is formed. Mark the positions of the object, image and the principal foci of the lens.

A scale diagram is not required.

Optics

Exam Style Question 1

(i) State one other property of the image.

Image is virtual.

(ii) Determine the focal length of the lens.

Use $f = \frac{1}{P}$

$$f = \frac{1}{10\ D} = 0.10\ m$$

(iii) Show that the object should be placed approximately $0.07\ m$ from this lens for the image to be formed.

Use $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

$$\frac{1}{0.1\ m} = \frac{1}{u} - \frac{1}{0.25\ m}$$

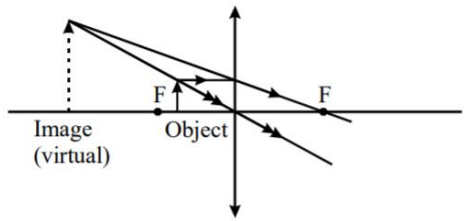
$$\frac{1}{u} = 14$$

$$u = \frac{1}{14} = 0.071\ m$$

(iv) Draw a ray diagram below to show how this image is formed. Mark the positions of the object, image and the principal foci of the lens.

A scale diagram is not required.

(iv)



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Exam Style Question 2

A converging lens can be used to produce both a magnified real image and a magnified virtual image of an object.

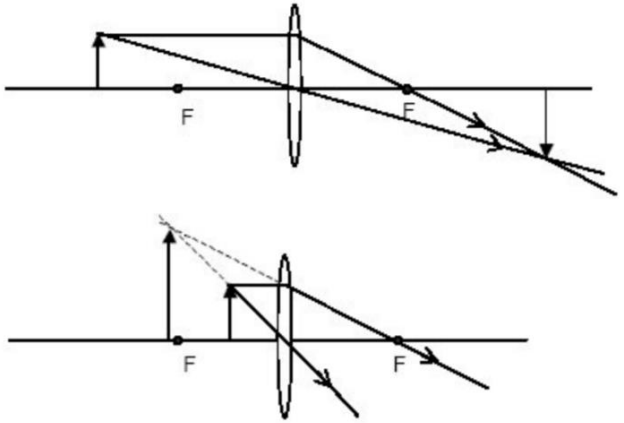
(a) Draw ray diagrams to show how each image is formed. Label the principal foci of the lens in each case.

(b) Calculate the object distance required to produce a magnified image $0.25\ m$ from a lens of focal length $0.10\ m$ where the image is virtual.

Optics

Exam Style Question 2

(a) Draw ray diagrams to show how each image is formed. Label the principal foci of the lens in each case.



(b) Calculate the object distance required to produce a magnified image $0.25\ m$ from a lens of focal length $0.10\ m$ where the image is virtual.

Use $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

$$\frac{1}{0.10\ m} = \frac{1}{u} - \frac{1}{0.25\ m}$$

$$\frac{1}{u} = \frac{1}{0.10\ m} + \frac{1}{0.25\ m}$$

$$\frac{1}{u} = 14$$

$$u = \frac{1}{14} = 0.07\ m$$

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Please see ‘5.5.1 Optics (Edexcel Only) notes’ pack for revision notes.

For more revision notes, tutorials and worked examples please visit www.tutorpacks.co.uk.

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