

GCSE Physics

Worksheet: Lenses

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Lenses

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

A lens forms an image of a small object. The object is 2 mm tall and its image is 12 mm tall.

0 1 . 1

Calculate the magnification produced by the lens.

Use the equation:

magnification = image height ÷ object height

.....

.....

.....

.....

Magnification =

[2 marks]

0 2

0 2 . 1

How is a convex (converging) lens shown in a ray diagram?

Tick (✓) **one** box.

A vertical line with arrowheads pointing outwards at each end

☐

A vertical line with arrowheads pointing inwards at each end

☐

A curved dashed line

☐

A rectangle

☐

[1 mark]

0 2 . 2

What is meant by a **virtual** image?

[1 mark]

0 2 . 3

Which type of lens always forms a virtual image?

Tick (✓) **one** box.

Convex lens only

☐

Concave lens only

☐

Both convex and concave lenses

☐

Neither convex nor concave lenses

☐

[1 mark]

0 3

Lenses form images by refracting light.

0 3 . 1

How is a concave lens shown in a ray diagram?

Tick (✓) **one** box.

A vertical line with arrowheads pointing inwards at each end

☐

A vertical line with arrowheads pointing outwards at each end

☐

A dashed vertical line

☐

A rectangle

☐

[1 mark]

0 3 . 2

What is meant by the **focal length** of a lens?

[1 mark]

0 3 . 3

A lens forms an image of an insect. The image is 36 mm tall. The insect is 12 mm tall.

Calculate the magnification.

Use the equation:

$$\text{magnification} = \frac{\text{image height}}{\text{object height}}$$

Magnification =

[2 marks]

0 3 . 4

Explain why magnification has no unit.

.....

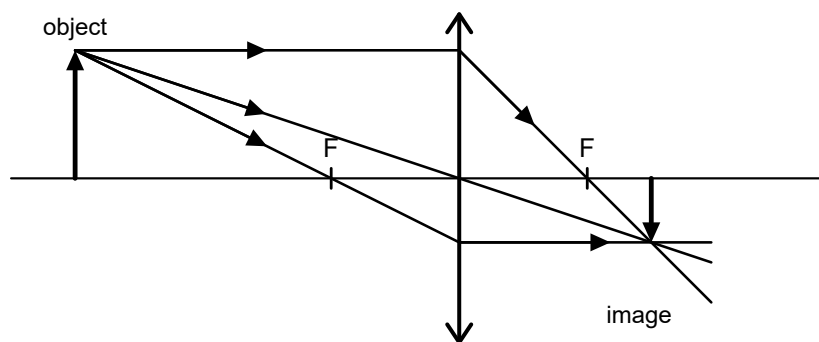
.....

[1 mark]

0 4

Figure 1 is a ray diagram showing how a convex lens forms an image of an object. F is the principal focus of the lens.

Figure 1



0 4 . 1

Give **three** words that describe the image.

.....

.....

.....

.....

.....

.....

[3 marks]

0 4 . 2

The object is 4.0 cm tall and the image is 2.0 cm tall.
Calculate the magnification.
Use the Physics Equations Sheet.

.....

.....

.....

.....

Magnification =

[2 marks]

0 4 . 3

What is meant by a **real** image?

.....

.....

[1 mark]

0 4 . 4

The object is moved closer to the lens, but it stays further from the lens than F.
Describe how the position and the size of the image change.

.....

.....

.....

.....

[2 marks]

.....

0 5

A lens produces an image with a magnification of 5. The image is 30 mm tall.

0 5 . 1

Calculate the height of the object.

Use the Physics Equations Sheet.

.....

.....

.....

.....

.....

Object height = mm

[3 marks]

0 6

Hassan uses a convex lens as a magnifying glass to look at a postage stamp.

0 6 . 1

Where must the stamp be placed for the lens to act as a magnifying glass?

.....

.....

[1 mark]

0 6 . 2

Give **two** words that describe the image Hassan sees.

.....

.....

.....

.....

[2 marks]

0 6 . 3

The letters printed on the stamp are 2.5 mm tall. The magnification of the lens is 4.0.
Calculate the height of the image of the letters.
Use the Physics Equations Sheet.

.....

.....

.....

.....

Image height = mm

[2 marks]

0 6 . 4

Explain why the image cannot be projected onto a screen.

.....

.....

[1 mark]

0 7

A camera and the human eye both use a convex lens to form an image.

0 7 . 1

When the object being photographed (or viewed) is further from the lens than the principal focus, describe **two** features of the image formed on the camera's sensor or on the retina.

.....

.....

.....

.....

[2 marks]

0 7 . 2

In the eye, the image on the retina is upside down, but people do not see the world upside down.
Suggest why.

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Physics · Worksheet: Lenses · 30 marks

Question 1 (2 marks)

01.1 [2 marks]

Answer: 6

- $12 \div 2$ (1)
- 6 (1)

Notes: Magnification has no unit. Allow the answer as a fraction.

Question 2 (3 marks)

02.1 [1 mark]

Correct: A vertical line with arrowheads pointing outwards at each end

02.2 [1 mark]

Answer: An image where the light rays only appear to come from that point; they do not actually meet there.

- an image where the rays of light only appear to come from, but do not actually pass through / meet there (1)
-

02.3 [1 mark]

Correct: Concave lens only

Question 3 (5 marks)

03.1 [1 mark]

Correct: A vertical line with arrowheads pointing inwards at each end

03.2 [1 mark]

Answer: The distance from the lens to the principal focus.

- the distance from the lens to the principal focus (1)
-

03.3 [2 marks]

Answer: 3

- $36 \div 12$ (1)
 - 3 (1)
-

03.4 [1 mark]

Answer: It is a ratio of two heights in the same unit.

- it is a ratio of two lengths measured in the same unit (so the units cancel) (1)
-

Question 4 (8 marks)

04.1 [3 marks]

Answer: Real, inverted and diminished.

- real (1)
 - inverted / upside down (1)
 - diminished / smaller than the object (1)
-

04.2 [2 marks]

Answer: 0.50

- $2.0 \div 4.0$ (1)
- 0.5(0) (1)

Notes: 2 ($4.0 \div 2.0$) scores 0.

04.3 [1 mark]

Answer: The rays actually meet there, so it can be formed on a screen.

- an image where the rays of light actually meet / an image that can be projected onto a screen (1)
-

04.4 [2 marks]

Answer: The image moves further from the lens and becomes larger.

- the image moves further away from the lens (1)
 - the image becomes larger (1)
-

Question 5 (3 marks)

05.1 [3 marks]

Answer: 6 mm

- $5 = 30 \div \text{object height}$ (1)
 - $\text{object height} = 30 \div 5$ (1)
 - 6 (mm) (1)
-

Question 6 (6 marks)

06.1 [1 mark]

Answer: Closer to the lens than the principal focus.

- between the lens and the principal focus / closer to the lens than the focal length (1)

06.2 [2 marks]

Answer: Any two of: virtual, upright, magnified.

- virtual (1)
- upright / the right way up (1)
- magnified / larger than the object (1)

Any 2 of the points above.

06.3 [2 marks]

Answer: 10 mm

- $4.0 = \text{image height} \div 2.5$ (1)
- 10 (mm) (1)

06.4 [1 mark]

Answer: It is virtual: the rays only appear to come from it.

- it is a virtual image: the rays of light do not actually meet there, they only appear to come from the image (1)

Question 7 (3 marks)

07.1 [2 marks]

Answer: Any two: real, inverted, and (for a distant object) diminished.

- it is a real image (it can be formed on a surface / screen) (1)
- it is inverted (upside down) (1)
- it is usually diminished (smaller than the object), for a distant object (1)

Any 2 of the points above.

07.2 [1 mark]

Answer: The brain processes the signal from the eye so the image is perceived the right way up.

- the brain processes (interprets/flips) the signals from the eye so that the world is perceived the right way up (1)