

PHYSICS WORKSHEET: LENSES

Class: Year 11

Topic: Lenses

Time Allowed: 45 minutes

Instruction: Answer all questions. Show all workings clearly. Diagrams must be neat and well labelled.

SECTION A: FILL IN THE GAPS

Complete the statements by filling in the correct words.

1. A lens that is thicker at the centre than at the edges is called a _____ lens.
 2. A concave lens is also known as a _____ lens.
 3. The point where parallel rays meet after refraction in a convex lens is called the _____.
 4. The distance between the optical centre and the principal focus is known as the _____.
 5. A concave lens always forms an image that is _____, _____ and _____.
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SECTION B: MATCHING (COLUMN A WITH COLUMN B)

Match each item in Column A with the correct option in Column B.

Column A

1. Convex lens
2. Concave lens
3. Principal focus
4. Optical centre
5. Focal length

Column B

- A. Spreads light rays
- B. Used for short sight
- C. Converges light rays
- D. Point where rays meet
- E. Distance OF

Write your answers here:

1 → _____ 2 → _____ 3 → _____ 4 → _____ 5 → _____

SECTION C: MULTIPLE CHOICE QUESTIONS (MCQ)

Choose the correct option.

6. The image formed by a convex lens when the object is placed beyond $2F$ is
 - A. virtual and erect
 - B. real and inverted
 - C. virtual and inverted
 - D. erect and magnified
 7. Which instrument uses a concave lens?
 - A. Magnifying glass
 - B. Camera
 - C. Microscope
 - D. Spectacles for short sight
 8. The unit of focal length is
 - A. centimetre
 - B. metre
 - C. millimetre
 - D. metre per second
 9. A ray passing through the optical centre of a thin lens
 - A. bends towards the focus
 - B. bends away from the axis
 - C. is undeviated
 - D. is reflected back
 10. The lens formula is given by
 - A. $1/f = u + v$
 - B. $f = u/v$
 - C. $1/f = 1/u + 1/v$
 - D. $f = uv$
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SECTION D: LABEL THE DIAGRAM

11. The diagram below shows a convex lens. Label the following parts:

- Principal axis
- Optical centre (O)
- Principal focus (F)
- Focal length (f)

(Diagram: *Labelled diagram of a convex lens*)

SECTION E: SHORT ANSWER QUESTIONS

12. Define a lens.
 13. State two differences between a convex lens and a concave lens.
 14. State two uses of a convex lens.
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SECTION F: CALCULATIONS (SHOW ALL STEPS)

Use the lens formula:

$$1/f = 1/v + 1/u$$

Question 15

An object is placed 20 cm from a convex lens of focal length 10 cm. Calculate the image distance.

Step 1: Write the formula

$$[1/f = 1/v + 1/u]$$

Step 2: Substitute known values

$$[1/\underline{\hspace{2cm}} = 1/v + 1/\underline{\hspace{2cm}}]$$

Step 3: Make v the subject of the formula

$$[1/v = \underline{\hspace{2cm}}]$$

Step 4: Find v

$$[v = \underline{\hspace{2cm}} \text{ cm}]$$

Question 16

A concave lens has a focal length of -15 cm. If the object distance is -30 cm, calculate the image distance.

Step 1: Formula

$$[1/f = 1/v + 1/u]$$

Step 2: Substitute values

$$[1/\underline{\hspace{2cm}} = 1/v + 1/\underline{\hspace{2cm}}]$$

Step 3: Rearrange the formula

[$1/v = \underline{\hspace{2cm}}$]

Step 4: Final answer

[$v = \underline{\hspace{2cm}}$ cm]

SECTION G: THINKING AND APPLICATION

17. Why does a concave lens always produce a virtual image?
18. Explain why a convex lens can be used as a magnifying glass.

SECTION H: DIAGRAM DRAWING

19. Draw a neat ray diagram to show image formation when an object is placed between F and $2F$ of a convex lens.

(Diagram: *Ray diagram for convex lens – object between F and $2F$*)

20. Draw a ray diagram showing the image formed by a concave lens.

(Diagram: *Ray diagram for concave (diverging) lens*)

End of Worksheet