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 _____.

SECTION B: MATCHING (COLUMN A WITH COLUMN B)

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

Column A	Column B
1. Convex lens	A. Spreads light rays
2. Concave lens	B. Used for short sight
3. Principal focus	C. Converges light rays
4. Optical centre	D. Point where rays meet
5. Focal length	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. $f = uv$

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.

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/_____ = 1/v + 1/_____]

Step 3: Make v the subject of the formula
[1/v = _____]

Step 4: Find v
[v = _____ 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/_____ = 1/v + 1/_____]

Step 3: Rearrange the formula

[1/v = _____]

Step 4: Final answer

[v = _____ 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