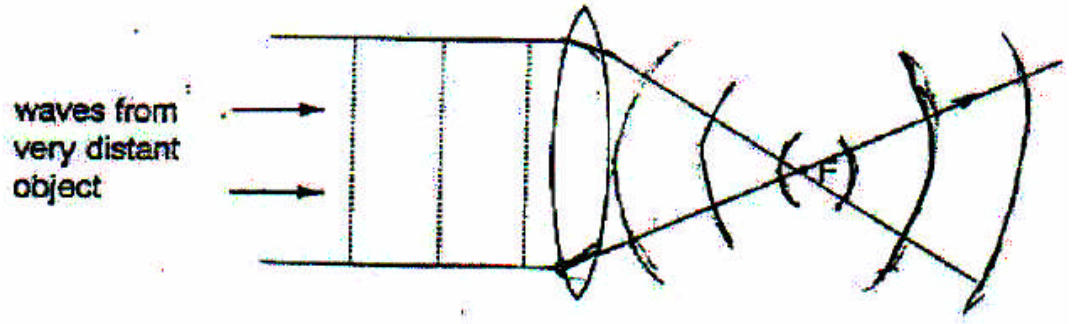
Chapter 1
Multiple choice and quick questions

1. A digital camera has a converging lens. It produces a focused image of a very distant object at F.

(a) The diagram below shows wavefronts moving towards the lens.

Complete the diagram to show the passage of wavefronts of light after passing through the lens.



(b) The focal length of the lens is 4.0 mm.

How much curvature does the lens add to the wavefronts?

$$\text{Curvature} = \frac{1}{f}$$

$$\frac{1}{f} = \frac{1}{4\text{x}10^{-3}} = 250\text{D}$$

Curvature = ..250 D.....

2. Here are some quantities.

1 the electronic charge measured in coulombs
2 the number of atoms in a gram of carbon
3 the speed of sound in air measured in metres per second
4 the velocity of light in air measured in metres per second

Which one of **A** to **E** below correctly lists the quantities in order, with the smallest first?

A 1, 3, 4, 2 ✓

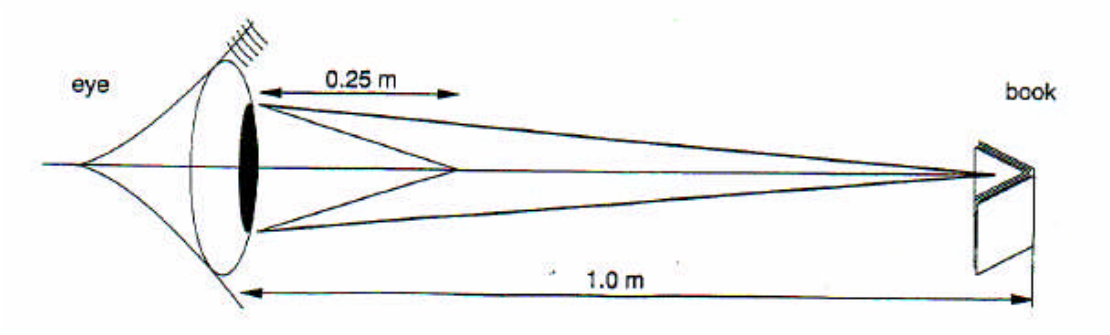
B 1, 3, 2, 4

C 1, 2, 4, 3

D 3, 1, 2, 4

E 3, 2, 4, 1

3. Simon needs glasses for reading. Without glasses the nearest he can comfortably focus is 1.0m away. He would like a normal reading distance of 0.25m. This is illustrated below.



(a) What is the difference in curvature between the wavefronts arriving at his eye from these two distances?

$$\text{Curvature} = \frac{1}{f}$$

$$\frac{1}{f} \Rightarrow \Delta\text{curvature} = \frac{1}{0.25} - \frac{1}{1} = 3.0$$

Difference in curvature = ...3.0 dioptre

(b) What power is needed for his reading lenses?

$$\text{Power} = \frac{1}{f}$$

Power of lenses = ..3.0 dioptre