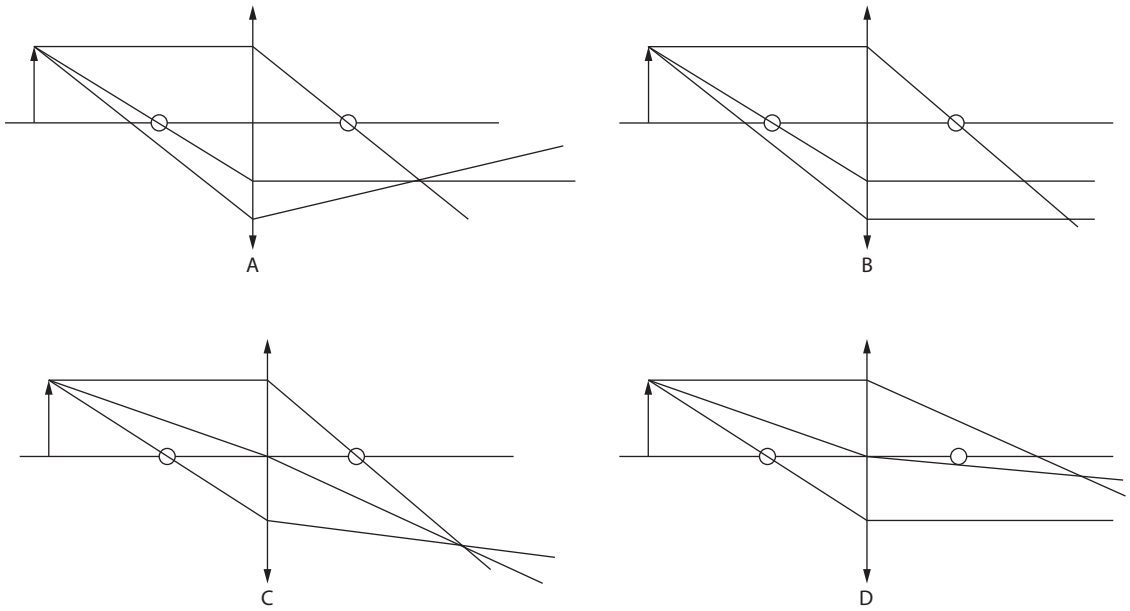
Self-test questions

Option C (HL)

1 Of the figures below, which one is a correct ray diagram for a converging lens?



A
B
C
D

2 An object is placed at a distance of 30 cm in front of a converging lens of focal length 10 cm. What is the correct description of the image?

	Type of image	Distance
A	real	7.5 cm
B	real	15 cm
C	virtual	7.5 cm
D	virtual	15 cm

3 An object is placed at a distance of 4.0 cm in front of a converging (concave) mirror of focal length 12 cm. What is the correct description of the image?

	Type of image	Distance
A	real	3.0 cm
B	real	6.0 cm
C	virtual	3.0 cm
D	virtual	6.0 cm

4 Optical instrument defects include spherical and chromatic aberrations. Which list correctly identifies an instrument with an aberration?

	Spherical	Chromatic
A	lenses and mirrors	lenses and mirrors
B	lenses and mirrors	lenses
C	lenses	lenses and mirrors
D	lenses	lenses

5 Which list gives types of dispersion suffered by monomode and mutimode optical fibres?

	Monomode	Multimode
A	material and waveguide	material and waveguide
B	material and waveguide	material
C	material	material and waveguide
D	waveguide	material

6 A digital signal of power 1200 mW is input into an optic fibre. After travelling a distance of 4.0 km in the fibre the power has been reduced to 12 mW. What is the power loss per km for this fibre?

A $5.0\,\text{dB}\,\text{km}^{-1}$
B $0.50\,\text{dB}\,\text{km}^{-1}$
C $2.5\,\text{dB}\,\text{km}^{-1}$
D $0.25\,\text{dB}\,\text{km}^{-1}$

7 An array of radio telescopes consists of N identical parabolic antennas of diameter D. The antennas extend over a linear distance of L. Give an **estimate** of the smallest angular separation that can be resolved.

A $\frac{\lambda}{D}$
B $\frac{\lambda}{ND}$
C $\frac{\lambda}{L}$
D $\frac{\lambda}{NL}$

8 In the context of X-ray imaging, **half-value thickness** is the distance in a medium after which the X-ray's:

A wavelength is reduced by a factor of 2
B intensity is reduced by a factor of 2
C sharpness is reduced by a factor of 2
D resolution is reduced by a factor of 2

9 In ultrasound scanning, gel is placed in between the transducer and the skin. What is the reason for this?

A To have better contact between the transducer and the skin.
B To make it more comfortable for the patient.
C To make sure that no ultrasound leaks out.
D To make sure that very little ultrasound is reflected from the skin.

10 In monitoring the progress of a fetus, it is advisable to use:

A CT scan
B X-ray scan
C MRI
D ultrasound