

# PHYSICS

Paper 3174/12  
Multiple Choice 12

Question Number	Key	Question Number	Key	Question Number	Key	Question Number	Key
1	A	11	A	21	B	31	C
2	C	12	B	22	D	32	C
3	C	13	C	23	D	33	B
4	A	14	A	24	A	34	D
5	C	15	A	25	B	35	B
6	D	16	B	26	D	36	D
7	B	17	D	27	D	37	D
8	C	18	C	28	C	38	A
9	B	19	B	29	D	39	B
10	C	20	D	30	C	40	C

## General comments

The questions for which most candidates gave the correct answer were **Questions 2, 10, 18 and 22**. In all cases the candidates who did select the correct option were the candidates who performed well on the rest of the paper.

Questions often test similar parts of the syllabus in similar but not identical ways and when the question is subtly different, it is likely to require a different approach. It is important to answer the question that has been asked and not to jump to any conclusions.

### Comments on specific questions

#### Question 5

The situation prevailing here is revealed by the two arrows. The air resistance is acting upwards and so the parachutist must be moving downwards and because the upward arrow is longer than the arrow that represents the weight, the parachutist must be decelerating. The question refers to the lengths of the arrows but information is also conveyed by their direction.

#### Question 7

A satellite in a circular orbit is accelerating as a consequence of a change in the direction of its velocity even though the magnitude does not change. In an exactly similar manner, the direction of its acceleration changes even though its magnitude does not.

#### Question 11

Most candidates gave the correct answer to this question with option **D** being the most commonly chosen incorrect answer. To obtain option **D**, candidates had to divide the moment due to the total load by the distance 50 cm. This distance is the horizontal distance between the point where the applied force acts and the point where the total weight acts. The pivot, however, is at the wheel and so the correct answer is smaller than the value given in option **D**.

#### Question 25

Many candidates chose the correct option. The most commonly chosen incorrect answer was **A**. Nearly all candidates realised that the particles vibrate in the same way but a significant number believed that they also vibrate in the same way at the same time. What is seen as a crest moving along a rope is neighbouring particles reaching the position of their maximum displacement at slightly different times.

#### Question 28

The correct answer was the most popular choice but each of the options was selected by a significant number of candidates. Usually, only three rays are drawn when determining the position of a focused image. Candidates need to be aware, however, that these three rays are only a sample of the very large number of rays that leave every point on an object. Any ray that leaves **Q** passes through **Y**. The ray referred to in the question is not one that can be used to locate **Y**, but once the position of **Y** is known, the path of any ray that leaves **Q** can be found.

#### Question 29

Although the correct answer **D** was the most popular answer, many candidates chose **A**, which ignores the use of a converging lens as a magnifying glass.

#### Question 30

Candidates found this question difficult and there was evidence of guesswork in the distribution of options chosen. It is possible that there were candidates who were expecting a speed of  $3.0 \times 10^8$  m/s for the speed of electromagnetic waves and who rejected statement 2 without noticing the unit supplied.

### Question 32

The correct answer was by far the most popular and the other options were chosen by very similar numbers of candidates. The skill here is to interpret a short paragraph of continuous writing in numerical terms and then to apply knowledge from the syllabus to deduce the correct response. The best way to approach this question is to consider the middle medium. The speed of sound decreases as sound enters it and increases when it leaves. Hence the middle medium is the medium in which sound is travelling the slowest.

### Question 34

Most candidates selected options **B** or **D** which both rely on the realisation that the ink needs to be positively charged in order to be attracted to the plate with the excess of electrons fixed in position. Rather more, however, chose the option that suggested that the plate was a conductor than chose the correct answer.

### Question 35

The correct answer was commonly selected. The current to be measured proved to be just less than 6.4 mA and candidates who worked this out were unlikely to select an incorrect option.

### Question 37

The correct choice was the most popular with just under half of the candidates making it. The most frequently selected incorrect answer was **B**, a graph with a straight line of negative gradient.

### Question 38

The correct option was supplied by more than half of the candidates with option **D** being the next most popular.

The comment and the pattern in option **D** are consistent in that current-carrying wires that repel each other would produce such a magnetic field pattern. However, two wires carrying currents in the same direction do not repel - they attract.