

3220/201

SCOTTISH
CERTIFICATE OF
EDUCATION
1999

FRIDAY, 14 MAY
9.00 AM – 10.30 AM

PHYSICS
HIGHER GRADE
Paper I

Read Carefully

- 1 All questions should be attempted.
- 2 The following data should be used when required unless otherwise stated.

Speed of light in vacuum c	$3.00 \times 10^8 \text{ m s}^{-1}$	Planck's constant h	$6.63 \times 10^{-34} \text{ J s}$
Charge on electron e	$-1.60 \times 10^{-19} \text{ C}$	Mass of electron m_e	$9.11 \times 10^{-31} \text{ kg}$
Acceleration due to gravity g	9.8 m s^{-2}	Mass of proton m_p	$1.67 \times 10^{-27} \text{ kg}$

Section A (questions 1 to 30)

- 3 Check that the answer sheet is for Physics Higher I (Section A).
- 4 Answer the questions numbered 1 to 30 on the answer sheet provided.
- 5 Fill in the details required on the answer sheet.
- 6 Rough working, if required, should be done only on this question paper, or on the first two pages of the answer book provided—**not** on the answer sheet.
- 7 For each of the questions 1 to 30 there is only **one** correct answer and each is worth 1 mark.
- 8 Instructions as to how to record your answers to questions 1–30 are given on page two.

Section B (questions 31 to 37)

- 9 Answer questions numbered 31 to 37 in the answer book provided.
- 10 Fill in the details on the front of the answer book.
- 11 Enter the question number clearly in the margin of the answer book beside each of your answers to questions 31 to 37.
- 12 Care should be taken **not** to give an unreasonable number of significant figures in the final answers to calculations.



SECTION A

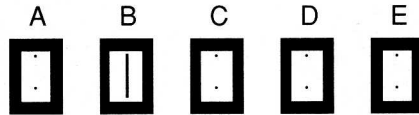
For questions 1 to 30 in this section of the paper, an answer is recorded on the answer sheet by indicating the choice A, B, C, D or E by a stroke made in ink in the appropriate box of the answer sheet—see the example below.

EXAMPLE

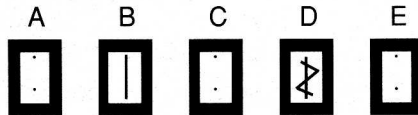
The energy unit measured by the electricity meter in your home is the

- A ampere
- B kilowatt-hour
- C watt
- D coulomb
- E volt.

The correct answer to the question is B—kilowatt-hour. Record your answer by drawing a heavy vertical line joining the two dots in the appropriate box on your answer sheet in the column of boxes headed B. The entry on your answer sheet would now look like this:



If after you have recorded your answer you decide that you have made an error and wish to make a change, you should cancel the original answer and put a vertical stroke in the box you now consider to be correct. Thus, if you want to change an answer D to an answer B, your answer sheet would look like this:



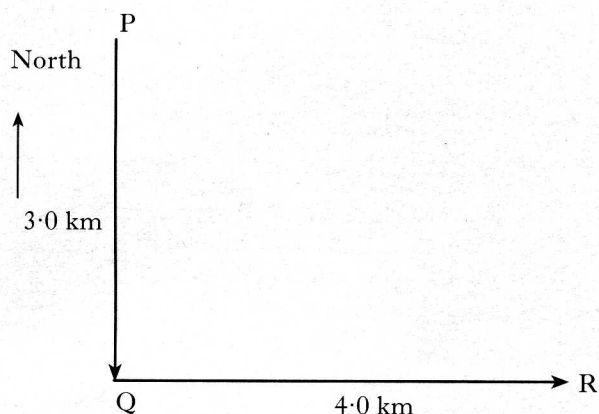
If you want to change back to an answer which has already been scored out, you should enter a tick (✓) to the RIGHT of the box of your choice, thus:



SECTION A

Answer questions 1–30 on the answer sheet.

1. A long-distance athlete runs from point P to point Q and then jogs to point R.

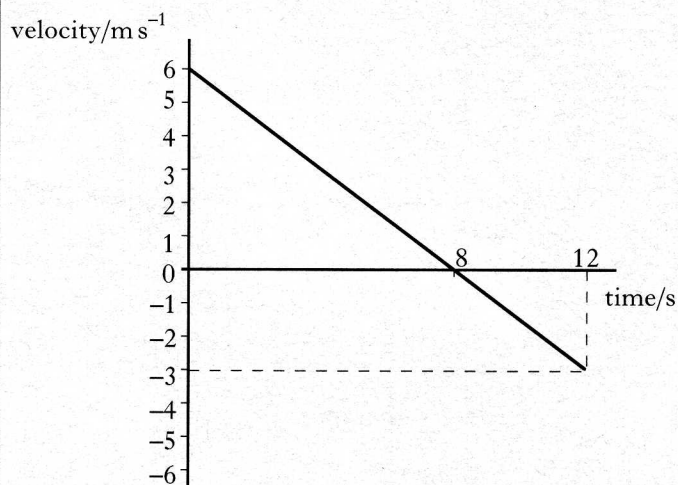


She takes 20 minutes to run from P to Q and then a further 40 minutes to jog from Q to R.

Which row in the following table correctly gives her average speed and her average velocity for the whole journey from P to R?

	<i>Average speed</i>	<i>Average velocity</i>
A	7.0 km h^{-1}	5.0 km h^{-1} on a bearing of 143°
B	7.0 km h^{-1}	7.0 km h^{-1} on a bearing of 127°
C	7.0 km h^{-1}	5.0 km h^{-1} on a bearing of 127°
D	5.0 km h^{-1}	7.0 km h^{-1} on a bearing of 127°
E	5.0 km h^{-1}	5.0 km h^{-1} on a bearing of 143°

2. The velocity-time graph for an object travelling along a straight line is shown below.

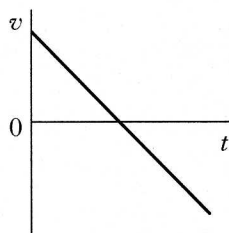


The displacement of the object during the first 12 seconds is

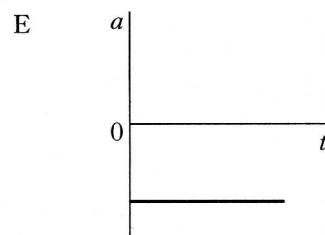
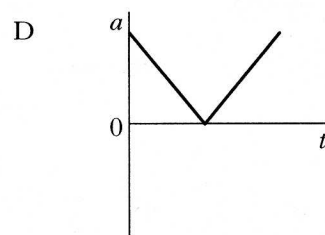
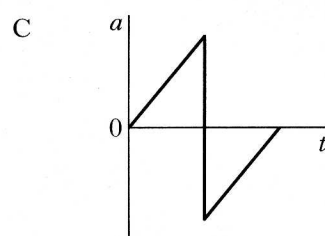
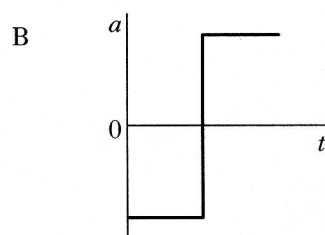
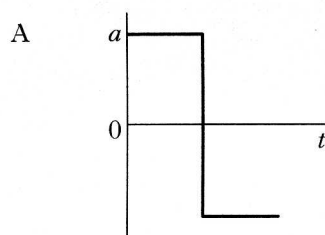
- A 18 m
- B 24 m
- C 30 m
- D 36 m
- E 54 m.

[Turn over

3. The velocity-time graph for an object travelling in a straight line is shown below.

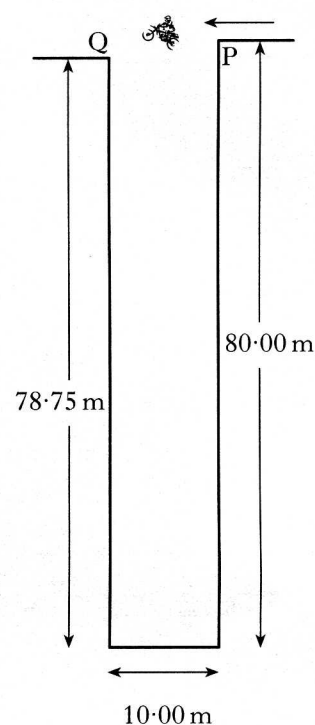


Which one of the following is the corresponding acceleration-time graph?



4. In the equation $s = ut + \frac{1}{2}at^2$ for an object moving in a straight line with a uniform acceleration "a", the term "ut" represents
- A the initial velocity of the object
 - B the initial acceleration of the object
 - C the velocity of the object after t seconds
 - D the acceleration of the object after t seconds
 - E the displacement of the object after t seconds if the acceleration is zero.

5. A motorcycle stunt involves crossing a ravine from P to Q. The motorcycle is travelling horizontally when it leaves point P.



Neglecting air resistance and taking the acceleration due to gravity to be 10 ms^{-2} , the time taken to cross the ravine from P to Q is

- A 0.125 s
- B 0.25 s
- C 0.5 s
- D 1.0 s
- E 4.0 s.

