

1
Paper 1 [20 marks]

1	B
2	C
3	D
4	C
5	B
6	B
7	B
8	C
9	D
10	A

11	D
12	D
13	C
14	A
15	C
16	C
17	C
18	D
19	D
20	B

1 (a) $W = mg = (120)(10) = 1200 \text{ N}$

(1 m for substitution, 1 m for final answer) [2]

(b) By Principle of Moments,

$$\begin{aligned} CWM &= ACWM \\ (1200)(0.80) &= (F)(0.80 + 0.50) \\ 960 &= 1.30F \\ F &= \frac{960}{1.30} = 738 \text{ N} \end{aligned}$$

(1 m for substitution, 1 m for final answer) [2]

Total marks = 4

2 (a) $3 \times 10^8 \text{ m/s}$ [1]

(b) $f = \frac{v}{\lambda} = \frac{3 \times 10^8}{0.1 \times 10^{-9}} = 3 \times 10^{18} \text{ Hz}$

(1 m for correct substitution, 1 m for correct answer)
(if prefix not considered, max of 1m) [2]

(c)	frequency of gamma rays compared to X-rays	Higher
	wavelength of gamma rays compared to X-rays	Lower / shorter
	speed of gamma rays in vacuum compared to X-rays	Same / Equal [2]

Total marks = 5

3 (a) $R_{\text{effective}} = 3 + \left(\frac{1}{4} + \frac{1}{4}\right)^{-1} = 5 \Omega$

(1 m for correct substitution, 1 m for correct answer) [2]

(b) $I = \frac{V}{R} = \frac{6}{5} = 1.2 \text{ A}$

(1 m for correct substitution, 1 m for correct answer) [2]

(c) Increase (resistors connected in parallel have a lower effective resistance, thus the current would increase) [1]

Total marks = 5

Paper 2 Section B [16 marks]

4 (a) (i) 101.905 s [1]

(ii)
$$\text{average speed} = \frac{\text{total distance}}{\text{total time}} = \frac{5.063 \times 10^3}{101.905} = 49.7 \text{ m/s}$$

(Allow for ECF from (a)(i))

(1 m for correct substitution, 1 m for correct answer)

(1 m awarded if students do not convert km to m, but show workings) [2]

(b)
$$a = \frac{v - u}{t} = \frac{55 - 0}{7} = 7.86 \text{ m/s}^2$$

(1 m for correct substitution, 1 m for correct answer)

[2]

(c)
$$F = ma = (920)(7.86) = 7230 \text{ N}$$

(1 m for correct substitution, 1 m for correct answer)

[2]

(d) Stopping distance would increase, due to the decreased friction between the tyres and the road/brakes

Total marks = 8

5 (a) X marked between 2 and 6 minutes [1]

(b) [4]

	solid state	liquid state
arrangement of molecules	<u>Closely packed</u> in an <u>orderly</u> arrangement	<u>Closely packed, disorderly/no long range order</u>
movement of molecules	<u>Vibrates</u> about a <u>fixed position</u>	<u>Slip and slide</u> over each other

1m for each correct description

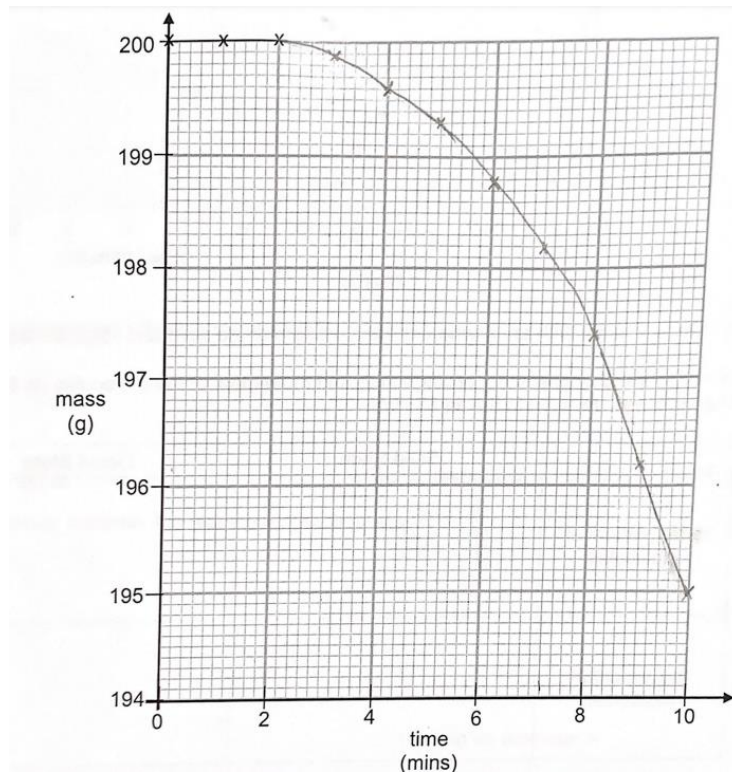
(c) (i) 1 m for every 4 points plotted correctly

If students make a mistake for 1 point, can still award 2 m

[2]

(ii) Curved line of best fit drawn correctly

[1]



- (iii) The liquid evaporates / Some molecules escape from the surface of the liquid / Any reasonable answer

[1]

Total marks = 8

- 6 (a) Neutral [1]
Blue

- (b) (i) $Q = It = (14.2)(5 \times 60) = 4260 \text{ C}$ [2]

(1 m for correct substitution, 1 m for correct answer)

If students show substitution but did not convert time to seconds, to award 1 m.

- (ii) $P = IV = (14.2)(240) = 3410 \text{ W}$ [2]
(1 m for correct substitution, 1 m for correct answer)

- (iii) 15 A [1]

- (c)
1. The circuit breaker would trip (when the earth wire touches the neutral wire, current would flow in the earth wire, causing the circuit breaker to trip)
 2. The fuse would blow (as the earth wire has a low resistance, a larger than normal current flows in the circuit, causing the current to exceed the fuse rating).
 3. Any other logical explanation

[Note: The explanations given here are not required to be awarded the marks]

[2]

Total marks = 8