

**HIGHER TIER
MINI PRACTICE EXAM 8**



**CALCULATOR ALLOWED
20 MINUTES ALLOWED**

1.
Ashley is playing a game.
He is going to roll two fair six-sided dice.
He will then multiply the results together, giving a final score.
Ashley will win the game if his score is a multiple of 4.

Work out the probability that Ashley wins the game.

x	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

$$\frac{15}{36} = \frac{5}{12}$$

(3)

2.

(a) Show that the equation $x^3 + 5x - 11 = 0$ has a solution between 1 and 2.

$$x=1: 1^3 + 5 \times 1 - 11 = -5$$

$$x=2: 2^3 + 5 \times 2 - 11 = 7$$

so the solution lies between 1 and 2.

(1)

(b) Show that $x^3 + 5x - 11 = 0$ can be written in the form $x = \sqrt[3]{11 - 5x}$.

$$x^3 + 5x - 11 = 0$$

$$x^3 = 11 - 5x$$

$$x = \sqrt[3]{11 - 5x}$$

(2)

(c) Hence use the iterative formula $x_{n+1} = \sqrt[3]{11 - 5x_n}$ with a suitable x_0 to find the solution to the equation $x^3 + 5x - 11 = 0$ to 2 decimal places.

(Choose x_0 to be either 1 or 2)

$$x_0 = 1$$

$$x_1 = \sqrt[3]{11 - 5 \times 1} = 1.817120593$$

$$x_2 = \sqrt[3]{11 - 5 \times 1.817120593} = 1.241682817$$

$$\underline{x = 1.51}$$

(3)

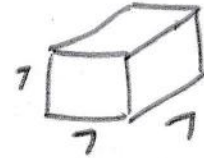
3.

A solid cube of wood has a mass of 1,372g and a density of 4 g/cm³.
Find the surface area of the block of wood.

$$D^M V$$

$$\text{Volume} = 1,372 \div 4 = 343 \text{ cm}^3$$

$$\text{Side length} = \sqrt[3]{343} = 7 \text{ cm}$$



$$\text{Surface area} = 7 \times 7 \times 6 = \underline{\underline{294 \text{ cm}^2}}$$

(4)

4.

Factorise fully: $5x^3 - 80x$

$$5x(x^2 - 16)$$

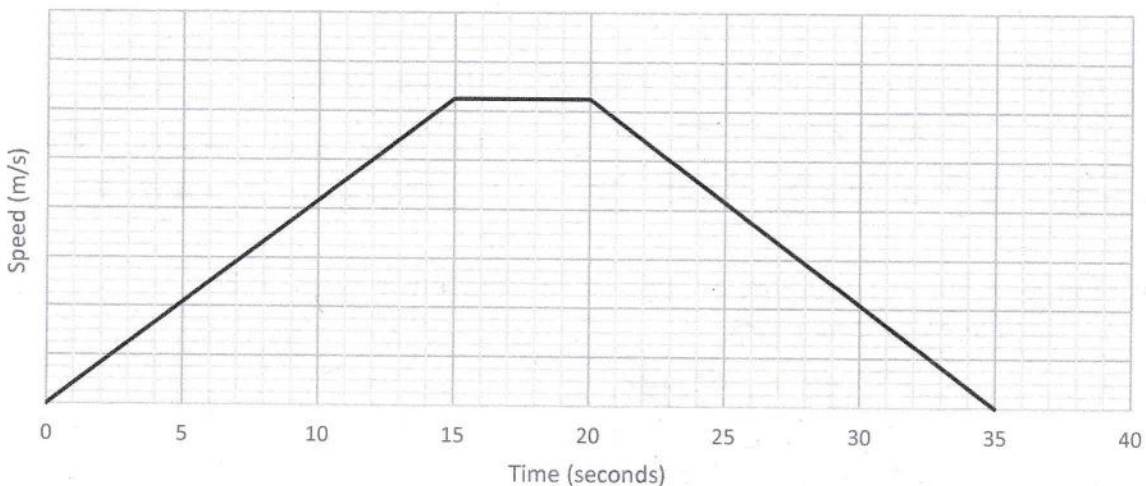
$$\underline{\underline{5x(x-4)(x+4)}}$$

(2)

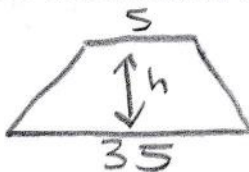
5.

James ran 250 metres.

The velocity-time graph below shows how his velocity varied across the run.



(a) What was James's maximum speed?



$$\frac{s+35}{2} \times h = 250$$

$$\underline{\underline{h = 12.5 \text{ m/s}}}$$

(3)

(b) Find James's acceleration in the first 15 ^{seconds} ~~minutes~~ of the run, to 2 decimal places.

$$12.5 \div 15 = 0.8\dot{3} = \underline{\underline{0.83 \text{ m/s}^2}}$$

(2)