

M2 PAPER A

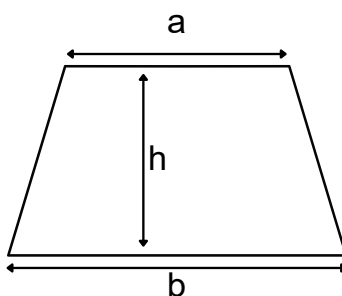
NI TUTORING SCHOOL – ANSWERS



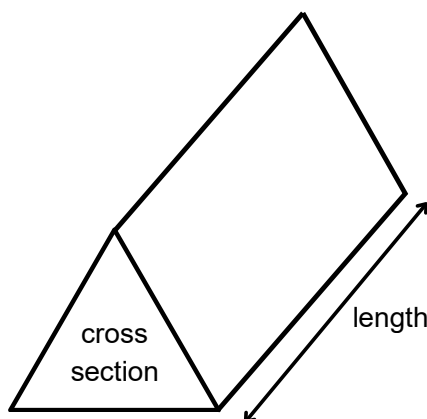


Formula Sheet

Area of a trapezium = $\frac{1}{2}(a + b)h$



Volume of prism = area of cross section x length





1

A (0, -3)

B (8, -5)

Find the co-ordinates of the mid-point of the line AB

A (0, -3)
mid (4, -4)
(8, -5)

$$\frac{0+8}{2}=4$$

$$\frac{-3+(-5)}{2}=-4$$

Answer: (4, -4) [2]

2

A pair of shoes normally costs £65. In the January sales the price is £50. Calculate the percentage decrease.

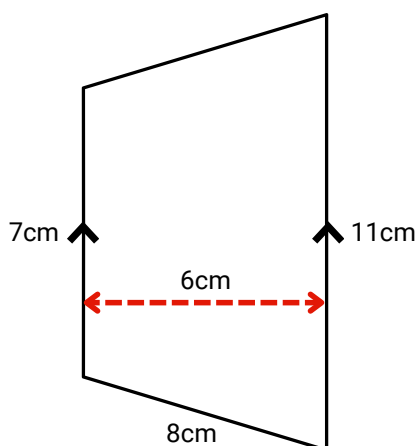
change = £15✓
original = £65✓

$$\frac{15}{65} \times 100 = 23.0769 \checkmark$$

Answer: 23.1% [3]

3

Calculate the area of this trapezium.



$$\begin{aligned} &\frac{1}{2}(a+b)h \\ &\frac{1}{2}(7+11) \times 6 \\ &9 \times 6 \checkmark \\ &= 54 \text{ cm}^2 \checkmark \end{aligned}$$

Answer: 54 cm² [3]



4 a) Expand:

$$4(3x - 5)$$
$$12x - 20$$

Answer: $12x - 20$ [2]

b) Factorise:

$$14x + 35$$
$$7(2x + 5)$$

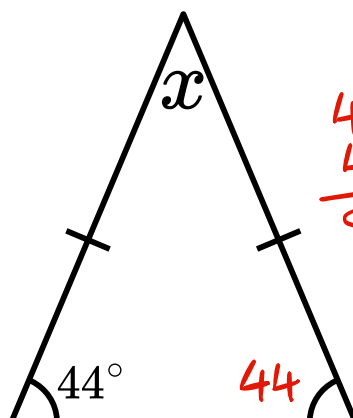
Answer: $7(2x + 5)$ [2]

c) Solve:

$$5x - 15 = 25$$
$$+15 \quad +15$$
$$5x = 40$$
$$x = 8$$

Answer: $x = 8$ [2]

5 a) Find x



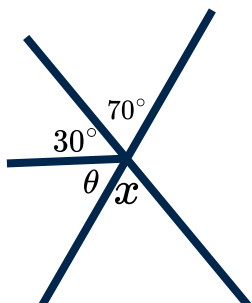
$$\begin{array}{r} 44 \\ 44 + \\ \hline 88 \end{array}$$

$$\begin{array}{r} 180 \\ - 88 \\ \hline 92 \end{array}$$

$x =$ 92 ° [2]



b) Find the missing angles:



i)

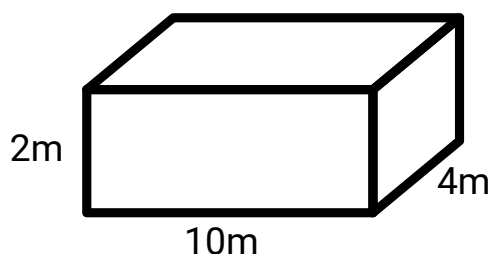
$$x = \underline{70}^{\circ} [1]$$

$$\begin{aligned} 70 + 30 &= 100 \\ 180 - 100 &= 80 \end{aligned}$$

ii)

$$\theta = \underline{80}^{\circ} [1]$$

6 Air has a density of 1.225 kg/m^3 . Calculate the mass of air in the following container.



$$V = 2 \times 10 \times 4 = 80 \text{ m}^3 \checkmark$$

$$D = 1.225 \text{ kg/m}^3$$

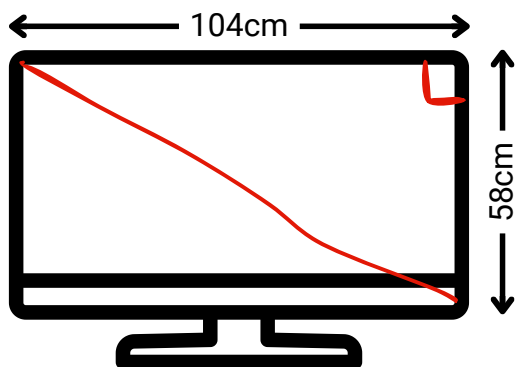
$$M = ?$$

$$\begin{aligned} M &= D \times V \checkmark \\ &= 1.225 \times 80 \\ &= 98 \checkmark \end{aligned}$$

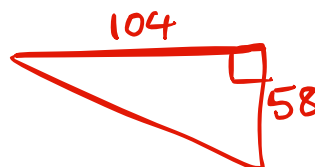
$$\text{Answer } \underline{98 \text{ kg}} [4]$$



- 7 A TV has a width of 104cm and a height of 58cm. Televisions are advertised using the length of the diagonal of the screen. Calculate the screen size of the television, measured along the diagonal. Leave your answer to the nearest centimetre.



Pythagoras!



$$\begin{aligned}c^2 &= a^2 + b^2 \\c^2 &= 104^2 + 58^2 \checkmark \\c &= \sqrt{104^2 + 58^2} \\&= 119.07 \checkmark\end{aligned}$$

Answer 119 cm [3]

- 8 Daniel earns £31,500 per year.
He has a tax-free personal allowance of £10,500.
The rest of his income is taxed at 22%

How much take-home pay does Daniel receive after tax has been deducted?
Show your working clearly.

$$\begin{array}{r}31,500 \\ - 10,500 \\ \hline 20,000\end{array}$$

$$20,000 \times 0.22 = 4400 \checkmark$$

$$20,000 - 4400 = 15600 \checkmark$$

$$\begin{aligned}\text{THP} &= 10,500 + 15,600 \\&= 26100 \checkmark\end{aligned}$$

Answer £26100 [3]



- 9 A teacher is buying 40 chocolate bars for a school trip.
Each bar normally costs 40p
Two shops have special offers.

Super Saver Shop

25% off every 8 bars

Corner Shop

Buy 3 bars
and get 1 free!

Stephen says:

"The Super Saver Shop is cheaper."

SS

$$8 \times 40p = \text{£}3.20$$

$$\text{£}3.20 \times 0.75 = \text{£}2.40$$

$$\text{£}2.40 \times 5 = \text{£}12 \checkmark$$

CS

4 bars cost

$$3 \times 40p = \text{£}1.20$$

so
40 bars cost $\text{£}12 \checkmark$

Is Stephen correct? Circle Yes or No and justify your answer.

Yes

No

Same price. $\checkmark$

[4]



- 10 a) What percentage of 400g is 2.4kg ?

$$2.4\text{kg} = 2400\text{g} \checkmark$$

$$\frac{400}{2400} \times 100 = 16.67\% \checkmark$$

Answer 16.7 % [2]

- b) Ben and Olivia both invest £3000 in savings accounts.

Ben invests his money in an account that pays
4% **simple interest** per year for 2 years.

Olivia invests her money in an account that pays
3% **compound interest** per year for 3 years.

Who will have more money at the end of their investment and by how much?

Ben

$$3000 \times 0.04 \times 2 \\ = £240 \checkmark$$

$$\text{Total} = £3240 \checkmark$$

Olivia

$$3000 \times 1.03^3 \\ = £3278.18 \checkmark$$

$$\begin{array}{r} 3278.18 \\ 3240.00 \\ \hline 38.18 \checkmark \end{array}$$

Answer: Olivia will have £ 38.18 more [4]



11

The table shows the number of minutes students spent revising for a test.

Time (mins)	Frequency	x	fx
$0 \leq t < 20$	5	10	50
$20 \leq t < 40$	12	30	360
$40 \leq t < 60$	7	50	350
$60 \leq t < 80$	2	70	140

$$\sum f = 26$$

$$\sum fx = 900$$

a) What is the **modal** class interval?

Answer: $20 \leq t < 40$ [1]

b) Determine the **median** class interval.

$$\frac{26}{2} = 13$$

Answer: $20 \leq t < 40$ [1]

c) Calculate an **estimate of the mean** time spent revising.

$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{900}{26} = 34.6 \text{ mins}$$

Answer: 34.6 mins [3]

d) Explain why your answer to part (c) is only an estimate

We do not use exact values in each class interval - instead we estimate by using midpoints.

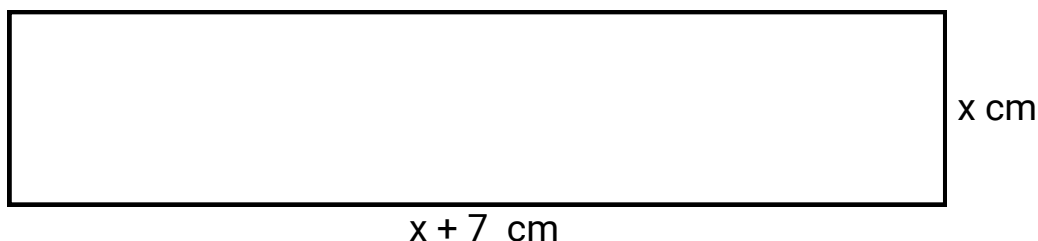
[1]



12

The diagram shows a rectangle.

- The length of the rectangle is $(x + 7)$ cm
- The width of the rectangle is x cm



- a) Write an expression for the **perimeter** of the rectangle in terms of x .

$$x + x + 7 + x + x + 7$$

$$4x + 14$$

Answer: $4x + 14$ [2]

- b) The perimeter of the rectangle is **62cm**.

By **forming and solving an equation**, find the value of x .

Hence, find the **area of the rectangle**.

$$4x + 14 = 62$$

$$\begin{array}{r} -14 \quad -14 \\ 4x = 48 \end{array}$$

$$4x = 48$$

$$x = 12$$

$$\text{So } x + 7 = 19$$

$$\text{Area} = 12 \times 19 = 228 \text{ cm}^2$$

Answer: 228 cm^2 [4]