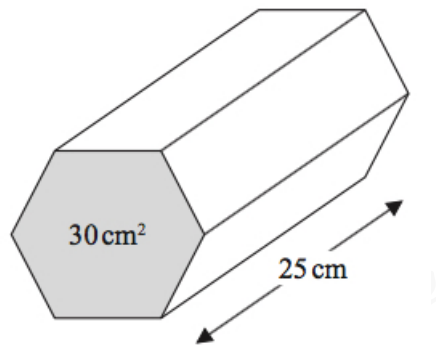


Dr Oliver Mathematics
GCSE Mathematics
2016 Paper 1H: Non-Calculator
1 hour 45 minutes

The total number of marks available is 100.
You must write down all the stages in your working.

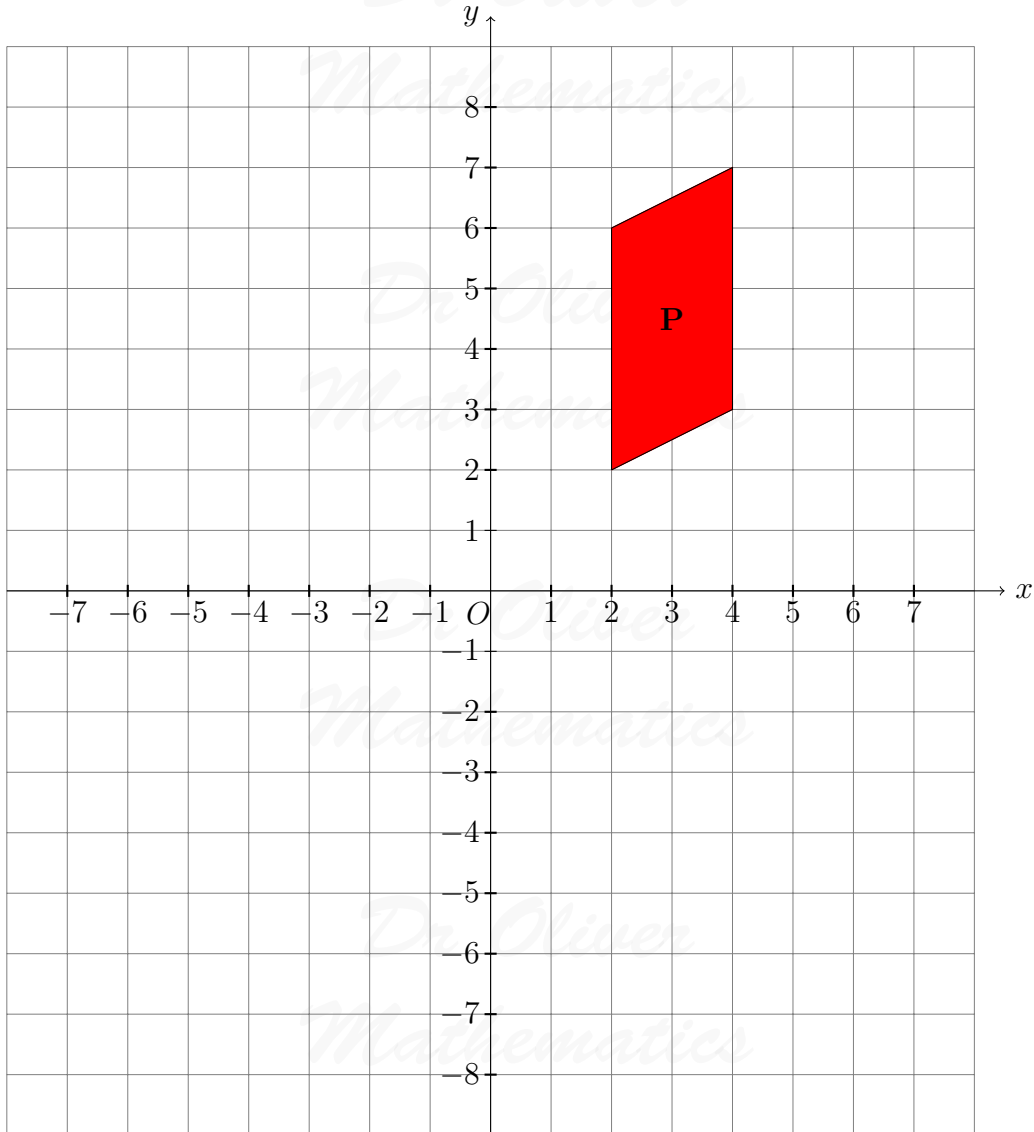
1. The diagram shows a prism.

(3)



The area of the cross section of the prism is 30 cm^2 .
The length of the prism is 25 cm .
Work out the volume of the prism.

2. Here is a grid.



- (a) Reflect shape **P** in the line $x = -1$. (2)
- (b) Rotate shape **P** 90° anticlockwise about $(0, 1)$. (2)
3. Richard wants to find out how often people buy crisps. He uses this question on a questionnaire.

How often do you buy crisps?

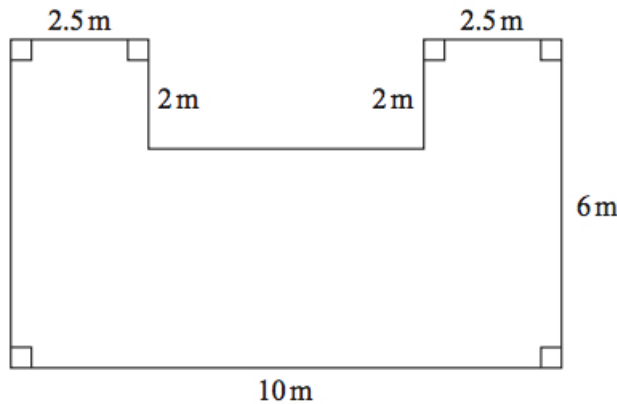
Often Sometimes Never

- (a) Write down **two** things that are wrong with this question. (2)

- (b) Design a better question for Richard to use on his questionnaire to find out how often people buy crisps. (2)

Richard is going to ask the students in his maths class to answer his questionnaire.

- (c) This may **not** be a good sample to use. (1)
Give one reason why.
4. (a) Simplify $p^2 \times p^5$. (1)
(b) Simplify $g^6 \div g^4$. (1)
(c) Simplify $(k^3)^2$. (1)
(d) Expand and simplify $3(m + 4) - 2(4m + 1)$. (2)
(e) Factorise $n^2 - 7n$. (1)
5. There are 892 litres of oil in Mr Aston's oil tank. (2)
He uses 18.7 litres of oil each day.
Estimate the number of days it will take him to use all the oil in the tank.
6. One of the teachers at a school is chosen at random. (3)
The probability that this teacher is female is $\frac{3}{5}$.
There are 36 **male** teachers at the school.
Work out the total number of teachers at the school.
7. The diagram shows the plan of a floor. (5)



Angie is going to varnish the floor.
She needs 1 litre of varnish for 5 m^2 of floor.
There are 2.5 litres of varnish in each tin of varnish.
Angie has 3 tins of varnish.
Does she have enough varnish for all the floor?
You must show all your working.

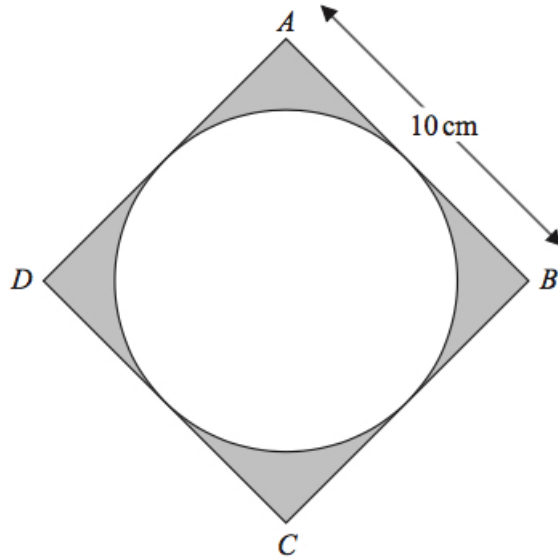
8. Carol spins a spinner 80 times. (3)
The table shows information about her results.

Outcome	Frequency
J	39
K	25
L	16

Dan spins this spinner 300 times.

Work out an estimate for the number of times that Dan will get an L .

9. A shop sells packets of envelopes. (3)
There are 5 envelopes in a small packet.
There are 20 envelopes in a large packet.
There is a total of T envelopes in x small packets and y large packets.
Write down a formula for T in terms of x and y .
10. Point P has coordinates $(5, 7)$. (2)
Point M has coordinates $(1, 2.5)$.
Point M is the midpoint of the line PQ .
Find the coordinates of point Q .
11. 66 people went on a day trip. (4)
Each person did only one activity on the trip.
Each person went skating or went to an art gallery or went bowling.
43 of the people are female.
4 of the 10 people who went skating are male.
20 of the people went to the art gallery.
10 males went bowling.
Work out the number of females who went to the art gallery.
12. The diagram shows a circle inside a square. (3)



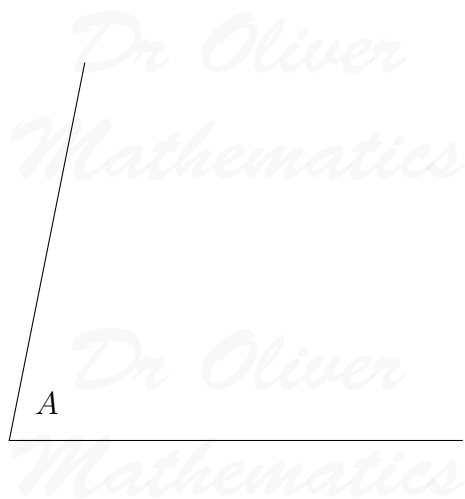
$ABCD$ is a square of side 10 cm.
 Each side of the square is a tangent to the circle.
 Work out the total area of the shaded regions in terms of π .
 Give your answer in its simplest form.

13. The table gives information about Ali's spending last month. (3)

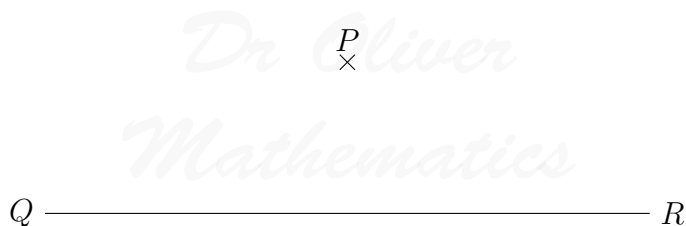
Item	Percentage of total spending
Rent	30%
Food	15%
Transport	12%
Other	43%

Ali's total spending last month was £800.
 Next month Ali's rent, in pounds, is going to rise by 20%.
 His total spending will still be the same.
 Express the amount of money Ali will spend on rent next month as a percentage of £800.

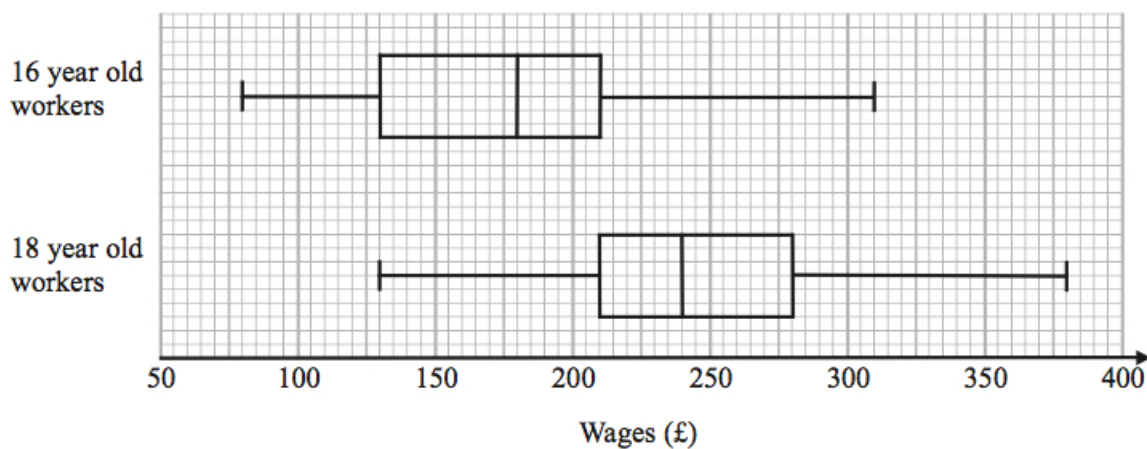
14. (a) Use ruler and compasses to bisect the angle at A . (2)
 You must show all your construction lines.



- (b) Use ruler and compasses to construct the perpendicular from the point P to the line QR . (2)
 You must show all your construction lines.



15. The box plots give information about the wages of a group of 16 year old workers and a group of 18 year old workers.



- (a) Compare the distribution of the wages of the 16 year old workers with the distribution of the wages of the 18 year old workers. (3)

There are 200 workers who are 16 years old.

- (b) Work out an estimate for the number of these workers whose wages are £130 or more. (2)

16. Work out the value of $(3.5 \times 10^6) \div (5 \times 10^{-3})$. (2)

Give your answer in standard form.

17. (a) Solve $3x - 5 < 16$. (2)

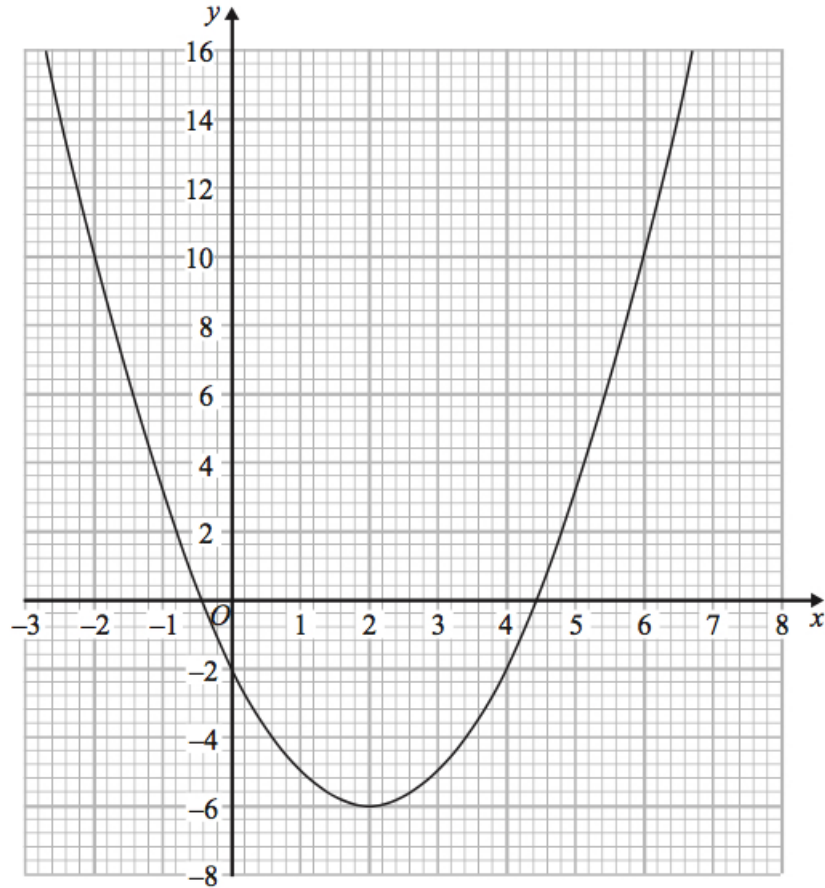
(b) Solve $\frac{11 - w}{4} = 1 + w$. (3)

18. (a) Work out $1\frac{1}{5} \times 2\frac{1}{3}$. (3)

Give your answer as a mixed number in its simplest form.

(b) Work out $2\frac{7}{15} - 1\frac{2}{3}$. (3)

19. The diagram shows the graph of $y = x^2 - 4x - 2$.



- (a) Use the graph to find estimates for the solutions of (3)
- (i) $x^2 - 4x - 2 = 0$,
 - (ii) $x^2 - 4x - 6 = 0$.
- (b) Use the graph to find estimates for the values of x that satisfy the simultaneous equations $y = x^2 - 4x - 2$ and $x + y = 6$. (3)

20. P , M , and S are points on a circle, centre O . (5)

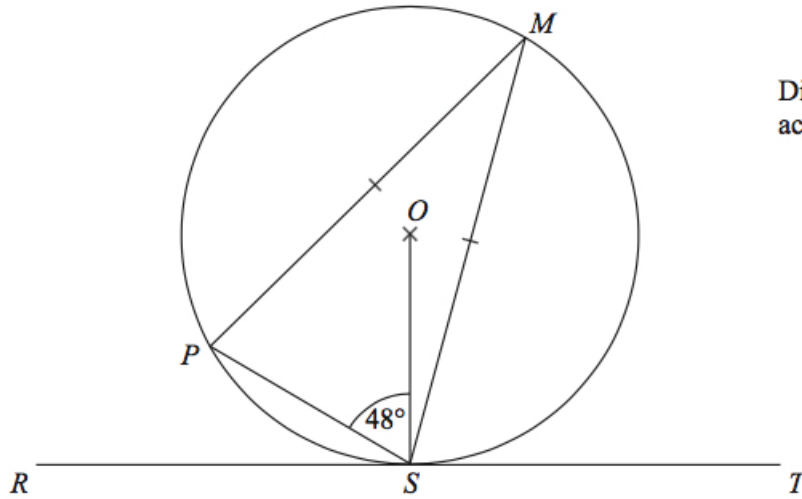


Diagram **NOT** accurately drawn

RST is a tangent to the circle.

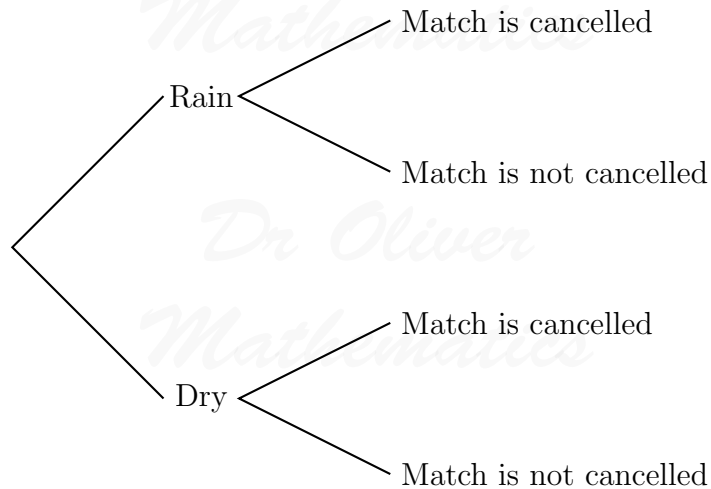
Angle $PSO = 48^\circ$.

$MP = MS$.

Work out the size of angle MST .

Give reasons for each stage of your working.

21. The probability that it will rain on a day in June is 0.2.
 When it rains the probability that my tennis match is cancelled is 0.7.
 When it does not rain, the probability that my tennis match is **not** cancelled is 0.95.
- (a) Complete the probability tree diagram for this information. (3)



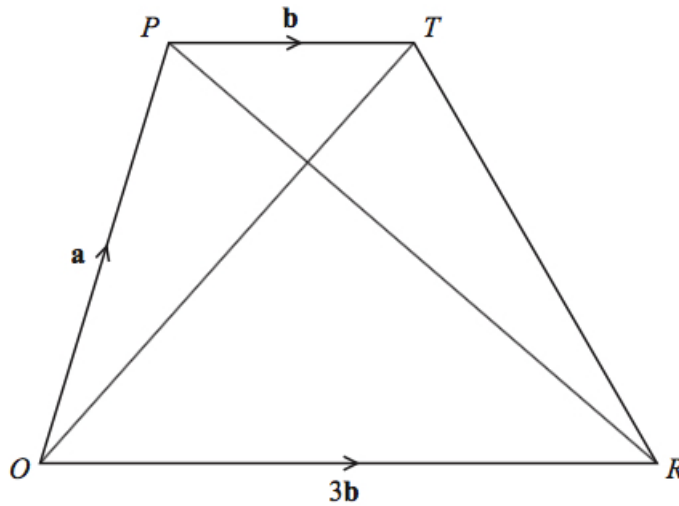
- (b) Work out the probability that, on a day in June, it does **not** rain and my tennis match is cancelled. (2)

22. Solve

$$x^2 = 4(x - 3)^2.$$

(3)

23. $OPTR$ is a trapezium.



$$\overrightarrow{OP} = \mathbf{a}.$$

$$\overrightarrow{PT} = \mathbf{b}.$$

$$\overrightarrow{OR} = 3\mathbf{b}.$$

(a) (i) Find \overrightarrow{OT} in terms of \mathbf{a} and \mathbf{b} .

(2)

(ii) Find \overrightarrow{PR} in terms of \mathbf{a} and \mathbf{b} .

Give your answer in its simplest form.

S is the point on PR such that $PS : SR = 1 : 3$.

(b) Find \overrightarrow{OS} in terms of \mathbf{a} and \mathbf{b} .

(2)

Give your answer in its simplest form.

(c) What does your answer to part (b) tell you about the position of point S ?

(2)

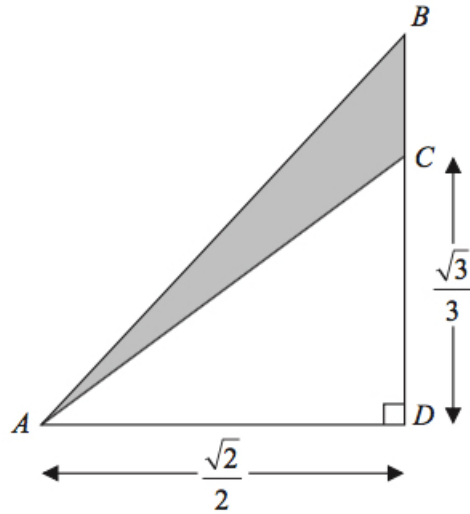
24. Given that $y \propto \frac{1}{x^2}$, complete this table of values.

(4)

x	1	2	5	10
y				1

25. ABD is a right angled triangle.

(3)



All measurements are given in centimetres.
 C is the point on BD such that $CD = \frac{\sqrt{3}}{3}$.
 $AD = BD = \frac{\sqrt{2}}{2}$.
Work out the exact area, in cm^2 , of the shaded region.

*Dr Oliver
Mathematics*

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Mathematics*

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Mathematics*