

Dr Oliver Mathematics
GCSE Mathematics
2017 November Paper 1H: Non-Calculator
1 hour 30 minutes

The total number of marks available is 80.

You must write down all the stages in your working.

1. Write 36 as a product of its prime factors. (2)

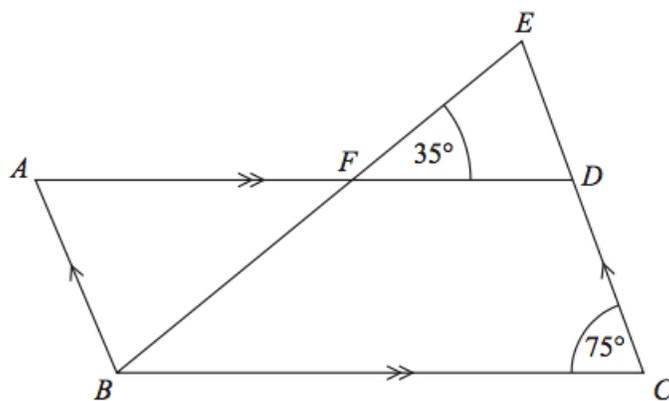
2. Kiaria is 7 years older than Jay. (4)

Martha is twice as old as Kiaria.

The sum of their three ages is 77.

Find the ratio of Jay's age to Kiaria's age to Martha's age.

3. $ABCD$ is a parallelogram. (4)



EDC is a straight line.

F is the point on AD so that BFE is a straight line.

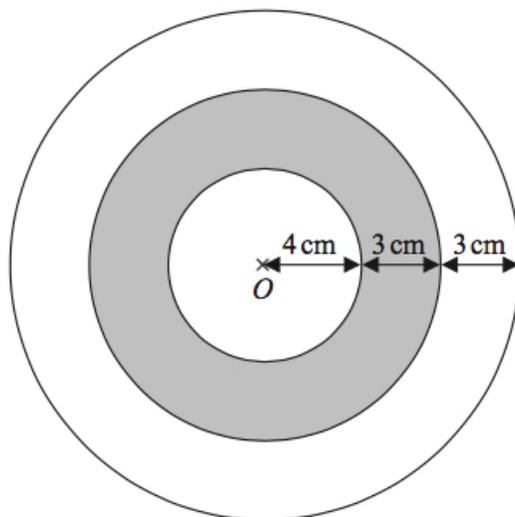
Angle $EFD = 35^\circ$.

Angle $DCB = 75^\circ$.

Show that angle $ABF = 70^\circ$.

Give a reason for each stage of your working.

4. The diagram shows a logo made from three circles. (4)



Each circle has centre, O .

Daisy says that exactly $\frac{1}{3}$ of the logo is shaded.

Is Daisy correct?

You must show all your working.

5. The table shows information about the weekly earnings of 20 people who work in a shop.

Weekly earnings ($\pounds x$)	Frequency
$150 < x \leq 250$	1
$250 < x \leq 350$	11
$350 < x \leq 450$	5
$450 < x \leq 550$	0
$550 < x \leq 650$	3

- (a) Work out an estimate for the mean of the weekly earnings. (3)

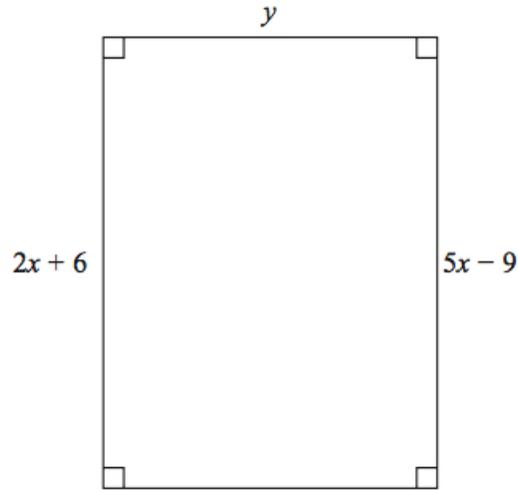
Nadiya says, "The mean may not be the best average to use to represent this information."

- (b) Do you agree with Nadiya? (1)

You must justify your answer.

6. Here is a rectangle. (4)

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All measurements are in centimetres.
The area of the rectangle is 48 cm^2 .

Show that $y = 3$.

7. Brogan needs to draw the graph of

(1)

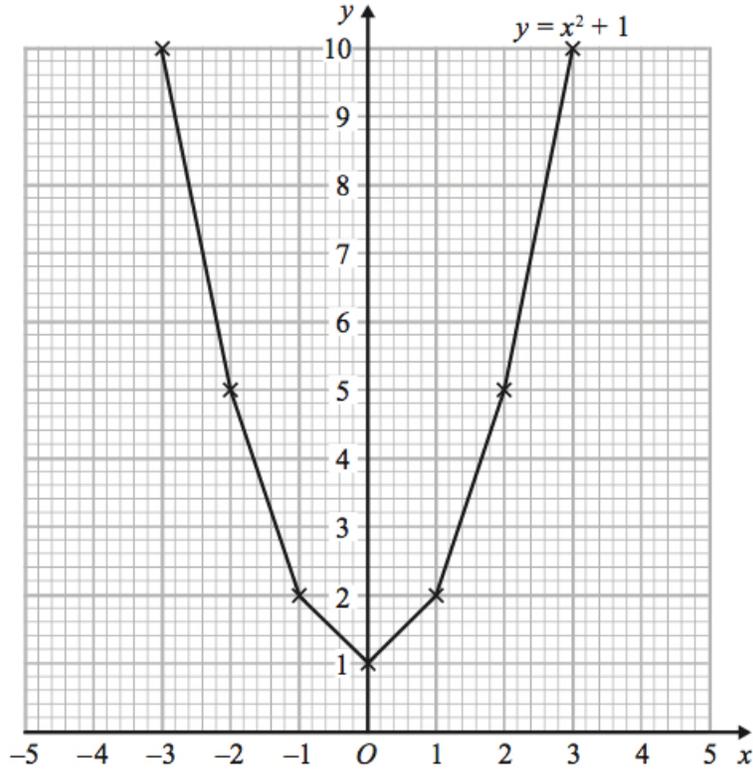
$$y = x^2 + 1.$$

Here is her graph.

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Write down one thing that is wrong with Brogan's graph.

8. Write these numbers in order of size. (2)
Start with the smallest number.

$$0.2\dot{4}\dot{6} \quad 0.24\dot{6} \quad 0.\dot{2}4\dot{6} \quad 0.246$$

9. James and Peter cycled along the same 50 km route. (5)
James took $2\frac{1}{2}$ hours to cycle the 50 km.

Peter started to cycle 5 minutes after James started to cycle.
Peter caught up with James when they had both cycled 15 km.

James and Peter both cycled at constant speeds.

Work out Peter's speed.

10. (a) Write down the value of $100^{\frac{1}{2}}$. (1)

- (b) Find the value of $125^{\frac{2}{3}}$. (2)

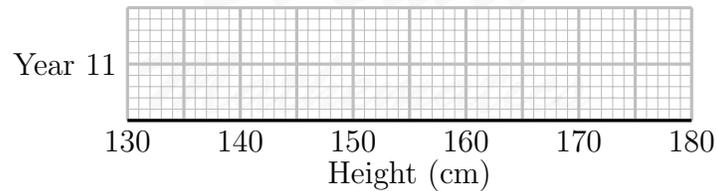
11. 3 teas and 2 coffees have a total cost of £7.80. (4)
 5 teas and 4 coffees have a total cost of £14.20.

Work out the cost of one tea and the cost of one coffee.

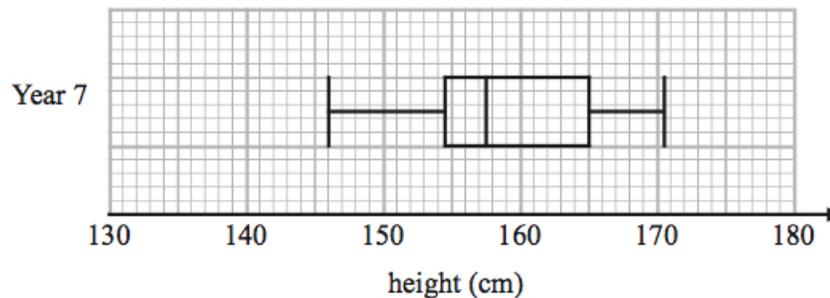
12. The table shows information about the heights, in cm, of a group of Year 11 girls.

Value	Height (cm)
Least height	154
Median	165
Lower Quartile	161
Interquartile Range	7
Range	20

- (a) Draw a box plot for this information. (3)



The box plot below shows information about the heights, in cm, of a group of Year 7 girls.



- (b) Compare the distribution of heights of the Year 7 girls with the distribution of heights of the Year 11 girls. (2)
13. A factory makes 450 pies every day.
 The pies are chicken pies or steak pies.

Each day Milo takes a sample of 15 pies to check.

The proportion of the pies in his sample that are chicken is the same as the proportion of the pies made that day that are chicken.

On Monday Milo calculated that he needed exactly 4 chicken pies in his sample.

- (a) Work out the total number of chicken pies that were made on Monday. (2)

On Tuesday, the number of steak pies Milo needs in his sample is 6 correct to the nearest whole number.

Milo takes at random a pie from the 450 pies made on Tuesday.

- (b) Work out the lower bound of the probability that the pie is a steak pie. (2)

14. The ratio (3)

$$(y + x) : (y - x)$$

is equivalent to $k : 1$.

Show that

$$y = \frac{x(k + 1)}{k - 1}.$$

15. $x = 0.4\dot{3}\dot{6}$. (3)

Prove algebraically that x can be written as $\frac{24}{55}$.

16. y is directly proportional to $\sqrt[3]{x}$. (3)

$$y = 1\frac{1}{6} \text{ when } x = 8.$$

Find the value of y when $x = 64$.

17. n is an integer. (2)

Prove algebraically that the sum of

$$\frac{1}{2}n(n + 1)$$

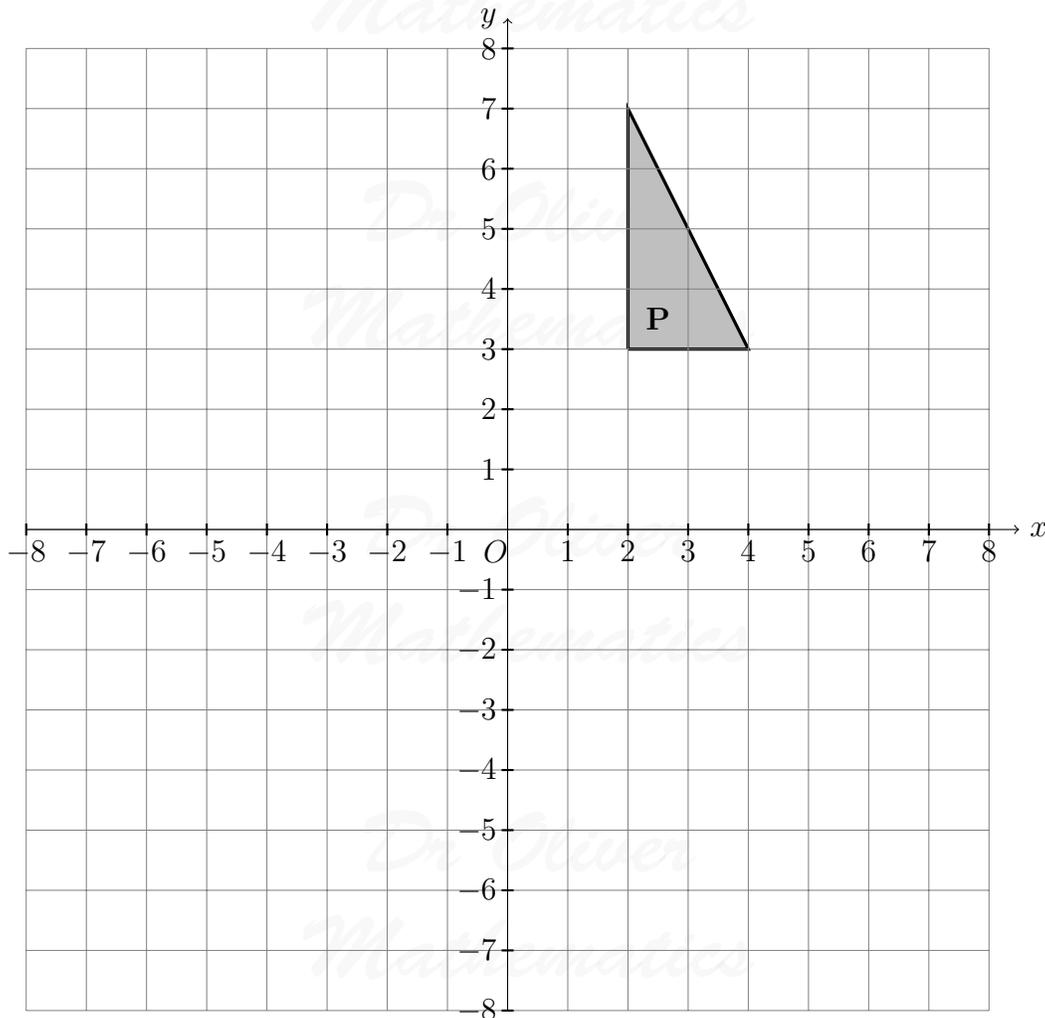
and

$$\frac{1}{2}(n + 1)(n + 2)$$

is always a square number.

18. Enlarge shape **P** by scale factor $-\frac{1}{2}$ with centre of enlargement $(0, 0)$.

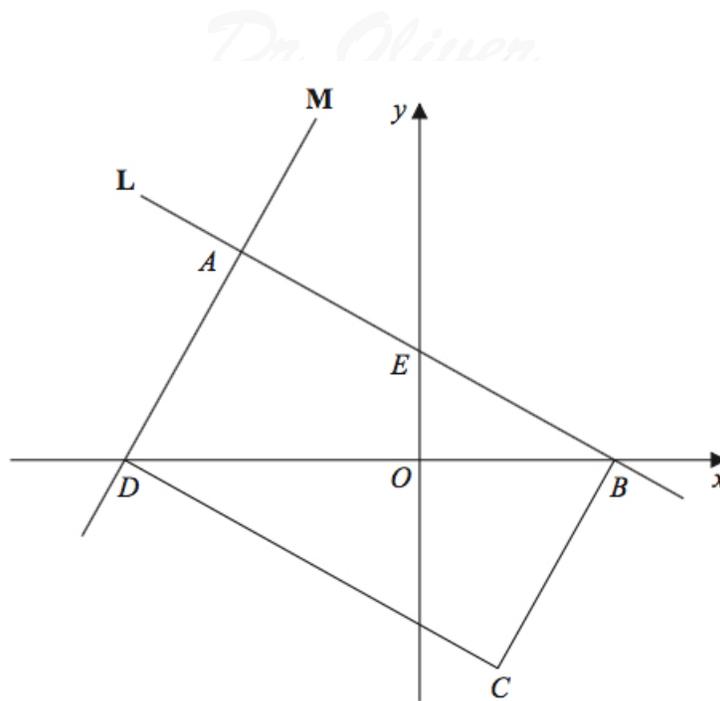
(2)



Label your image **Q**.

19. $ABCD$ is a rectangle.

(4)



A , E , and B are points on the straight line L with equation

$$x + 2y = 12.$$

A and D are points on the straight line M .

$$AE = EB.$$

Find an equation for M .

20. The table shows some values of x and y that satisfy the equation (4)

$$y = a \cos x^\circ + b.$$

x	0	30	60	90	120	150	180
y	3	$1 + \sqrt{3}$	2	1	0	$1 - \sqrt{3}$	-1

Find the value of y when $x = 45$.

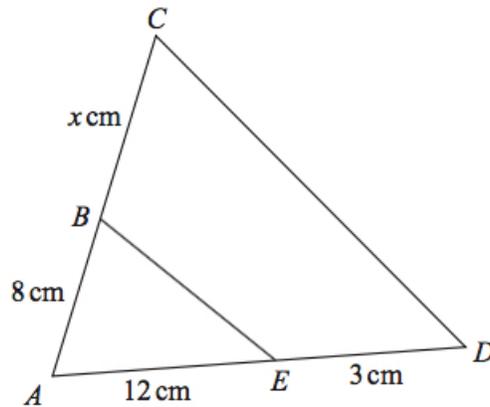
21. Show that (3)

$$\frac{6 - \sqrt{8}}{\sqrt{2} - 1}$$

can be written in the form $a + b\sqrt{2}$ where a and b are integers.

22. The two triangles in the diagram are similar.

(5)



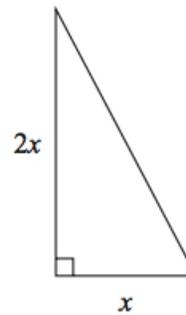
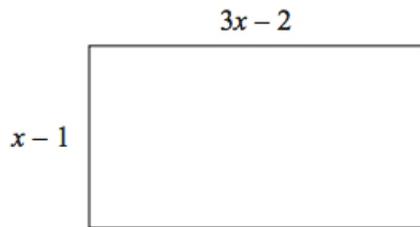
There are two possible values of x .

Work out each of these values.

State any assumptions you make in your working.

23. Here is a rectangle and a right-angled triangle.

(5)



All measurements are in centimetres.

The area of the rectangle is greater than the area of the triangle.

Find the set of possible values of x .