Dr Oliver Mathematics
AQA GCSE Mathematics
2017 November Paper 1: 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. Work out (1)

$$\sqrt{2^6 + 6^2}.$$

Circle your answer.

$$10 \quad 14 \quad 50 \quad 100.$$

2. What is (1)

$$800 \text{ million}$$

in standard form?
Circle your answer.

$$800 \times 10^6 \quad 8 \times 10^8 \quad 8 \times 10^9 \quad 0.8 \times 10^{10}.$$

3. Circle the expression that is equivalent to (1)

$$(4a^5)^2.$$

$$16a^{10} \quad 16a^7 \quad 8a^{10} \quad 8a^7.$$

4. (1)

$$y = \frac{10}{x}.$$

If the value of x doubles, what happens to the value of y?
Circle your answer.

$$\div 2 \quad \times 2 \quad \div 5 \quad \times 5.$$

5. (a) Factorise (1)

$$x^2 - 100.$$

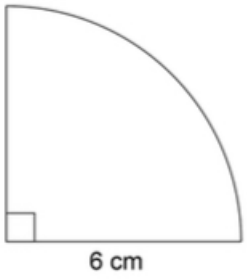
(b) Solve (2)

$$7x + 6 > 1 + 2x.$$

6. Work out the value of (2)

$$(\sqrt{3})^2 \times (\sqrt{2})^2.$$

7. Here is a quarter circle of radius 6 cm. (2)



Not drawn accurately

Work out the area of the quarter circle.
Give your answer in terms of π.

8. Three **whole** numbers are each rounded to the nearest 10. (2)

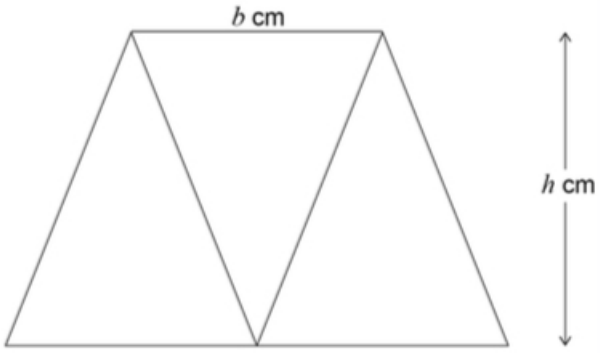
The sum of the rounded numbers is 70.

Work out the **maximum** possible sum for the original three numbers.

9. Circle the expression for the range of n consecutive integers. (1)

$$\frac{n+1}{2} \quad n-1 \quad n \quad n+1.$$

10. Three identical isosceles triangles are joined to make this trapezium.



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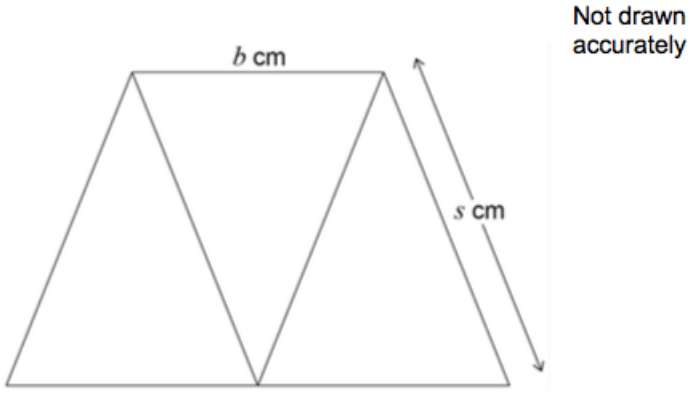
Each triangle has base b cm and perpendicular height h cm.

(a) Work out an expression, in terms of b and h, for the area of the trapezium. (2)
Give your answer in its simplest form.

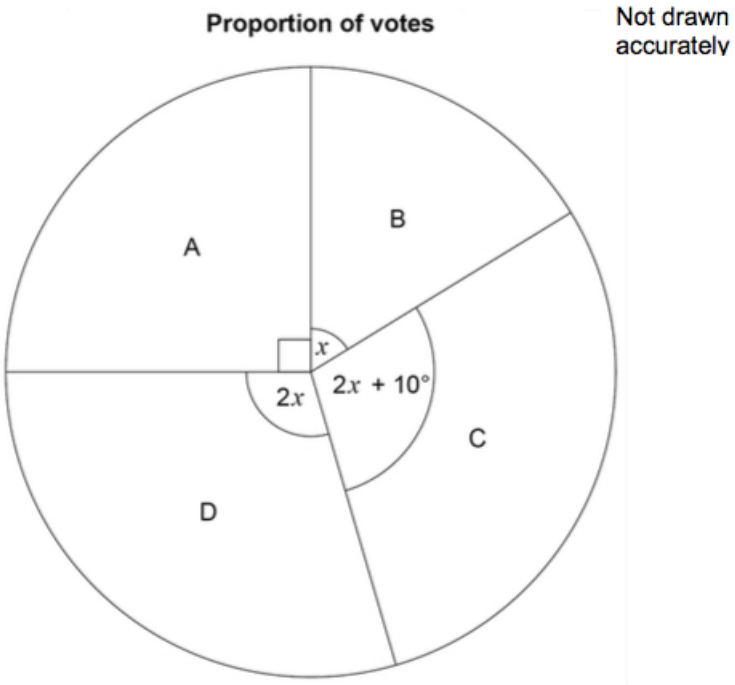
This diagram shows the same trapezium.



$b : s = 2 : 3$.

(b) Work out an expression, in terms of b, for the perimeter of the trapezium. (2)

11. The four candidates in an election were A, B, C, and D. (4)
The pie chart shows the proportion of votes for each candidate.



Work out the probability that a person who voted, chosen at random, voted for C.

12. Use approximations to 1 significant figure to estimate the value of (3)

$$\frac{0.526 \times 39.6^2}{\sqrt{97.65}}.$$

You **must** show your working.

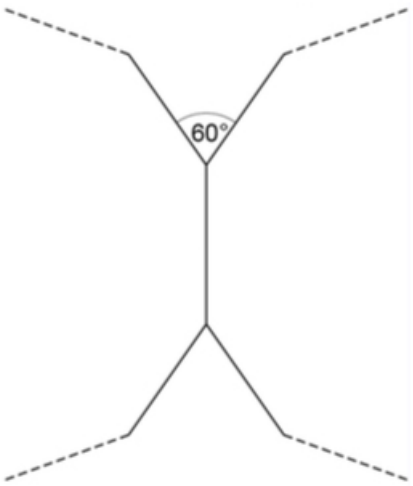
13. (3)

$$x : y = 7 : 4$$
$$x + y = 88.$$

Work out the value of

$$x - y.$$

14. Two congruent regular polygons are joined together. (3)



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Work out the number of sides on each polygon.

15. There are

- 7 different sandwiches
- 5 different drinks, and
- 3 different snacks.

Meal Deal

Choose one sandwich, one drink and one snack

(a) How many different Meal Deal combinations are there? (2)

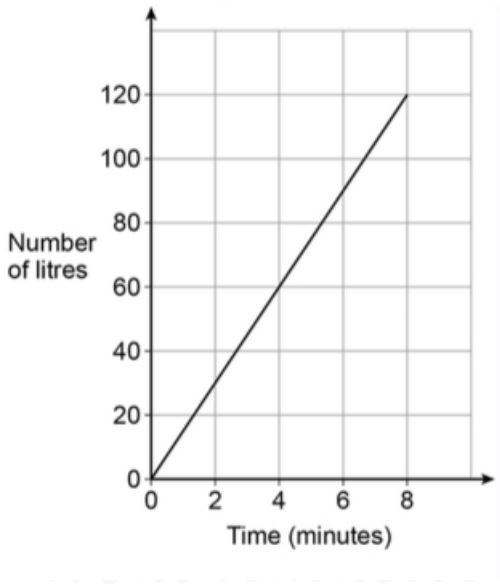
Two of the sandwiches have cheese in them.

Three of the drinks are fizzy.

Eva picks a Meal Deal at random.

(b) Work out the probability that the sandwich has cheese in it **and** the drink is fizzy. (2)
Give your answer as a fraction.

16. Water is poured into a tank. (1)
The graph shows the number of litres of water in the tank.



How much water is poured into the tank each minute?
Circle your answer.

1.5 litres 15 litres 30 litres 120 litres.

17. A and B are similar solids. (1)

Solid	Length (cm)
A	l
B	$2l$

Alex says, "The volume of B is double the volume of A because the length of B is double the length of A."'

Is he correct?
Tick a box.

Yes ☐ No ☐

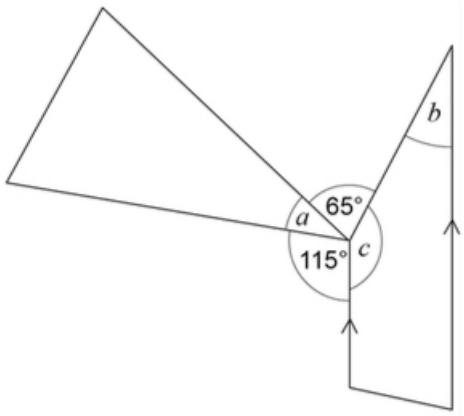
Give a reason for your answer.

18. Circle the two roots of (1)

$$(2x + 3)(5x - 2) = 0 :$$

$$-\frac{3}{2} \quad -\frac{2}{5} \quad \frac{2}{5} \quad \frac{3}{2}.$$

19. The diagram shows a triangle and a trapezium. (3)



Prove that

$$a = b.$$

20. In one month, the number of hours of exercise taken by 10 people are (2)

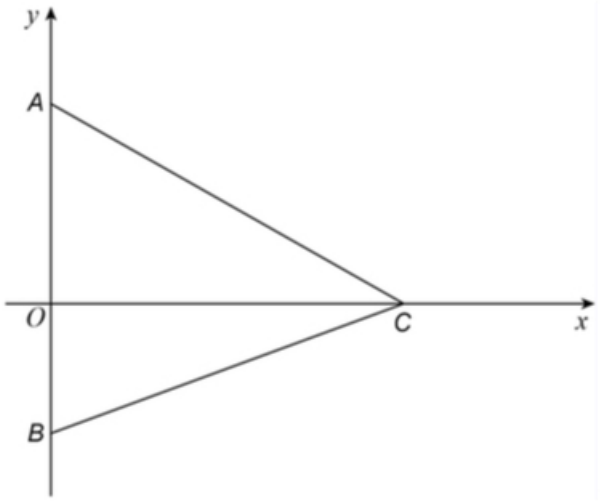
4 7 2 8 6 5 1 82 3 9.

Which is the appropriate average to use in this situation?
Tick a box.

☐ Mean ☐ Median ☐ Mode

Give one reason for each of the other two averages as to why they are **not** appropriate.

21. A, B, and C are points on the axes as shown. (2)



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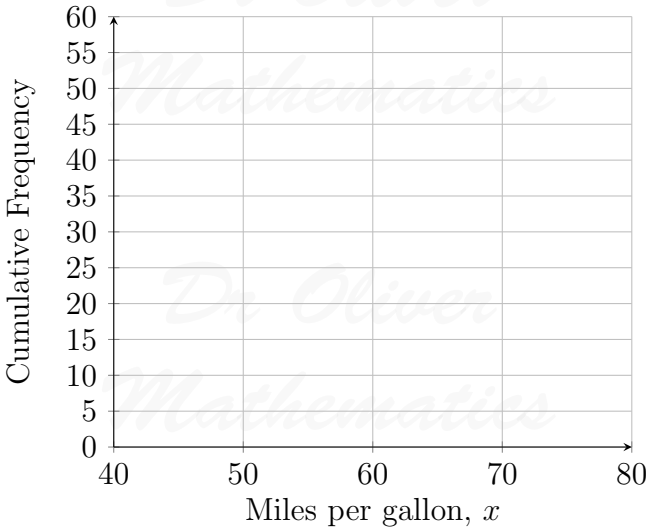
The area of triangle ABC is 28 square units.

Work out possible coordinates for A, B, and C.

22. Here is some information about the miles per gallon of 60 cars.

Miles per gallon, x	Frequency
$40 < x \leqslant 50$	6
$50 < x \leqslant 60$	16
$60 < x \leqslant 70$	28
$70 < x \leqslant 80$	10

(a) Draw a cumulative frequency graph. (3)



(b) Use the graph to work out the interquartile range. (2)

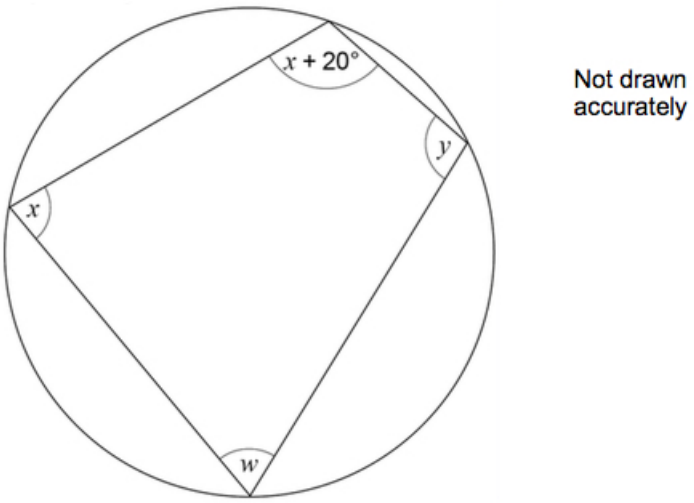
23. The equation of a curve is (1)

$$y = (x + 3)^2 + 5.$$

Circle the coordinates of the turning point.

$$(5, 3) \quad (5, -3) \quad (3, 5) \quad (-3, 5).$$

24. Here is a cyclic quadrilateral. (4)



$x : y = 5 : 7.$

Work out the size of angle w.

25. 15 machines work at the same rate. (3)

Together, the 15 machines can complete an order in 8 hours.

3 of the machines break down after working for 6 hours.

The other machines carry on working until the order is complete.

In total, how many hours does each of the other machines work?

26.

$$0.\dot{7} = \tfrac{7}{9}.$$

(a) Use this fact to show that (1)

$$0.0\dot{7} = \tfrac{7}{90}.$$

(b) Using part (a) or otherwise, convert (3)

$$0.2\dot{7}$$

to a fraction.
Give your answer in its simplest form.

27. There are 11 pens in a box. (4)

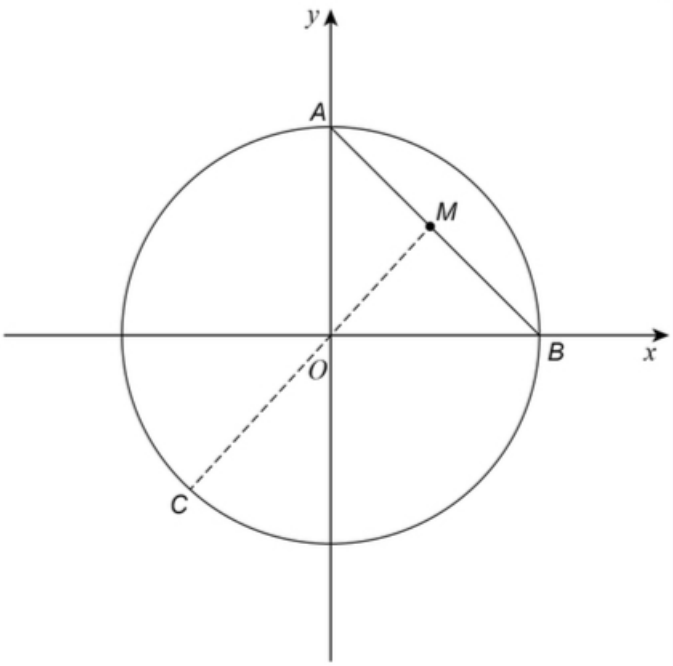
8 are black and 3 are red.

Two pens are taken out at random **without** replacement.

Work out the probability that the two pens are the **same** colour.

28. A, B, and C are points on the circle

$$x^2 + y^2 = 36.$$



- A is on the y-axis.
- B is on the x-axis.
- M is the midpoint of AB.
- COM is a straight line.

(a) Show that the coordinates of A are $(0, 6)$. (1)

(b) Work out the coordinates of B. (1)

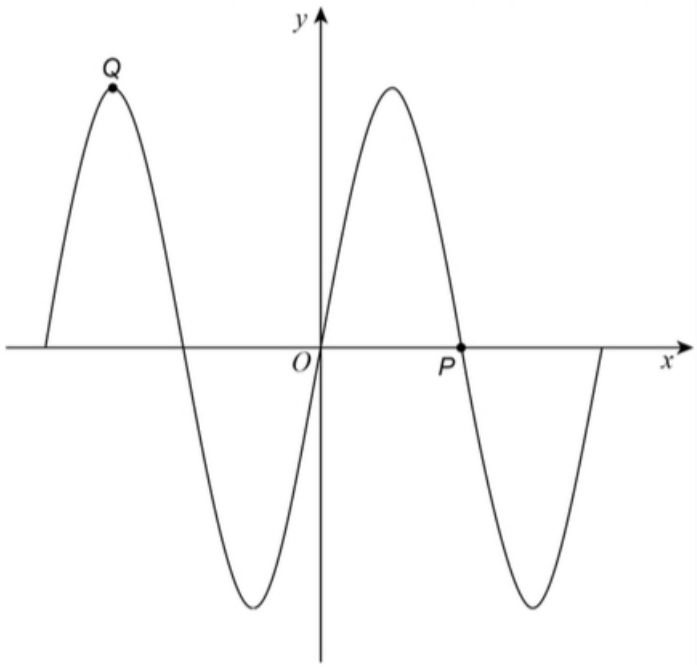
(c) Show that the equation of the straight line passing through C, O, and M is $y = x$. (2)

(d) Work out the coordinates of C. (3)
Give your answers in surd form.

29. Here is a sketch of

$$y = \sin x^\circ,$$

for $-360 \leqslant x \leqslant 360$.



(a) Write down the coordinates of P. (1)

(b) Write down the coordinates of Q. (1)

30. (a) Work out the value of (2)

$$81^{-\frac{1}{4}}.$$

(b) Write (3)

$$16 \times 8^{2x}$$

as a power of 2 in terms of x.