# Dr Oliver Mathematics
# AQA GCSE Mathematics
# 2017 June Paper 2: Calculator
# 1 hour 30 minutes

The total number of marks available is 80.
You must write down all the stages in your working.

1. Circle the decimal that is closest in value to $\frac{39}{800}$. (1)

   0.04 0.048 0.049 0.05

2. Circle the area that is equal to 36 mm$^2$. (1)

3. $A$ is $(2, 12)$ and $B$ is $(8, 2)$. (1)
   Circle the midpoint of $AB$.

   $(3, 5)$ $(4, 6)$ $(5, 7)$ $(6, 10)$

4. Here is a sequence. (1)

   90 82 74 66 58

   Circle the expression for the $n$th term of the sequence.

   $n - 8$ $98 - 8n$ $8n + 82$ $8n - 98$

5. A code has 4 digits.
   Each digit is a number from 0 to 9.
   Digits may be repeated.

   The code starts

   5 4 1

   (a) Amy knows the last digit is odd but not 7. (1)
   She chooses a different odd number at random.
   What is the probability that she chooses the correct number?

   (b) The 4-digit code is changed to an even number. (2)
   The first digit is 3.
   How many possible codes are there?

6. (a) Complete the table of values for (2)

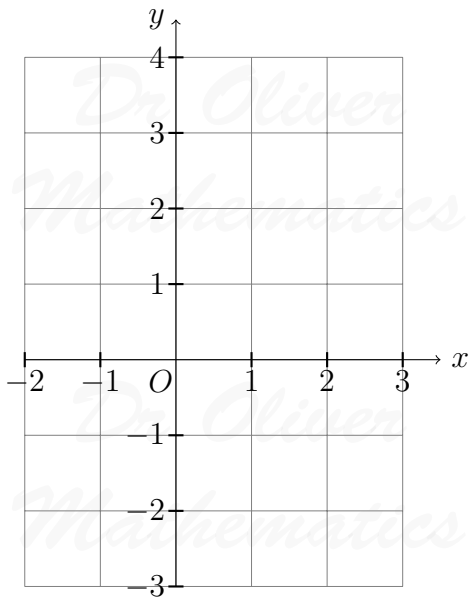
$$y = x^2 - x - 2.$$

| $x$ | $-2$ | $-1$ | $0$ | $1$ | $2$ | $3$ |
|---|---|---|---|---|---|---|
| $y$ | | | $-2$ | $-2$ | | $4$ |

(b) Draw the graph of (2)

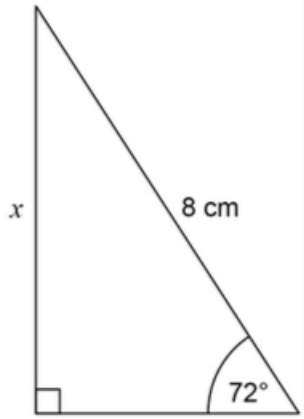
$$y = x^2 - x - 2$$

for values of $x$ from $-2$ to 3.




(c) Write down the $x$-coordinate of the turning point of the graph. (1)

7. Use trigonometry to work out the length $x$. (2)

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8. Lily goes on a car journey.

   - For the first 30 minutes her average speed is 40 miles per hour.
   - She then stops for 15 minutes.
   - She then completes the journey at an average speed of 60 miles per hour.
   - The total journey time is 1 hour.

   (a) Draw a distance-time graph for her journey. (3)

   (b) Write down the average speed for the total journey. (1)

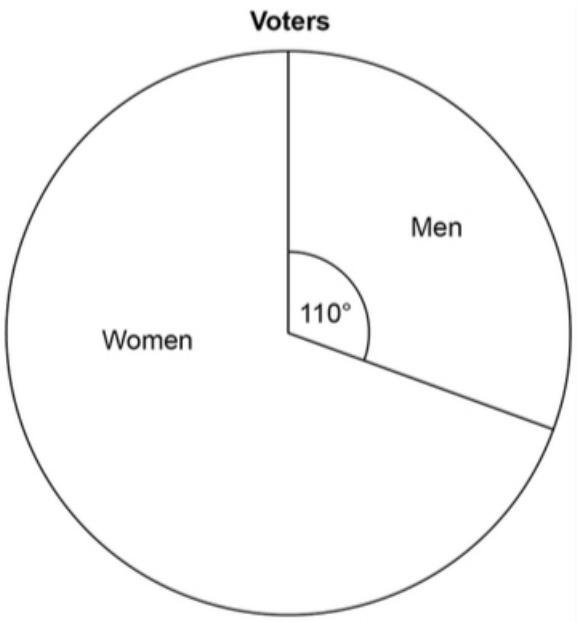
9. The table shows information about some CDs. (4)

| Type | Rock | Pop | Jazz |
|---|---|---|---|
| Number of CDs | 2 | $x$ | $2x + 5$ |

A CD is chosen at random.
The probability it is **rock** is $\frac{1}{20}$.

Work out the probability it is jazz.

10. The pie chart shows information about voters in an election. (3)



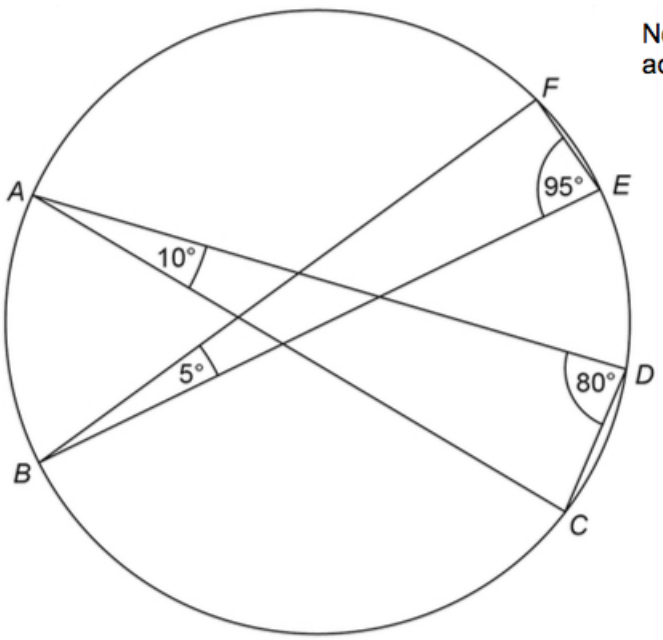

3 360 **more** women voted than men.

Work out the total number of voters.

11. Write these numbers in descending order: (2)

$$9\,563 \quad 9.56 \times 10^3 \quad 9.56 \times 3^{10}$$

12. $A$, $B$, $C$, $D$, $E$, and $F$ are points on a circle. (1)




Circle the line that is a diameter of the circle.

$BE \quad AD \quad AC \quad BF$

13. To make one cheese sandwich, Gina uses one bread roll and two cheese slices. (4)

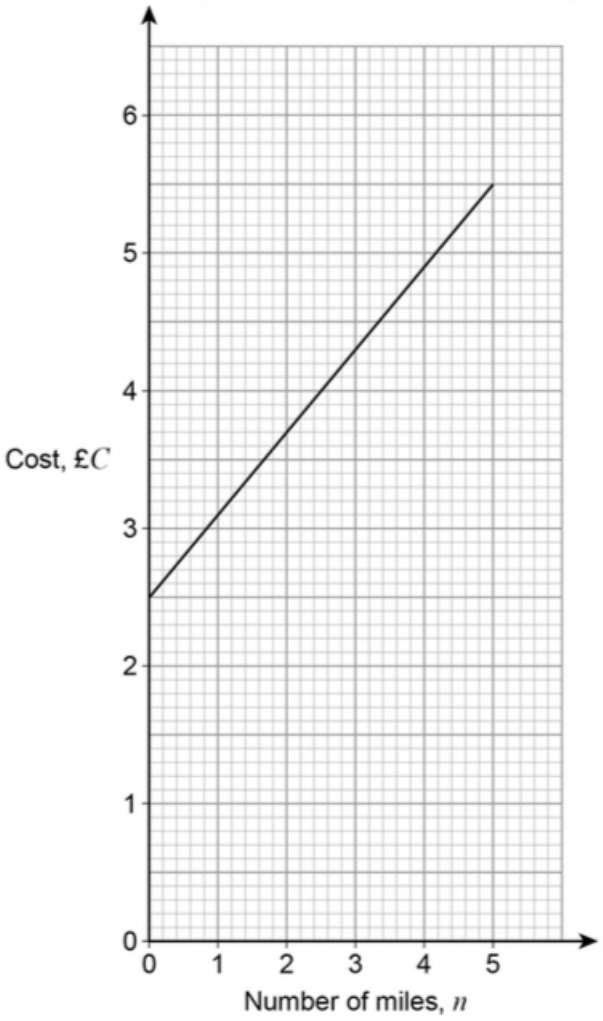
| Pack of 15 bread rolls | Pack of 20 cheese slices |
|---|---|
| £1.88 | £2.15 |

She is going to buy enough packs to

- have exactly twice as many cheese slices as bread rolls and
- make **more** than 100 cheese sandwiches.

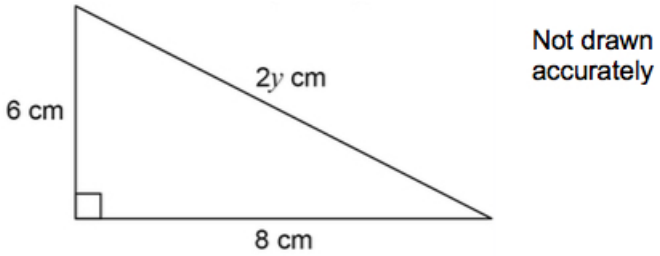
Work out the least amount she can spend.

14. The graph shows the cost of some taxi journeys. (3)




Work out a formula for $C$ in terms of $n$.

15. Sami is trying to work out the exact value of $y$ using Pythagoras' theorem.



Here is her working.

$$\begin{aligned}(2y)^2 &= 6^2 + 8^2\\ 2y^2 &= 36 + 64\\ 2y^2 &= 100\\ y^2 &= 100 \div 2\\ y^2 &= 50\\ y &= \sqrt{50}.\end{aligned}$$

(a) What error has she made in her working? (1)

(b) Kai works out that $y = 5$. (1)

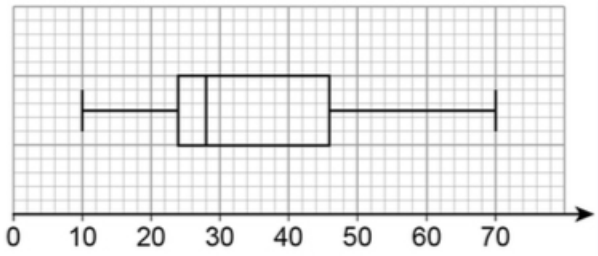
Mel says, "$y$ cannot be 5 because the hypotenuse should be the longest side and the other sides are longer than 5 cm."

Is Mel correct?
Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

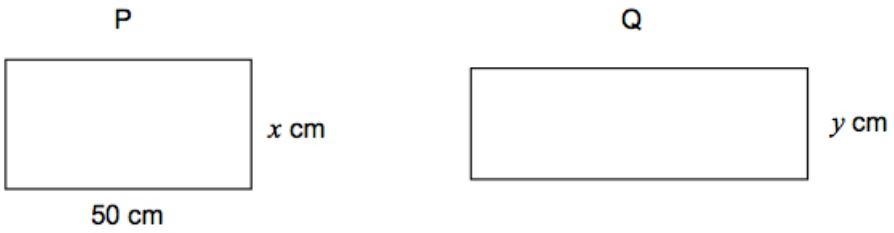
16. Here is a box plot. (1)




Circle the median value.

28 35 24 22

17. $P$ is a rectangle with length 50 cm and width $x$ cm. (4)
$Q$ is a rectangle with width $y$ cm.



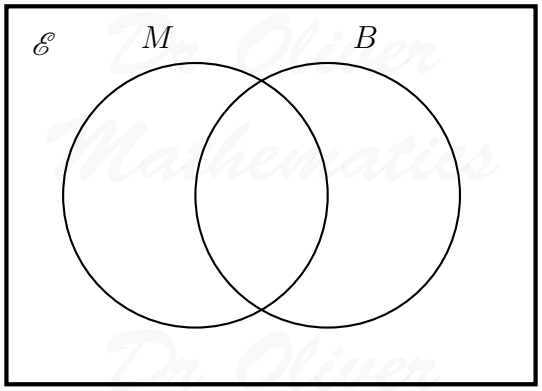

- The length of $Q$ is 20% more than the length of $P$.
- The area of $Q$ is 10% less than the area of $P$.

Work out the ratio $x : y$.
Give your answer in its simplest form.

18. A school has 86 teachers.

- 42 are male and 44 are female.
- $\frac{1}{3}$ of the male teachers have blue eyes.
- $\frac{1}{4}$ of the female teachers have blue eyes.

(a) $\mathscr{E}$ = {teachers in the school}. (3)
$M$ = {male teachers}.
$B$ = {teachers who have blue eyes}.




Complete the Venn diagram.

(b) One teacher who has blue eyes is chosen at random. (1)

Work out the probability that the teacher is male.

19. Rana sells 192 cakes in the ratio (5)

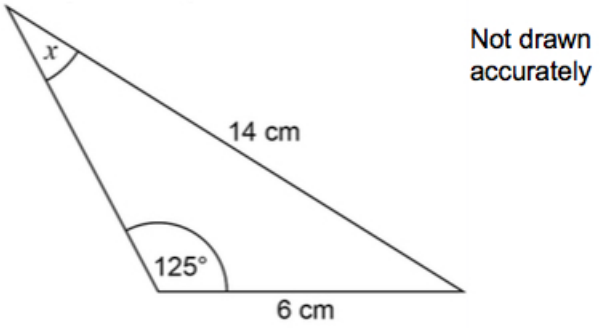
small : medium : large = 7 : 6 : 11.

- The profit for one medium cake is twice the profit for one small cake.
- The profit for one large cake is three times the profit for one small cake.

Her total profit is £532.48.

Work out the profit for one small cake.

20. Work out the size of angle $x$. (3)




21. Solve (4)

$$5x^2 = 10x + 4.$$

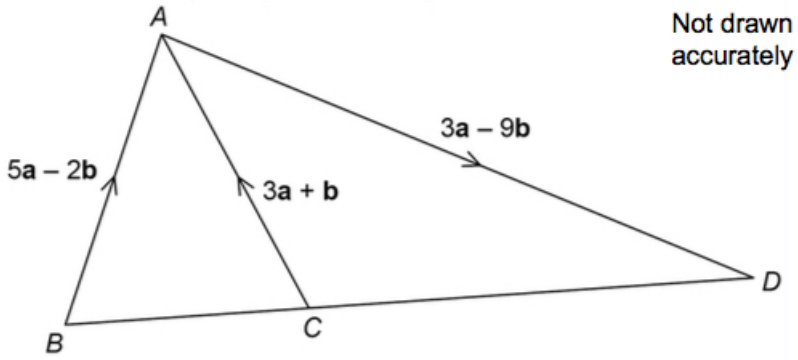
Give your answers to 2 decimal places.

22. A ball, dropped vertically, falls $d$ metres in $t$ seconds. (4)

- $d$ is directly proportional to the square of $t$.
- The ball drops 45 metres in the first 3 seconds.

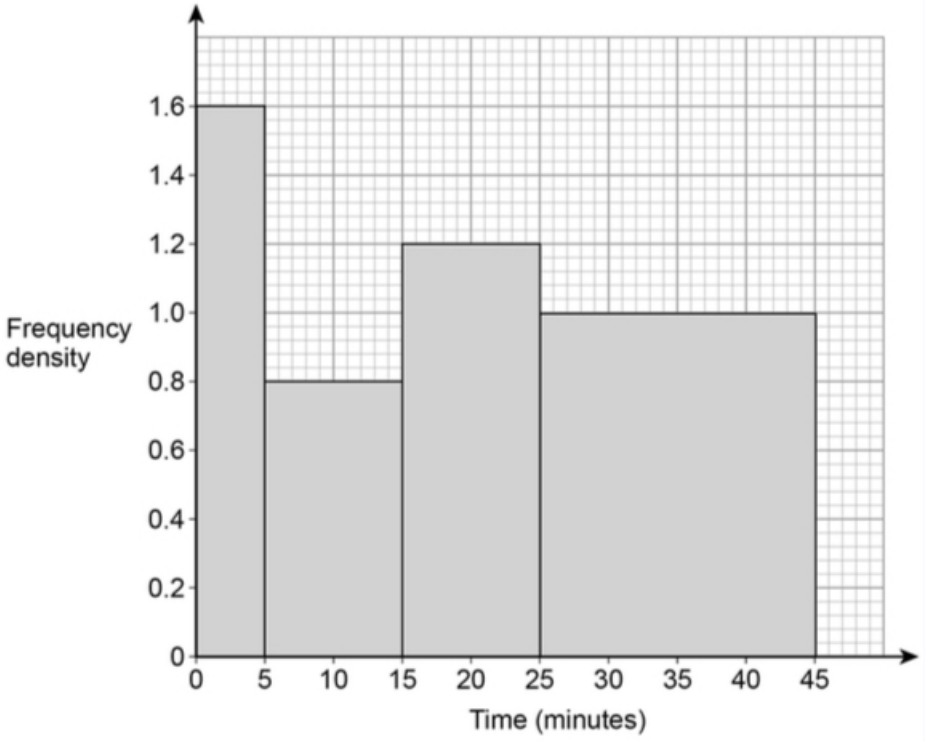
How far does the ball drop in the **next** 7 seconds?

23. Is $BCD$ a straight line? (3)



Show working to support your answer.

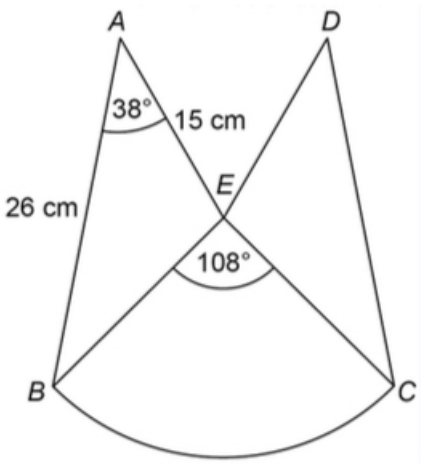
24. 48 students completed some homework. (4)
This histogram shows information about the times taken.




Work out an estimate of the interquartile range.
You **must** show your working.

25. The diagram shows a logo. (5)

- $ABE$ and $DCE$ are congruent triangles.
- $BCE$ is a sector of a circle, centre $E$.

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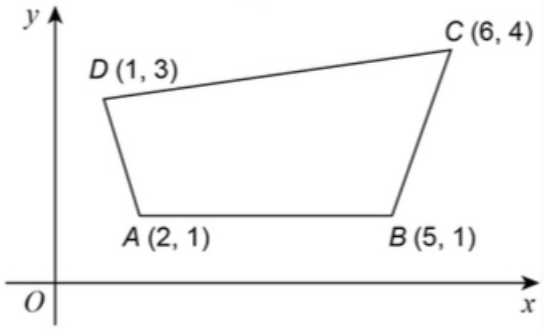
Show that the area of the logo is 510 $cm^2$, to 2 significant figures.

26. (a) A sketch of a quadrilateral $ABCD$ is shown. (1)

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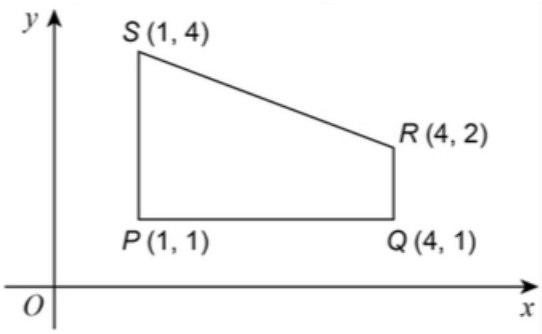
$ABCD$ is enlarged, centre $B$, scale factor $\frac{1}{3}$.
Circle the vertex that is invariant.

$A$ $B$ $C$ $D$

(b) A sketch of a quadrilateral $PQRS$ is shown. (1)

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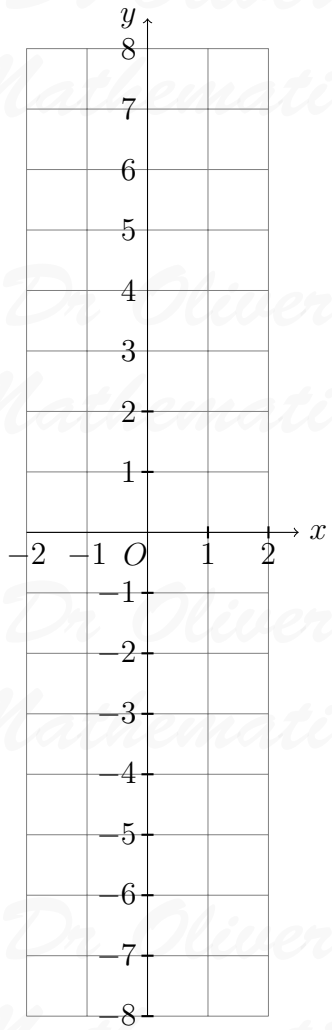
$PQRS$ is reflected in the line $y = x$.
Circle the vertex that is invariant.

$P \quad Q \quad R \quad S$

27. (a) (2)

$\mathrm{h}(x) = \sqrt[3]{x}$ for all values of $x$.

On the grid, draw the graph of the inverse function $y = \mathrm{h}^{-1}(x)$ for $-2 \leqslant x \leqslant 2$.




(b) For all values of $x$, (2)

- $\mathrm{f}(x) = \sin x^\circ$ and
- $\mathrm{g}(x) = (x + 90)^\circ$.

On the grid, draw the graph of the composite function $y = \mathrm{f}\,\mathrm{g}(x)$ for $0 \leqslant x \leqslant 360$.