Dr Oliver Mathematics
AQA GCSE Mathematics
2019 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 point that lies on the curve (1)

$$y = x^2 - 4x + 1.$$

$(-1, 4)$ $(-1, -4)$ $(-1, -2)$ $(-1, 6)$

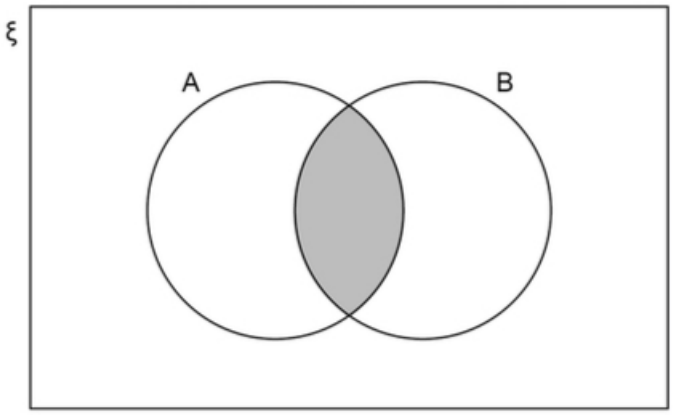
2. The height of a tree is 12 metres, correct to the nearest metre. (1)
Circle the error interval.

$11.5 \text{ m} \leqslant \text{height} < 12.5 \text{ m}$ $11.5 \text{ m} \leqslant \text{height} \leqslant 12.5 \text{ m}$
$11.5 \text{ m} < \text{height} \leqslant 12.5 \text{ m}$ $11.5 \text{ m} < \text{height} < 12.5 \text{ m}$

3. $2a$ is five times bigger than b. (1)
Circle the ratio $a : b$

$10 : 1$ $1 : 10$ $5 : 2$ $2 : 5$

4. Which of these represents the shaded region? (1)



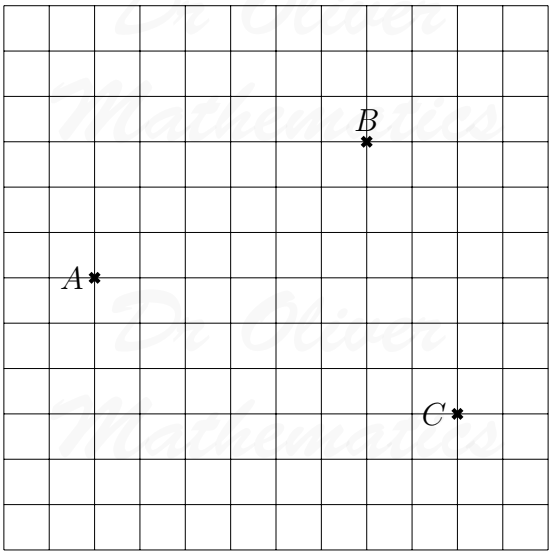
Circle your answer.

$A \cup B$ $(A \cap B)'$ $A \cap B$ $A' \cup B'$

5. Using ruler and compasses, show the region inside the grid that is (3)

- less than 4 cm from A and
- nearer to B than to C.

Label the region R.
Show all your construction lines.

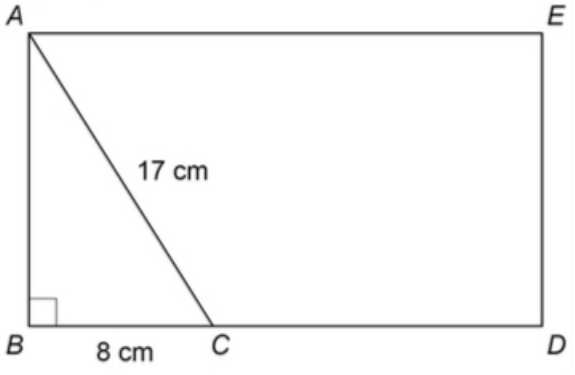


6. Beth drives 200 miles in 4 hours. (3)

She drives the first 18 miles at an average speed of 36 mph.

Work out her average speed for the rest of the journey.

7. The diagram shows rectangle $ABDE$ and right-angled triangle ABC. (4)



Not drawn accurately

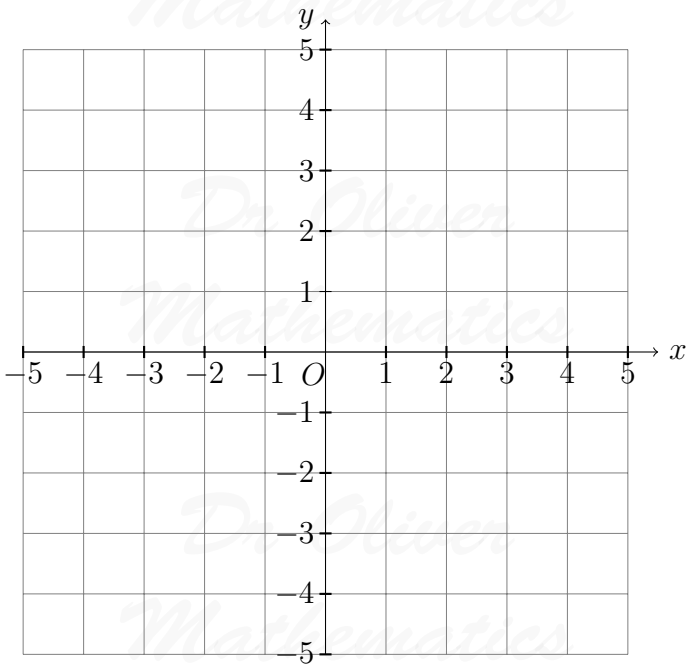
- $AC = 17$ cm
- $BC = 8$ cm.
- $BC : CD = 1 : 2$.

Work out the area of rectangle $ABDE$.

8. On the axes, sketch the curve (2)

$$y = x^3 - 2.$$

You must show the coordinates of the y-intercept.



9. In a sport, injury time is added time played at the end of a match.

The table shows the injury time, t (minutes) played in 380 matches.

Injury time, t (minutes)	Frequency
$0 < t \leqslant 2$	59
$2 < t \leqslant 4$	158
$4 < t \leqslant 6$	106
$6 < t \leqslant 8$	45
$8 < t \leqslant 10$	12

(a) Circle the two words that describe the data. (1)

continuous discrete grouped ungrouped

(b) Which class interval contains the median? (2)
You **must** show your working.

(c) What percentage of the matches had more than **6 minutes** of injury time? (2)

10. x is an integer. (3)

$$-4 < x \leqslant 2$$

and

$$2 \leqslant x + 3 < 9.$$

Work out all the possible values of x.

11. Joe and Kyle share an amount of money in the ratio $7 : n$. (2)

Joe gets 35% of the money.

Work out the value of n.

12. A biased coin is thrown 250 times. (1)

The relative frequency of Heads is worked out after every 50 throws.

Total number of throws	50	100	150	200	250
Relative frequency	0.4	0.29	0.4	0.32	0.3

Circle the best estimate of the probability of Heads.

0.3 0.32 0.342 0.4

13. The amounts spent on clothes by 40 boys and 40 girls in one month were recorded. (5)

The table shows information about the amounts spent by the boys.

Amount, x, (£)	Midpoint	Number of boys
$0 \leqslant x < 20$		22
$20 \leqslant x < 40$		9
$40 \leqslant x < 60$		6
$60 \leqslant x < 80$		3
		Total = 40

The mean for the girls was £35.

Estimate the mean for the girls as a percentage of the mean for the boys.

14. Ali and Mel are making 3-digit codes.

- The digit 0 is not used.
- Ali only uses odd digits.
- Mel only uses even digits.

(a) Ali can make x more codes than Mel. (3)

Assume that digits **cannot** be repeated.

Work out the value of x.

In fact, digits **can** be repeated.

(b) What does this tell you about the actual value of x? (1)
Tick one box.

☐ It is bigger than my answer to part (a)

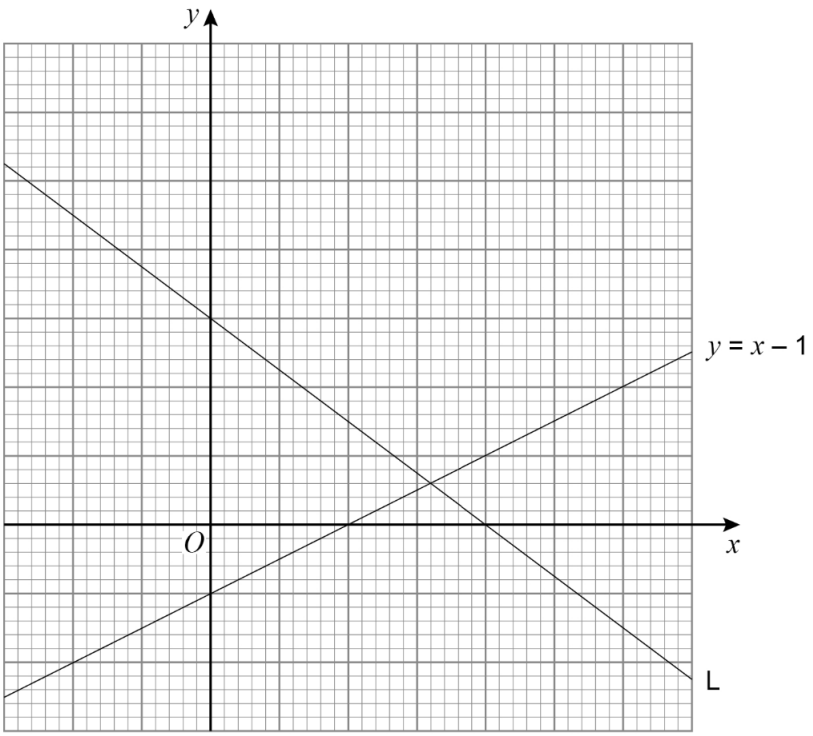
☐ It is smaller than my answer to part (a)

☐ It is the same as my answer to part (a)

15. Here is line L and the graph of (4)

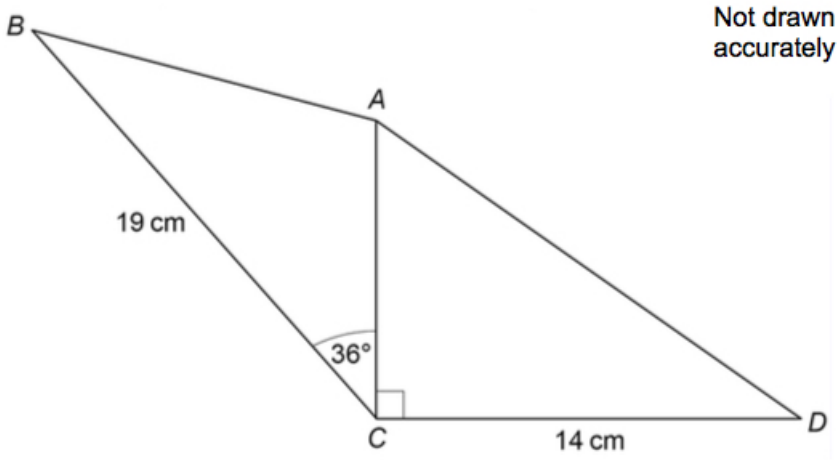
$$y = x - 1.$$

The scales of the axes are not shown.



Work out the equation of line L.

16. ABC and ACD are triangles. (4)



The area of ACD is 80.5 cm^2.

Work out the area of ABC.
Give your answer to 3 significant figures.

17. (3)

$$m = \frac{p - 2b}{2}.$$

- $p = 68.3$, correct to 1 decimal place.
- $b = 8.7$, correct to 1 decimal place.

Work out the lower bound for m.

18. In a bag there are blue discs, green discs, and white discs. (3)

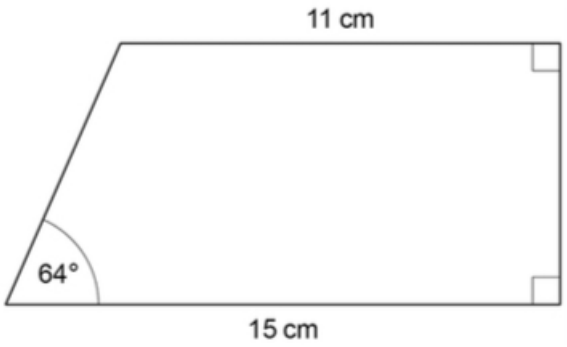
- There are four times as many blue discs as green discs.
- Number of blue discs : number of white discs = 3 : 5.

One disc is selected at random.

Work out the probability that the disc is either blue or white.

19. Work out the area of the trapezium. (4)

Not drawn accurately



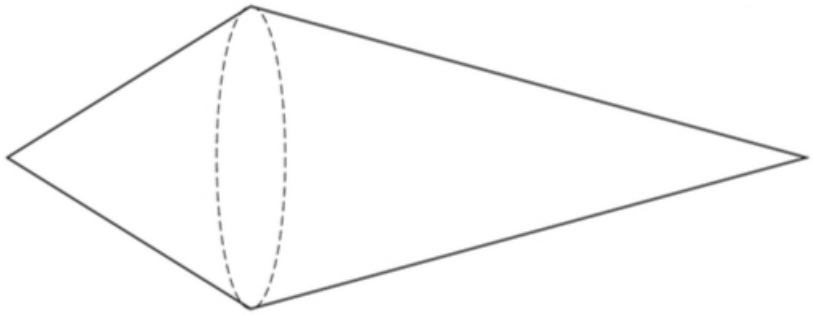
20. Expressions for consecutive triangular numbers are (4)

$$\tfrac{1}{2}n(n+1) \text{ and } \tfrac{1}{2}(n+1)(n+2).$$

Prove that the sum of two consecutive triangular numbers is always a square number.

21. A solid shape is made by joining two cones. (3)

Each cone has the same radius.



One cone has

$$\text{slant height} = 2 \times \text{radius}.$$

The other cone has

$$\text{slant height} = 3 \times \text{radius}.$$

The total surface area of the shape is 57.8π cm^2.

Curved surface area of a cone = πrl where r is the radius and l is the slant height

Work out the radius.

22. Show that (3)

$$(5\sqrt{3} - \sqrt{12})^2$$

simplifies to an integer.

23. A and B are similar cuboids. (1)

Surface area of A : surface area of $B = 16 : 25$.

Work out

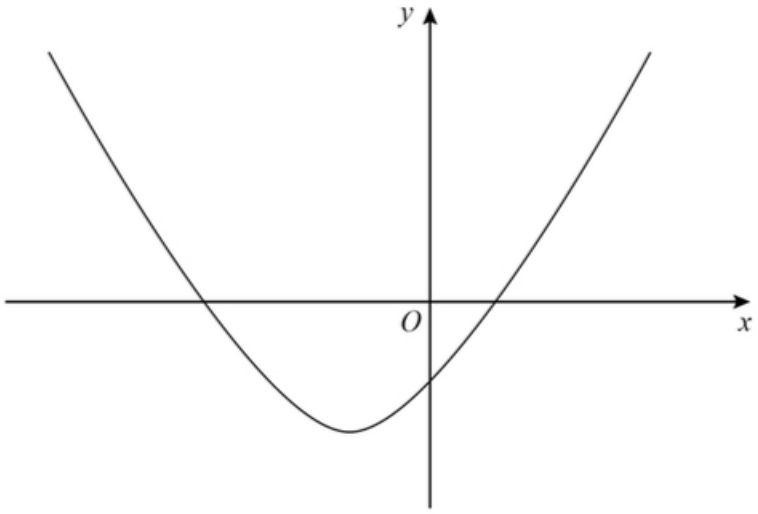
$$\text{volume of } A : \text{volume of } B.$$

Circle your answer.

$$4 : 5 \quad 16 : 25 \quad 64 : 125 \quad 256 : 625$$

24. Here is a sketch of the curve (3)

$$y = x^2 + 4x - 12.$$



Work out the values of x for which

$$x^2 + 4x - 12 < 0.$$

Give your answer as an inequality.

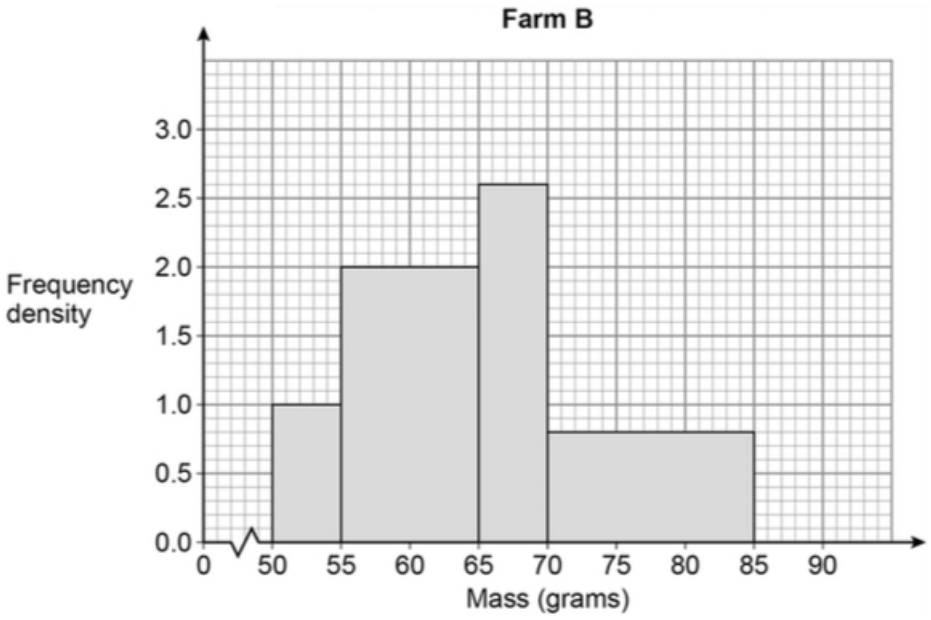
25. A sample of 50 eggs is taken from Farm A. (4)

The table shows information about the masses of the eggs from Farm A.

Mass, m (grams)	Frequency
$53 < m \leqslant 58$	8
$58 < m \leqslant 63$	19
$63 < m \leqslant 68$	15
$68 < m \leqslant 73$	8

A sample of 50 eggs is taken from Farm B.

The histogram shows information about the masses of the eggs from Farm B.



For medium eggs, 53 g $<$ mass $\leqslant$ 63 g.

The Farm A sample has more medium eggs than the Farm B sample.

Using the table and the histogram, estimate how many more.
You **must** show your working.

26. (3)

$$(x+5)(x+2)(x+a) \equiv x^3 + bx^2 + cx - 30.$$

Work out the values of the integers a, b, and c.

27. (5)

$$\mathrm{f}(x) = \tfrac{2}{5}x - 1.$$

Work out the value of

$$\mathrm{f}^{-1}(3) + \mathrm{f}(-0.5).$$