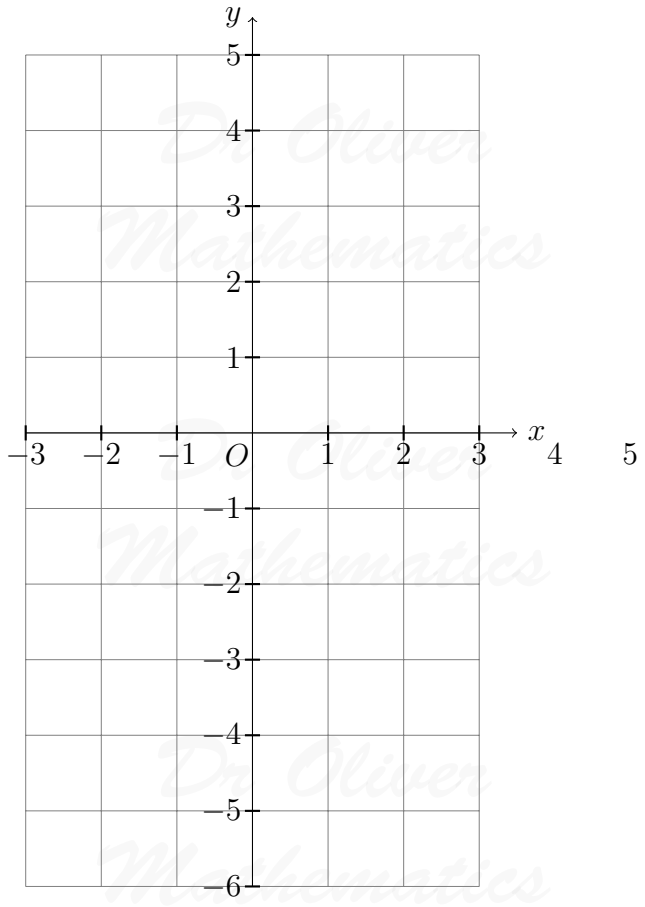
Dr Oliver Mathematics
AQA GCSE Mathematics
2013 November Paper 2: Calculator
2 hours

The total number of marks available is 105.
You must write down all the stages in your working.

1. On the grid, draw the graph of (3)

$$y = 2x - 1$$

for values of x from -2 to 2.



2. In this question, assume that the car uses the same amount of petrol for each mile it travels.

   (a) A car uses 55 litres of petrol to travel 495 miles. (3)

   How far would the car travel on 80 litres of petrol?

(b) How much petrol would the car use on a trip of 160 miles? (4)
Give your answer to the nearest litre.

3. Decide whether each of these sets of data is discrete or continuous.
Tick the correct box.

(a) The heights of people. (1)

☐ Discrete ☐ Continuous

(b) The number of coins in a bag. (1)

☐ Discrete ☐ Continuous

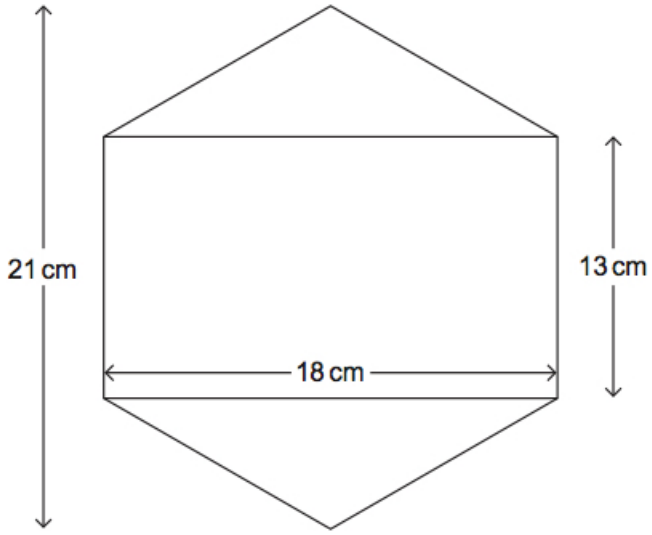
(c) The weights of bicycles. (1)

☐ Discrete ☐ Continuous

(d) The shoe sizes of women. (1)

☐ Discrete ☐ Continuous

4. The hexagon is made from a rectangle and two congruent triangles. (5)



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Work out the area of the hexagon.

5. 20 students choose a sport.

	Tennis	Basketball	Football
Boys	4	3	5
Girls	5	2	1

(a) How many students did **not** choose football? (2)

(b) What percentage of the students choose tennis? (3)

(c) Considering the boys and the girls separately, compare their relative frequencies of choosing basketball. (3)

6. (a) Multiply out and simplify (3)

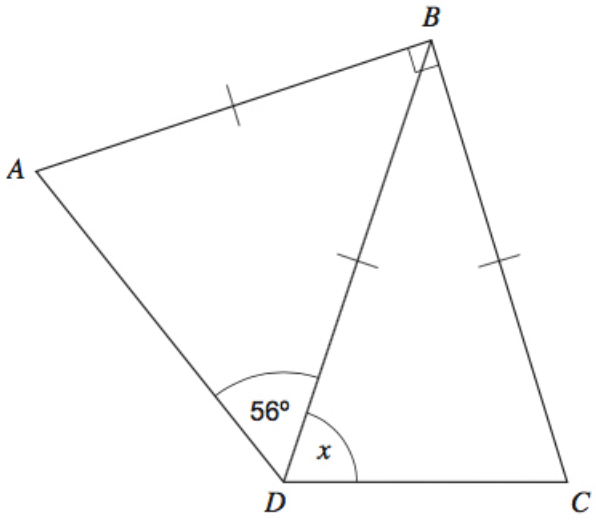
$$2(3x + 2) - (x + 7).$$

(b) Matt knows the value of a is 6 or 7 and the value of b is -4 or -5. (4)

Work out the largest and smallest possible values of

$$3a - 2b.$$

7. Triangles ABD and BCD are isosceles. (4)
Angle ABC is $90°$.



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Work out the size of angle x.

8. (a) Rearrange the formula to make w the subject of (2)

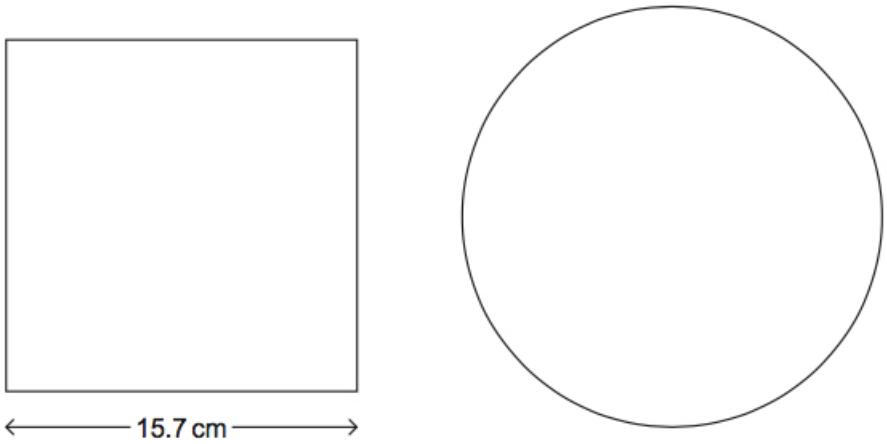
$$y = 3w + 8.$$

(b) Solve (4)

$$5(x + 4) = 3(x + 7) + 2.$$

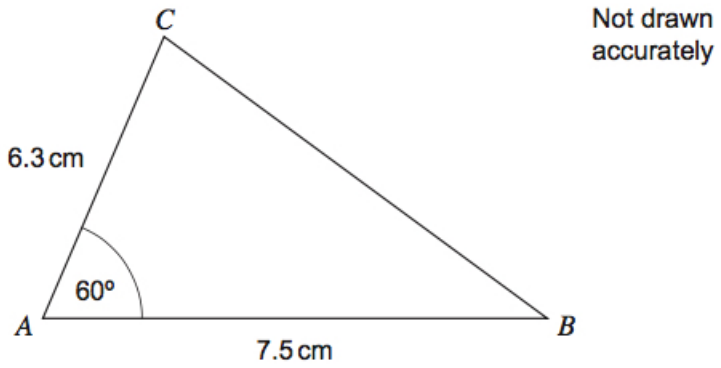
9. A square of side 15.7 cm is made from a length of wire. (4)
The same length of wire is then made into a circle.

Not drawn accurately



Work out the diameter of the circle.

10. The diagram shows a sketch of triangle ABC. (3)



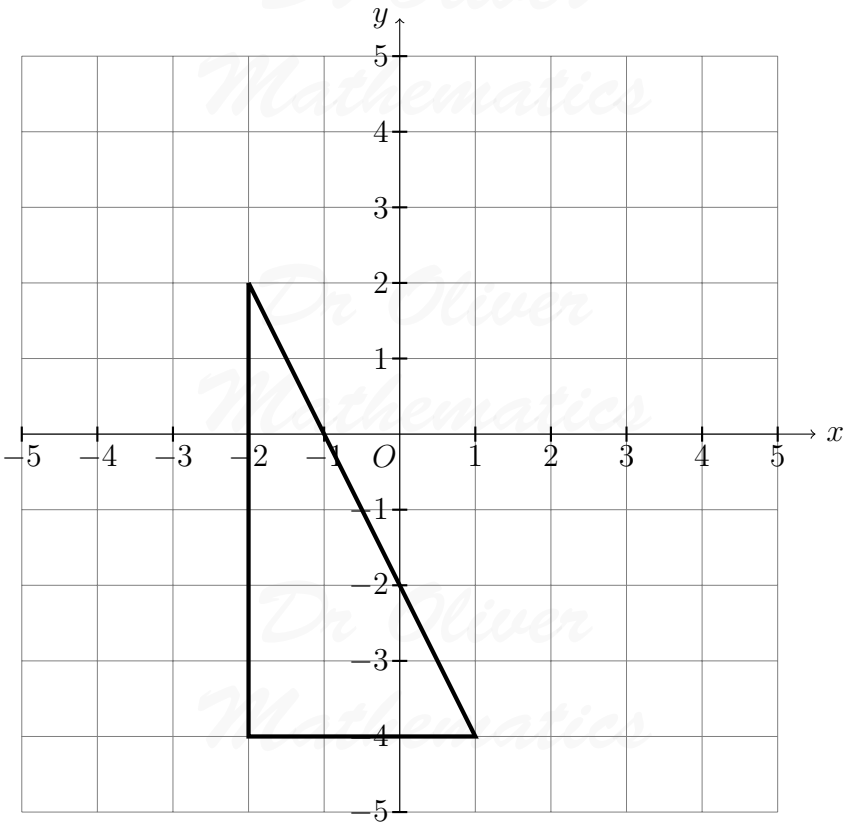
Using ruler and compasses only, make an accurate drawing of triangle ABC.

11. The population of England in 2013 is approximately 53 million. (3)
It is predicted that

- the population in 2018 will be 4% more than the population in 2013 and
- and the population in 2023 will be 4% more than the population in 2018.

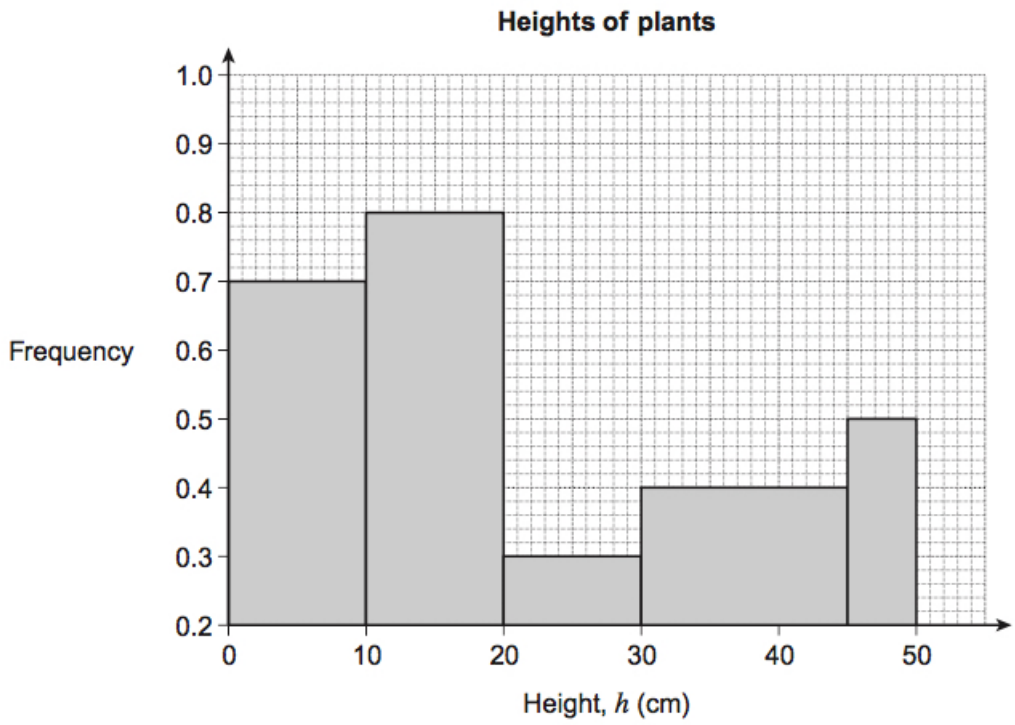
Work out the predicted population of England in 2023.

12. Enlarge the triangle by scale factor $\frac{1}{3}$ with centre $(-5, -4)$. (2)



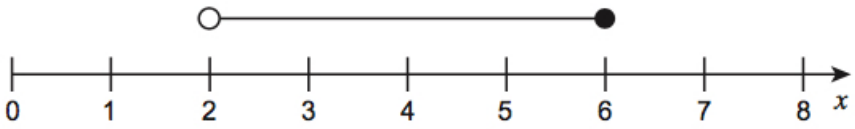
13. Jon uses this data about the heights of plants (h) to draw the histogram below. (3)

Height, h (cm)	$0 < h \leqslant 10$	$10 < h \leqslant 20$	$20 < h \leqslant 30$	$30 < h \leqslant 45$	$45 < h \leqslant 50$
Frequency	7	8	3	6	5



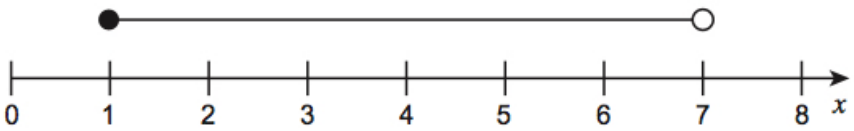
Write down **three different** types of mistake that he has made.

14. (a) Circle the inequality shown by the diagram. (1)



$2 < x < 6$ $2 \leqslant x < 6$ $2 < x \leqslant 6$ $2 \leqslant x \leqslant 6$

(b) Write down the integer values satisfied by this diagram. (2)

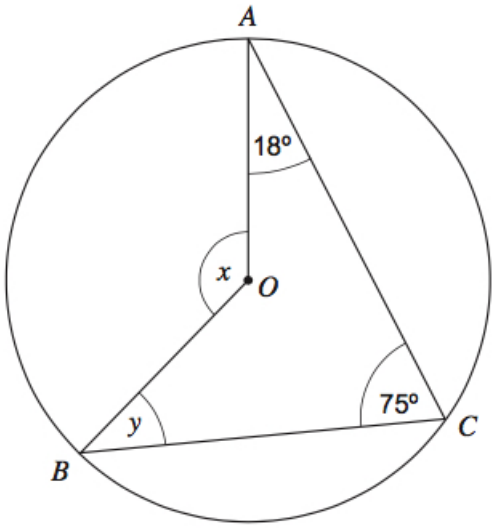


15. Each number in the grid is double the previous number. (5)
The first **seven** numbers are shown.

1	2	4	8	16
32	64			
				x

Work out the number for the last cell, marked x.
Give your answer in standard form to 3 significant figures.
You must show your working.

16. The diagram shows a circle, centre O.



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(a) Work out the size of angle x. (1)

(b) Work out the size of angle y. (3)

17. (a) Simplify (3)

$$(2x^5y^4z^6) \times (7x^2y^3z).$$

(b) Simplify fully (2)

$$\frac{6(x-5)^2}{3(x-5)(x+4)}.$$

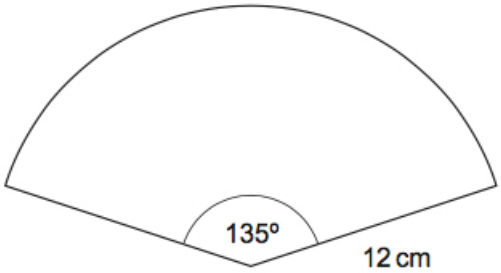
(c) Factorise (2)

$$(x+1)^2 + 4(x+1).$$

(d) Factorise fully (3)

$$2x^2 - 50y^2.$$

18. The diagram shows a sector of a circle, radius 12 cm. (3)



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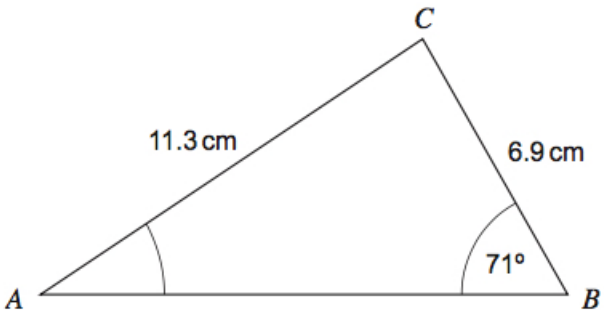
Show that the perimeter of the sector is greater than 52 cm.

19. Work out the size of angle A. (4)



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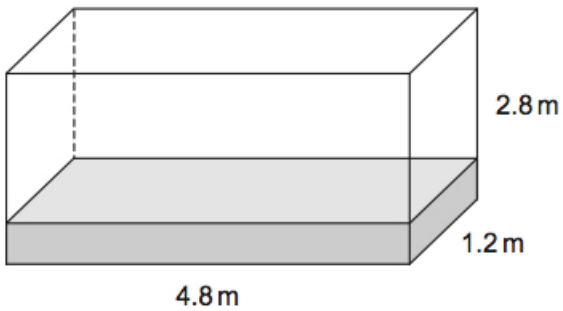
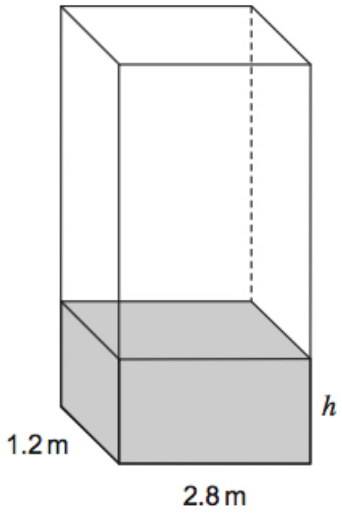
Give your answer to a suitable degree of accuracy.

20. The measurements on this tank are exact. (5)
Water is put in the tank to a height of 0.7 m to **the nearest tenth of a metre**.



The tank is now turned on its side as shown.



Work out the minimum height of water in the tank, marked h.
Give your answer to 1 decimal place.

21. n is an integer. (5)

$$S = \tfrac{1}{2}n(n+1).$$

Prove that

$$8S + 1$$

is an odd square number.

22. Robin is firing arrows at a target.
The probability that he hits the target on his xth attempt is

$$\frac{x+2}{x+3}.$$

For example,

$$\text{P(hit on his 5 attempt)} = \tfrac{7}{8}.$$

(a) Work out the probability that he hits the target with both his 1st and 2nd attempts. (3)

(b) Work out the probability that he hits the target **exactly** once on his first two attempts. (4)