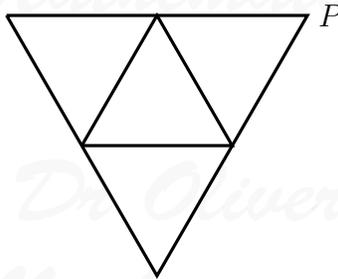


Dr Oliver Mathematics
GCSE Mathematics
2006 June Paper 6H: Calculator
2 hours

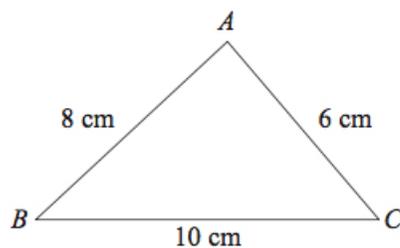
The total number of marks available is 100.
You must write down all the stages in your working.

1. Here is the net of a 3-D shape. (2)



The net is folded to make the 3-D shape.
Two other vertices meet at P .
Mark each of these vertices with the letter P .

2. Amy, Beth and Colin share 36 sweets in the ratio 2 : 3 : 4. (3)
Work out the number of sweets that each of them receives.
3. ABC is a triangle.



**Diagram NOT
accurately drawn**

$AB = 8$ cm.
 $AC = 6$ cm.
 $BC = 10$ cm.

- (a) Use ruler and compasses to construct an accurate drawing of triangle ABC . (2)
The line BC has been drawn for you.
You must show all your construction lines.

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- (b) Use ruler and compasses to construct the perpendicular bisector of the line PQ . (2)
You must show all your construction lines.

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4. Sophie says, “For any whole number, n , the value of $6n - 1$ is always a prime number.” (2)
Sophie is wrong.
Give an example to show that Sophie is wrong.

5. This item appeared in a newspaper. (3)

Cows produce 3% more milk.

A farmer found that when his cow listened to classical music the milk it produced increased by 3%.

This increase of 3% represented 0.72 litres of milk.

Calculate the amount of milk produced by the cow when it listened to classical music.

6. (a) Simplify (5)

(i) $x^4 \times x^5$,

(ii) $\frac{p^8}{p^3}$,

(iii) $3s^2t^3 \times 4s^4t^2$,

(iv) $(q^3)^4$.

- (b) Expand (1)

$$3(2g - 1).$$

- (c) Expand (2)

$$2d(d + 3).$$

(d) Expand and simplify (2)

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

7. PQR is a right-angled triangle. (3)

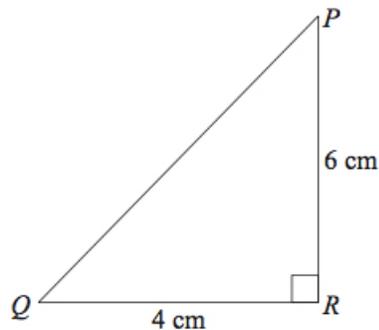


Diagram NOT
accurately drawn

$$PR = 6 \text{ cm.}$$

$$QR = 4 \text{ cm.}$$

Work out the length of PQ .

Give your answer correct to 3 significant figures

8. Bill recorded the times, in minutes, taken to complete his last 40 homeworks.

This table shows information about the times.

Time (t minutes)	Frequency
$20 \leq t < 25$	8
$25 \leq t < 30$	3
$30 \leq t < 35$	7
$35 \leq t < 40$	7
$40 \leq t < 45$	15

(a) Find the class interval in which the median lies. (1)

(b) Calculate an estimate of the mean time it took Bill to complete each homework. (4)

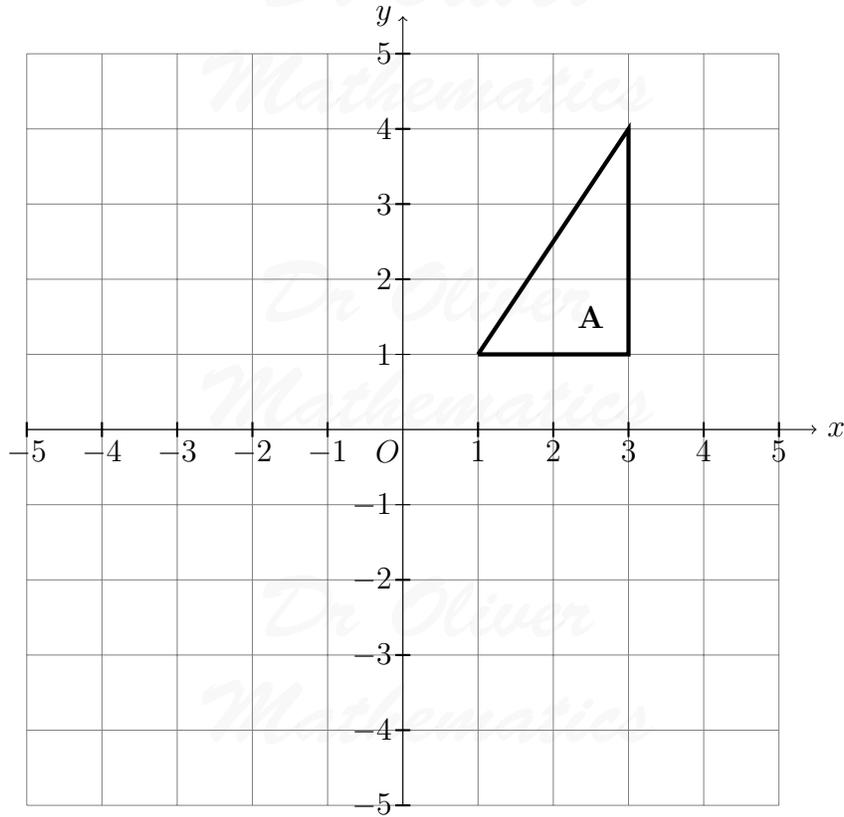
9. Work out

$$\frac{\sqrt{2.56 + 3.50}}{8.765 - 6.78}$$

(a) Write down all the figures on your calculator display. (2)

(b) Give your answer to part (a) to an appropriate degree of accuracy. (1)

10. Here is a picture. (3)



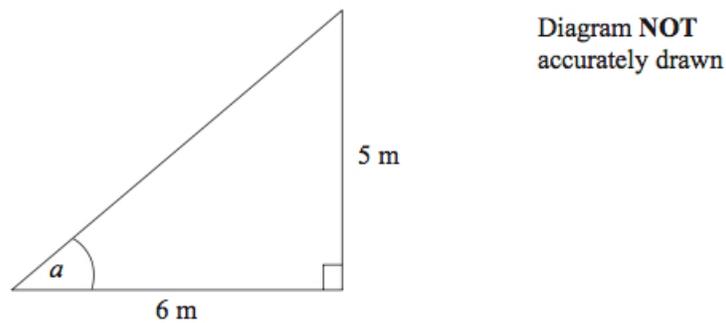
Triangle **A** is reflected in the y -axis to give triangle **B**.
 Triangle **B** is then reflected in the x -axis to give triangle **C**.
 Describe the **single** transformation that takes triangle **A** to triangle **C**.

11. Solve the simultaneous equations (3)

$$5a + 3b = 9$$

$$2a - 3b = 12.$$

12. (a) Calculate the size of angle a in this right-angled triangle. (3)



Give your answer correct to 3 significant figures.

- (b) Calculate the size of angle x in this right-angled triangle. (3)

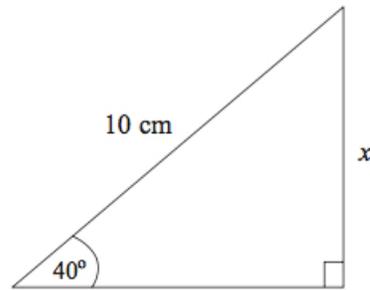


Diagram NOT accurately drawn

Give your answer correct to 3 significant figures.

13. $ABCD$ is a parallelogram.

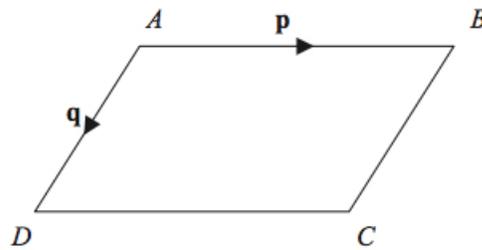


Diagram NOT accurately drawn

AB is parallel to DC .

AD is parallel to BC .

$\vec{AB} = \mathbf{p}$.

$\vec{AD} = \mathbf{q}$.

- (a) Express, in terms of \mathbf{p} and \mathbf{q} , (2)
- (i) \vec{AC} ,
 - (ii) \vec{BD} .

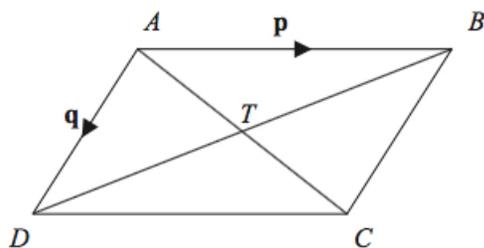


Diagram NOT accurately drawn

AC and BD are diagonals of parallelogram $ABCD$.
 AC and BD intersect at T .

(b) Express \overrightarrow{AT} in terms of \mathbf{p} and \mathbf{q} . (1)

14. Jim makes a model of his school. (2)

He uses a scale of 1 : 50.

The area of the door on his model is 8 cm^2 .

Work out the area of the door on the real school.

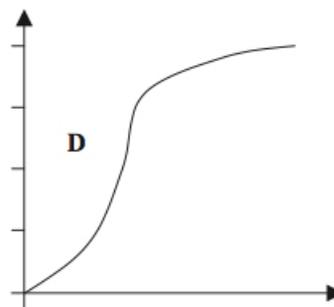
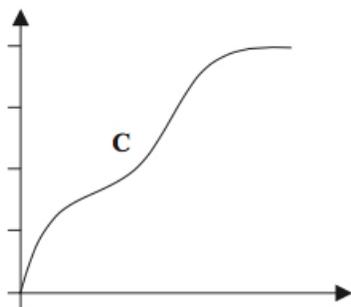
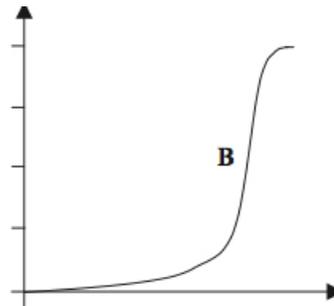
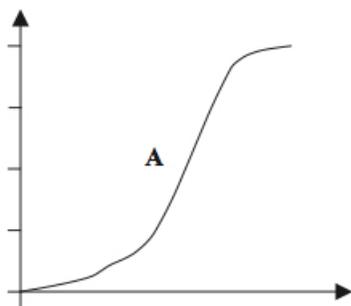
15. (a) List all the possible integer values of n such that (2)

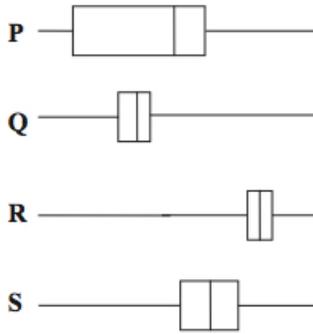
$$-2 \leq n < 3.$$

(b) Solve the inequality (2)

$$4p - 8 < 7 - p.$$

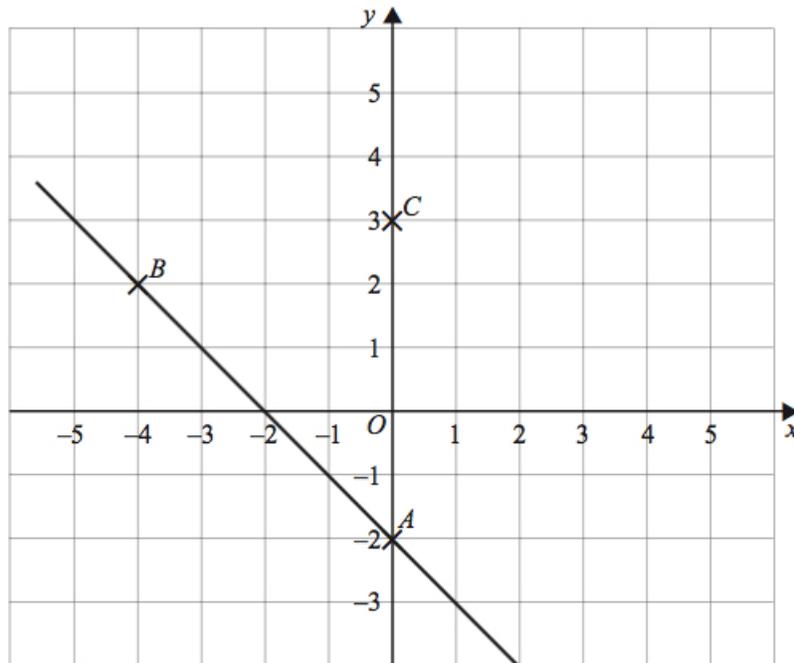
16. Here are four cumulative frequency diagrams. (2)





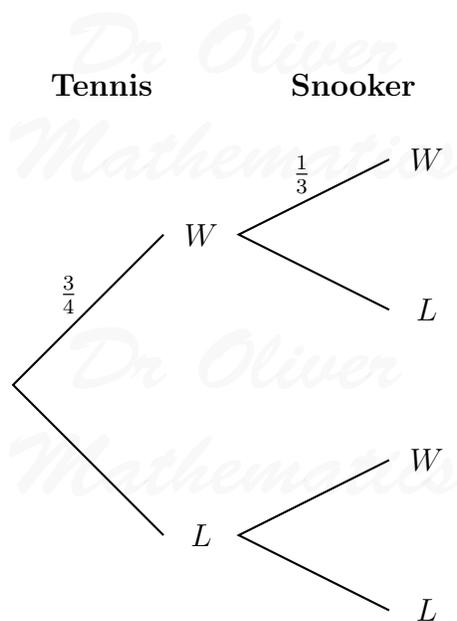
For each box plot, write down the letter of the appropriate cumulative frequency diagram.

17. In the diagram, A is the point $(0, -2)$, B is the point $(-4, 2)$, and C is the point $(0, 3)$. (4)



Find an equation of the line that passes through C and is parallel to AB .

18. Simon plays one game of tennis and one game of snooker.
 The probability that Simon will win at tennis is $\frac{3}{4}$.
 The probability that Simon will win at snooker is $\frac{1}{3}$.
 (a) Complete the probability tree diagram below. (2)



- (b) Work out the probability that Simon wins both games. (2)
- (c) Work out the probability that Simon will win only one game. (3)
19. The length of a rectangle is 6.7 cm, correct to 2 significant figures.
- (a) For the length of the rectangle write down (2)
- (i) the upper bound,
- (ii) the lower bound.
- The area of the rectangle is 26.9 cm², correct to 3 significant figures.
- (b) (i) Calculate the upper bound for the width of the rectangle. (3)
Write down all the figures on your calculator display.
- (ii) Calculate the lower bound for the width of the rectangle.
Write down all the figures on your calculator display.
- (c) (i) Write down the width of the rectangle to an appropriate degree of accuracy. (2)
- (ii) Give a reason for your answer.
20. (a) Simplify fully (2)
- $$(3x^2y^4)^3.$$
- (b) Expand and simplify (2)
- $$(2x + 5)(3x - 2).$$
- (c) Simplify fully (2)
- $$\frac{x^2 + 5x + 6}{x^2 + 2x}.$$

21. Solve this quadratic equation

$$x^2 - 5x - 8 = 0.$$

(3)

Give your answers correct to 3 significant figures.

22. The diagram shows a sector $OABC$ of a circle with centre O .

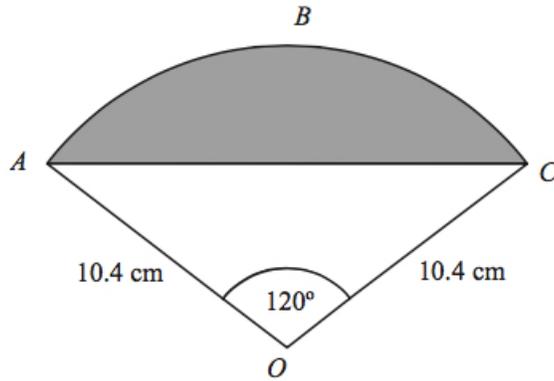


Diagram **NOT**
accurately drawn

$OA = OC = 10.4$ cm.

Angle $AOC = 120^\circ$.

(a) Calculate the length of the arc ABC of the sector.

(3)

Give your answer correct to 3 significant figures.

(b) Calculate the area of the shaded segment ABC .

(4)

Give your answer correct to 3 significant figures.

23. The diagram shows a vertical tower DC on horizontal ground ABC .

(5)

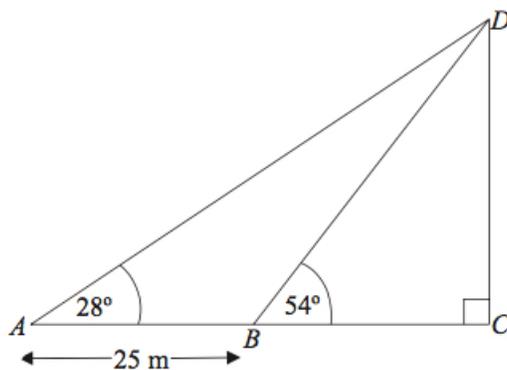


Diagram **NOT**
accurately drawn

ABC is a straight line.

The angle of elevation of D from A is 28° .

The angle of elevation of D from B is 54° .

$AB = 25$ m.

Calculate the height of the tower.

Give your answer correct to 3 significant figures.

24. Show that any straight line that passes through the point $(1, 2)$ must intersect the curve (3) with equation

$$x^2 + y^2 = 16$$

at two points.

