1 (a)

Write down the inequality shown on the number line.

....

(1)

(b) Solve the inequality $4y - 13 \leqslant y + 8$

....

(2)

(Total for Question 1 is 3 marks)

DO NOT WRITE IN THIS AREA

2 Show that $5\dfrac{2}{3} - 2\dfrac{3}{4} = 2\dfrac{11}{12}$

**(Total for Question 2 is 3 marks)**

3 (a) Complete the table of values for $y = 1 + 5x - x^2$

x	-1	0	1	2	3	4	5	6
y		1		7	7		1	

(2)

(b) On the grid, draw the graph of $y = 1 + 5x - x^2$ for values of x from -1 to 6

(2)
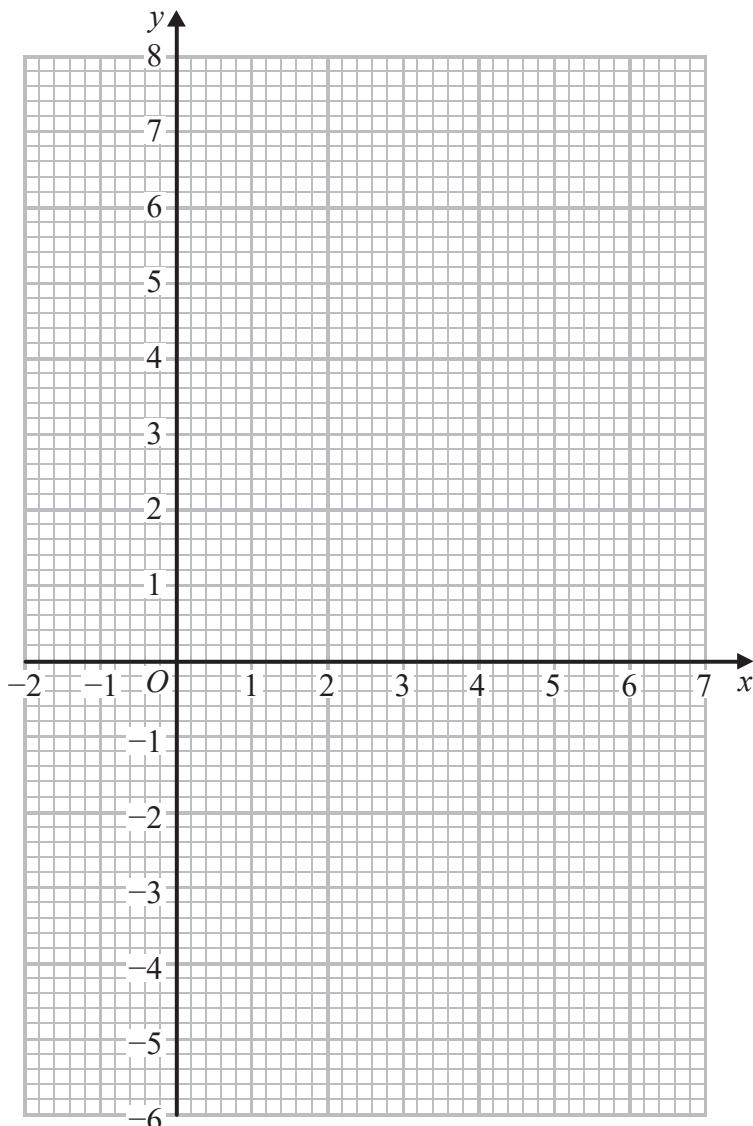
(Total for Question 3 is 4 marks)

P 6 0 2 6 1 A 0 4 2 4

4 *ABC* and *DEF* are similar triangles.

A

12 cm

B

16 cm

C

D

E

40 cm

F
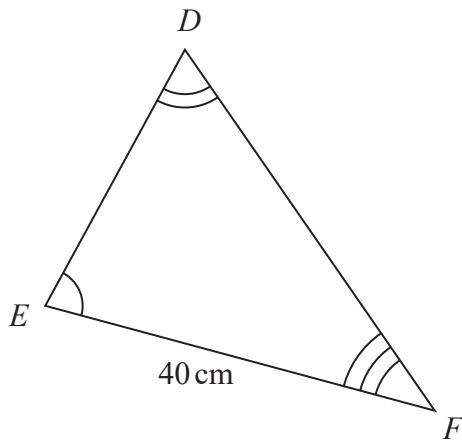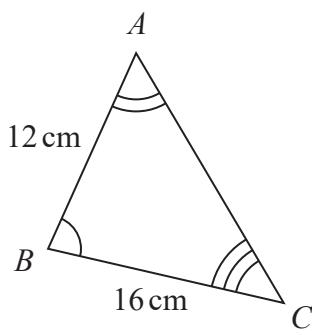
Diagram **NOT** accurately drawn

(a) Work out the length of *DE*.

.... cm

(2)

The area of triangle *DEF* is 525 cm^2

(b) Find the area of triangle *DEF* in m^2

.... m^2

(2)

(Total for Question 4 is 4 marks)

P 6 0 2 6 1 A 0 5 2 4

5 Factorise $x^2 - 5x - 36$

....

(Total for Question 5 is 2 marks)

6 There are some ice lollies in a freezer.

The flavour of each ice lolly is banana or strawberry or mint or chocolate.

Julius takes at random an ice lolly from the freezer.

The table shows the probabilities that the flavour of the ice lolly that Julius takes is banana or strawberry or chocolate.

Flavour	banana	strawberry	mint	chocolate
Probability	0.35	0.32		0.12

Work out the probability that the flavour of the ice lolly that Julius takes is either strawberry or mint.

....

(Total for Question 6 is 3 marks)

7 A football team played 55 games.
Each game was won, drawn or lost.

number of games won : number of games drawn : number of games lost = 6 : 3 : 2

Work out how many more games the team won than the team lost.

....

(Total for Question 7 is 3 marks)

8 $A = 3^2 \times 5^4 \times 7$ $B = 3^4 \times 5^3 \times 7 \times 11$

(a) Find the highest common factor (HCF) of A and B.

....

(2)

(b) Find the lowest common multiple (LCM) of A and B.

....

(2)

(Total for Question 8 is 4 marks)

9 (a) Write 840 000 in standard form.

....

(1)

(b) Work out $(6 \times 10^7) \div (8 \times 10^{-2})$
Give your answer in standard form.

....

(2)

(Total for Question 9 is 3 marks)

10 Henri buys a yacht for 150 000 euros.

The yacht depreciates in value by 18% each year.

Work out the value of the yacht at the end of 3 years.
Give your answer correct to the nearest euro.

.... euros

(Total for Question 10 is 3 marks)

11 Line **L** is drawn on the grid.
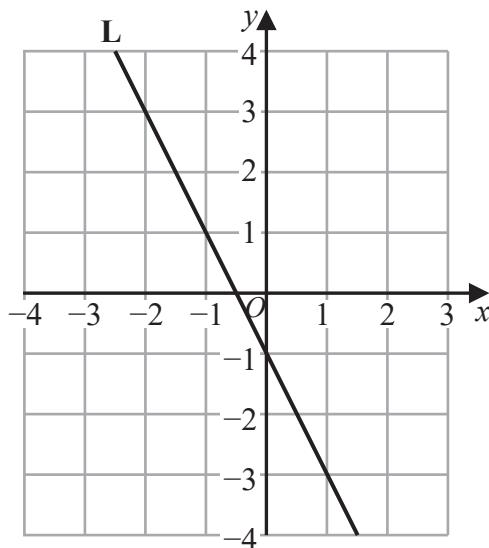
Find an equation for **L**.

....

(Total for Question 11 is 3 marks)

12
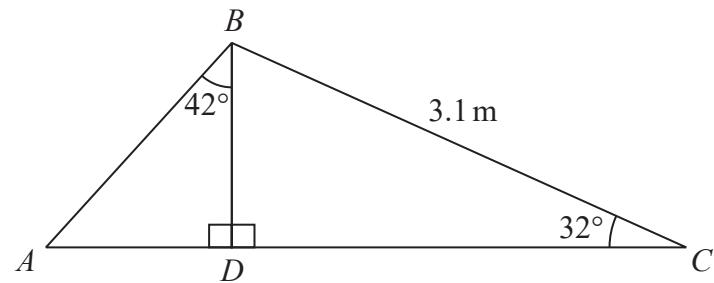
Diagram **NOT** accurately drawn

Calculate the length of *AB*.
Show your working clearly.
Give your answer correct to 3 significant figures.

.... m

**(Total for Question 12 is 5 marks)**

13 Sandeep recorded the length of time, in minutes, that each of 100 adults went for a walk one Saturday afternoon.

The cumulative frequency table gives information about these times.

Time (t minutes)	Cumulative frequency
$30 < t \leqslant 40$	6
$30 < t \leqslant 50$	20
$30 < t \leqslant 60$	56
$30 < t \leqslant 70$	84
$30 < t \leqslant 80$	95
$30 < t \leqslant 90$	100

(a) On the grid, draw a cumulative frequency graph for the information in the table.

Cumulative frequency

Time (minutes)

(2)
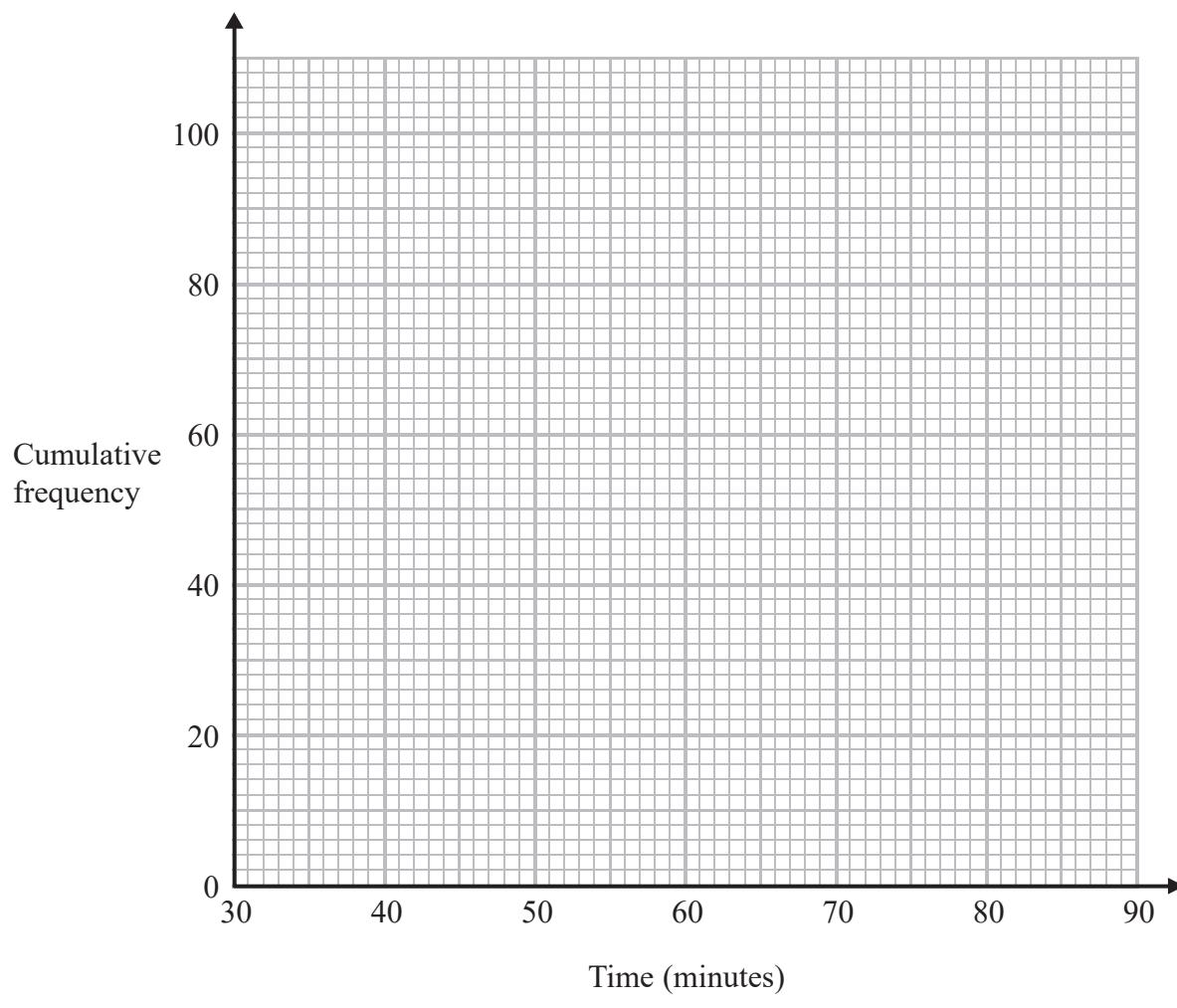
(b) Use your graph to find an estimate for the median length of time that these adults went for a walk.

.... minutes

(2)

One of the 100 adults is chosen at random.

(c) Use your graph to find an estimate for the probability that this adult went for a walk for more than 72 minutes.

....

(3)

(Total for Question 13 is 7 marks)

14 (a) Simplify fully $(x^{12}y^8)^{\frac{3}{4}}$

....

(2)

Given that $3^n = \dfrac{3^x}{9^y}$

(b) find an expression for n in terms of x and y.

$n = $ ....

(2)

(Total for Question 14 is 4 marks)

**15** *A*, *B*, *C* and *D* are points on a circle, centre *O*.
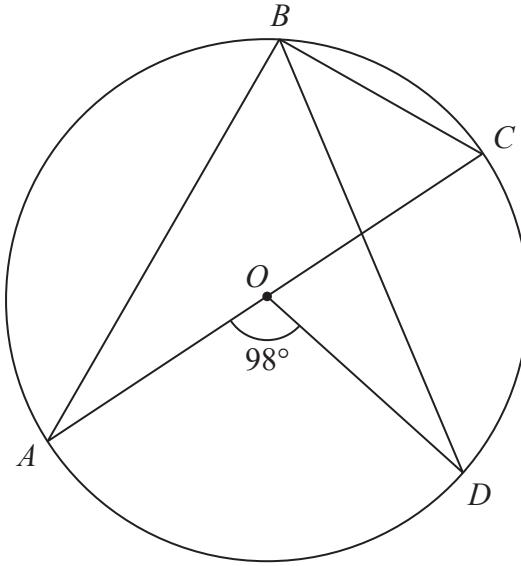
Diagram **NOT** accurately drawn

AOC is a diameter of the circle.

Angle *AOD* = 98°

Work out the size of angle *DBC*.
Give a reason for each stage in your working.

....°

(Total for Question 15 is 4 marks)

16 The following table gives values of x and y where y is inversely proportional to the square of x.

x	1.5	2	3	4
y	16	9	4	2.25

(a) Find a formula for y in terms of x.

....

(3)

Given that $x > 0$

(b) find the value of x when $y = 144$

....

(2)

(Total for Question 16 is 5 marks)

P 6 0 2 6 1 A 0 1 4 2 4

17 The table gives information about the first six terms of a sequence of numbers.

Term number	1	2	3	4	5	6
Term of sequence	$\dfrac{1 \times 2}{2}$	$\dfrac{2 \times 3}{2}$	$\dfrac{3 \times 4}{2}$	$\dfrac{4 \times 5}{2}$	$\dfrac{5 \times 6}{2}$	$\dfrac{6 \times 7}{2}$

Prove algebraically that the sum of any two consecutive terms of this sequence is always a square number.

(Total for Question 17 is 4 marks)

P 6 0 2 6 1 A 0 1 5 2 4

18 The functions f and g are defined as

$$f(x) = \frac{x}{4x - 3} \quad \text{and} \quad g(x) = x - 5$$

(a) State which value of x must be excluded from any domain of the function f.

....

(1)

(b) Find fg(x).
Simplify your answer.

fg(x) = ...

(2)

(c) Express the inverse function f^{-1} in the form $f^{-1}(x) = \ldots$

$f^{-1}(x) =$ ....

(3)

Part of the curve with equation $y = h(x)$ is shown on the grid.
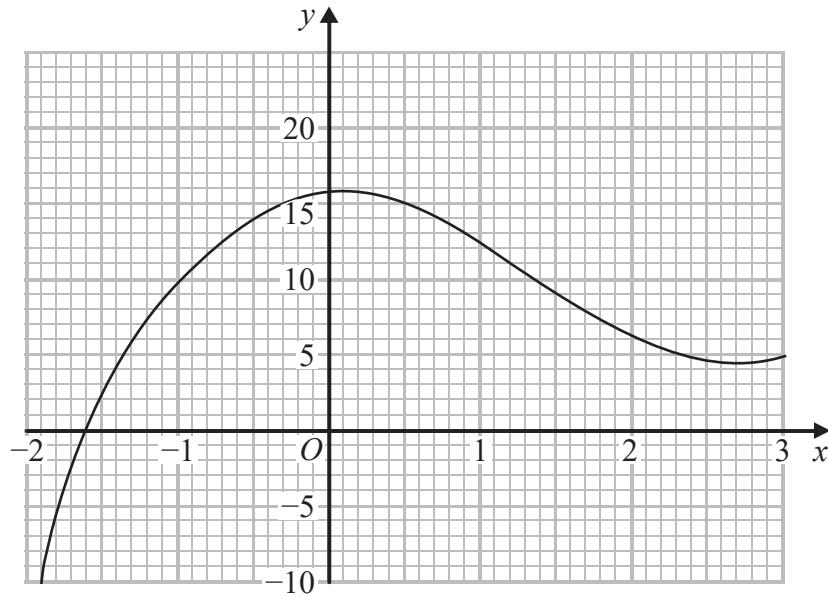
(d) Find an estimate for the gradient of the curve at the point where $x = -0.5$
Show your working clearly.

....

(3)

(Total for Question 18 is 9 marks)

**19** The diagram shows a sector $OAPB$ of a circle, centre O.
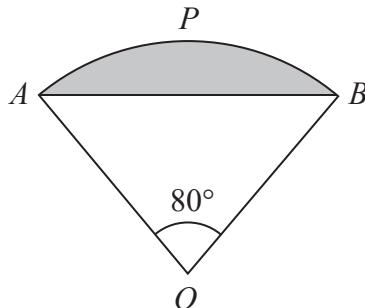
Diagram **NOT** accurately drawn

AB is a chord of the circle.
Angle $AOB = 80°$

The area of sector $OAPB$ is $\dfrac{25}{2}\pi\,\text{cm}^2$

Work out the perimeter of the shaded segment.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 19 is 6 marks)

20

$$x = \frac{6a}{b-a}$$

$a = 3.46$ correct to 3 significant figures.
$b = 6.3$ correct to 1 decimal place.

Work out the upper bound for the value of x.
Give your answer as a decimal correct to 3 significant figures.
Show your working clearly.

....

(Total for Question 20 is 3 marks)

P 6 0 2 6 1 A 0 1 9 2 4

21 The diagram shows two similar bottles, **A** and **B**.
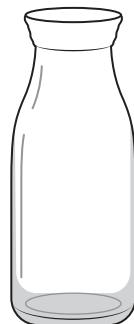
Diagram **NOT** accurately drawn

A

B

Bottle **A** has surface area 240 cm²
Bottle **B** has surface area 540 cm² and volume 2025 cm³

Work out the volume of bottle **A**.

.... cm³

(Total for Question 21 is 3 marks)

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22 Write $5 + 12x - 2x^2$ in the form $a + b(x + c)^2$ where a, b and c are integers.

....

(Total for Question 22 is 4 marks)

23 The diagram shows a solid pyramid *ABCDE* with a horizontal base.
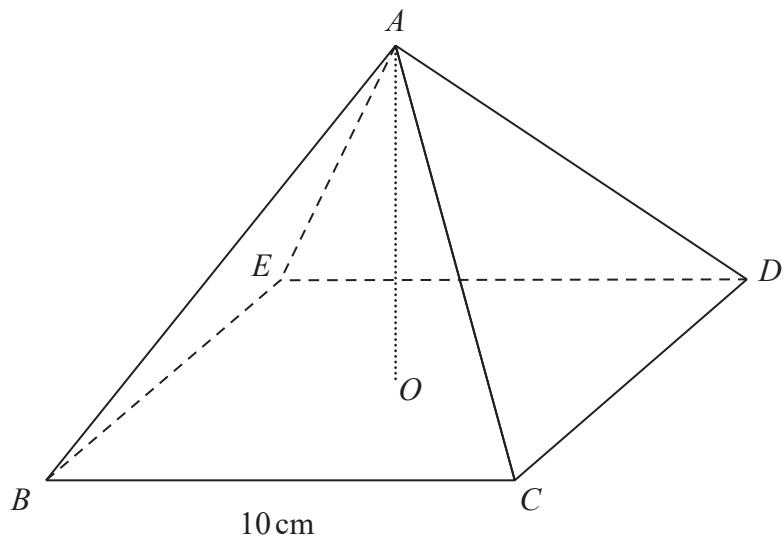
Diagram **NOT** accurately drawn

The base, *BCDE*, of the pyramid is a square of side 10 cm.

The vertex *A* of the pyramid is vertically above the centre *O* of the base so that $AB = AC = AD = AE$

The **total** surface area of the pyramid is 360 cm^2

Work out the size of the angle between *AC* and the base *BCDE*.
Give your answer correct to 3 significant figures.

.... °

(Total for Question 23 is 6 marks)

24 A box contains marbles.

4 of the marbles are red.
The rest of the marbles are yellow.

Antonia takes at random a marble from the box and does not replace it.
Sergio then takes at random a marble from the box.

The probability that Antonia and Sergio both take a yellow marble is 0.7

Work out how many marbles were originally in the box.
Show your working clearly.

....

(Total for Question 24 is 5 marks)