CANDIDATE NAME	
CLASS / GROUP	
DATE	

MATHEMATICS

Paper 4 Calculator (Extended)

2 hours

You must answer on the question paper.

You will need: Geometrical instruments · Scientific calculator

INSTRUCTIONS

- Answer all questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name and class in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do not use an erasable pen or correction fluid.
- Do not write on any bar codes.
- You should show all your working in the booklet.
- You may use a calculator.
- If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [ ].
- This document has 16 pages, including a list of formulas.

For teacher use

Total
/ 100

Questions adapted from Cambridge IGCSE 0580 past papers (© UCLES) for classroom practice.
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List of formulas (Extended)

Area, A, of triangle, base b, height h.	**$A = \frac{1}{2}bh$**
Area, A, of circle of radius r.	**$A = \pi r^2$**
Circumference, C, of circle of radius r.	**$C = 2\pi r$**
Curved surface area, A, of cylinder of radius r, height h.	**$A = 2\pi rh$**
Curved surface area, A, of cone of radius r, sloping edge l.	**$A = \pi rl$**
Surface area, A, of sphere of radius r.	**$A = 4\pi r^2$**
Volume, V, of prism, cross-sectional area A, length l.	**$V = Al$**
Volume, V, of pyramid, base area A, height h.	**$V = \frac{1}{3}Ah$**
Volume, V, of cylinder of radius r, height h.	**$V = \pi r^2 h$**
Volume, V, of cone of radius r, height h.	**$V = \frac{1}{3}\pi r^2 h$**
Volume, V, of sphere of radius r.	**$V = (4/3)\pi r^3$**
Area, A, of parallelogram, base b, perpendicular height h.	**$A = bh$**
Area, A, of trapezium, parallel sides a and b, height h.	**$A = \frac{1}{2}(a + b)h$**
For the equation $ax^2 + bx + c = 0$,	**$x = (-b \pm \sqrt{(b^2 - 4ac)}) / 2a$**
In any triangle ABC (sine rule)	**$a/\sin A = b/\sin B = c/\sin C$**
Cosine rule	**$a^2 = b^2 + c^2 - 2bc \cos A$**
Area of triangle	**$\text{Area} = \frac{1}{2}ab \sin C$**

1 Alberto and Maria share \$240 in the ratio 3 : 5.

(a) Show that Alberto receives \$90 and Maria receives \$150.

Answer(a)

[1]

(b) **(i)** Alberto invests his \$90 for 2 years at r % per year **simple** interest.
At the end of 2 years the amount of money he has is \$99.
Calculate the value of r.

Answer(b)(i) r = ... [2]

(ii) The \$99 is 60% of the cost of a holiday.
Calculate the cost of the holiday.

Answer(b)(ii) \$ ..... [2]

(c) Maria invests her \$150 for 2 years at 4% per year **compound** interest.
Calculate the exact amount Maria has at the end of 2 years.

Answer(c) \$ ..... [2]

(d) Maria continues to invest her money at 4% per year **compound** interest.
After 20 years she has \$328.67.

(i) Calculate exactly how much more this is than \$150 invested for 20 years at 4% per year **simple** interest.

Answer(d)(i) \$ ..... [3]

(ii) Calculate \$328.67 as a percentage of \$150.

Answer(d)(ii) ..... % [2]

2 **(a)** y is 5 less than the square of the sum of p and q.

Write down a formula for y in terms of p and q.

Answer(a) $y =$ ..... [2]

(b) The cost of a magazine is $\$x$ and the cost of a newspaper is $\$(x - 3)$.

The total cost of 6 magazines and 9 newspapers is \$51.

Write down and solve an equation in x to find the cost of a magazine.

Answer(b) \$ ..... [4]

(c) Bus tickets cost \$3 for an adult and \$2 for a child.

There are a adults and c children on a bus.

The total number of people on the bus is 52.

The total cost of the 52 tickets is \$139.

Find the number of adults and the number of children on the bus.

Answer(c) Number of adults = ...

Number of children = ... [5]

3 **(a)** $f(x) = 2x - 1$ $g(x) = x^2$

Work out

(i) f(2),

Answer(a)(i) ..... [1]

(ii) g(– 2),

Answer(a)(ii) ..... [1]

(iii) ff(x) in its simplest form,

Answer(a)(iii) ff(x) = ... [2]

(iv) $f^{-1}(x)$, the inverse of f(x),

Answer(a)(iv) $f^{-1}(x)$ = ... [2]

(v) x when gf(x) = 4.

Answer(a)(v) x = ... or x = ... [4]

(b) y is **inversely** proportional to x and $y = 8$ when $x = 2$.

Find,

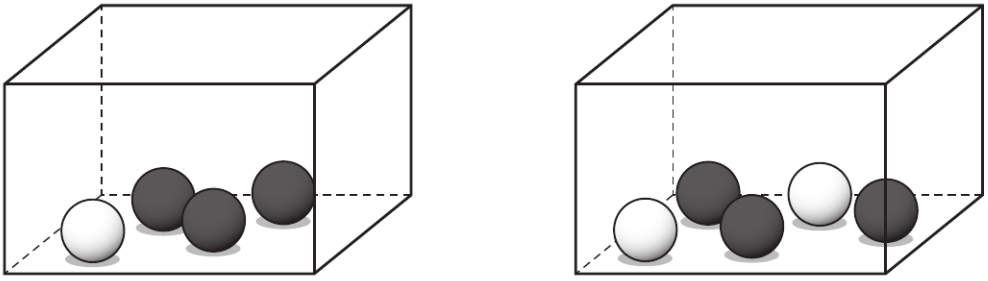
(i) an equation connecting y and x,

Answer(b)(i) ..... [2]

(ii) y when $x = \frac{1}{2}$.

Answer(b)(ii) y = ... [1]

4



A B

Box A contains 3 black balls and 1 white ball.
Box B contains 3 black balls and 2 white balls.

(a) A ball can be chosen at random from either box.
Complete the following statement.

There is a greater probability of choosing a white ball from Box ..... .

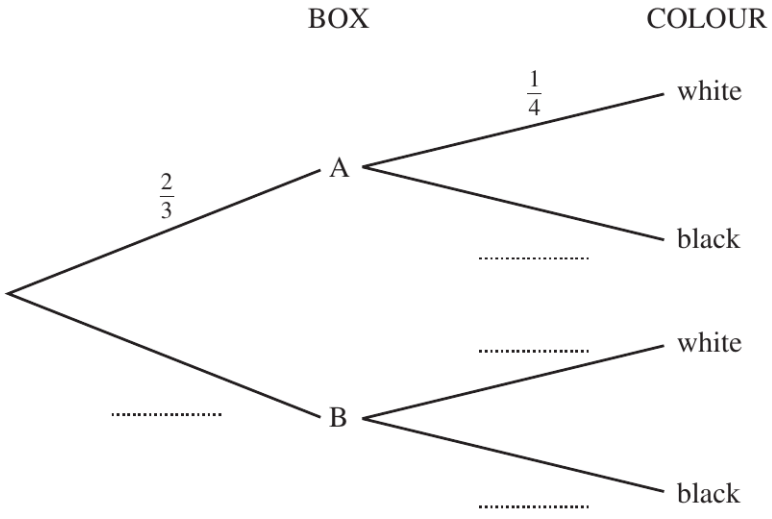
Explain your answer.

Answer(a) ..... [1]

(b) Abdul chooses a box and then chooses a ball from this box at random.

The probability that he chooses box A is $\frac{2}{3}$.

(i) Complete the tree diagram by writing the four probabilities in the empty spaces.



[4]

(ii) Find the probability that Abdul chooses box A and a black ball.

Answer(b)(ii) ..... [2]

(iii) Find the probability that Abdul chooses a black ball.

Answer(b)(iii) ..... [2]

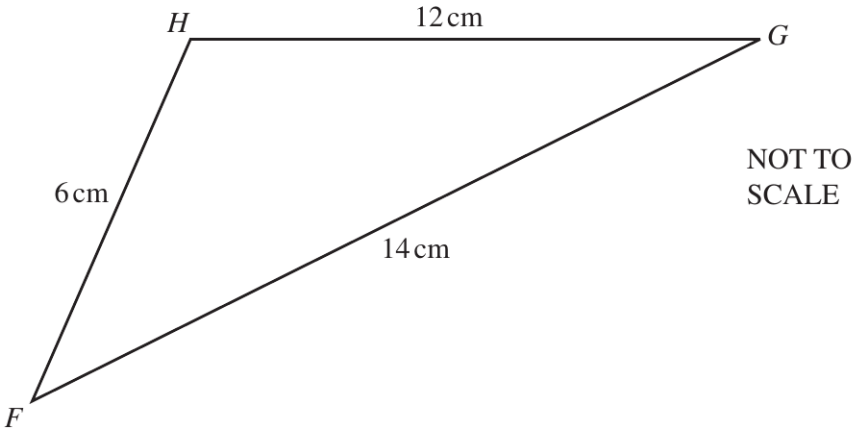
(c) Tatiana chooses a box and then chooses **two** balls from this box at random (without replacement).

The probability that she chooses box A is $\frac{2}{3}$.

Find the probability that Tatiana chooses two white balls.

Answer(c) ..... [2]

5 (a)



The diagram shows triangle *FGH*, with *FG* = 14 cm, *GH* = 12 cm and *FH* = 6 cm.

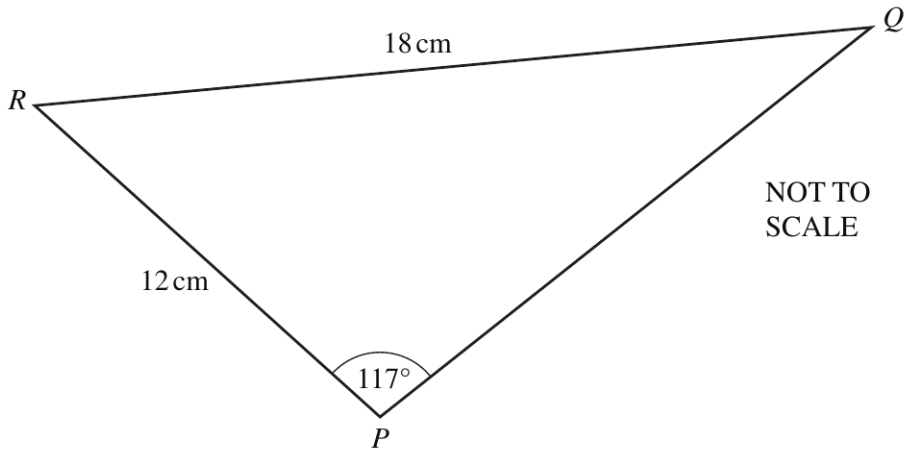
(i) Calculate the size of angle *HFG*.

Answer(a)(i) Angle *HFG* = ... [4]

(ii) Calculate the area of triangle *FGH*.

Answer(a)(ii) ..... cm^2 [2]

(b)

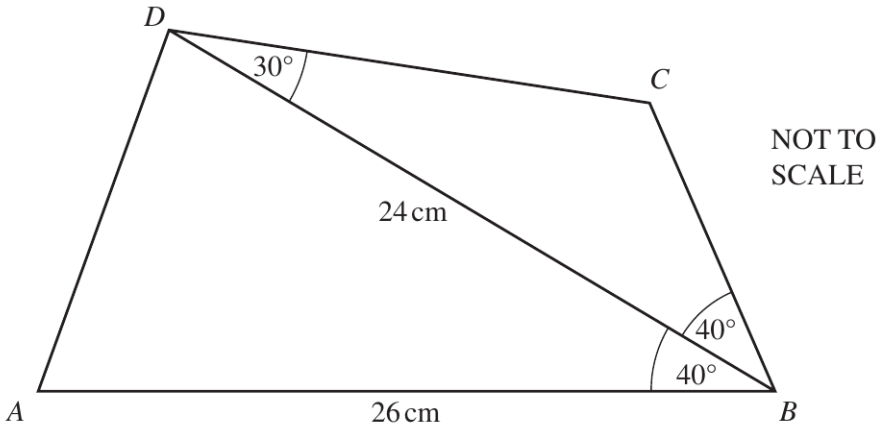


The diagram shows triangle PQR, with $RP = 12$ cm, $RQ = 18$ cm and angle $RPQ = 117°$.

Calculate the size of angle RQP.

Answer(b) Angle RQP = ... [3]

6



ABCD is a quadrilateral and *BD* is a diagonal.
AB = 26 cm, *BD* = 24 cm, angle *ABD* = 40°, angle *CBD* = 40° and angle *CDB* = 30°.

(a) Calculate the area of triangle *ABD*.

Answer(a) ..... cm^2 [2]

(b) Calculate the length of *AD*.

Answer(b) ..... cm [4]

(c) Calculate the length of *BC*.

Answer(c) ..... cm [4]

(d) Calculate the shortest distance from the point *C* to the line *BD*.

Answer(d) ..... cm [2]

7 A spherical ball has a radius of 2.4 cm.

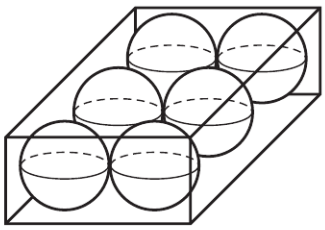
(a) Show that the volume of the ball is 57.9 cm^3, correct to 3 significant figures.

[The volume V of a sphere of radius r is $V = \frac{4}{3}\pi r^3$.]

Answer(a)

[2]

(b)



NOT TO SCALE

Six spherical balls of radius 2.4 cm fit exactly into a **closed** box.
The box is a cuboid.

Find

(i) the length, width and height of the box,

Answer(b)(i) ..... cm, ... cm, ... cm [3]

(ii) the volume of the box,

Answer(b)(ii) ..... cm^3 [1]

(iii) the volume of the box **not** occupied by the balls,

Answer(b)(iii) ..... cm^3 [1]

(iv) the surface area of the box.

Answer(b)(iv) ..... cm^2 [2]

(c)



NOT TO SCALE

The six balls can also fit exactly into a **closed** cylindrical container, as shown in the diagram.

Find

(i) the volume of the cylindrical container,

Answer(c)(i) ..... cm^3 [3]

(ii) the volume of the cylindrical container **not** occupied by the balls,

Answer(c)(ii) ..... cm^3 [1]

(iii) the surface area of the cylindrical container.

Answer(c)(iii) ..... cm^2 [3]

8 **(a)** The times, t seconds, for 200 people to solve a problem are shown in the table.

Time (t seconds)	Frequency
$0 < t \leqslant 20$	6
$20 < t \leqslant 40$	12
$40 < t \leqslant 50$	20
$50 < t \leqslant 60$	37
$60 < t \leqslant 70$	42
$70 < t \leqslant 80$	50
$80 < t \leqslant 90$	28
$90 < t \leqslant 100$	5

Calculate an estimate of the mean time.

Answer(a) ..... s [4]

(b) **(i)** Complete the cumulative frequency table for this data.

Time (t seconds)	$t \leqslant 20$	$t \leqslant 40$	$t \leqslant 50$	$t \leqslant 60$	$t \leqslant 70$	$t \leqslant 80$	$t \leqslant 90$	$t \leqslant 100$
Cumulative Frequency	6	18	38			167		

[2]

(ii) Draw the cumulative frequency graph on the grid opposite to show this data. [4]

(c) Use your cumulative frequency graph to find

(i) the median time,

Answer(c)(i) ..... s [1]

(ii) the lower quartile,

Answer(c)(ii) ..... s [1]

(iii) the inter-quartile range,

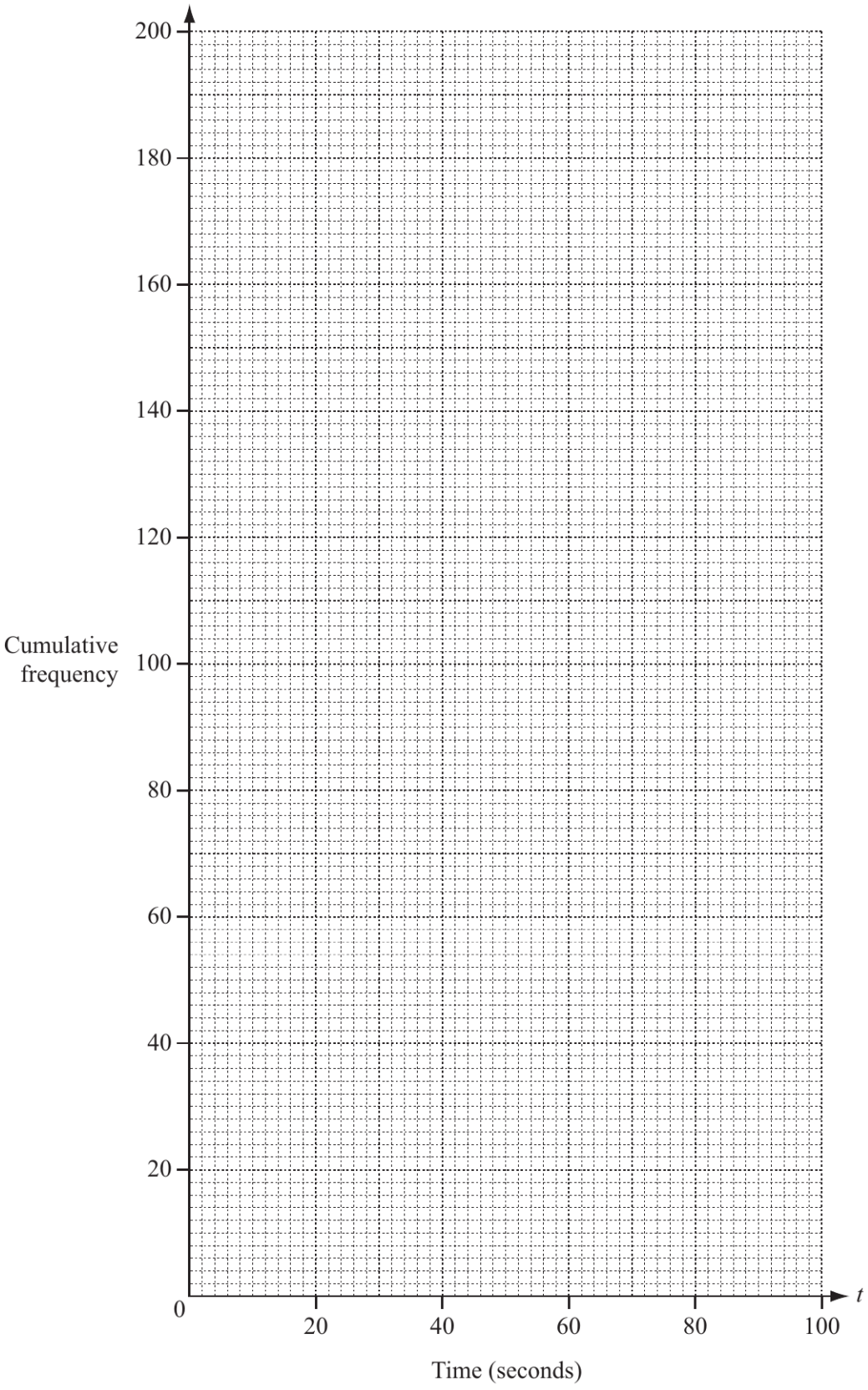
Answer(c)(iii) ..... s [1]

(iv) how many people took between 65 and 75 seconds to solve the problem,

Answer(c)(iv) ..... [1]

(v) how many people took longer than 45 seconds to solve the problem.

Answer(c)(v) ..... [2]


200
180
160
140
120
100
80
60
40
20
0
Cumulative frequency
20
40
60
80
100
t
Time (seconds)

END OF PAPER

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