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CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/41

Paper 4 (Extended)

May/June 2020

2 hours 15 minutes

You must answer on the question paper.

You will need: Geometrical instruments

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, centre number and candidate number 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 use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π , use your calculator value.

INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [].

This document has **20** pages. Blank pages are indicated.

Formula List

For the equation $ax^2 + bx + c = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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 . $A = \pi rl$

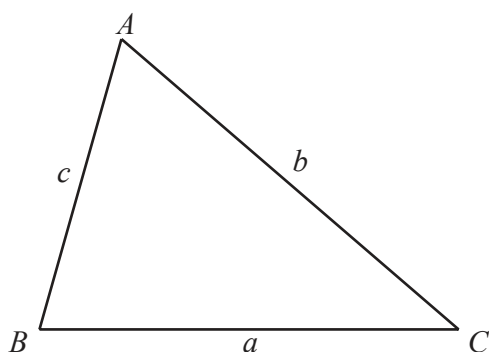
Curved surface area, A , of sphere of radius r . $A = 4\pi r^2$

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 . $V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

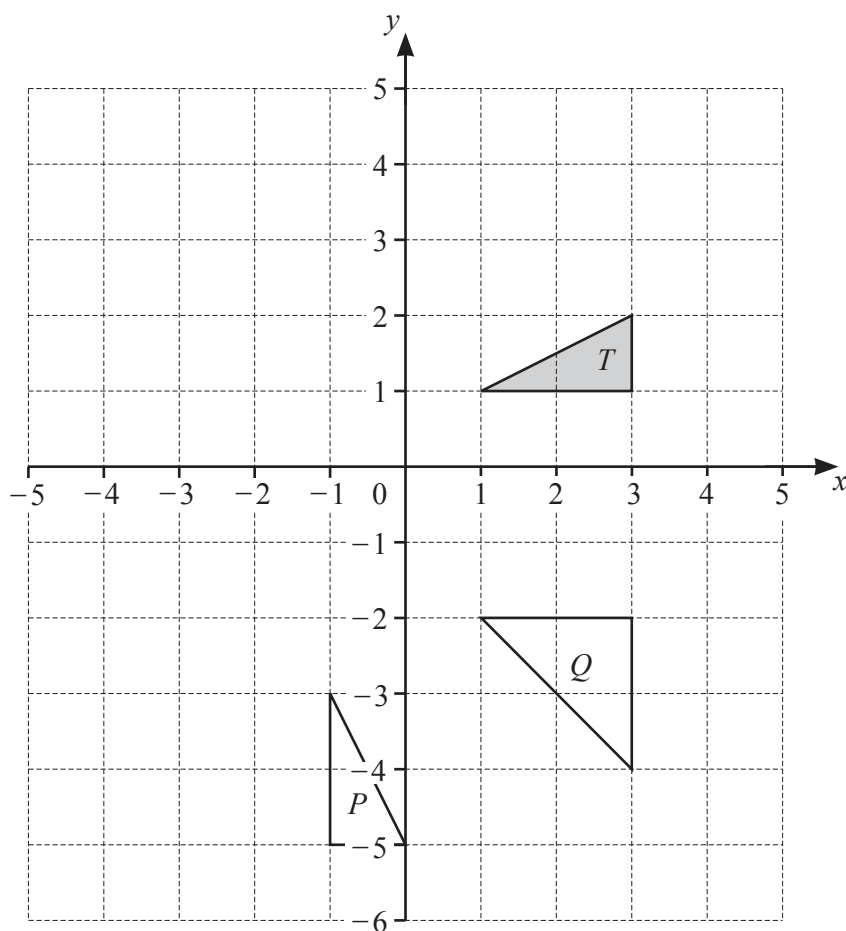
$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2}bc \sin A$$

3

Answer **all** the questions.

1



(a) (i) Reflect shape T in the y -axis. [1]

(ii) Translate shape T by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$. [2]

(iii) Enlarge shape T by scale factor 2, centre $(2, 0)$. [2]

(b) Describe fully the **single** transformation that maps shape T onto

(i) shape P ,

.....

..... [3]

(ii) shape Q .

.....

..... [3]

4

- 2 (a) These are Tom's ten homework marks.

8 7 10 8 9 5 8 10 6 8

Find

- (i) the range,

..... [1]

- (ii) the mean,

..... [1]

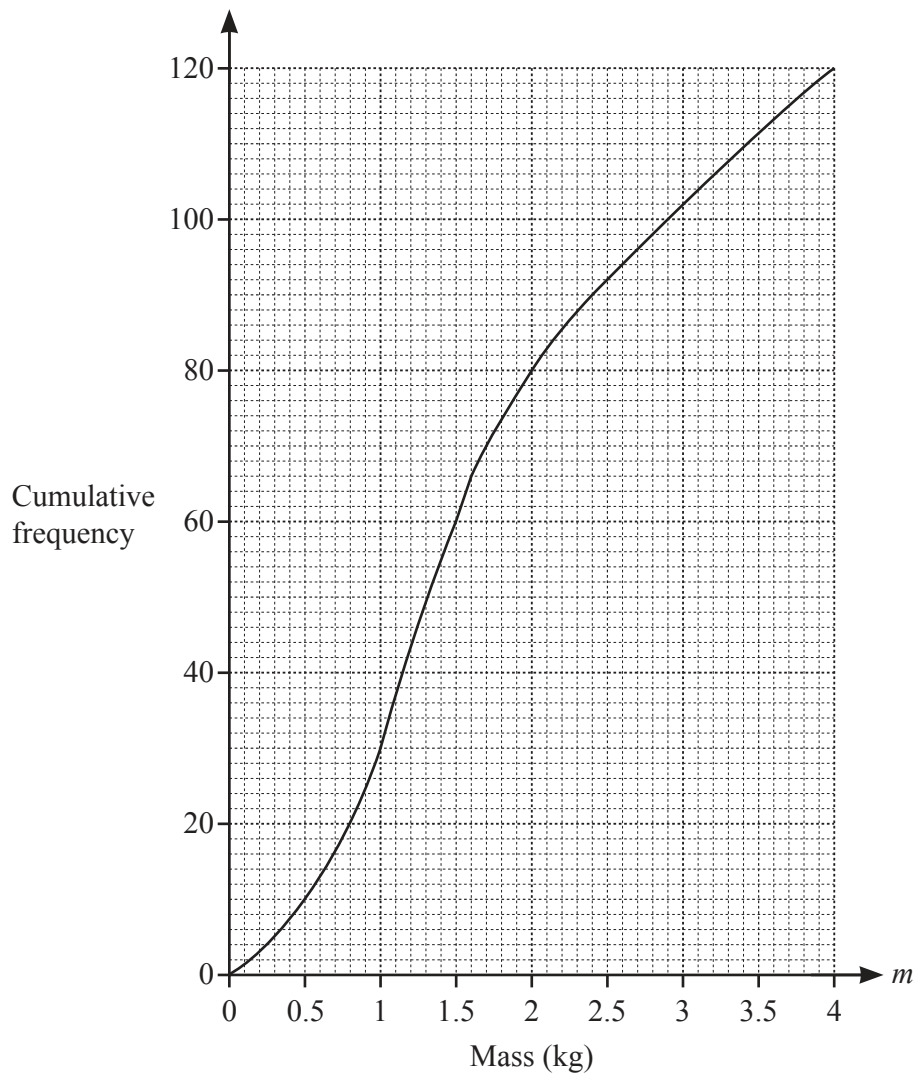
- (iii) the median,

..... [1]

- (iv) the upper quartile.

..... [1]

- (b) The mass, m kg, of each of 120 parcels is recorded.
The cumulative frequency curve shows the results.



5**(i)** Find the median.

..... kg [1]

(ii) Find the lower quartile.

..... kg [1]

(iii) Find the interquartile range.

..... kg [1]

(iv) Find the number of parcels with a mass of more than 3 kg.

..... [2]

(v) (a) Use the cumulative frequency curve to complete the frequency table.

Mass (m kg)	$0 < m \leq 1$	$1 < m \leq 1.5$	$1.5 < m \leq 2$	$2 < m \leq 3$	$3 < m \leq 4$
Frequency	30	30			

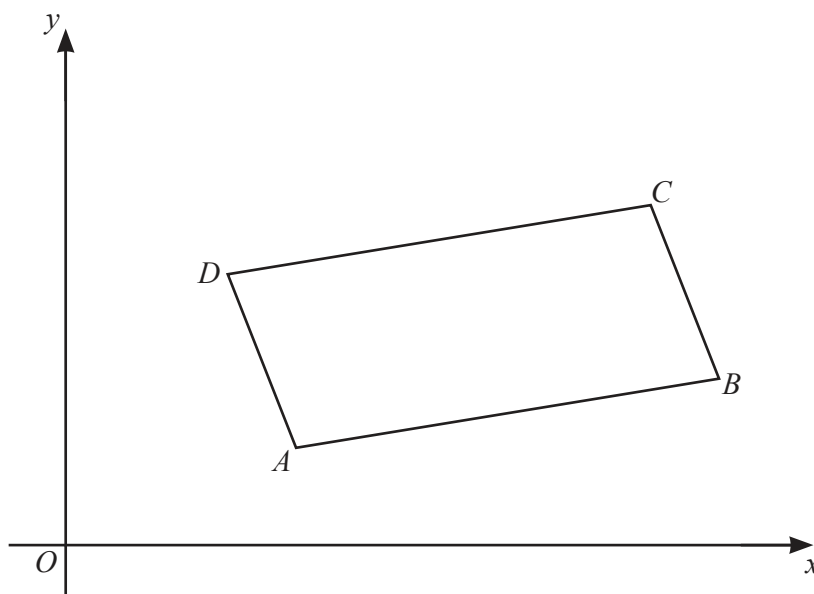
[3]

(b) Use the frequency table to calculate an estimate of the mean.

..... kg [2]

6

3

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SCALE

$ABCD$ is a parallelogram.

A is the point $(3, 1)$, B is the point $(10, 2)$ and D is the point $(2, 3)$.

(a) Find the coordinates of C .

(.....,) [2]

(b) Calculate the length of AB .
Give your answer as a surd in its simplest form.

$AB = \dots\dots\dots$ [3]

(c) The diagonals of the parallelogram meet at X .

Find the coordinates of X .

(.....,) [2]

7

- (d) The straight line BA is extended to meet the y -axis at P and the x -axis at Q .

Find the coordinates of P and the coordinates of Q .

P (..... ,)

Q (..... ,) [5]

8**4** Find the n th term of each sequence.**(a)** 16, 25, 36, 49, 64, ...

..... [2]

(b) 3, 10, 29, 66, 127, ...

..... [2]

(c) 64, 32, 16, 8, 4, ...

..... [2]

9**5 (a)** Expand the brackets and simplify.

(i) $5(2-p) - 3(3+2p)$

..... [2]

(ii) $(7g-2h)(3g+11h)$

..... [3]

(b) Factorise completely.

(i) $2x^2y^3 - 4x^3y^2$

..... [2]

(ii) $49t^2 - 9u^2$

..... [2]

(iii) $6d^2 + d - 2$

..... [2]

10**6 (a)**

(i) On the diagram, sketch the graph of $y = |\log x|$ for $0 < x \leq 5$. [2]

(ii) Solve the equations.

(a) $|\log x| = 0.2$

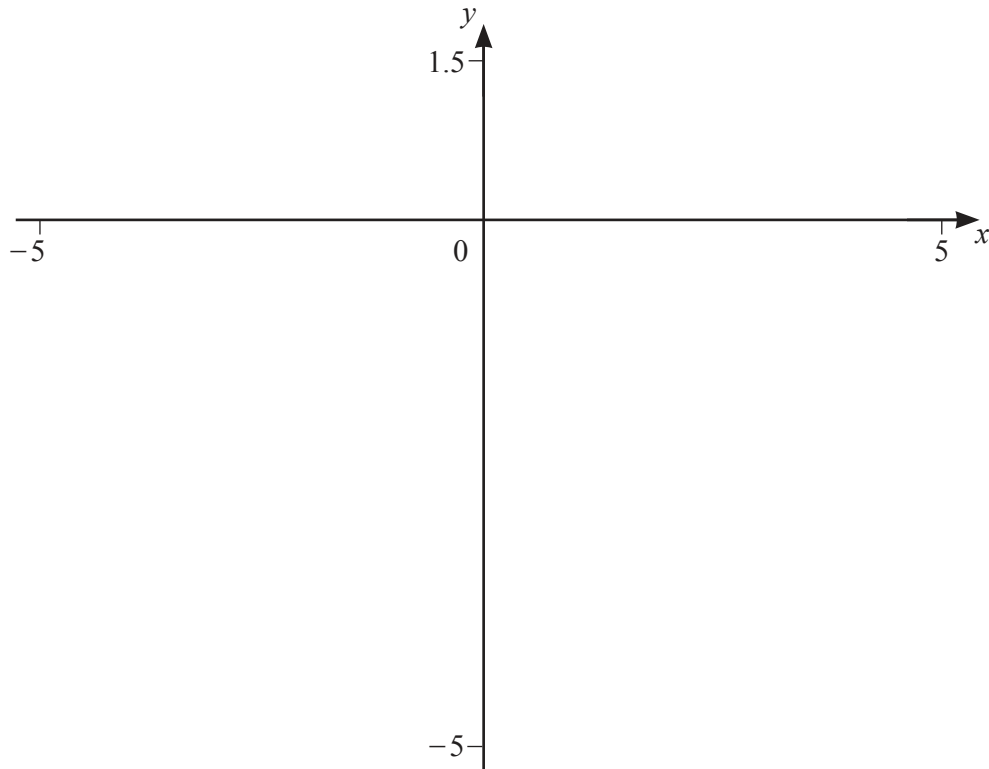
$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

(b) $|\log x| = 1 - \frac{x}{4}$

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

11

(b)



(i) On the diagram, sketch the graph of $y = \log|x|$ for values of x between -5 and 5 . [2]

(ii) Solve the equation $\log|x| = 0.2$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

(c) Write down the range of values of x for which the graph of $y = |\log x|$ is the same as the graph of $y = \log|x|$.

$\dots\dots\dots$ [1]

12

- 7 (a)** Louis invests \$500 at a rate of 2.5% per year simple interest.

Calculate the total amount of interest at the end of 8 years.

\$ [2]

- (b)** Martha invests \$500 at a rate of 2.4% per year compound interest.

Calculate the total amount of interest at the end of 8 years.

\$ [4]

- (c)** Naomi invests an amount of money at a rate of 2.1% per year compound interest.

Find the number of complete years it takes for the value of Naomi's investment to double.

..... [4]

13

- (d) Oscar invests an amount of money at a rate of $r\%$ per year compound interest. At the end of 31 years the value of Oscar's investment is 2.5 times greater than the original amount of money.

Find the value of r .

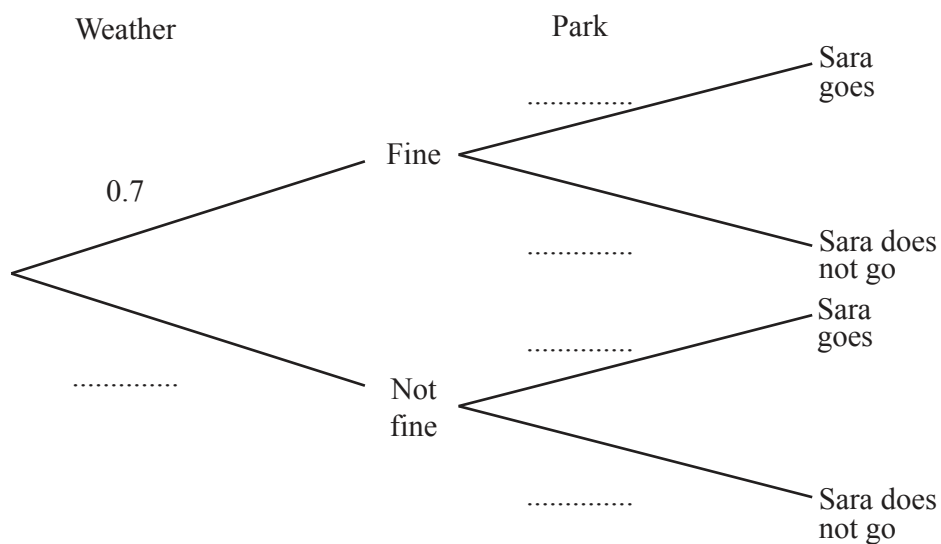
$r = \dots\dots\dots$ [3]

14

- 8 (a) When the weather is fine, the probability that Sara goes to the park is 0.9 .
When the weather is not fine, the probability that Sara goes to the park is 0.2 .

On any day, the probability that the weather is fine is 0.7 .

- (i) Complete the tree diagram.



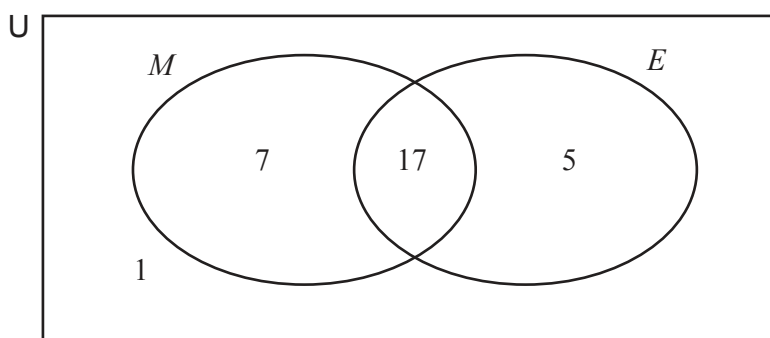
[3]

- (ii) Find the probability that, on any day, Sara goes to the park.

..... [3]

15

- (b) 30 students are asked if they like Mathematics (M) and if they like English (E). The Venn diagram shows the number of students in each subset.



- (i) Find $n(M \cup E)$.

..... [1]

- (ii) Two students are chosen at random.

Find the probability that they both like Mathematics but not English.

..... [3]

9



$$f(x) = x^3 - 6x^2 + 8x \quad \text{for } -0.5 \leq x \leq 4.5$$

(a) On the diagram, sketch the graph of $y = f(x)$. [2]

(b) Solve the inequality $f(x) < 0$.

..... [3]

(c) Find the positive value of k when $f(x) = k$ has two different solutions.

$k =$ [2]

17

10 $f(x) = 2x + 3$ $g(x) = 5^x$

(a) Find $f(g(3))$.

..... [2]

(b) Find $f^{-1}(x)$.

$f^{-1}(x) =$ [2]

(c) Find x when $g(x) = \frac{1}{25\sqrt{5}}$.

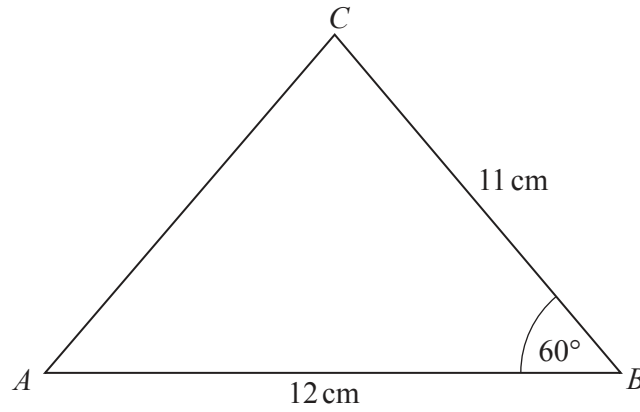
$x =$ [2]

(d) Find $g^{-1}(x)$.

$g^{-1}(x) =$ [2]

18

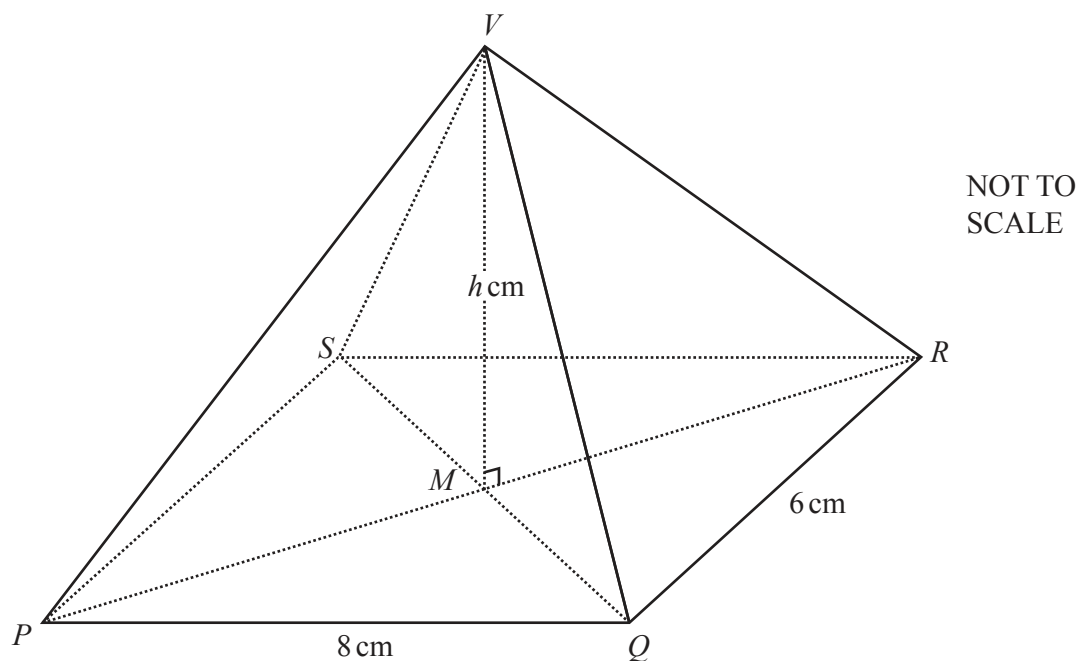
11 (a)

NOT TO
SCALECalculate the shortest distance from B to AC .

..... cm [7]

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(b)



The diagram shows a pyramid on a rectangular base $PQRS$.
The diagonals of the base meet at M and V is vertically above M .

$PQ = 8\text{ cm}$, $QR = 6\text{ cm}$ and $VM = h\text{ cm}$.
The volume of the pyramid is 112 cm^3 .

(i) Show that $h = 7$.

[2]

(ii) Calculate the length of VR .

$VR = \dots\dots\dots\text{ cm}$ [3]

(iii) K is the mid-point of PS and L is the mid-point of QR .

Calculate angle KVL .

Angle $KVL = \dots\dots\dots$ [3]

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