Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

1545754021

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **October/November 2015**

2 hours 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometric Instruments
Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 120.

This document consists of **20** printed pages.

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[Turn over

Formula List

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

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

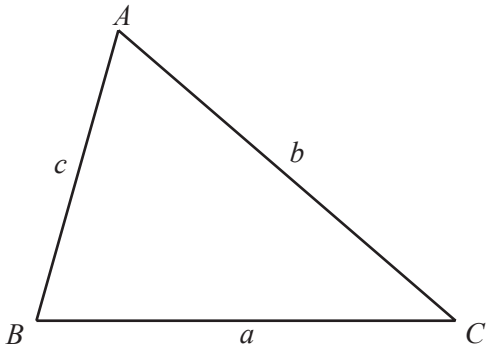
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \dfrac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \dfrac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \dfrac{4}{3}\pi r^3$



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

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

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

Answer **all** the questions.

1 Sunil has \$80 and Asha has \$75.

(a) Write the ratio 80 : 75 in its simplest form.

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

(b) **(i)** Sunil spends \$24.

Work out \$24 as a percentage of \$80.

Answer(b)(i) .....% [1]

(ii) Sunil invests \$50 at a rate of 2% per year compound interest.

Calculate the **interest** Sunil has after 20 years.

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

(c) During each month, Asha spends $\frac{1}{5}$ of the money that she had at the beginning of the month.

(i) Work out how much of the \$75 Asha has at the end of the 2nd month.

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

(ii) Calculate the number of **whole** months it takes for Asha to have less than \$5.

Answer(c)(ii) .....[3]

2 **(a)** $\mathbf{p} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} 14 \\ 8 \end{pmatrix}$

(i) Find $2\mathbf{p} + 3\mathbf{q}$.

Answer(a)(i) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

(ii) Find $|\mathbf{q} - \mathbf{p}|$.

Answer(a)(ii) ..... [3]

(b) The graph of $y = f(x)$ is mapped onto the graph of $y = f(x + 2)$ by a translation with vector $\begin{pmatrix} u \\ v \end{pmatrix}$.

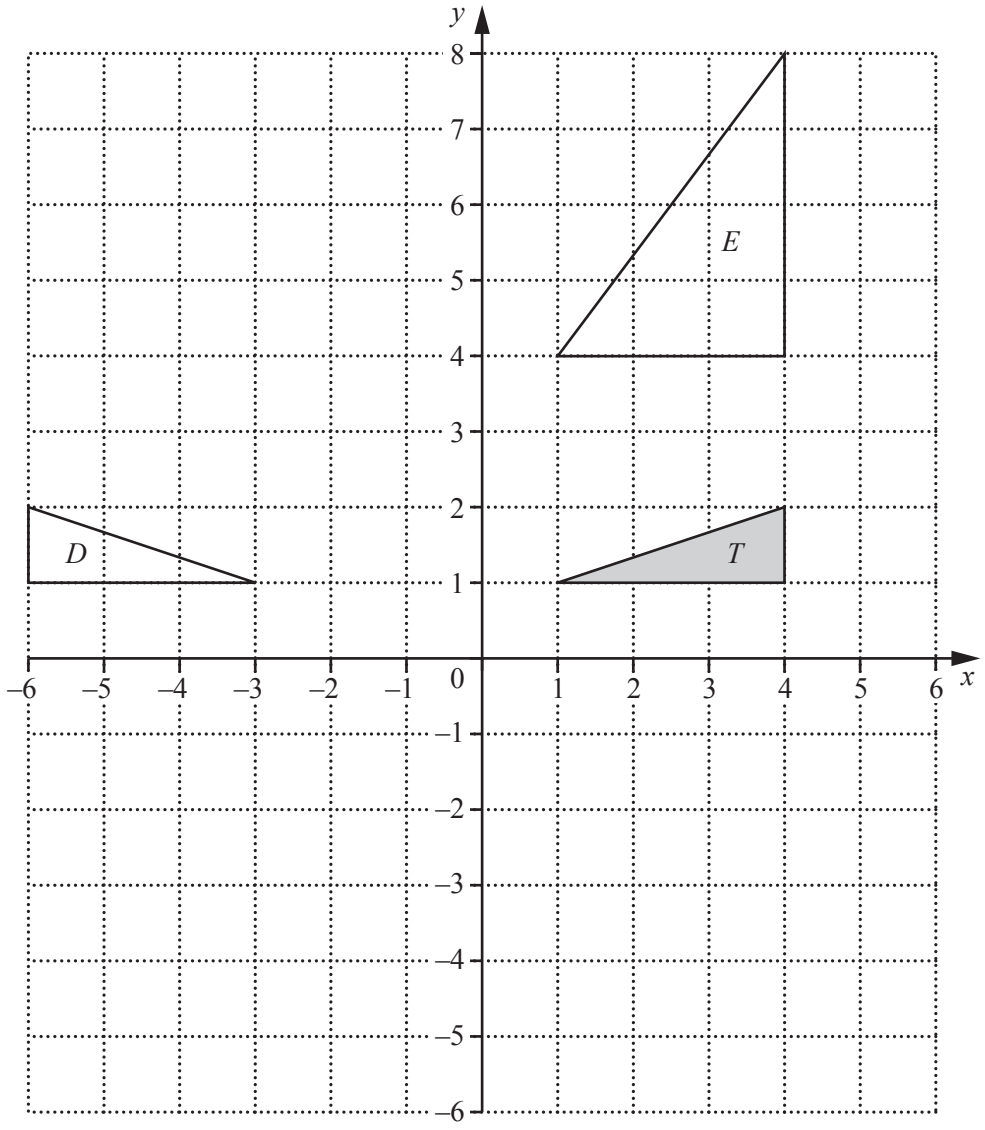
Find the value of u and the value of v.

Answer(b) $u =$ .....

$v =$ ..... [2]

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(c)



(i) Draw the image of triangle T under a rotation of 90° clockwise about the point $(-1, -1)$. [3]

(ii) Describe fully the **single** transformation that maps triangle T onto triangle D.

.....

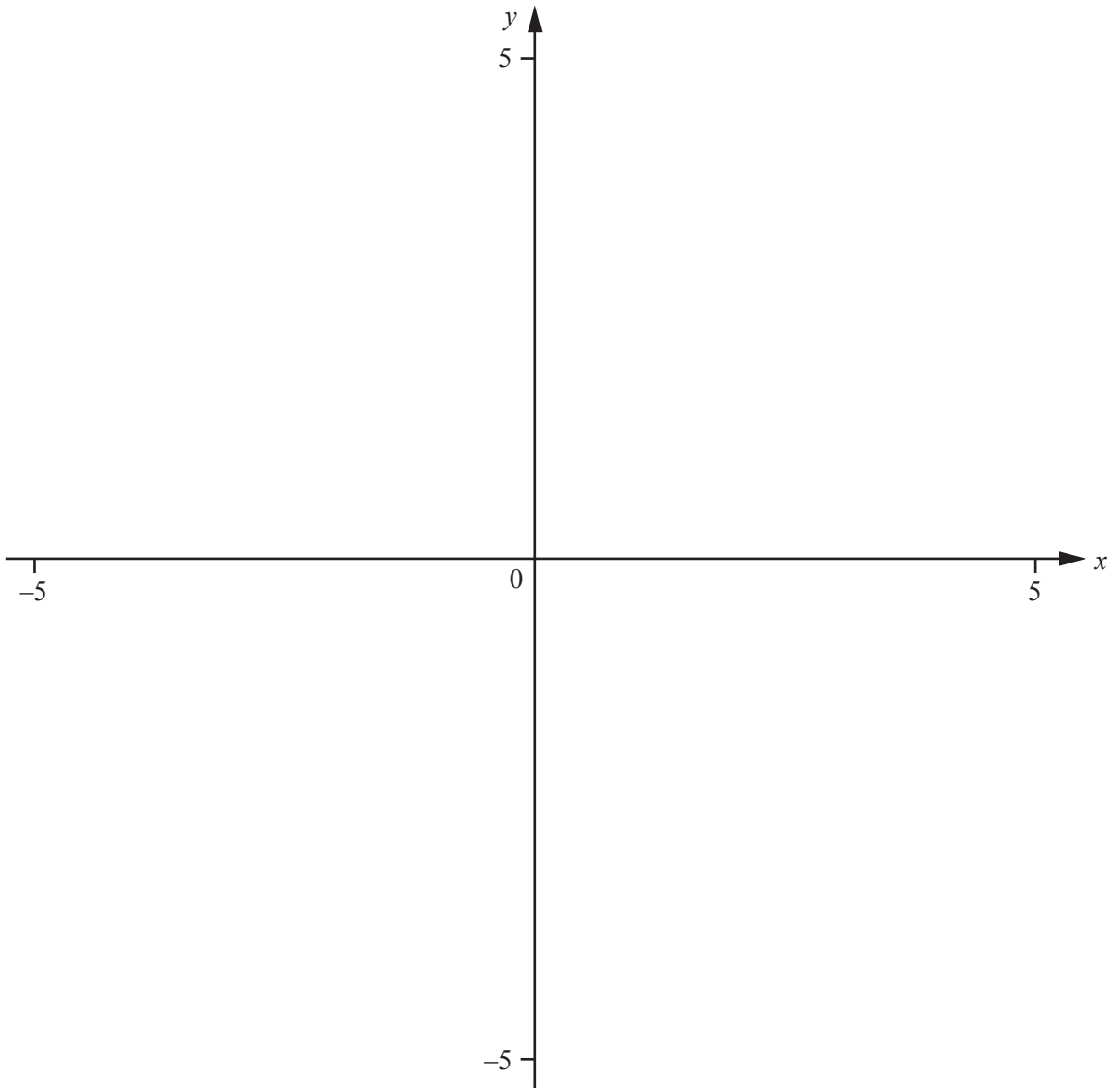
..... [2]

(iii) Describe fully the **single** transformation that maps triangle T onto triangle E.

.....

..... [3]

3



$$f(x) = 1 - \frac{2}{x}, \quad x \neq 0$$

(a) On the diagram, sketch the graph of $y = f(x)$, for values between $x = -5$ and $x = 5$. [2]

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

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

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

Answer(c) ..... [3]

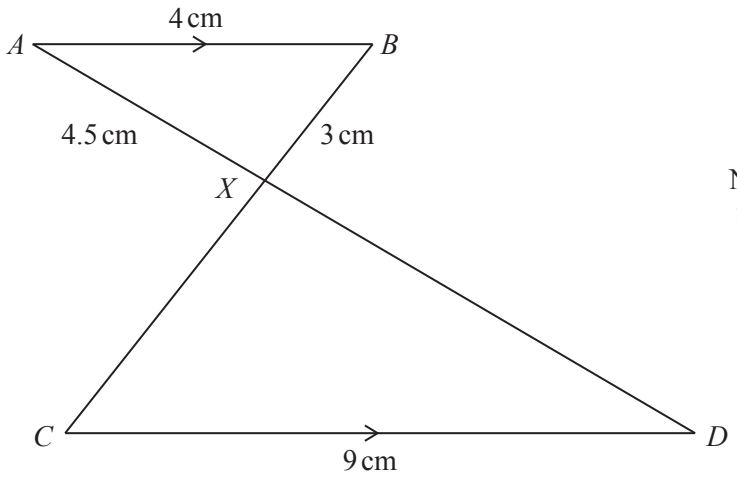
(d) On the diagram, sketch the graph of $y = f^{-1}(x)$, for values between $x = -5$ and $x = 5$. [2]

(e) Describe fully the **single** transformation that maps the graph of $y = f(x)$ onto the graph of $y = f^{-1}(x)$.

.....

..... [2]

4 (a)



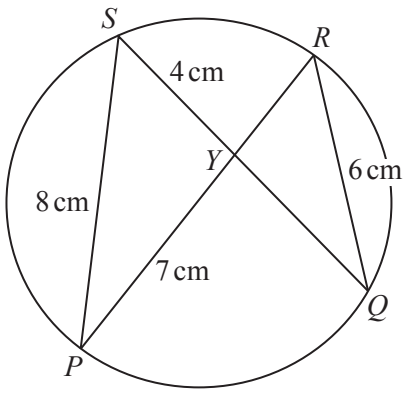
NOT TO SCALE

AB and *CD* are parallel.
AD and *CB* intersect at *X*.
CD = 9 cm, *AB* = 4 cm, *AX* = 4.5 cm and *BX* = 3 cm.

Calculate the length of *CX*.

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

(b)



NOT TO SCALE

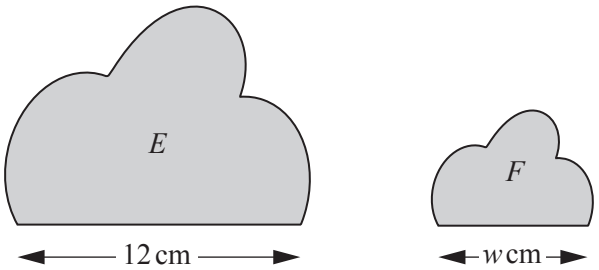
P, *Q*, *R* and *S* lie on a circle.
PR and *QS* intersect at *Y*.
QR = 6 cm, *PS* = 8 cm, *PY* = 7 cm and *YS* = 4 cm.

Calculate the length of *RY*.

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

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(c)



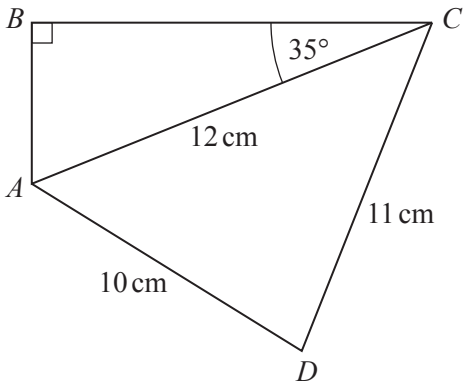
NOT TO SCALE

The two shapes are mathematically similar.
The area of E is $90\,cm^2$ and the area of F is $45\,cm^2$.

Find the value of w.

Answer(c) $w =$ ..... [3]

5



NOT TO SCALE

Calculate

(a) BC,

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

(b) angle CAD,

Answer(b) ..... [3]

(c) the area of the quadrilateral $ABCD$.

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

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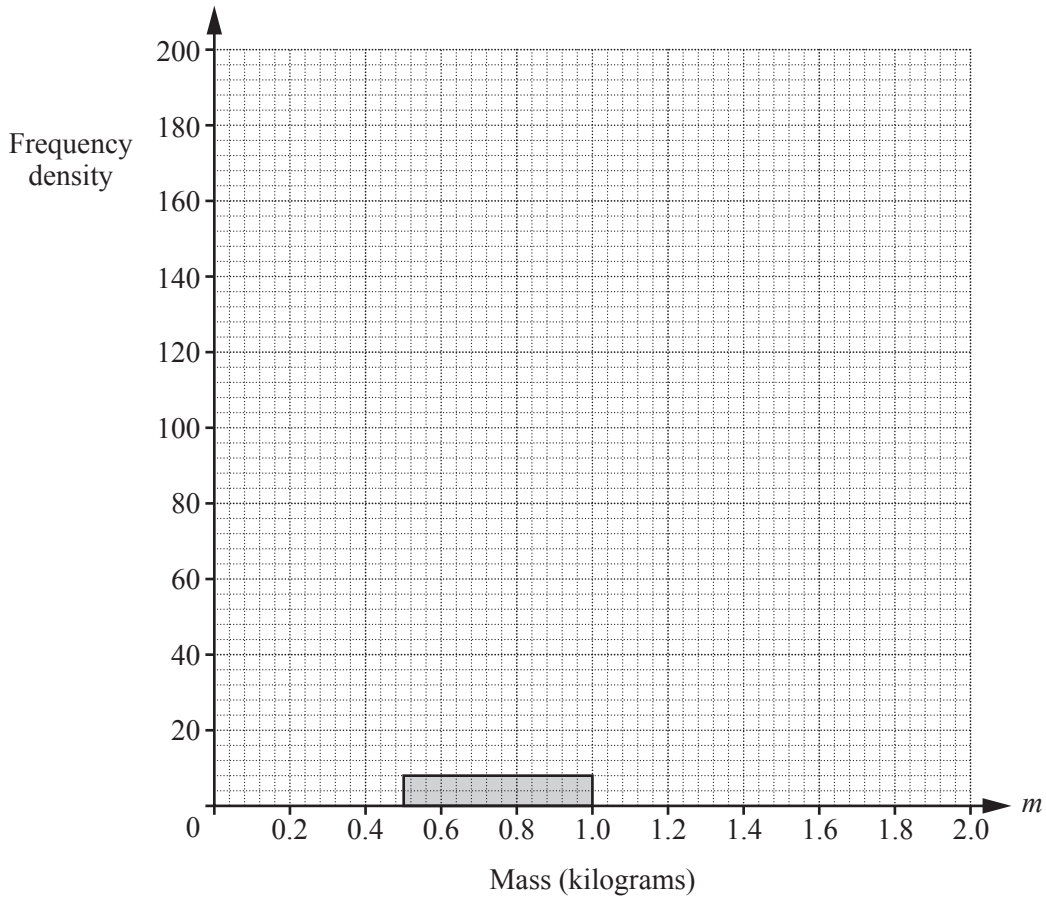
6 120 students estimate the mass, m kg, of a bag of oranges.
The frequency table shows the results.

Mass (m kg)	$0.5 < m \leqslant 1$	$1 < m \leqslant 1.2$	$1.2 < m \leqslant 1.4$	$1.4 < m \leqslant 1.6$	$1.6 < m \leqslant 2$
Frequency	4	36	40	32	8

(a) Calculate an estimate of the mean.

Answer(a) ..... kg [2]

(b) Complete the histogram to show the information in the table.



[3]

7 **(a)** A solid metal cuboid measures 20 cm by 8 cm by 2 cm.
$1\,cm^3$ of the metal has a mass of 7.85 g.

(i) Calculate the mass of the cuboid.

Answer(a)(i) ..... g [2]

(ii) The surface of the cuboid is painted at a cost of 8 cents per cm^2.

Calculate the cost of painting the cuboid.
Give your answer in dollars.

Answer(a)(ii) $ ..... [3]

(b) Another cuboid measures 16 cm by 6 cm by 4 cm.
It is cut into cubes, each of side 2 cm.

Calculate the number of cubes.

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

(c) Another solid metal cuboid measures 20 cm by 12 cm by 4 cm.
It is melted down and made into spheres of radius 1.5 cm.

Calculate

(i) the largest number of spheres of radius 1.5 cm that can be made,

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

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(ii) the volume of metal remaining after the spheres have been made,

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

(iii) the radius of the sphere that can be made using all the remaining metal.

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

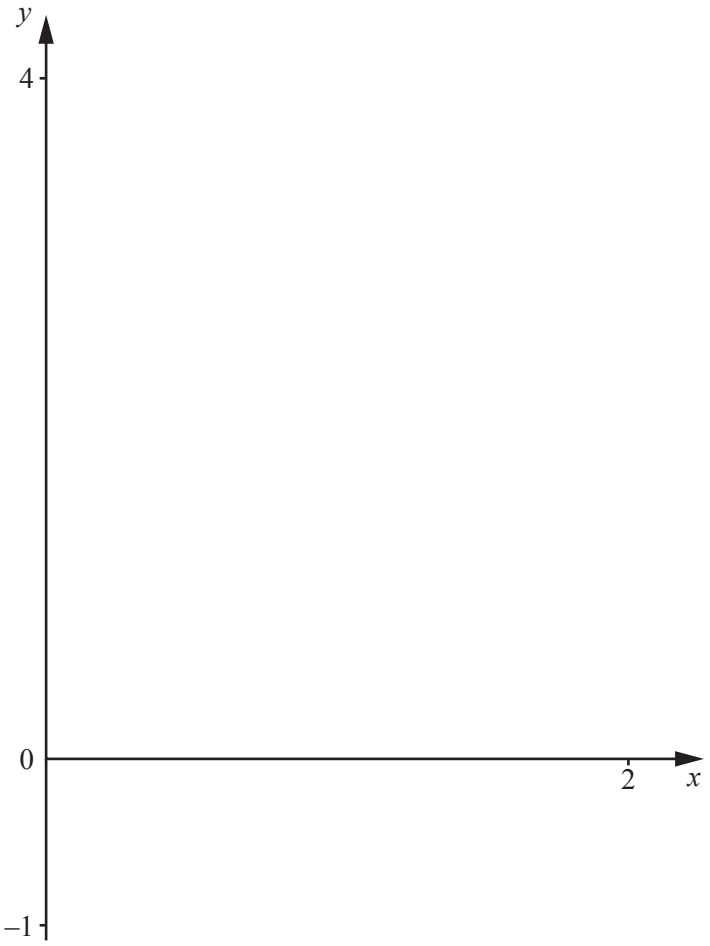
(d) A plastic cone has radius r cm and perpendicular height $3r$ cm.
$1\,cm^3$ of the plastic has a mass of 0.9 g.

A wooden hemisphere has a radius of $2r$ cm.
$1\,cm^3$ of the wood has a mass of 0.45 g.

Find the mass of the cone as a fraction of the mass of the hemisphere.
Give your answer in its lowest terms.

Answer(d) ..... [4]

8



$f(x) = 3 - x^2$ $\quad$ $g(x) = x^x$

(a) On the diagram, sketch the graphs of $y = f(x)$ and $y = g(x)$ for values between $x = 0$ and $x = 2$. [4]

(b) Solve the equation $3 - x^2 = x^x$ for $0 \leqslant x \leqslant 2$.

Answer(b) $x =$ ..... [1]

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(c) Solve the equation $3 - x^2 = 0$ for $0 \leqslant x \leqslant 2$.

Answer(c) $x =$ ..... [1]

(d) (i) Find the co-ordinates of the local minimum point on the graph of $y = g(x)$.

Answer(d)(i) (..... , ...) [2]

(ii) Find the range of $g(x)$ for the domain $0 < x \leqslant 2$.

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

(e) (i) Find the values of the following.

g(0.1) = ... g(0.01) = ... g(0.001) = ... [3]

(ii) Complete the statement.

Starting from $x = 0.1$, as x gets closer and closer to 0,

g(x) gets closer and closer to the value ..... [1]

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9



A *B*

The diagram shows two unbiased dice, *A* and *B*.

The numbers on die *A* are 0, 1, 1, 1, 2, 3.
The numbers on die *B* are 1, 2, 2, 3, 3, 3.

When a die is rolled, the number shown on the top face is recorded.

(a) Both dice are rolled.

Find the probability that

(i) both dice show 3,

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

(ii) the numbers showing on the two dice add up to 2.

Answer(a)(ii) ..... [3]

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(b) Die B is rolled until it shows 2.

Find the probability that this occurs when the die is rolled for the 4th time.

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

(c) Die A is rolled until it shows 3.

The probability that this occurs when the die is rolled for the nth time is $\frac{3125}{46656}$.

Find the value of n.

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

10 $f(x) = 2x + 3$ $g(x) = x - 1$ $h(x) = \log (x + 1)$

(a) Find f(h(9)).

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

(b) Find g(f(x)) in its simplest form.

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

(c) Find $\frac{1}{f(x)} + \frac{1}{g(x)}$ in terms of x.

Give your answer as a single fraction.

Answer(c) ..... [3]

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(d) Solve the equation.

$$h(x) = -1$$

Answer(d) $x =$ ..... [2]

(e) Solve the equation.

$$(g(x))^2 = 5$$

Give exact answers.

Answer(e) x ..... or $x =$ ..... [3]

Question 11 is printed on the next page.

11 **(a)** Cakes cost x cents each and drinks cost y cents each.
2 cakes and 1 drink cost \$1.57 .
1 cake and 3 drinks cost \$2.96 .

Find the total cost of 3 cakes and 2 drinks.
Give your answer in dollars.

Answer(a) \$ ..... [6]

(b) A child's train ticket costs \$$x$.
An adult's train ticket costs \$$(x + 5)$.
Claudia buys 11 tickets.
She spends \$24 on children's tickets and \$24 on adults' tickets.

Write down an equation in x and solve it to find the cost of a child's ticket.

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

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