Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

0011989208

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/31**

Paper 3 (Core) **May/June 2016**

1 hour 45 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical 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 96.

This document consists of **16** printed pages.

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Formula List

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, 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.	$A = \pi rl$
Curved 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.	$V = \pi r^2h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

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Answer **all** the questions.

1 **(a)** Write 356.31

(i) correct to 1 decimal place,

..... [1]

(ii) correct to 2 significant figures,

..... [1]

(iii) correct to the nearest 100,

..... [1]

(iv) in standard form.

..... [1]

(b) **(i)** Calculate $16.8^2 - \sqrt{9.61}$.

Write down all the figures shown on your calculator, giving your answer as a decimal.

..... [1]

(ii) Myrto estimates that the answer to **part (b)(i)** is 300.

(a) Find the difference between Myrto's estimate and your answer to **part (b)(i)**.

..... [1]

(b) Write this difference as a percentage of your answer to **part (b)(i)**.

..... % [1]

2 **(a)** Write $4 \times 4 \times 4 \times 4 \times 4 \times 4$

(i) as a power of 4,

..... [1]

(ii) as an integer.

..... [1]

(b) Find the value of

(i) $4^4 + 4^2$,

..... [1]

(ii) $4^4 - 4^0$.

..... [1]

(c) Write $\frac{4^{10}}{4^2}$ as a power of 4.

..... [1]

3 Tingwei buys 2 kg of cheese.
The cheese costs \$13.50 for one kilogram.

(a) Work out how much Tingwei pays for the 2 kg of cheese.

\$ ..... [1]

(b) He uses all the cheese to make 200 cheese balls.

Find the mass, **in grams**, of one cheese ball.

..... g [1]

(c) **(i)** He sells all these cheese balls at a school fair for \$0.25 each.

Work out how much money he received.

\$ ..... [1]

(ii) The profit goes to the school charity.

Work out how much money goes to the school charity.

\$ ..... [1]

(d) The school fair makes a total profit of \$460.

Write the profit that Tingwei made as a fraction of \$460.
Give your answer in its simplest form.

..... [2]

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[Turn over

4 The number of strawberries in each of 20 boxes is listed below.

32	28	27	32	33	28	34	28	29	29
28	28	33	31	33	33	30	29	29	26

(a) Complete the frequency table.

Number of strawberries	26	27	28	29	30	31	32	33	34
Frequency	1	1							1

[2]

(b) Find

(i) the range,

..... [1]

(ii) the mode,

..... [1]

(iii) the median,

..... [1]

(iv) the mean.

..... [1]

(c) One of these boxes of strawberries is chosen at random.

Find the probability that it contains

(i) exactly 33 strawberries,

..... [1]

(ii) fewer than 30 strawberries.

..... [1]

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5 **(a)** $A = 5B - 2C - \frac{1}{2}D$

(i) Find the value of A when $B = 2$, $C = 3$ and $D = 6$.

..... [2]

(ii) Find the value of B when $A = 12$, $C = 1$ and $D = 4$.

..... [3]

(b) Find the value of $7p - 4q$ when $p = -3$ and $q = -2$.

..... [2]

(c) Rearrange $2y = 3x - 9$ to make x the subject.

$x =$ ..... [2]

(d) The mass of 1 pomegranate and 2 kiwi fruit is 480 g.
The mass of 1 pomegranate and 6 kiwi fruit is 840 g.

Find the mass of 1 pomegranate and the mass of 1 kiwi fruit.
Show all your working.

1 pomegranate = ... g

1 kiwi fruit = ... g [4]

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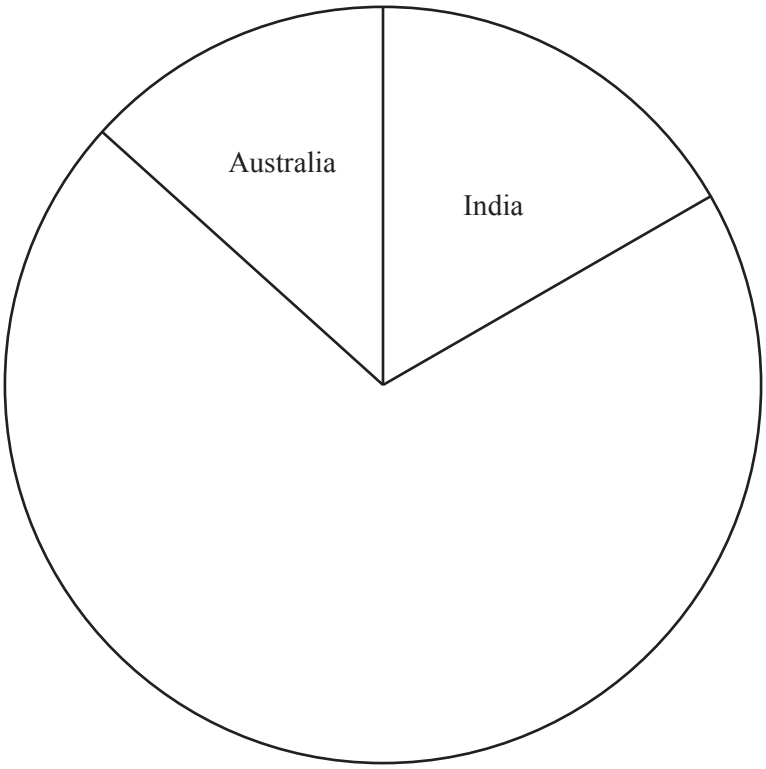
6 30 people were asked where they were going on holiday.
The results are to be shown in a pie chart.

Country	India	Spain	South Africa	United States	Australia
Number of people	5	12	3	6	4
Sector angle	60°				48°

(a) Calculate the sector angle for Spain.

..... [2]

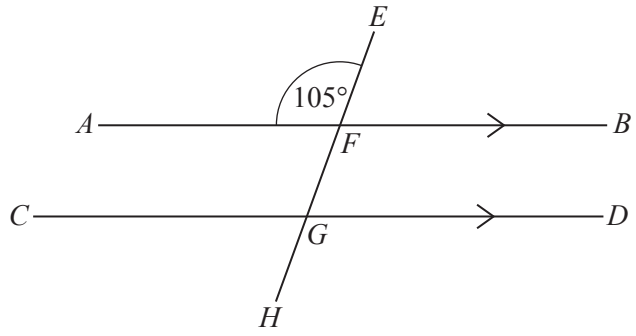
(b) Complete the pie chart.
Label each sector.



[3]

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7 **(a)**



NOT TO SCALE

AFB and *CGD* are parallel lines.
EFGH is a straight line and angle *AFE* = 105°.

Find

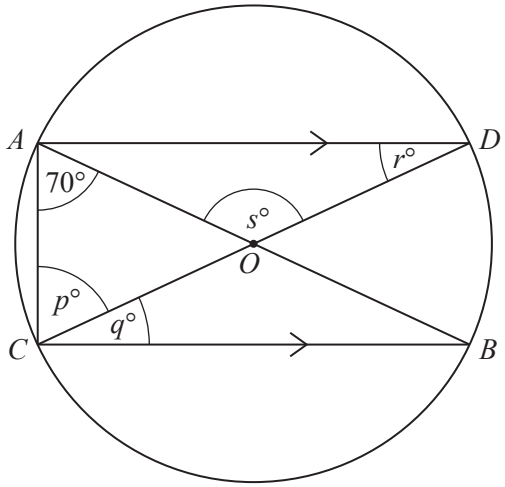
(i) angle *EFB*,

Angle *EFB* = ... [1]

(ii) angle *CGF*.

Angle *CGF* = ... [1]

(b)



NOT TO SCALE

AOB and *COD* are diameters of a circle, centre *O*.
The lines *AD* and *CB* are parallel and angle *CAB* = 70°.

Find the values of *p*, *q*, *r* and *s*.

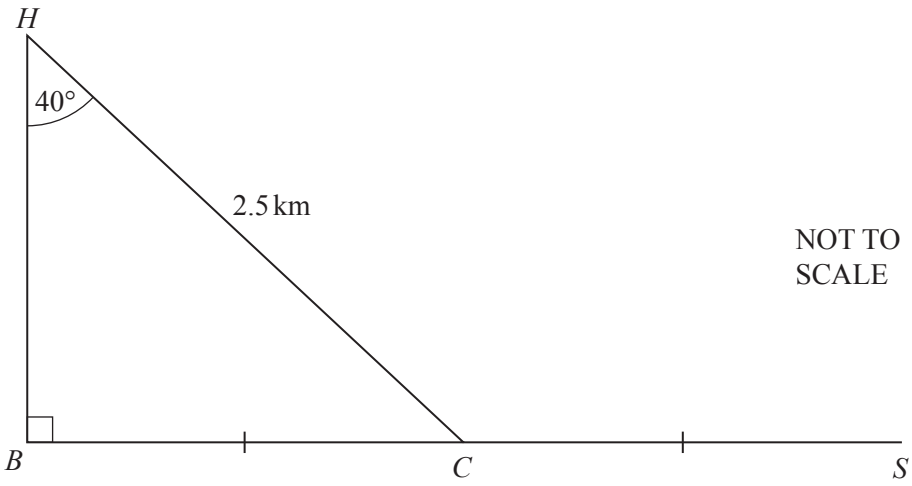
p = ...

q = ...

r = ...

s = ... [4]

8



The diagram shows four straight cycle tracks *HB*, *HC*, *BC* and *CS*.
BC = *CS* and *HC* = 2.5 km.
Angle *HBC* = 90° and angle *BHC* = 40°.

(a) Abimela cycles from home, *H*, to school, *S*, each day along cycle track *HC* and *CS*.

(i) Use trigonometry to find the distance *BC*.

..... km [2]

(ii) Find the distance Abimela cycles to school.

..... km [1]

(b) One day track *HC* is blocked and she has to cycle along tracks *HB*, *BC* and *CS*.

Find the distance *HB*.

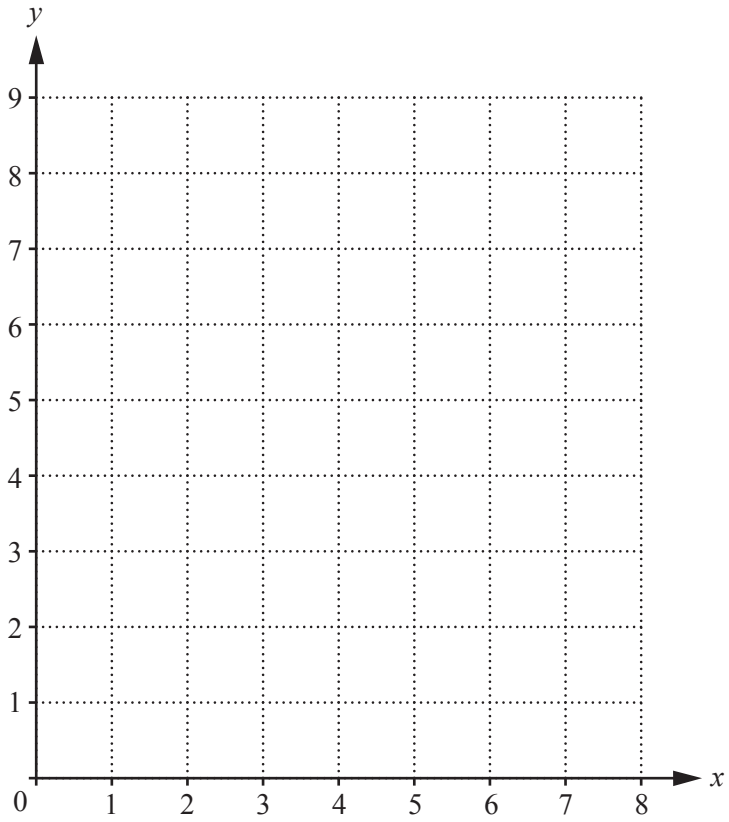
..... km [2]

(c) Find the **extra** distance that Abimela now has to cycle to school.

..... km [1]

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(a) On the grid, plot the points $A(2, 3)$ and $B(5, 7)$.
Draw the line AB. [2]

(b) Write down the co-ordinates of the midpoint of AB.

(..... , ...) [1]

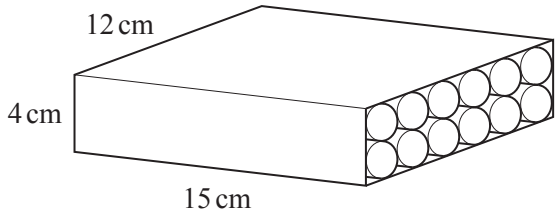
(c) Find the gradient of AB.

..... [2]

(d) Find the equation of the line parallel to AB that passes through the point (0, 4).

..... [2]

10



NOT TO SCALE

The diagram shows 12 solid cylinders packed into a box.
Each cylinder has radius 1 cm and length 15 cm.

(a) (i) Find the volume of one cylinder.

..... cm^3 [1]

(ii) Work out the volume of 12 cylinders.

..... cm^3 [1]

(b) The box measures 15 cm by 12 cm by 4 cm.

Find the volume of the box.

..... cm^3 [1]

(c) Find the volume of the box not taken up by the cylinders.

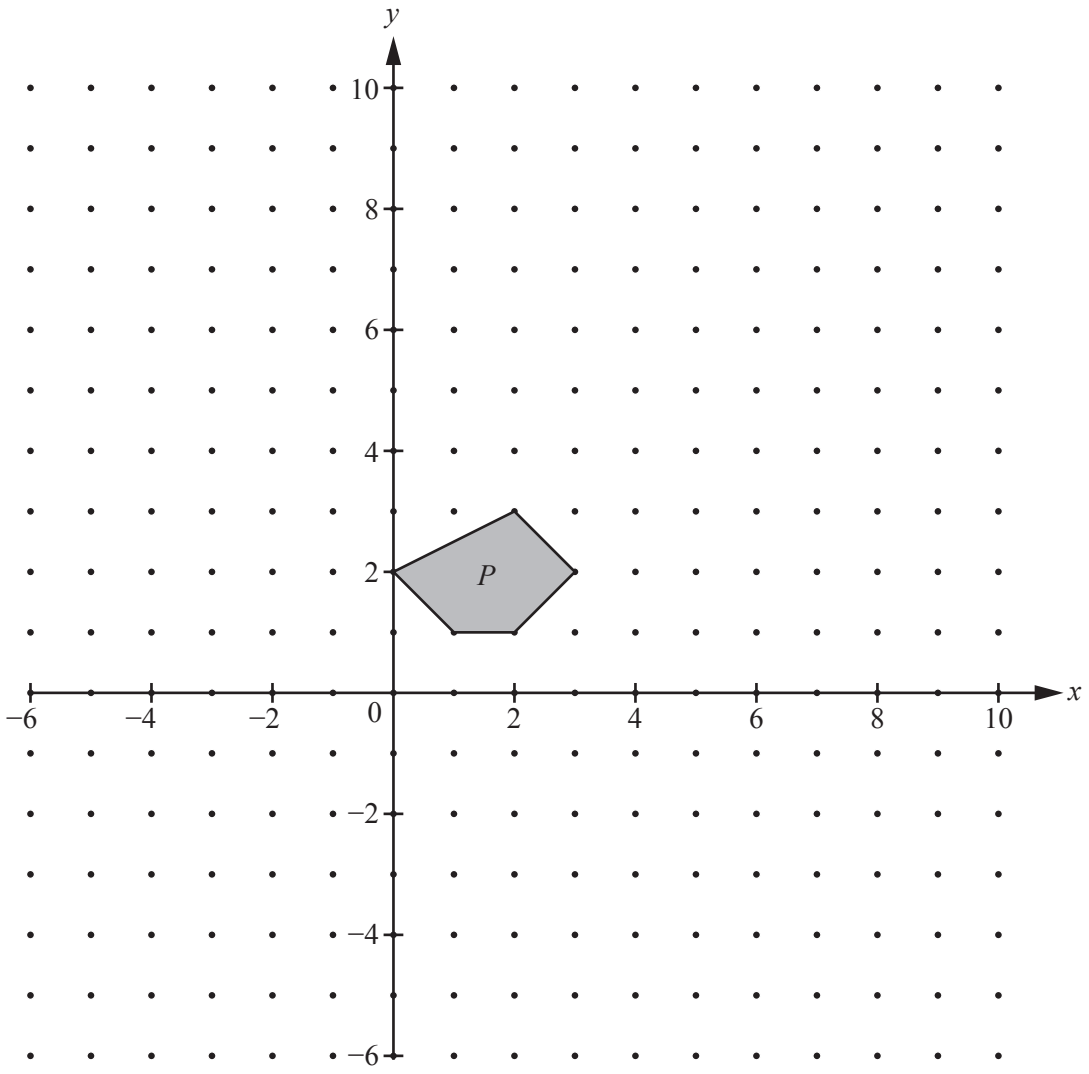
..... cm^3 [1]

(d) Write your answer to **part (c)** as a percentage of the total volume of the box.

..... % [1]

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The diagram shows a pentagon, P.

(a) Draw the image of P after a reflection in the y-axis.
Label this image Q. [1]

(b) Draw the image of P after a translation by the vector $\begin{pmatrix} 2 \\ -6 \end{pmatrix}$.
Label this image R. [2]

(c) Draw the image of P after an enlargement, scale factor 3, centre (0, 0).
Label this image S. [2]

(d) Find the ratio

length of horizontal side of S : length of horizontal side of P.

..... : ..... [1]

(e) Congruent Regular Similar

Choose a word from the list to complete the statement.

P and S are ……..…… shapes. [1]

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12 The masses of 200 meerkats are recorded in the frequency table.

Mass (x grams)	Frequency
$200 < x \leqslant 300$	5
$300 < x \leqslant 400$	10
$400 < x \leqslant 500$	26
$500 < x \leqslant 600$	34
$600 < x \leqslant 700$	40
$700 < x \leqslant 800$	62
$800 < x \leqslant 900$	18
$900 < x \leqslant 1000$	5
Total	200

(a) Write down the modal group.

..... $< x \leqslant$ ..... [1]

(b) **(i)** Show that the midpoint of the first group is 250.

[1]

(ii) Find an estimate of the mean mass of these 200 meerkats.

..... g [2]

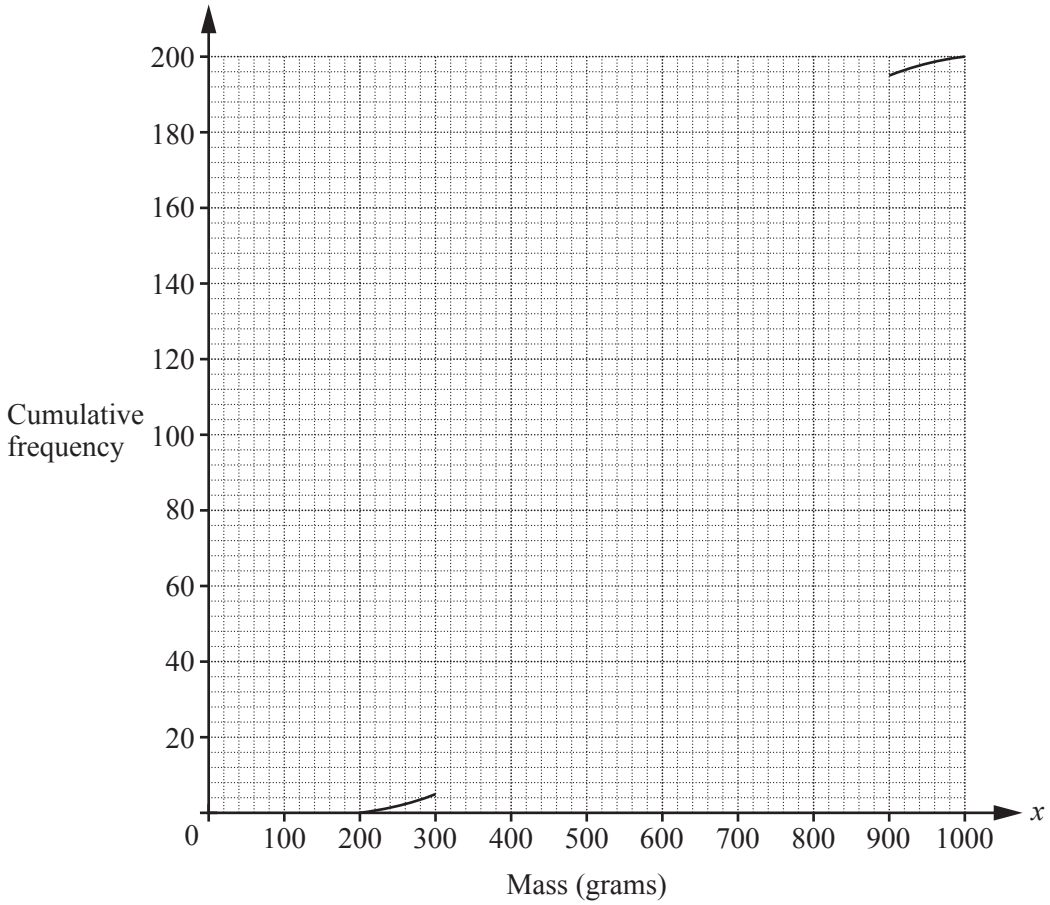
(c) Complete the cumulative frequency table.

Mass (x grams)	Cumulative frequency
$x \leqslant 300$	5
$x \leqslant 400$	
$x \leqslant 500$	
$x \leqslant 600$	
$x \leqslant 700$	
$x \leqslant 800$	
$x \leqslant 900$	195
$x \leqslant 1000$	200

[2]

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(d) Complete the cumulative frequency curve.



[3]

(e) Use your graph to find

(i) the median,

..... g [1]

(ii) the inter-quartile range,

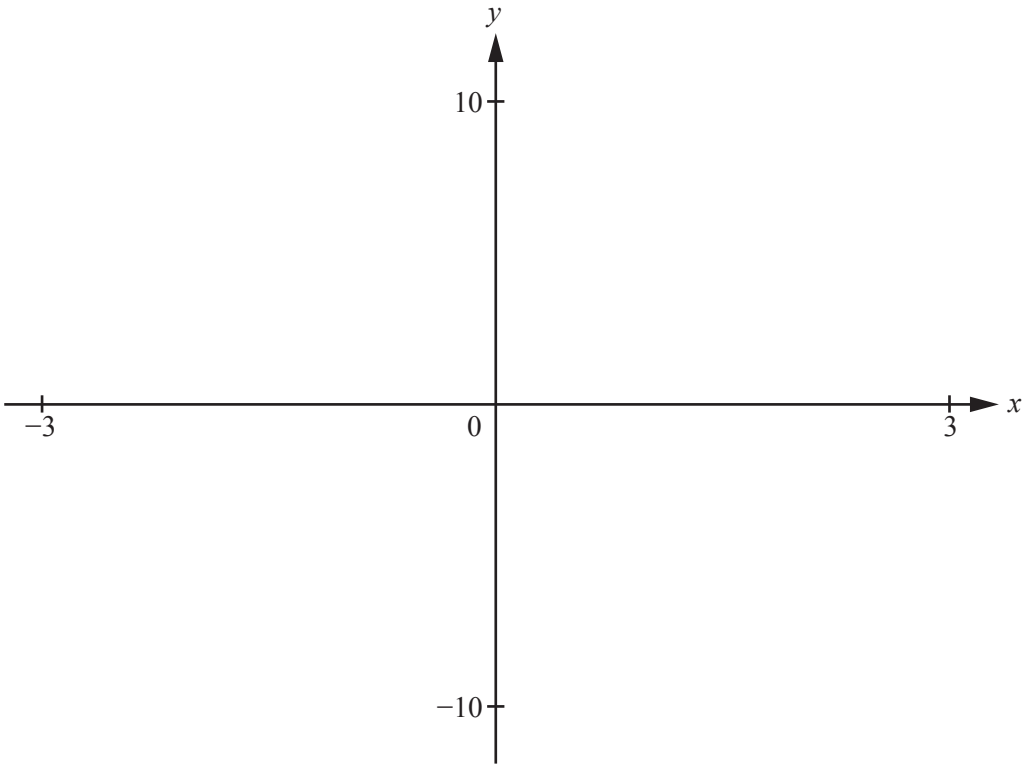
..... g [2]

(iii) the number of meerkats with a mass of more than 850 g.

..... [2]

Question 13 is printed on the next page.

13



$$f(x) = x^2 + \frac{2}{x}$$

(a) On the diagram, sketch the graph of $y = f(x)$ from $x = -3$ to $x = 3$. [4]

(b) Write down the equation of the vertical asymptote for this graph.

..... [1]

(c) Find the co-ordinates of the local minimum point.

(..... , ...) [1]

(d) Write down the number of solutions of $y = f(x)$ when $y = 6$.

..... [1]

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