Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2096705365

MATHEMATICS **0580/42**

Paper 4 (Extended) **October/November 2016**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

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.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
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.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

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CAMBRIDGE International Examinations

1 **(a)** **(i)** Each year the value of a car decreases by 15% of its value at the beginning of that year.
Alberto buys a car for $18 000.

Calculate the value of Alberto's car after 3 years.

$ ..... [2]

(ii) Belinda bought a car one year ago.
The value of this car has decreased by 15% to $14025.

Calculate how much Belinda paid for the car.

$ ..... [3]

(b) Chris invested some money at a rate of 5% per year compound interest.
After 2 years the value of this investment is $286.65 .

Calculate how much Chris invested.

$ ..... [2]

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(c) Dani invested \$200 and after 2 years the value of this investment is \$224.72 .

Calculate the rate of interest per year when the interest is

(i) simple,

.....% [3]

(ii) compound.

.....% [3]

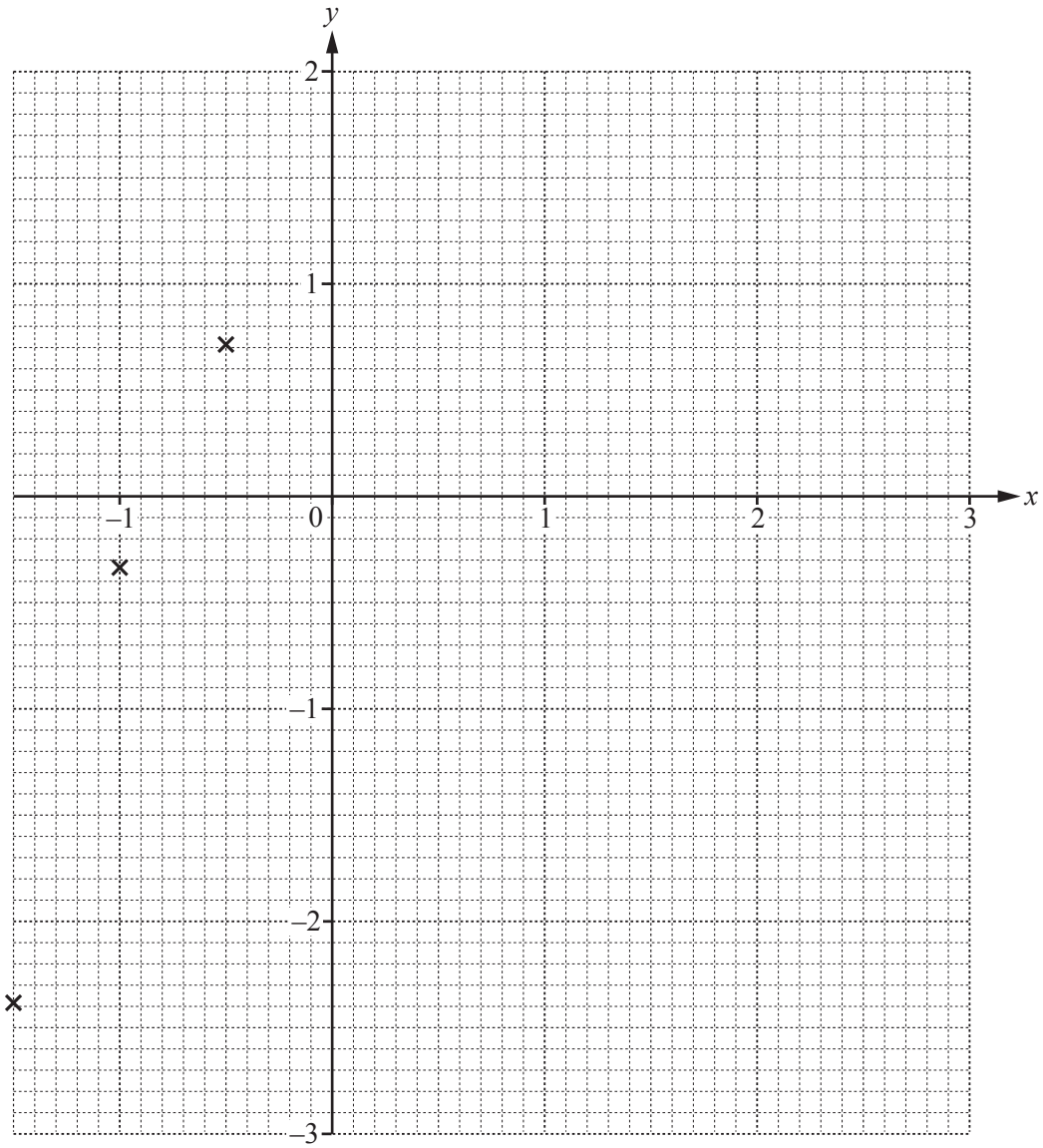
2 **(a)** Complete the table of values for $y = \frac{x^3}{3} - x^2 + 1$.

x	–1.5	–1	–0.5	0	0.5	1	1.5	2	2.5	3
y	–2.38	–0.33	0.71		0.79	0.33	–0.13	–0.33	–0.04	

[2]

(b) Draw the graph of $y = \frac{x^3}{3} - x^2 + 1$ for $-1.5 \leqslant x \leqslant 3$.

The first 3 points have been plotted for you.



[4]

(c) Using your graph, solve the equations.

(i) $\frac{x^3}{3} - x^2 + 1 = 0$

$x =$ ..... or $x =$ ..... or $x =$ .....[3]

(ii) $\frac{x^3}{3} - x^2 + x + 1 = 0$

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

(d) Two tangents to the graph of $y = \frac{x^3}{3} - x^2 + 1$ can be drawn parallel to the x-axis.

(i) Write down the equation of each of these tangents.

.....

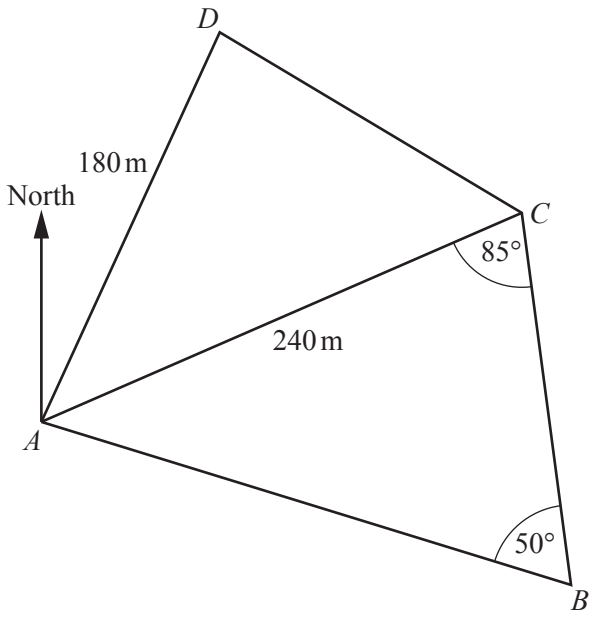
..... [2]

(ii) For $0 \leqslant x \leqslant 3$, write down the smallest possible value of y.

$y =$ ..... [1]

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3



NOT TO SCALE

The diagram shows a field, $ABCD$.
$AD = 180$ m and $AC = 240$ m.
Angle $ABC = 50°$ and angle $ACB = 85°$.

(a) Use the sine rule to calculate AB.

$AB =$ ..... m [3]

(b) The area of triangle $ACD = 12\,000\,\text{m}^2$.

Show that angle $CAD = 33.75°$, correct to 2 decimal places.

[3]

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(c) Calculate BD.

$BD =$ ..... m [5]

(d) The bearing of D from A is 030°.

Find the bearing of

(i) B from A,

..... [1]

(ii) A from B.

..... [2]

4 200 people run 10 km.
The table shows some information about the times, t minutes, taken to run the 10 km.

Time (t minutes)	$30 < t \leqslant 40$	$40 < t \leqslant 45$	$45 < t \leqslant 50$	$50 < t \leqslant 55$	$55 < t \leqslant 60$	$60 < t \leqslant 80$
Frequency	8	22	95	55	14	6

(a) Howard takes 40 minutes to run the 10 km.

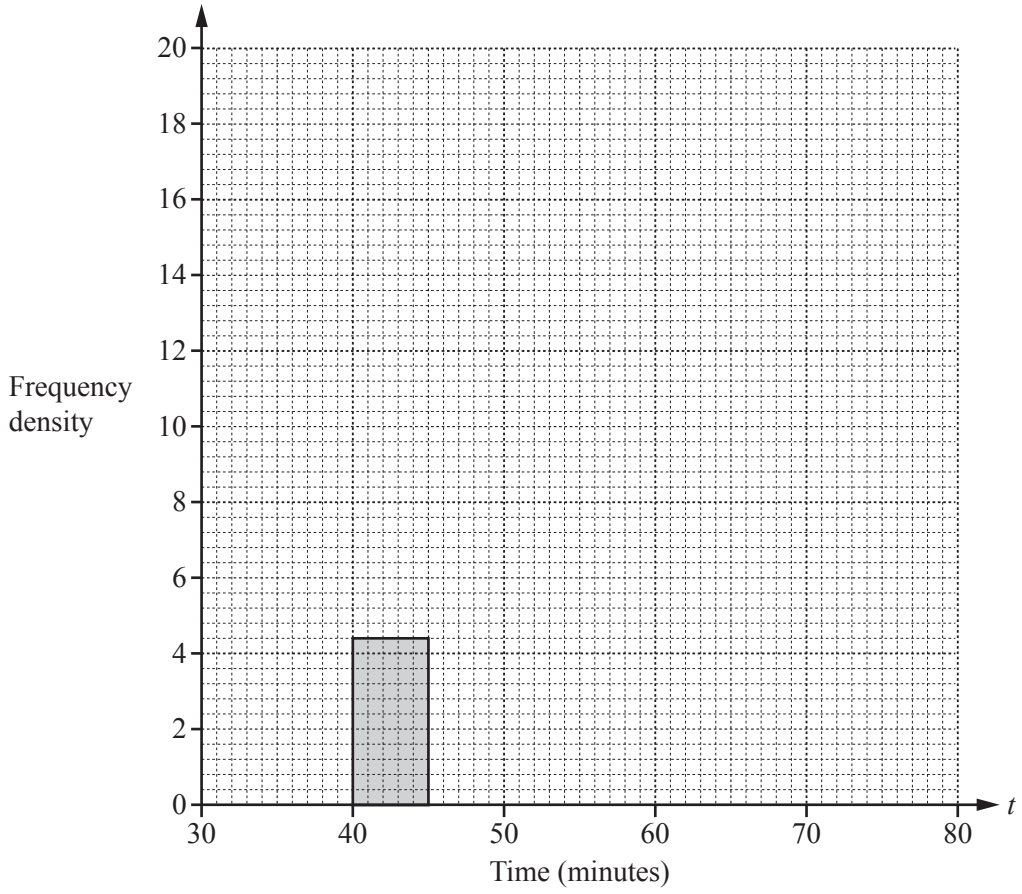
Calculate his average speed in kilometres per hour.

..... km/h [2]

(b) Calculate an estimate of the mean time.

..... min [4]

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



[4]

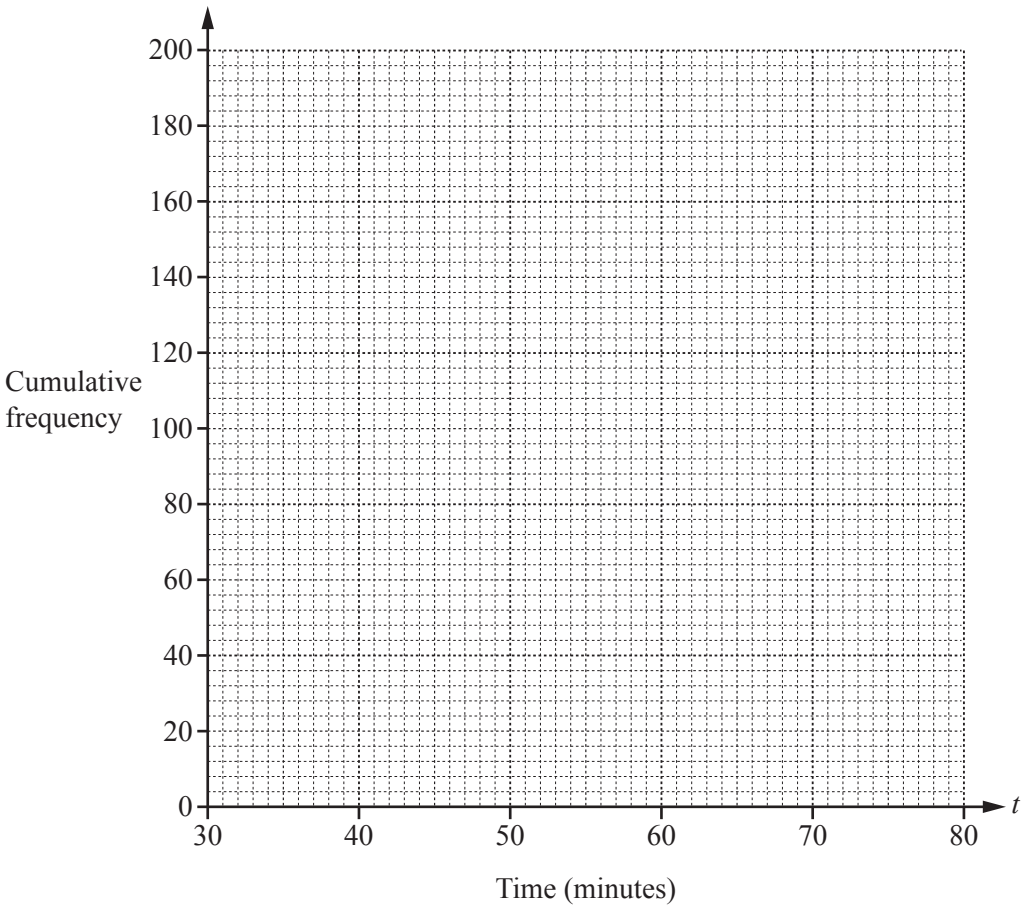
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(d) (i) Use the frequency table opposite to complete the cumulative frequency table.

Time (t minutes)	$t \leqslant 40$	$t \leqslant 45$	$t \leqslant 50$	$t \leqslant 55$	$t \leqslant 60$	$t \leqslant 80$
Cumulative frequency	8	30			194	200

[1]

(ii) Draw a cumulative frequency diagram to show the information in the table above.



[3]

(iii) Use your diagram to find

(a) the median,

..... min [1]

(b) the 90th percentile,

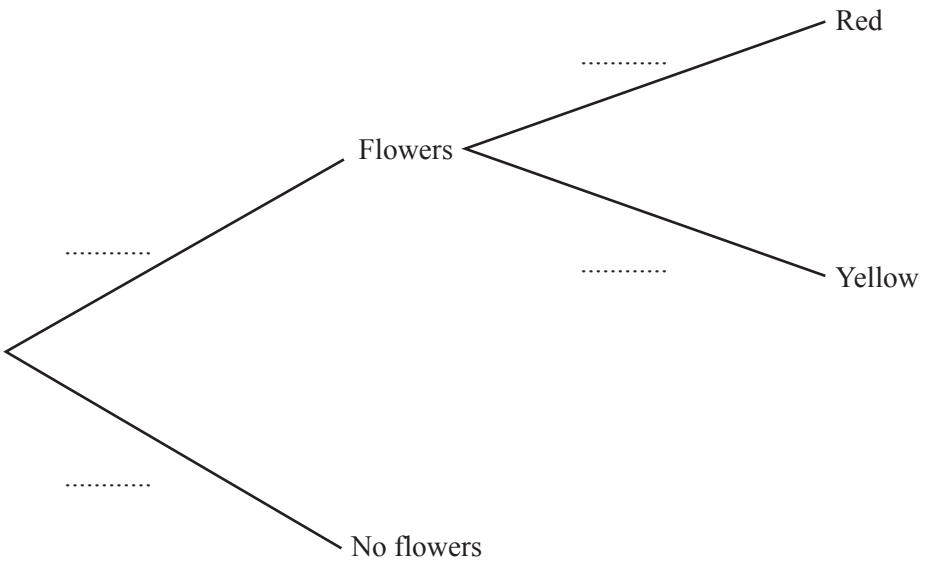
..... min [1]

(c) the number of people who took more than 58 minutes to run the 10 km.

..... [2]

5 The probability that a plant will produce flowers is $\frac{7}{8}$.
The flowers are either red or yellow.
If the plant produces flowers, the probability that the flowers are red is $\frac{3}{4}$.

(a) (i) Complete the tree diagram by writing a probability beside each branch.



[2]

(ii) Calculate the probability that a plant, chosen at random, will produce red flowers.

..... [2]

(iii) Two plants are chosen at random.

Calculate the probability that both will produce red flowers.

..... [2]

(b) Alphonse buys 200 of these plants.

Calculate the number of plants that are expected to produce flowers.

..... [2]

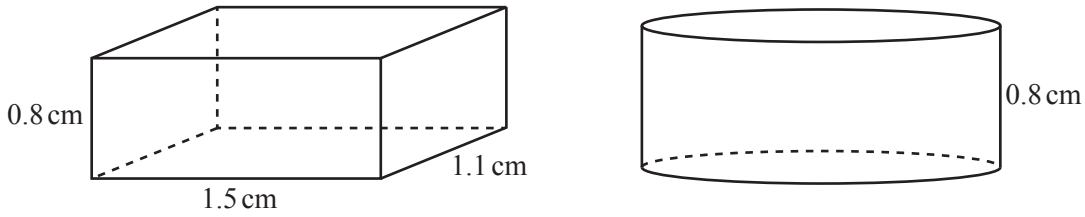
(c) Gabriel has 1575 plants with red flowers.

Estimate the total number of plants that Gabriel has.

..... [2]

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6 (a)



The diagram shows two sweets.
The cuboid has length 1.5 cm, width 1.1 cm and height 0.8 cm.
The cylinder has height 0.8 cm and the same volume as the cuboid.

(i) Calculate the volume of the cuboid.

..... cm^3 [2]

(ii) Calculate the radius of the cylinder.

..... cm [2]

(iii) Calculate the difference between the surface areas of the two sweets.

..... cm^2 [5]

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(b) A bag of sweets contains x orange sweets and y lemon sweets.
Each orange sweet costs 2 cents and each lemon sweet costs 3 cents.

The cost of a bag of sweets is less than 24 cents.
There are at least 9 sweets in each bag.
There are at least 2 lemon sweets in each bag.

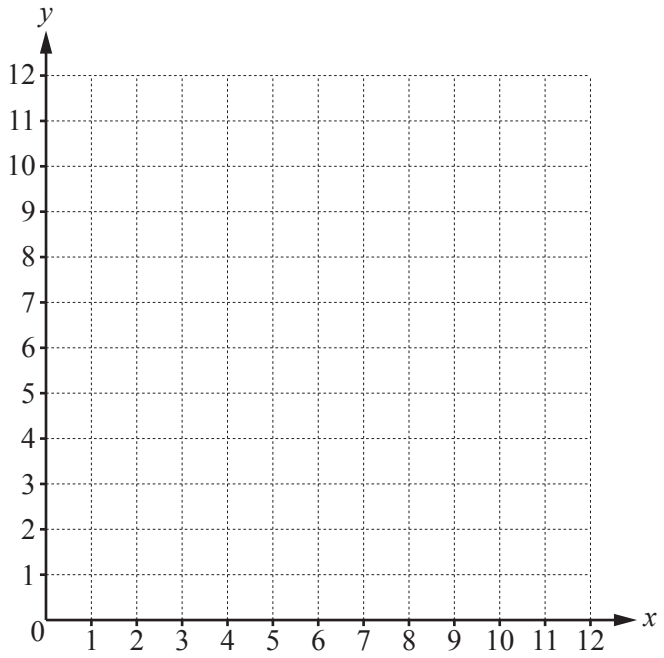
(i) One of the inequalities that shows this information is $2x + 3y < 24$.

Write down the other two inequalities.

.....

..... [2]

(ii) On the grid, by shading the unwanted regions, show the region which satisfies the three inequalities.



[4]

(iii) Find the lowest cost of a bag of sweets.
Write down the value of x and the value of y that give this cost.

Lowest cost = ... cents

x = ...

y = ... [3]

7 **(a)** $1= 3.67 dirhams

Calculate the value, in dollars, of 200 dirhams.
Give your answer correct to 2 decimal places.

$..... [2]

(b) **(i)** Write as a single fraction, in its simplest form.

$$\frac{1000}{x} - \frac{1000}{x+1}$$

..... [3]

(ii) One day in 2014, 1 euro was worth x rand.
One year later, 1 euro was worth $(x + 1)$ rand.

Winston changed 1000 rand into euros in both years.
In 2014 he received 4.50 euros more than in 2015.

Write an equation in terms of x and show that it simplifies to

$$9x^2 + 9x - 2000 = 0.$$

[3]

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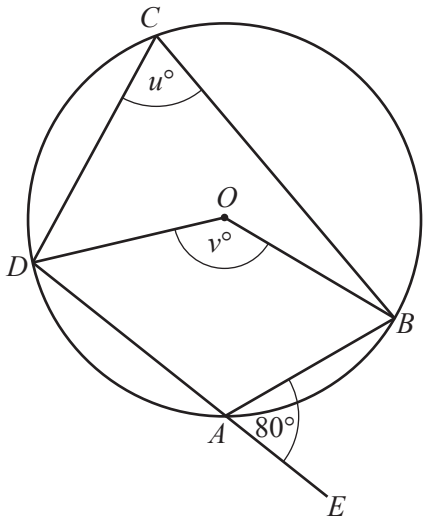
(iii) Use the quadratic formula to solve the equation $9x^2 + 9x - 2000 = 0$.
Show all your working and give your answers correct to 2 decimal places.

x = ... or x = ... [4]

(iv) Calculate the number of euros Winston received in 2014.
Give your answer correct to 2 decimal places.

.....euros [2]

8 **(a)**



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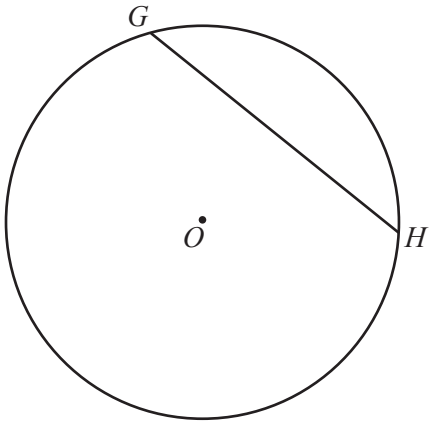
A, *B*, *C* and *D* lie on the circle, centre *O*.
DAE is a straight line.

Find the value of *u* and the value of *v*.

u = ...

v = ... [2]

(b)



NOT TO SCALE

The diagram shows a circle, centre *O*, radius 8 cm.
GH is a chord of length 10 cm.

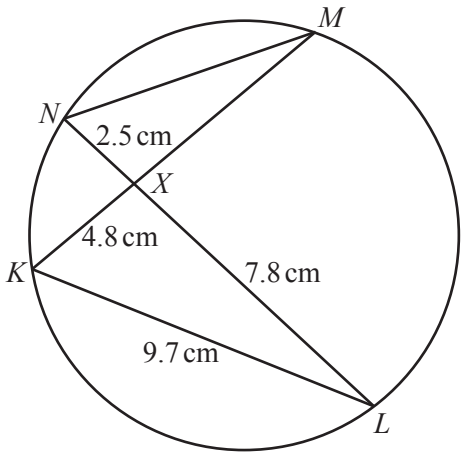
Calculate the length of the perpendicular from *O* to *GH*.

..... cm [3]

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(c) *K, L, M* and *N* lie on the circle.
KM and *LN* intersect at *X*.
KL = 9.7 cm, *KX* = 4.8 cm,
LX = 7.8 cm and *NX* = 2.5 cm.

Calculate *MN*.



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MN = ... cm [2]

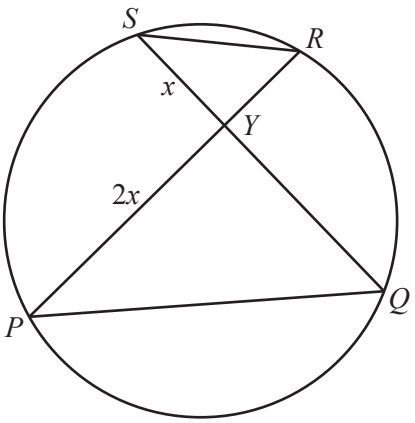
(d) All lengths are in centimetres.

P, *Q*, *R* and *S* lie on the circle.
PR and *QS* intersect at *Y*.
PY = $2x$ and *YS* = x.

The area of triangle $YRS = \frac{5}{12}x(x-1)$.

The area of triangle $YQP = x(x+1)$.

Find the value of x.



NOT TO SCALE

x = ... [4]

9 **(a)** $y = \frac{3}{x} + 2, \quad x \neq 0$

(i) Find the value of y when $x = -6$.

$y =$ ..... [1]

(ii) Find x in terms of y.

$x =$ ..... [3]

(b) $g(x) = 2 - x$ $\quad$ $h(x) = 2^x$

(i) Find g(5).

..... [1]

(ii) Find hhh(2).

..... [2]

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(iii) Find x when $g(x) = h(3)$.

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

(iv) Find x when $g^{-1}(x) = -1$.

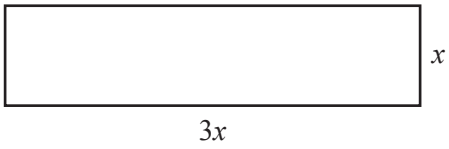
$x =$ ..... [1]

Question 10 is printed on the next page.

10 The **perimeter** of each of the three shapes is 60 cm.

Find x in each part.

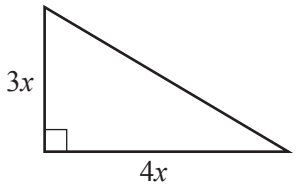
(a) Rectangle



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x = ... cm [2]

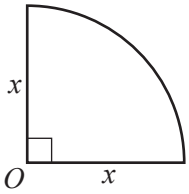
(b) Triangle



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x = ... cm [3]

(c) Sector



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x = ... cm [3]

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