

Write your name here

Surname	Other names
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Pearson Edexcel Centre Number Candidate Number
 Level 1/Level 2 GCSE (9-1)

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Mathematics
 Non calculator paper questions
 June/November 2017

Higher Tier

adapted & compiled by JustMaths	
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You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used.**



Information

- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

- 1 The scatter graph shows the maximum temperature and the number of hours of sunshine in fourteen British towns on one day.

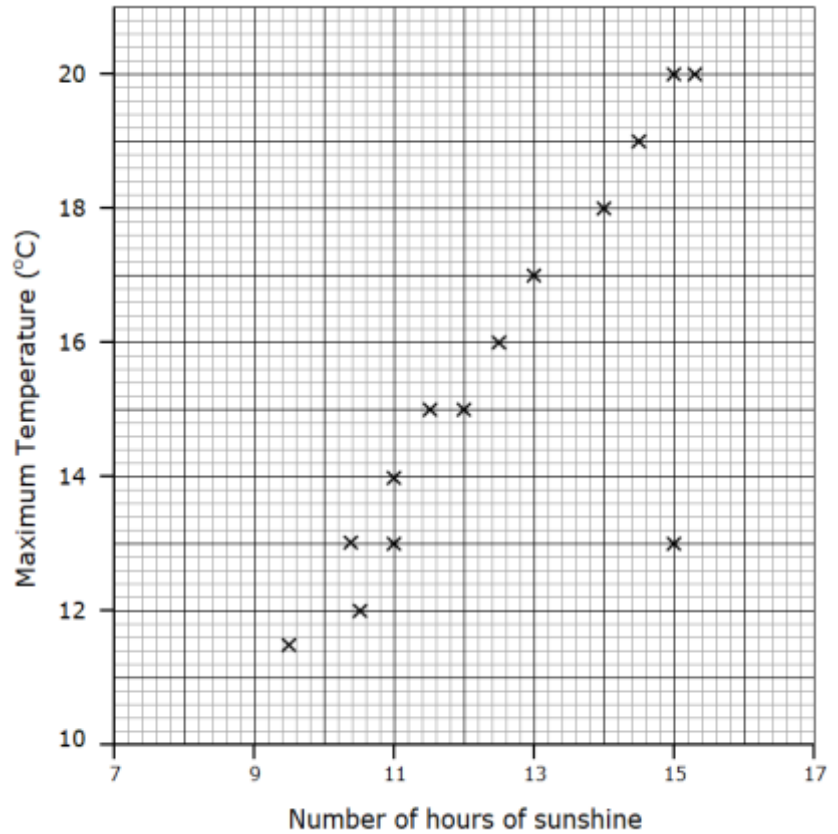
One of the points is an outlier.

(a) Write down the coordinates of this point.

(1)

(b) For all the other points write down the type of correlation.

(1)



On the same day, in another British town, the maximum temperature was 15.4°C.

(c) Estimate the number of hours of sunshine in this town on this day.

(2)

A weatherman says: "Temperatures are higher on days when there is more sunshine."

(d) Does the scatter graph support what the weatherman says? Give a reason for your answer.

(5)

- 2 Express 80 as the product of its prime factors.

(2)

- 3 Work out 64.7×5.3

(3)

- 4 Kiaria is 8 years older than Jay.
Martha is twice as old as Kiaria.
The sum of their three ages is 80.
Find the ratio of Jay's age to Kiaria's age to Martha's age.

(2)

- 5 The table shows information about the weekly earnings of 20 people who work in a shop.

Weekly earnings (£x)	Frequency
$150 < x \leq 250$	2
$250 < x \leq 350$	11
$350 < x \leq 450$	5
$450 < x \leq 550$	0
$550 < x \leq 650$	2

- (a) Work out an estimate for the mean of the weekly earnings.

(3)

Nadiya says: "The mean may **not** be the best average to use to represent this information."

- (b) Do you agree with Nadiya? You must justify your answer.

(1)

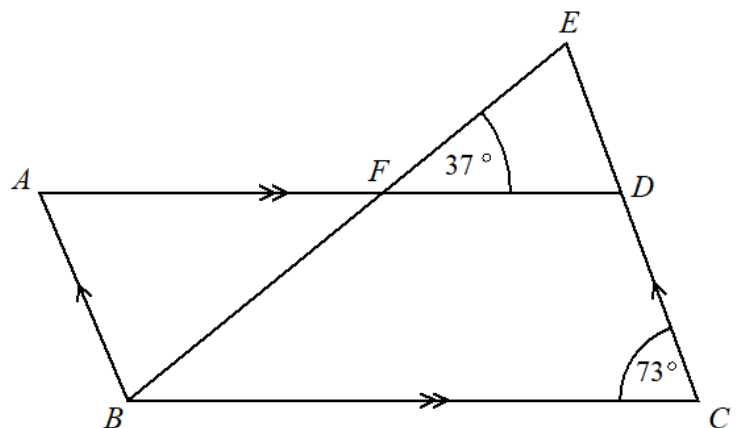
- 6 $ABCD$ is a parallelogram.
 EDC is a straight line.
 F is the point on AD so that BFE is a straight line.

Angle $EFD = 37^\circ$

Angle $DCB = 73^\circ$

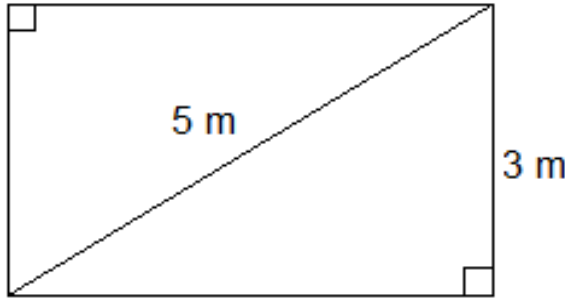
Show that angle $ABF = 70^\circ$

Give a reason for each stage of your working.



(4)

- 7** This rectangular frame is made from 5 straight pieces of metal.
The weight of the metal is 1.5 kg per metre.
Work out the total weight of the metal in the frame.



(5)

- 8** Write these numbers in order of size. Start with the smallest number.

0.524

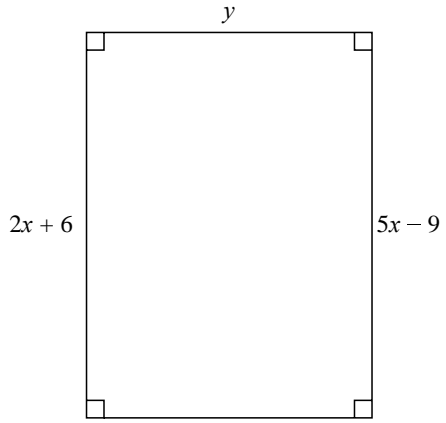
0.524

0.524

0.524

(2)

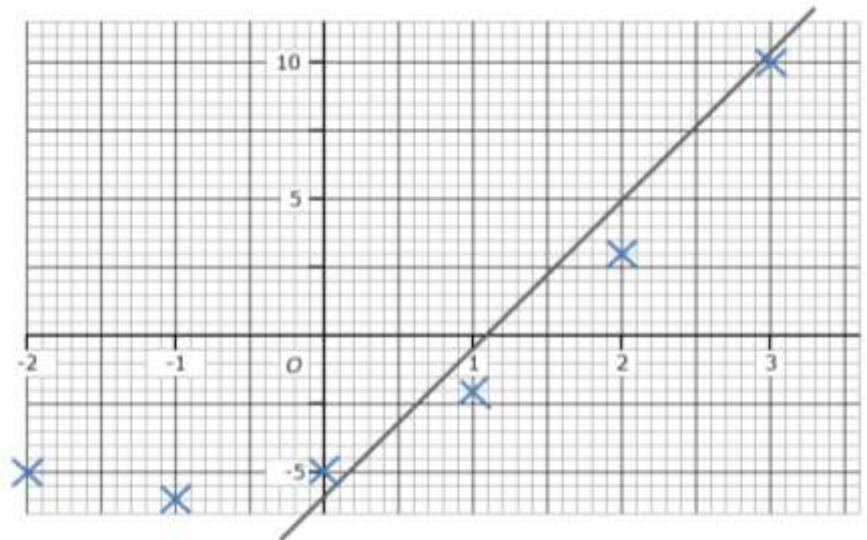
- 9** Here is a rectangle.
All measurements are in centimetres.
The area of the rectangle is 80 cm^2 .
Show that $y = 5$



(4)

- 10** Brogan needs to draw the graph of $y = x^2 + 2x - 5$
Here is her graph.

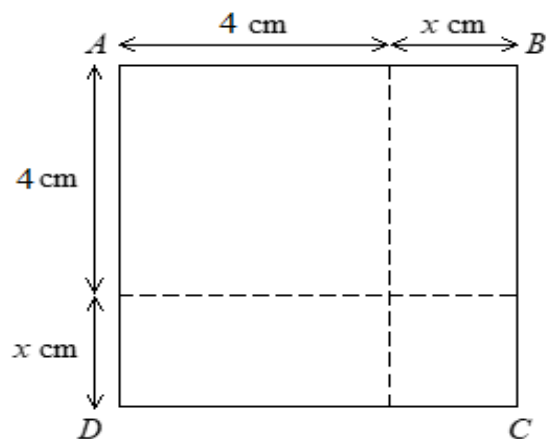
Write down one thing that is wrong with Brogan's graph.



(1)

- 11 The area of square $ABCD$ is 17 cm^2 .

Show that $x^2 + 8x = 1$



(3)

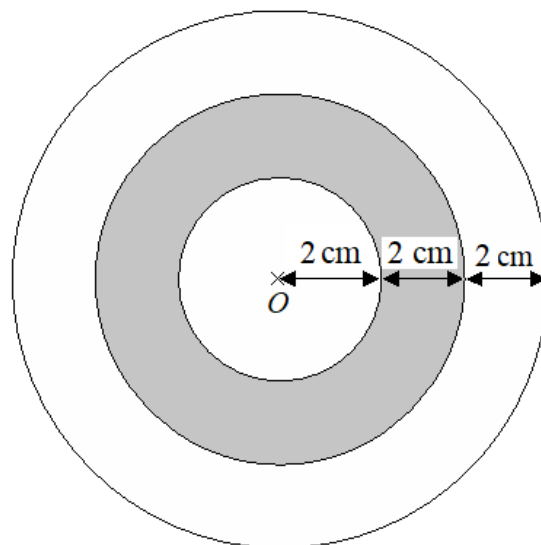
- 12 The diagram shows a logo made from three circles.

Each circle has centre O .

Daisy says that exactly $\frac{1}{3}$ of the logo is shaded.

Is Daisy correct?

You must show all your working.



(4)

- 13 The equation of the line L_1 is $y = \frac{1}{2}x - 3$

The equation of the line L_2 is $2y - x - 5 = 0$

Show that these two lines are parallel.

(2)

- 14 (a) Write 6.84×10^{-4} as an ordinary number.

(1)

(b) Work out the value of $(4.48 \times 10^{-3}) \div (8 \times 10^{-5})$
Give your answer in standard form.

(2)

- 15** James and Peter cycled along the same 40 km route.

James took $2\frac{1}{2}$ hours to cycle the 40 km.

Peter started to cycle 5 minutes after James started to cycle.
Peter caught up with James when they had both cycled 24 km.

James and Peter both cycled at constant speeds.

Work out Peter's speed.

(5)

- 16** There are 20 boys and 30 girls in a class. The class has a test.

The mean mark for all the class is 56.

The mean mark for the girls is 60.

Work out the mean mark for the boys.

(3)

- 17** Jules buys a washing machine. 20% VAT is added to the price of the washing machine.

Jules then has to pay a total of £720.

What is the price of the washing machine with **no** VAT added?

(2)

- 18** Show that $(x + 1)(2x + 2)(x + 3)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a, b, c and d are positive integers.

(3)

- 19** (a) Write down the value of $64^{\frac{1}{2}}$

(1)

(b) Find the value of $216^{\frac{2}{3}}$

(2)

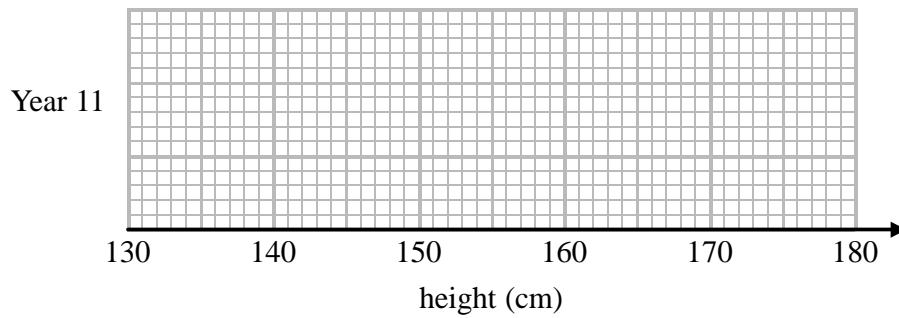
- 20** 3 teas and 2 coffees have a total cost of £7.90
 5 teas and 4 coffees have a total cost of £14.30
 Work out the cost of one tea and the cost of one coffee.

(4)

- 21** The table shows information about the heights, in cm, of a group of Year 11 girls.

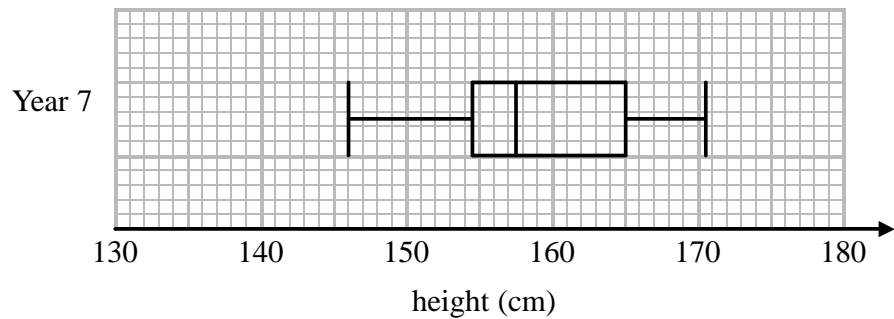
	height (cm)
least height	153
median	164
lower quartile	159
interquartile range	9
range	19

(a) Draw a box plot for this information.



(3)

The box plot below shows information about the heights, in cm, of a group of Year 7 girls.



(b) Compare the distribution of heights of the Year 7 girls with the distribution of heights of the Year 11 girls.

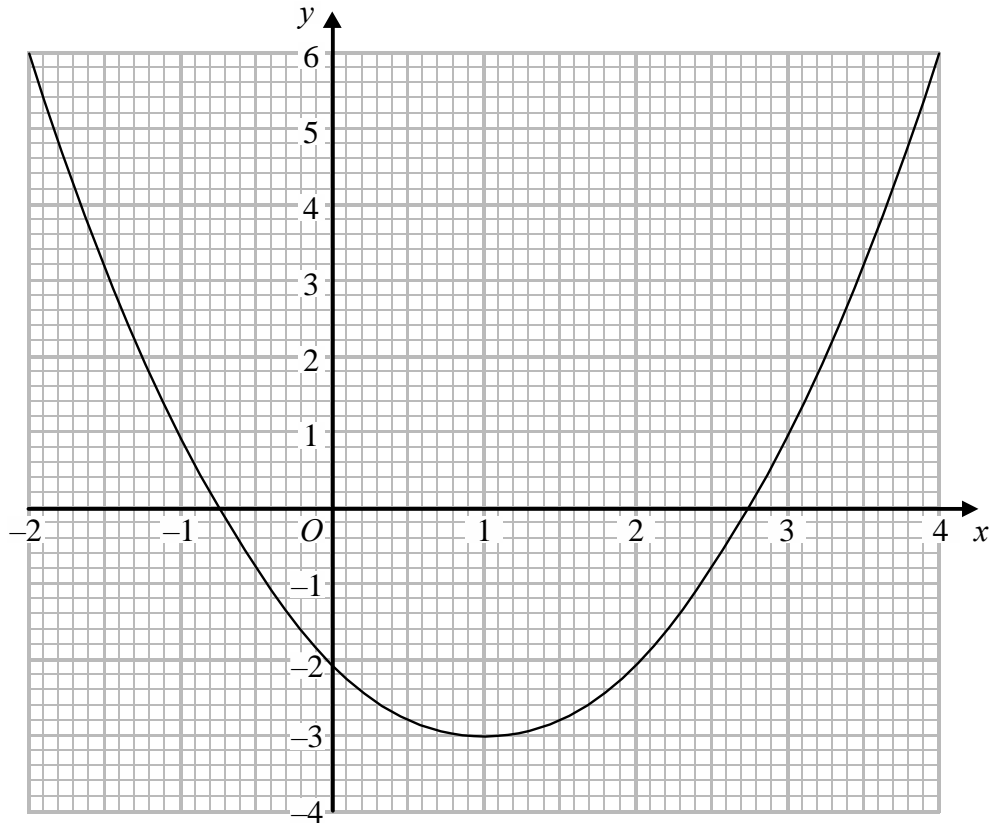
(2)

22 The graph of $y = f(x)$ is drawn on the grid.

a) Write down the coordinates of the turning point of the graph.

b) Write down estimates for the solution to $f(x) = 6$

c) Use the graph to find an estimate for $f(5)$



(3)

23 A factory makes 450 pies every day. The pies are chicken pies or steak pies. Each day Milo takes a sample of 15 pies to check.

The proportion of the pies in his sample that are chicken is the same as the proportion of the pies made that day that are chicken.

On Monday Milo calculated that he needed exactly 3 chicken pies in his sample.

(a) Work out the total number of chicken pies that were made on Monday.

(2)

On Tuesday, the number of steak pies Milo needs in his sample is 5 correct to the nearest whole number. Milo takes at random a pie from the 450 pies made on Tuesday.

(b) Work out the lower bound of the probability that the pie is a steak pie.

(2)

24 n is an integer

Prove that $(n + 1)^2 - (n - 1)^2 + 1$ is always odd for all positive integer values of n

(2)

25 The table shows a set of values for x and y .

x	1	2	3	4
y	4	1	$\frac{4}{9}$	$\frac{1}{4}$

y is inversely proportional to the square of x .

(a) Find an equation for y in terms of x .

(2)

(b) Find the positive value of x when $y = 16$

(2)

26 The ratio $(y + x) : (y - x)$ is equivalent to $k : 1$

Show that $y = \frac{x(k+1)}{k-1}$

(3)

27 White shapes and black shapes are used in a game.

Some of the shapes are circles.

All the other shapes are squares.

The ratio of the number of white shapes to the number of black shapes is 7:3

The ratio of the number of white circles to the number of white squares is 2:5

The ratio of the number of black circles to the number of black squares is 4:5

Work out what fraction of all the shapes are circles.

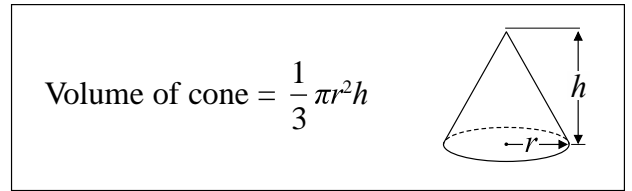
(4)

28 $x = 0.6\dot{3}\dot{6}$

Prove algebraically that x can be written as $\frac{7}{11}$

(3)

- 29** A cone has a volume of 102 cm^3 .
The radius of the cone is 5.24 cm .
(a) Work out an estimate for the height of the cone.



(3)

- John uses a calculator to work out the height of the cone to 2 decimal places.
(b) Will your estimate be more than John's answer or less than John's answer?
Give reasons for your answer.

(1)

-
- 30** Write an expression for the product of three consecutive integers.

Hence show that $n^3 - n$ is a multiple of 2

(4)

-
- 31** There are 7 counters in a bag.
3 of the counters are green.
4 of the counters are blue.
Ria takes at random two counters from the bag.
Work out the probability that Ria takes one counter of each colour. You must show your working.

(4)

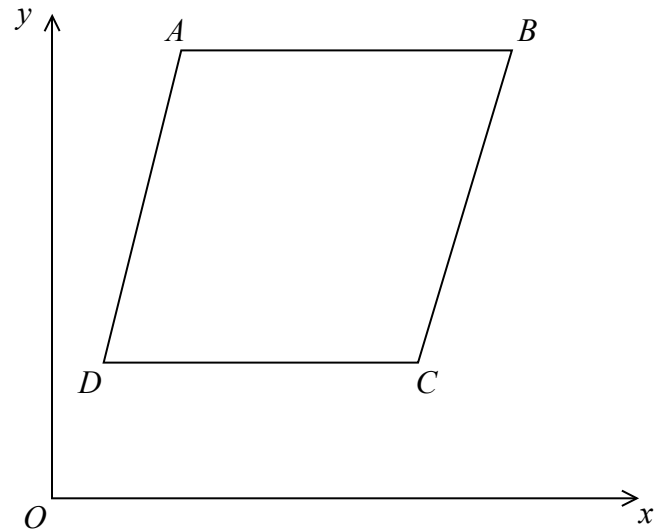
-
- 32** y is directly proportional to $\sqrt[3]{x}$

$$y = 1\frac{3}{4} \text{ when } x = 27$$

Find the value of y when $x = 125$

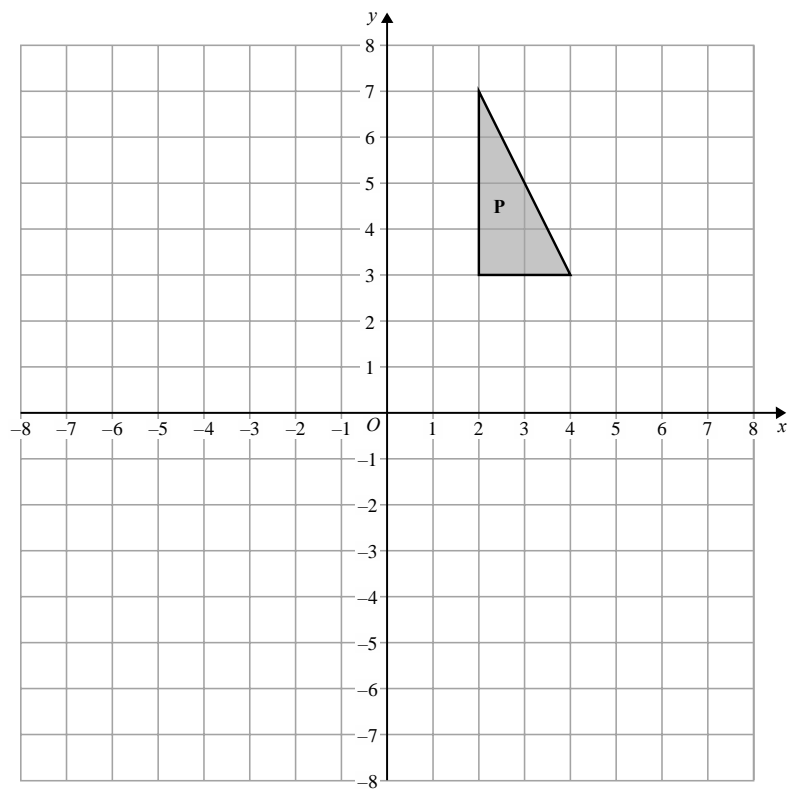
(3)

- 33** ABCD is a rhombus.
 The coordinates of D are (2,7)
 The equation of the diagonal AC is $y = -2x + 21$
 Find an equation of the diagonal DB.



(4)

- 34** Enlarge shape **P** by scale factor $-\frac{1}{2}$ with
 centre of enlargement (1, 1).
 Label your image **Q**.



(2)

- 35** Show that $\frac{6 - \sqrt{20}}{\sqrt{5} - 1}$ can be written in the form $a + b\sqrt{5}$ where a and b are integers

(3)

36 $OABC$ is a parallelogram.

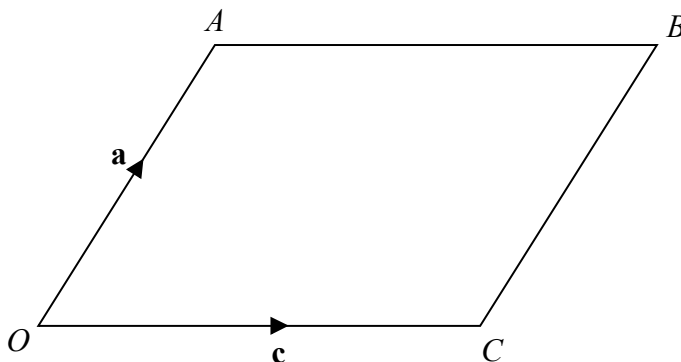
$$\vec{OA} = \mathbf{a} \quad \text{and} \quad \vec{OC} = \mathbf{c}$$

X is the midpoint of the line AC .

OCD is a straight line so that $OC:CD = k:1$

Given that $\vec{XD} = 5\mathbf{c} - \frac{1}{2}\mathbf{a}$

Find the value of k .



(4)

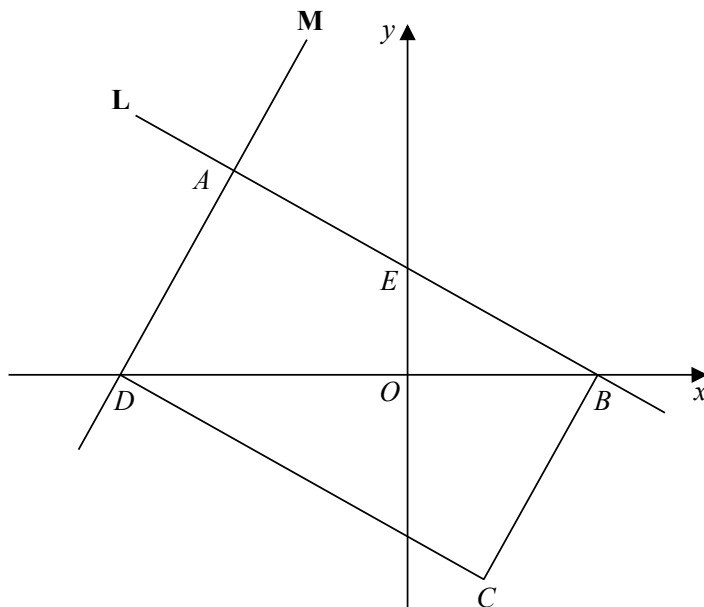
37 $ABCD$ is a rectangle.

A, E and B are points on the straight line L with equation $x + 2y = 16$

A and D are points on the straight line M

$$AE = EB$$

Find an equation for M .



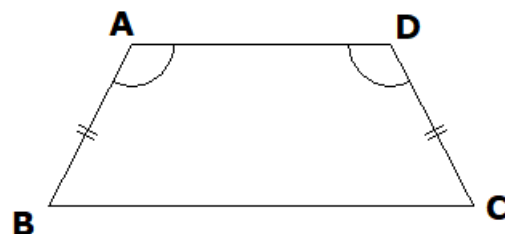
(4)

38 $ABCD$ is a quadrilateral.

$$AB = CD$$

$$\text{Angle } BAD = \text{angle } ADC$$

Prove that $AC = BD$.



(4)

39 Solve algebraically the simultaneous equations

$$x^2 + y^2 = 25$$

$$y - 2x = 5$$

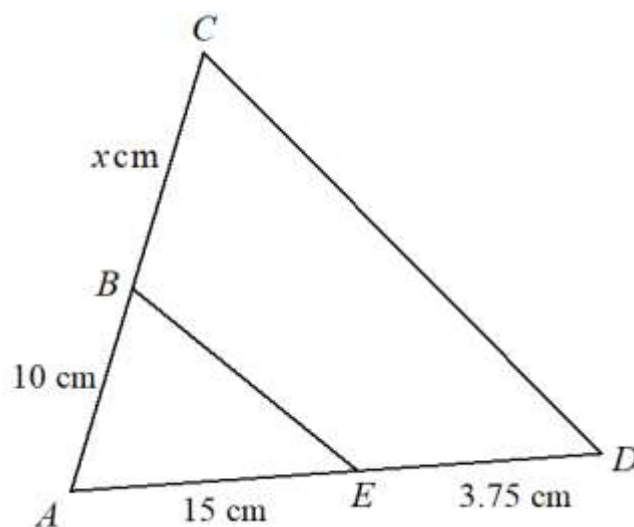
(5)

40 The two triangles in the diagram are similar.

There are two possible values of x .

Work out each of these values.

State any assumptions you make in your working.



(5)

41 The table shows some values of x and y that satisfy the equation $y = a \cos x^\circ + b$

x	0	30	60	90	120	150	180
y	5	$3 + \sqrt{3}$	4	3	2	$3 - \sqrt{3}$	1

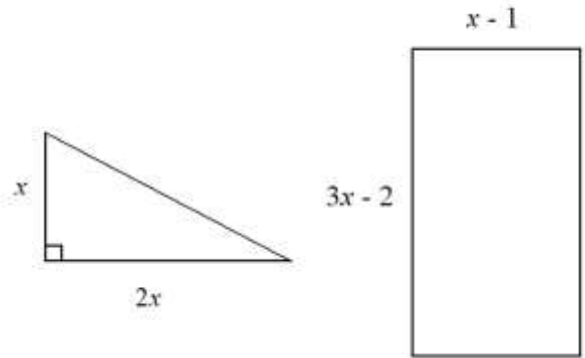
Find the value of y when $x = 45$

(4)

42 Here is a rectangle and a right-angled triangle.

All measurements are in centimetres.
 The area of the rectangle is greater than the area of the triangle.

Find the set of possible values of x .



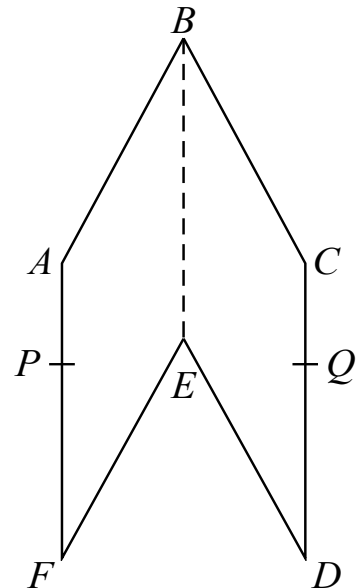
(5)

43 The diagram shows a hexagon $ABCDEF$.

$ABEF$ and $CBED$ are congruent parallelograms where $AB = BC = x$ cm.

P is the point on AF and Q is the point on CD such that $BP = BQ = 5$ cm.

Given that angle $ABC = 30^\circ$, prove that $\cos PBQ = 1 - \frac{(2 - \sqrt{3})}{50}x^2$



(5)

END OF PAPER