

Write your name here

Surname

Other names

**Pearson Edexcel**  
**International GCSE**

Centre Number

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Candidate Number

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# Mathematics B

## Paper 1R



Thursday 21 May 2015 – Morning  
**Time: 1 hour 30 minutes**

Paper Reference

**4MB0/01R**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. 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.*
- **Calculators may be used.**

### Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.
- Without sufficient working, correct answers may be awarded no marks.

Turn over ►

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**PEARSON**

**Answer ALL TWENTY-EIGHT questions.**

**Write your answers in the spaces provided.**

**You must write down all stages in your working.**

- 1 Express  $22\frac{1}{2}$  minutes as a percentage of one hour.

..... %

**(Total for Question 1 is 2 marks)**

- 2 Solve  $\frac{2x + 5}{4} = 1$

$x =$  .....

**(Total for Question 2 is 2 marks)**

- 3 Express 3.6 kg : 75g in the form  $m : 1$ , where  $m$  is an integer.

..... : 1

**(Total for Question 3 is 2 marks)**



4 Express  $\frac{4}{3a} + \frac{3}{2a} - \frac{5}{6a}$  as a single fraction.

Simplify your answer.

.....  
**(Total for Question 4 is 2 marks)**

5 Find the gradient of the line with equation  $3y = x - 4$

.....  
**(Total for Question 5 is 2 marks)**

6  $f$  is the function such that  $f: x \mapsto x^2 - 3x$

Given that the domain of  $f$  is  $\{-1, 0, 1\}$ , find the range of  $f$ .

{.....}

**(Total for Question 6 is 2 marks)**

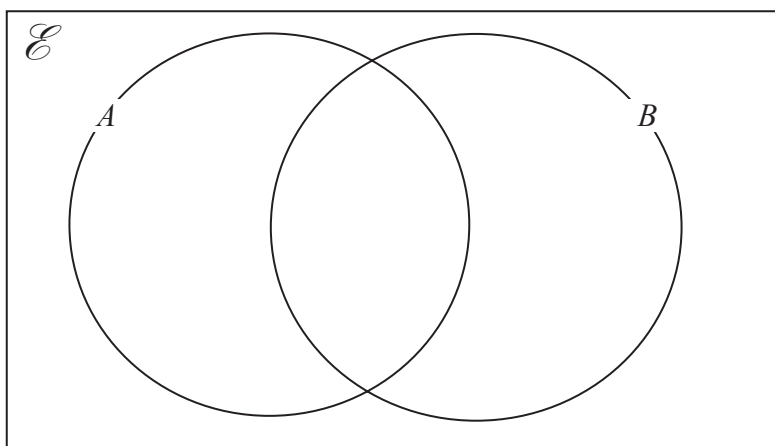


7 Factorise  $2x^2 + 7x - 15$

(Total for Question 7 is 2 marks)

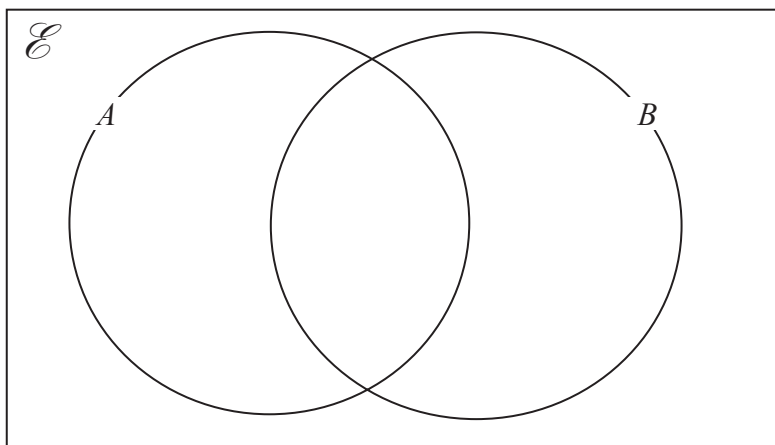
8  $A$  and  $B$  are two sets and  $\mathcal{E}$  is the universal set.

(a) On the diagram below, shade  $(A \cup B)'$



(1)

(b) On the diagram below, shade  $A' \cap B$



(1)

(Total for Question 8 is 2 marks)



9 Write down the coordinates of the image of the point  $P(-5, 3)$  when  $P$  is reflected in the line with equation  $y = -x$

(.....,.....)

(Total for Question 9 is 2 marks)

10 Given that  $(12 - 2n)$  is the  $n$ th term of a sequence, write down

(a) the 5th term,

.....  
(1)

(b) the difference between the first term and the third term.

.....  
(1)

(Total for Question 10 is 2 marks)



**11** A film at a cinema starts at 8:36 pm and is due to finish at 10:18 pm

The film projector broke down  $\frac{2}{3}$  of the way through the film.

Work out the time when the projector broke down.

..... pm

**(Total for Question 11 is 3 marks)**

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**12** Without using a calculator, and showing all your working, evaluate

$$\frac{\sqrt{27} + \sqrt{48}}{\sqrt{75}}$$

.....

**(Total for Question 12 is 3 marks)**

---



13 At a pop concert,  $\frac{3}{5}$  of the groups had all male singers,  $\frac{1}{4}$  of the groups had exactly one female singer and the rest of the groups had more than one female singer.

Find the fraction of the groups that had

(a) at least one female singer,

.....  
(1)

(b) more than one female singer.

.....  
(2)

(Total for Question 13 is 3 marks)

14

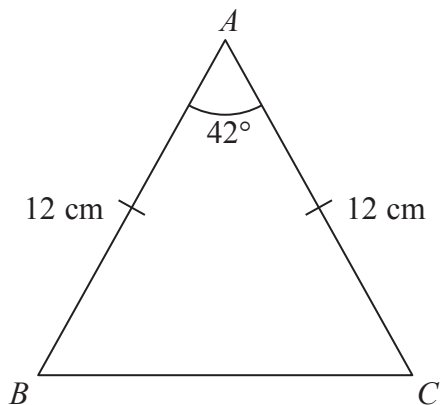


Diagram **NOT** accurately drawn

$ABC$  is an isosceles triangle with  $AB = AC = 12$  cm and  $\angle BAC = 42^\circ$   
Calculate the length, in cm to 3 significant figures, of  $BC$ .

..... cm

(Total for Question 14 is 3 marks)



15 (a) Expand and simplify  $\left(x + \frac{1}{x}\right)^2$

.....  
(2)

Given that  $x + \frac{1}{x} = 3$

(b) write down the value of  $x^2 + \frac{1}{x^2}$

.....  
(1)

**(Total for Question 15 is 3 marks)**

16 Wilson Kipsang ran the Berlin marathon in a time of 2 hours 3 minutes and 23 seconds in 2013. The length of the Berlin Marathon is 42.195 km.

Calculate, to 3 significant figures, Wilson's average speed, in m/s, for the Berlin marathon in 2013.

..... m/s

**(Total for Question 16 is 4 marks)**





17 Here are ten numbers

1 2 2 3 4 5 5 5 6  $x$  where  $x > 6$ ,

(a) Write down the

(i) mode of the ten numbers,

.....

(ii) median of the ten numbers.

.....

(2)

Given also that

$$\text{mean} = 3 \times \text{mode} - \text{median}$$

(b) find the value of  $x$ .

$x =$  .....

(2)

**(Total for Question 17 is 4 marks)**

18 Given that  $x$  is an integer, find the values of  $x$  which satisfy

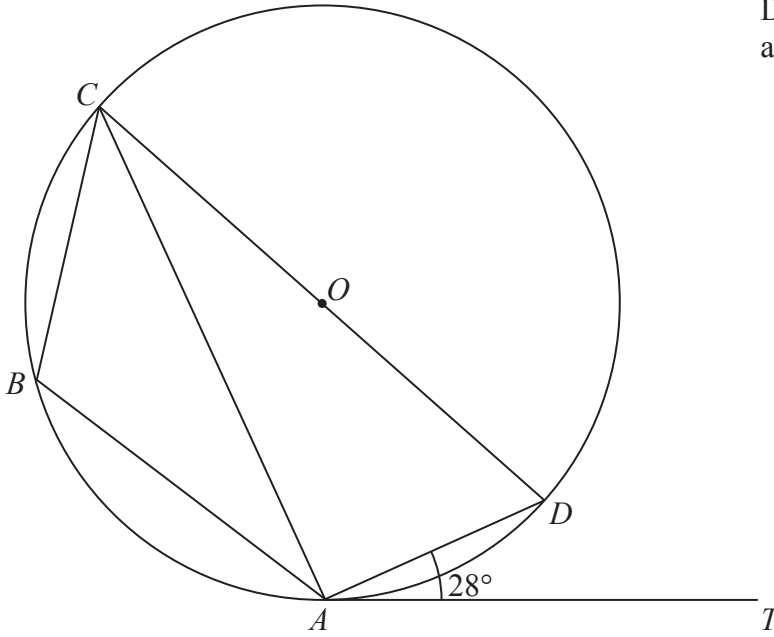
$$2 \leq 2x + 3 < 9$$

.....

**(Total for Question 18 is 4 marks)**



Diagram **NOT**  
accurately drawn



*ABCD* is a quadrilateral so that the points *A*, *B*, *C* and *D* lie on a circle, centre *O*, with diameter *COD*.

*AT* is the tangent to the circle at *A* and  $\angle DAT = 28^\circ$

Find the size, in degrees, of

(a)  $\angle CDA$ ,

$$\angle CDA = \dots\dots\dots^\circ$$

(3)

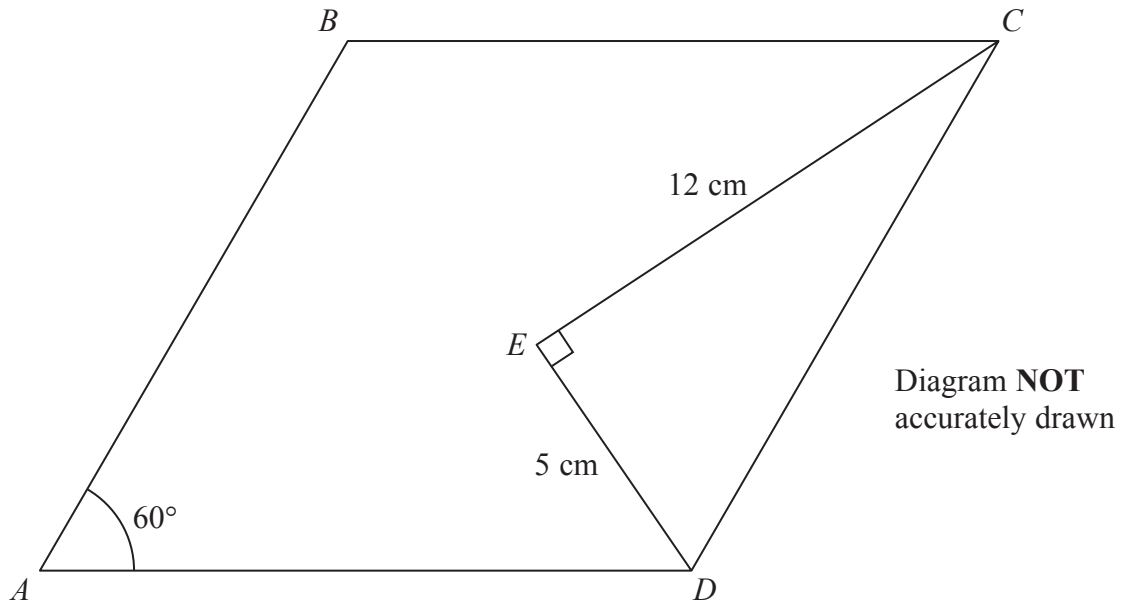
(b)  $\angle CBA$ .

$$\angle CBA = \dots\dots\dots^\circ$$

(1)

**(Total for Question 19 is 4 marks)**





$ABCD$  is a rhombus with  $\angle BAD = 60^\circ$

The point  $E$  inside the rhombus is such that  $EC = 12$  cm,  $ED = 5$  cm and  $\angle CED = 90^\circ$

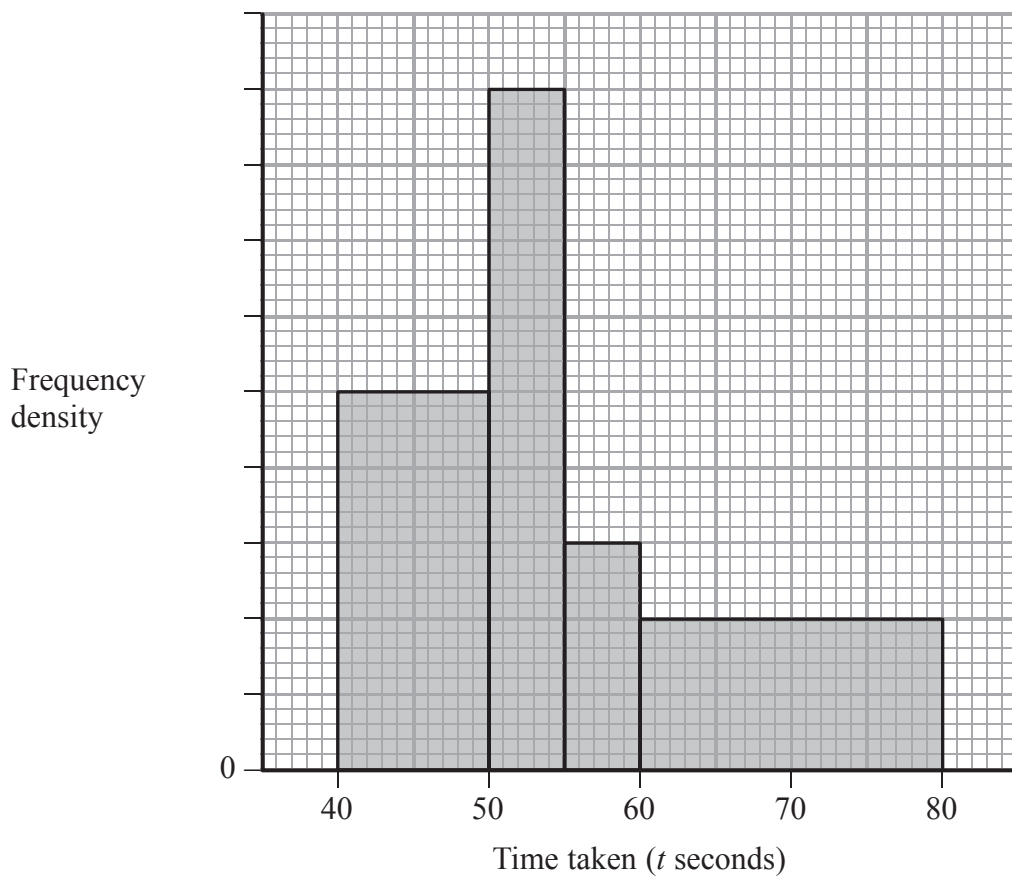
Calculate the area, in  $\text{cm}^2$  to 3 significant figures, of the rhombus  $ABCD$ .

.....  $\text{cm}^2$

(Total for Question 20 is 4 marks)



21 The times ( $t$  seconds) taken by some students to complete a task were recorded. The histogram below was drawn for these times.



(a) Use the histogram and the information in the table to complete the table.

Time taken ( $t$ secs)	Number of students
$40 \leq t < 50$	
$50 \leq t < 55$	18
$55 \leq t < 60$	
$60 \leq t < 80$	

(3)

One of the students who completed the task is chosen at random.

(b) Find the probability that this student took less than 60 seconds to complete the task.

(2)

(Total for Question 21 is 5 marks)



22 A stone is dropped from the top of a vertical cliff.

At time  $t$  seconds after the stone has been dropped, the height,  $h$  metres, of the stone above the ground is given by  $h = 125 - 5t^2$  ( $t \geq 0$ )

(a) Write down the height of the cliff.

..... m  
(1)

(b) Find the value of  $t$  when the stone hits the ground.

$t =$  .....  
(2)

(c) Find the speed of the stone when  $t = 2$

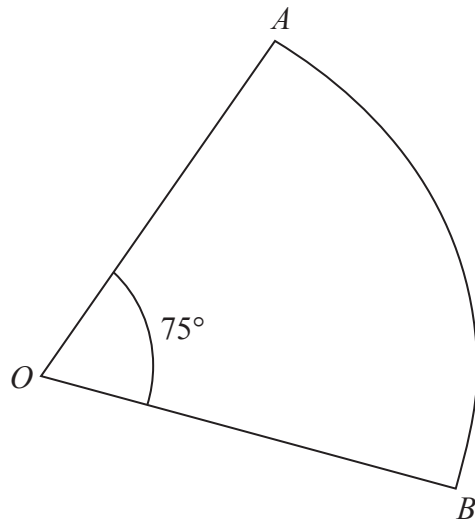
..... m/s  
(2)

(Total for Question 22 is 5 marks)



23

Diagram **NOT**  
accurately drawn



$AOB$  is a sector of a circle, centre  $O$ , with  $\angle AOB = 75^\circ$   
The area of the sector is  $180 \text{ cm}^2$

Find, to 3 significant figures,

(a) the radius, in cm, of the circle.

..... cm  
(2)

(b) the length, in cm, of the perimeter of the sector.

..... cm  
(3)

(Total for Question 23 is 5 marks)



24 Three positive numbers  $x$ ,  $y$  and  $z$  are such that  $x = (y - 3)$  and  $z = (y + 2)$

(a) Find and simplify an expression for  $x^2 + 3z^2 - 4y^2$  in terms of  $y$

.....  
(3)

Given that  $x^2 + 3z^2 - 4y^2 = 291$

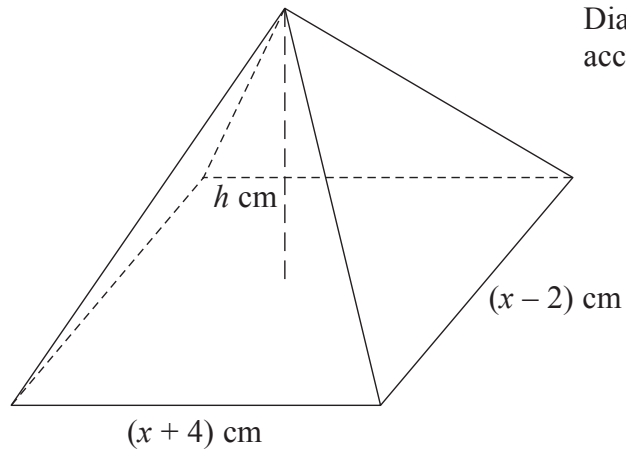
(b) Find the value of  $y$

$y =$  .....  
(2)

(Total for Question 24 is 5 marks)



Diagram **NOT**  
accurately drawn



The figure shows a pyramid.

The base of the pyramid is a rectangle with sides of length  $(x + 4)$  cm and  $(x - 2)$  cm.

The height of the pyramid is  $h$  cm.

The volume of the pyramid is  $120 \text{ cm}^3$

(a) Find an expression for  $h$  in terms of  $x$ .

$$h = \dots\dots\dots (2)$$

Given that  $h = 5$  cm,

(b) calculate the value of  $x$ .

$$x = \dots\dots\dots (4)$$

(Total for Question 25 is 6 marks)





26  $(x - 1)$  is a factor of  $x^3 - 3x^2 + kx + 24$ , where  $k$  is a constant.

(a) Find the value of  $k$ .

$$k = \dots\dots\dots (2)$$

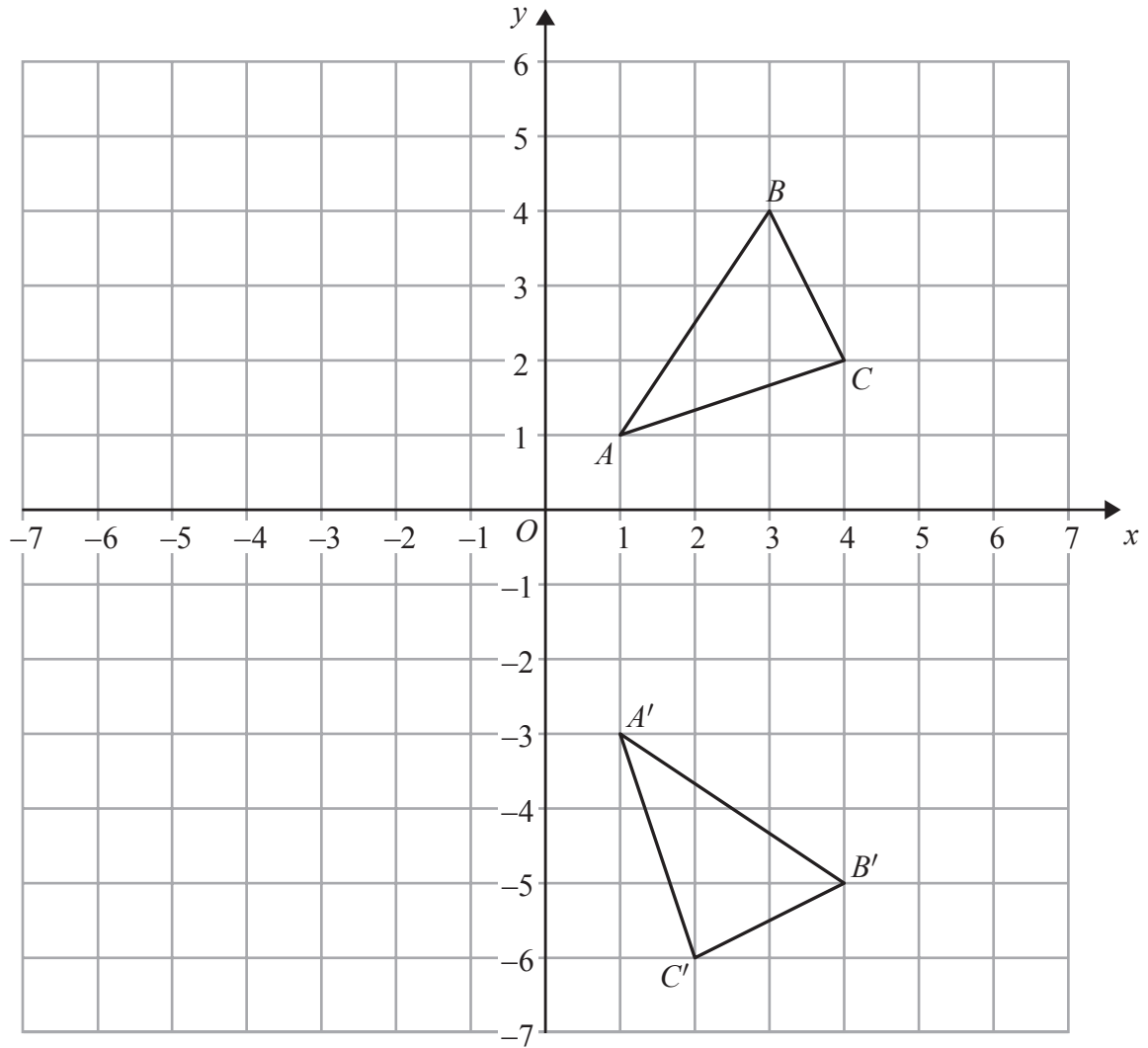
(b) Using the value of  $k$  obtained in part (a), completely factorise

$$x^3 - 3x^2 + kx + 24$$

$$\dots\dots\dots (4)$$

**(Total for Question 26 is 6 marks)**





Triangle  $A'B'C'$  is the image of triangle  $ABC$ , where  $A'$ ,  $B'$  and  $C'$  are respectively the images of  $A$ ,  $B$  and  $C$  after a rotation.

(a) Write down the coordinates of the centre of rotation.

.....  
(1)



The matrix  $\mathbf{M} = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$

(b) Calculate the matrix product  $\mathbf{M} \begin{pmatrix} 1 & 4 & 2 \\ -3 & -5 & -6 \end{pmatrix}$

.....  
(2)

Triangle  $A''B''C''$  is the image of triangle  $A'B'C'$ , where  $A''$ ,  $B''$  and  $C''$  are respectively the images of  $A'$ ,  $B'$  and  $C'$ , under the transformation with matrix  $\mathbf{M}$ .

(c) On the grid, draw and label triangle  $A''B''C''$

(2)

(d) Describe fully the single transformation which maps triangle  $A''B''C''$  onto triangle  $ABC$ .

.....  
.....  
.....  
(2)

**(Total for Question 27 is 7 marks)**

*Turn over for question 28*



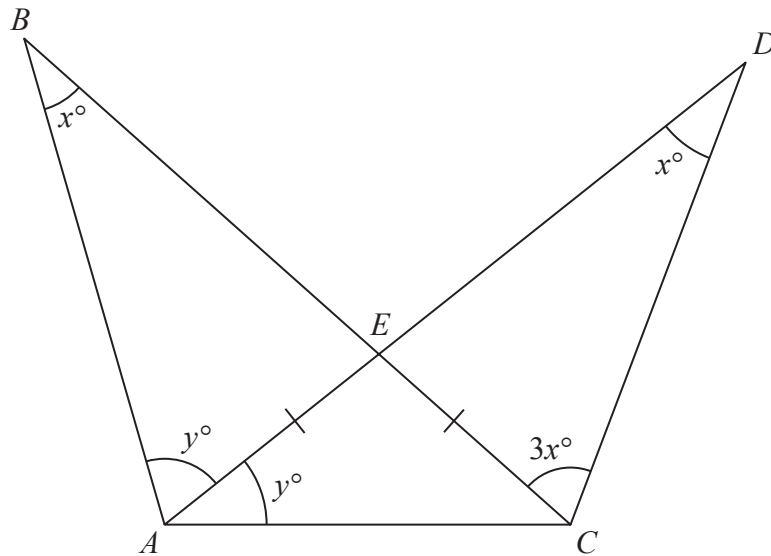


Diagram NOT accurately drawn

The figure shows two triangles  $ABC$  and  $ADC$ .  
 The sides  $BC$  and  $AD$  intersect at the point  $E$  and  $AE = EC$ .  
 $\angle ABC = \angle ADC = x^\circ$  and  $\angle BCD = 3x^\circ$   
 $\angle BAE = \angle EAC = y^\circ$

Using triangle  $ABC$  and the information given,

(a) write down an equation in  $x$  and  $y$ .

.....  
(1)

Using triangle  $ADC$  and the information given,

(b) write down a second equation in  $x$  and  $y$ .

.....  
(1)

(c) Use your two equations to find the value of  $x$  and the value of  $y$ .

$x = \dots\dots\dots$ ,  $y = \dots\dots\dots$   
(4)

**(Total for Question 28 is 6 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

