Mathematics

Paper 1 (Non-Calculator)   Higher Tier

Time Allowed: 1 hour

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 total mark for this paper is 60.
- 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 diagram shows triangle ABC.
      Find the size of the largest angle.

A

$5x - 3$

$5x - 11$
C

$3x - 1$
B
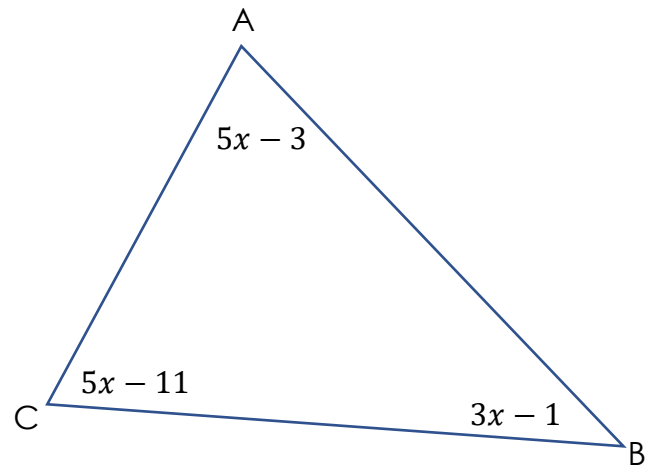
(4 marks)

2.   The table shows the distribution of heights of a year 11 class

Height, h (cm)	Frequency		
$125 \leq h < 135$	3		
$135 \leq h < 145$	5		
$145 \leq h < 155$	10		
$155 \leq h < 165$	10		
$165 \leq h < 195$	2		

(a) What will be the median group?

(1)

(b) Find the mean height of the class.

(3)
(4 marks)

3.   A block of marble has dimensions 1m by 80cm by 20cm.
      The density of marble is approximately 3 g/cm³.
      It is to be placed on a plinth which can hold a maximum load of 500kg.
      Will the plinth be able to hold the marble? Justify your answer.

(3 marks)

4. In the Venn diagram
ξ = number of pupils in a year 11 mathematics class
A = number of pupils studying geography
B = number of pupils studying history
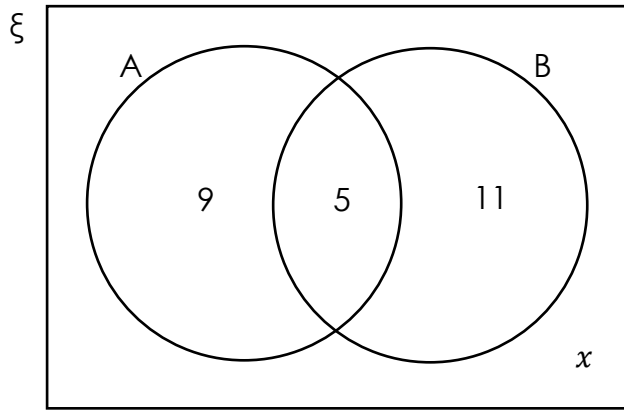
(a) Given that P(B) = $\frac{1}{2}$, find the value of x.

(1)

(b) Write down P(A ∩ B)

(1)

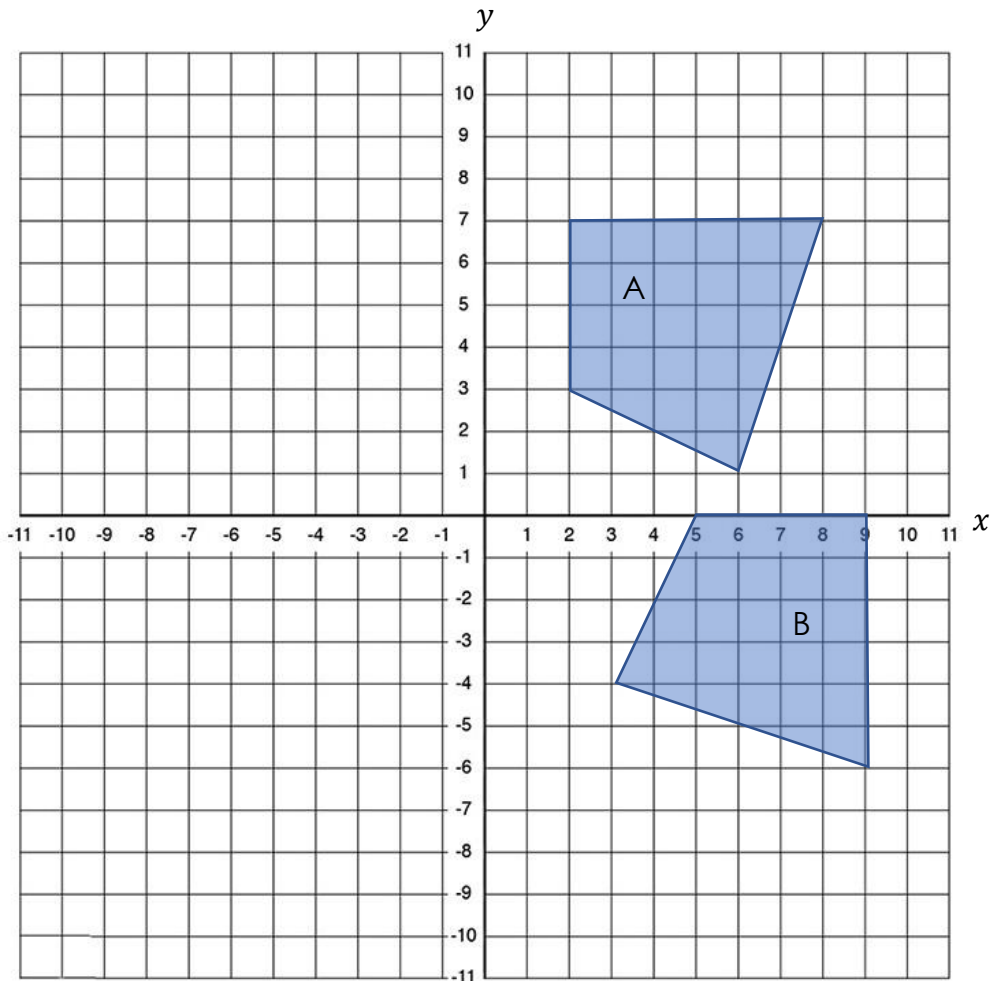(c) What is the probability a student studies history or geography but not both?

(1)
(3 marks)

5. Given that $\begin{pmatrix} 3a - 5 \\ 5b + 2 \end{pmatrix} = 4 \begin{pmatrix} 4 \\ 3 \end{pmatrix}$, find the values of a and b.

(4 marks)

6.

(a) Describe fully the single transformation which takes shape A onto shape B.

(3)

(b) C is an enlargement of shape A with scale factor $-\frac{1}{2}$ about the point (-2, 1). Draw shape C.

(3)

(6 marks)

7. a : b = 3 : 7
b : c = 2 : 5
Write down the ratio a : b : c in its simplest form where a, b and c are integers.

(3 marks)

8.   Solve the simultaneous equations $5x - 3y = 7$
$7x + 5y = -4$

(4 marks)

9.   (a) Factorise fully $2x^2 + 9x + 9$.

(2)

(b) Hence, or otherwise, write 299 as a product of two prime numbers.

(2)

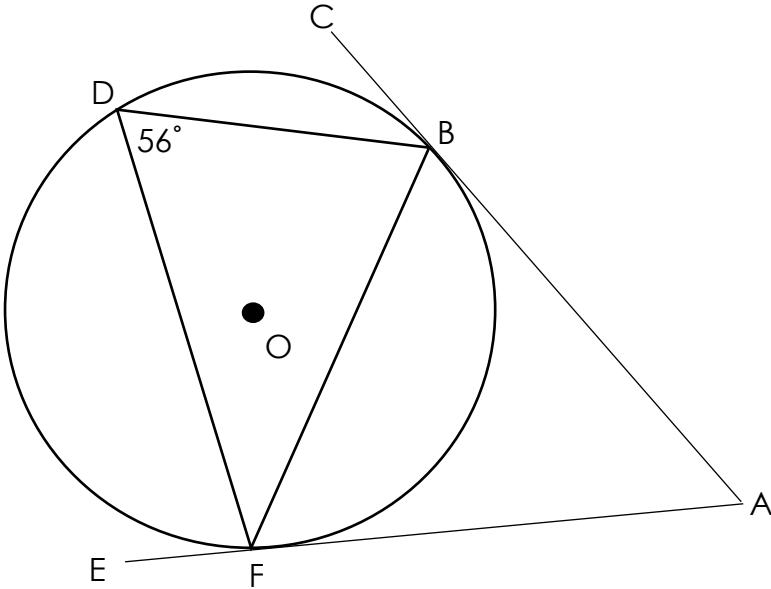**(4 marks)**

10.   (a) Work out the value of $16^{-1/4}$

(1)

(b) Solve the equation $16^{2x-1} = 8^{x+1}$

(4)

(5 marks)

11. The diagram shows a circle with centre O with two tangents AC and AE which touch the circle at B and F respectively. D also lies on the circumference of the circle.
Find the size of angle BAF giving geometric reasons for each stage of your working.

(4 marks)

12. The diagram shows a sector of a circle with centre O where angle AOB is 30°. OA and OB are radii of a circle of length r.

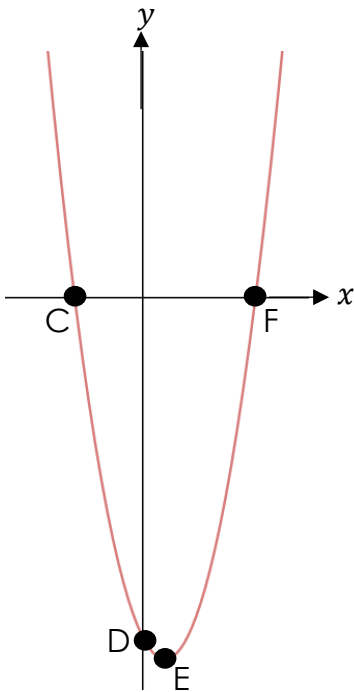Show that the perimeter of the shaded region is $\frac{r}{6}\left(\pi + 6\sqrt{2 - \sqrt{3}}\right)$
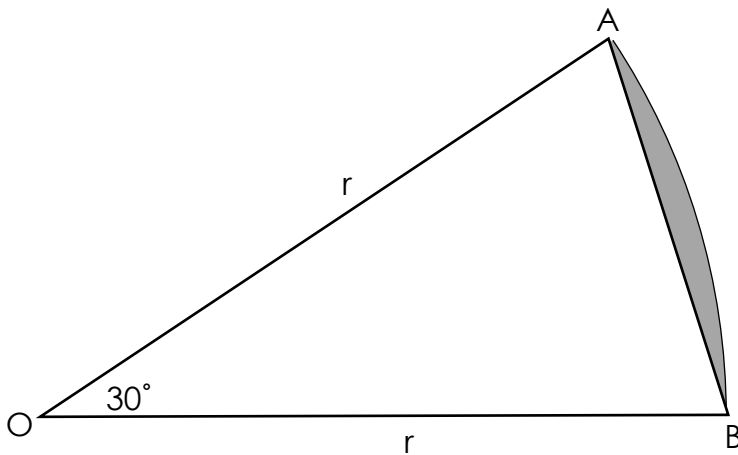
(5 marks)

13. (a) $y = x^2 - 2x - 15$ can be written in the form $y = (x + a)^2 + b$.
Find the values of a and b.

(2)

(b) The diagram shows the graph of $y = x^2 - 2x - 15$.
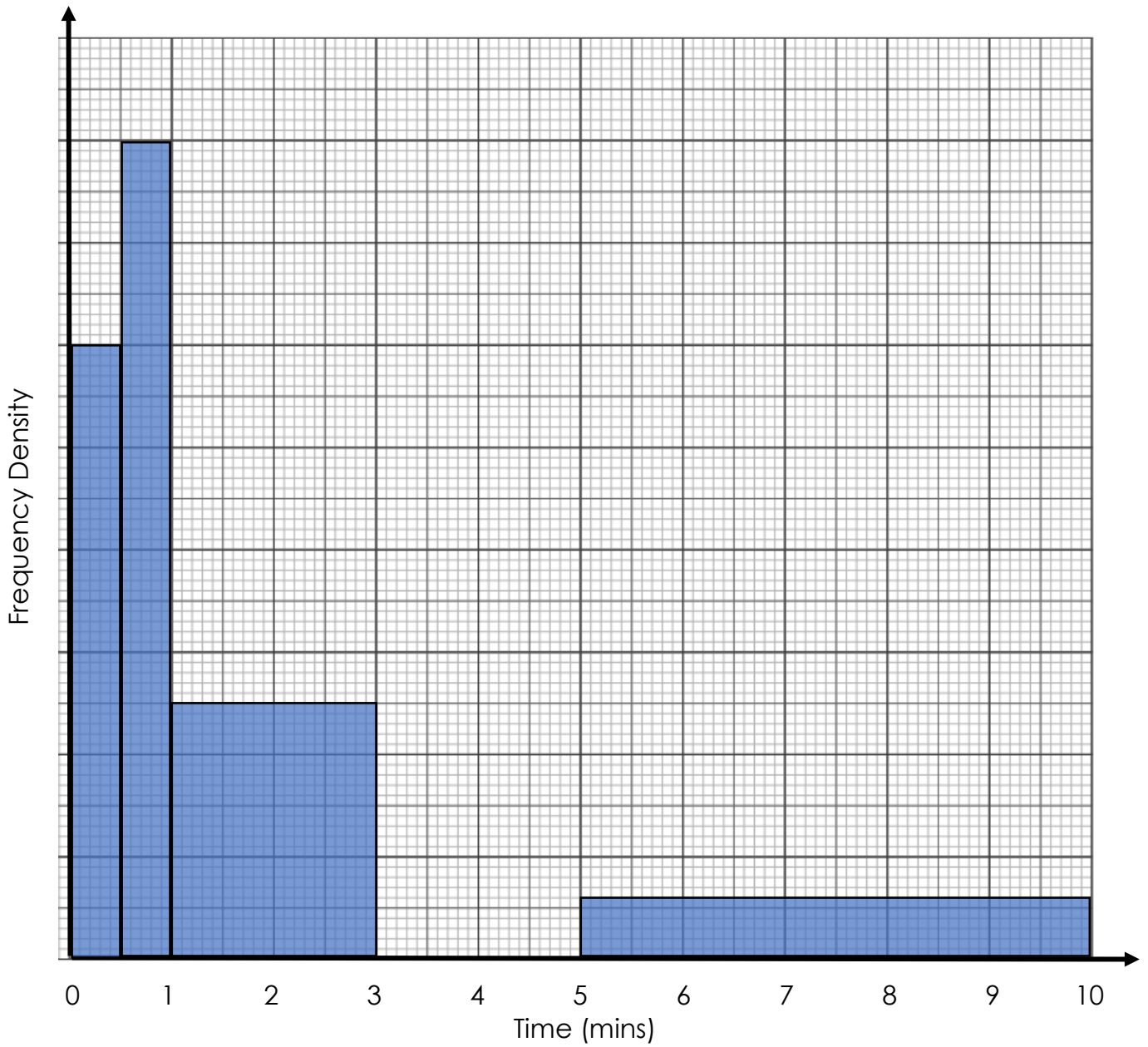Find the coordinates of C, D, E and F.

(4)

(6 marks)

14. Jayne often travels by train. She regularly rings the train company up to check the times of trains. She kept a record of how long she was kept waiting, in minutes, before getting through to speak to someone. This is illustrated in the table and the histogram.

Time, t (mins)	Frequency
$0 \leq t < 0.5$	6
$0.5 \leq t < 1$	8
$1 \leq t < 3$	
$3 \leq t < 5$	6
$5 \leq t < 10$	6

(a)   Complete the frequency table

(1)

(b)   Complete the histogram

(1)

(c)   Use the histogram to estimate the median waiting time.

(3)
(5 marks)