FOUNDED 1900

THE ENGLISH SCHOOL

A SECOND CENTURY OF EXCELLENCE

END-OF-YEAR-EXAMINATIONS

YEAR 3 MATHEMATICS
MATHEMATICS A - IGCSE Book 1

Time allowed: 2 hours

Instructions to candidates

In the boxes below write your name, surname and form.
Answer the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates

This paper has 25 questions.
There are 17 pages in this question paper.
Full marks may be obtained for answers to all questions.
The total marks for this paper is 100.
The marks for each question is shown in round brackets, e.g. **(2)**
Calculators may be used.

Advice for candidates

Write your answers neatly and in good English.
Work steadily through the paper.
Do not spend too long on one question.
Show all stages in any calculations.

Materials required for the paper

Calculator, ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

1. The number 10^{100} is called a googol. Write the number 50 googols in standard form.

Answer…….. **(1)**

2. Calculate the value of $6.3\times10^3+8.5\times10^2$, giving your answer in standard form.

Answer…….. **(1)**

3. Simplify the following expressions.

(a) $2pq-8pq^2+3pq-pq^2$

Answer…….. **(2)**

(b) $5b^2\times(2b)^3\times a^2$

Answer…….. **(2)**

4. Given the sequence 10, 8, 6, 4, …

(a) Write down the next two terms.

Answer ……. , …….. **(1)**

(b) Find a formula for the n^{th} term in terms of n.

u_n = **……..** **(1)**

5. In 2008 the population of Cyprus was 792604 and the population growth rate 0.522% per year. Calculate giving your answers to the nearest unit:

(a) The expected population for 2009?

Answer…….. **(1)**

(b) The expected population for 2020?

Answer…….. **(2)**

6. Carlos mixes cement, lime and sand in the ratios 4 : 1 : 12 by weight. Work out the weight of cement, the weight of lime and the weight of sand in 68 kg of the mixture.

cement **……..** **kg**

lime **……..** **kg**

sand **……..** **kg**

(3)

7. Factorise the following expressions:

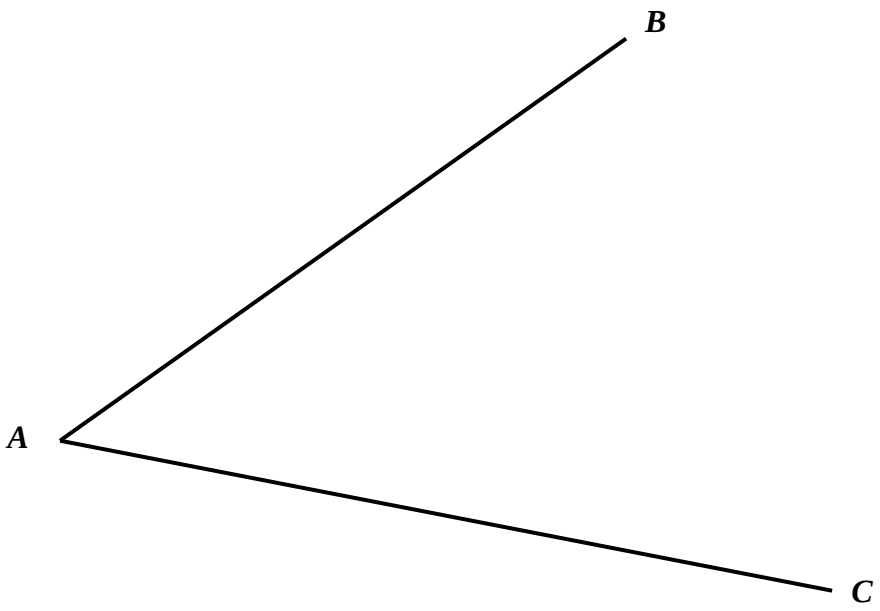
(a) $3\pi r - 2r^2$

Answer…….. **(2)**

(b) $4y^2 - 100x^2$

Answer…….. **(3)**

8. Use a ruler and compasses to bisect the angle BAC. You must show all construction lines.



(2)

9. Solve the following equations. Leave answers as fractions where necessary.

(a) $2\sqrt{x}-3=6$

Answer…….. **(3)**

(b) $x^2+9x-22=0$

Answers…….. **(3)**

(c) $\frac{2x-1}{3}-\frac{x}{4}=2$

Answer…….. **(3)**

10.

(a) Convert the recurring decimal $0.\dot{2}$ to a fraction.

Answer…….. (2)

$0.0\dot{\alpha}$ is a recurring decimal. α is a whole number such that $1 \leq \alpha \leq 9$.

(b)

(i) Write the recurring decimal $0.0\dot{\alpha}$ as a fraction.

Answer…….. (1)

(ii) $0.1\dot{\alpha}$ is also a recurring decimal. Using your answer to part (i), or otherwise, convert the recurring decimal $0.1\dot{\alpha}$ to a fraction. Give your answer as simply as possible.

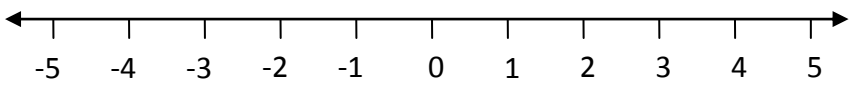
Answer…….. (2)

11.

(a) Find the values of x which satisfy the inequality $x+12 > 3x+10$.

Answer…….. (3)

(b) Show the inequality on a number line.



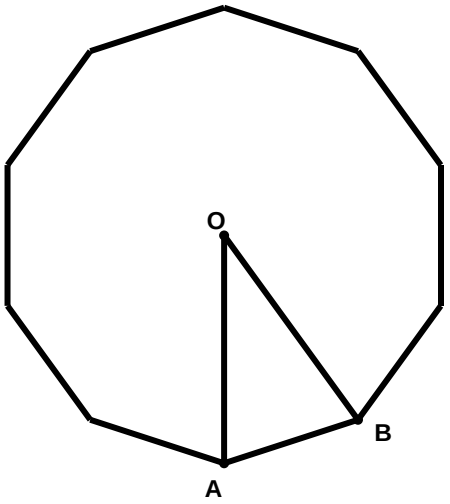
(1)

(c) x is a whole number. Write down the largest value of x that satisfies $x+12 > 3x+10$.

Answer…….. (1)

12.

(a) The diagram shows a regular decagon, with centre *O*. Work out the value of the angle OAB.



Answer…….. (2)

(b) A regular polygon has an exterior angle of 30°. Work out the number of sides of the polygon.

Answer…….. (2)

13. Solve the following simultaneous equations.

$$4x - 3y = 10$$
$$2x + y = 0$$

Answer…….. (4)

14. Jo uses the formula $F = \frac{9}{5}C + 32$ to change degrees Celsius (C) to degrees Fahrenheit (F).

(a) Use this formula to find the value of F when $C = 40$

Answer…….. **(1)**

(b) Rearrange the formula to make C the subject of the formula.

Answer…….. **(3)**

15.

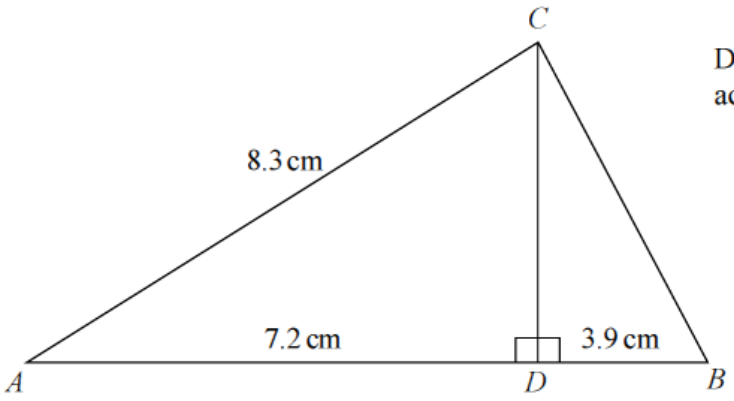


Diagram **NOT** accurately drawn

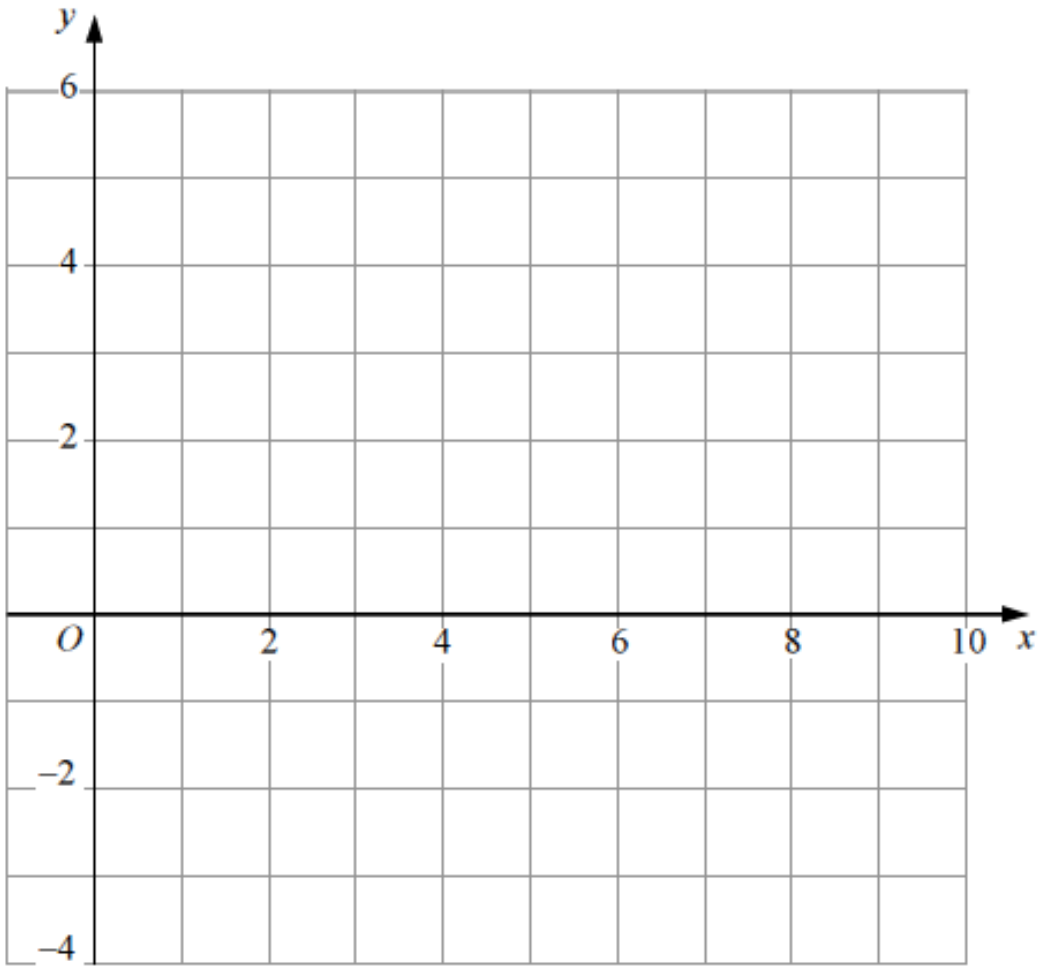
ABC is a triangle. D is a point on AB. CD is perpendicular to AB. AD = 7.2 cm, AC = 8.3 cm and DB = 3.9 cm.

Work out the size of the angle DCB. Give your answer correct to 1 decimal place.

Answer…….. **(4)**

16. On the grid, shade the region that satisfies all three of the following inequalities

$$y \geq -2,\ x \geq 1,\ y < 5 - x$$



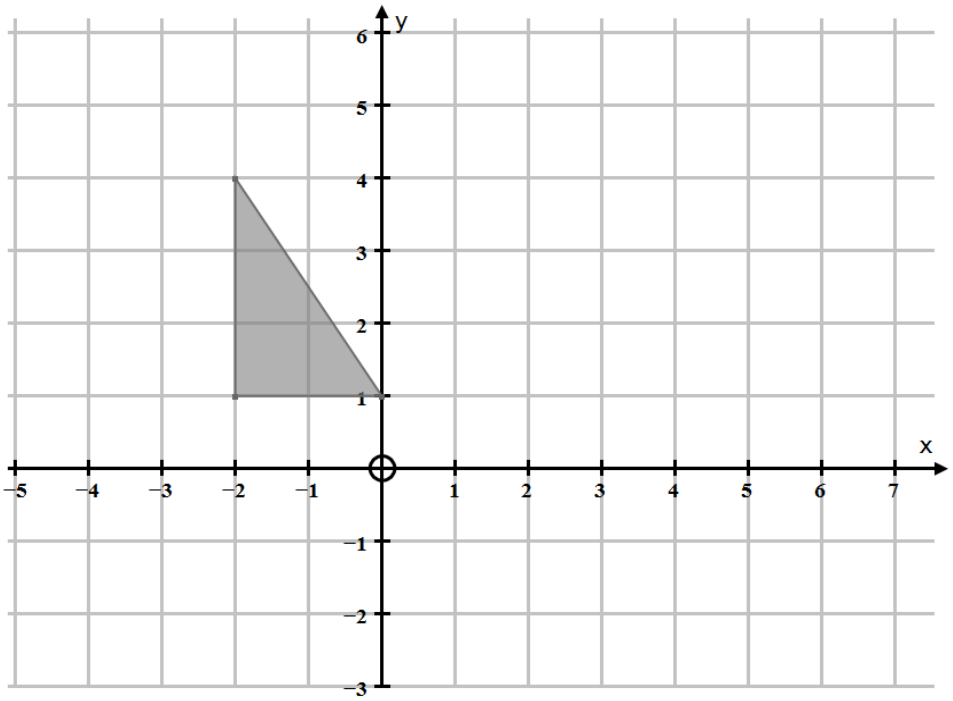
(4)

17. Janice asks 100 students if they like biology or chemistry or physics best. 38 of the students are girls. 21 of these girls like biology best. 18 boys like physics best. 7 out of the 23 students who like chemistry best are girls. Work out the number of students who like biology best.

Answer…….. **(2)**

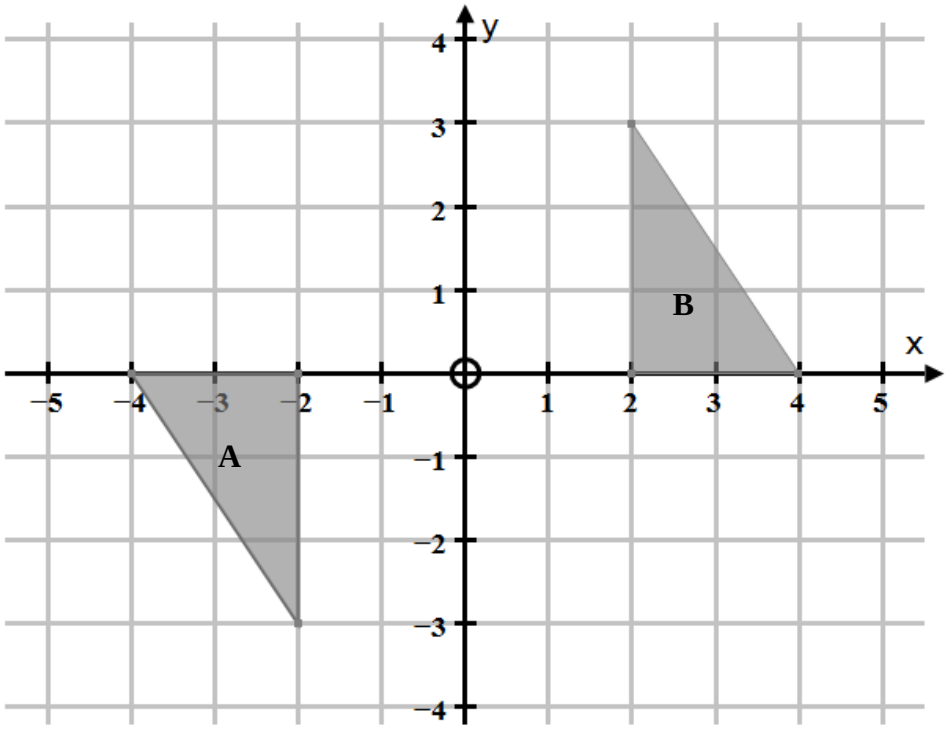
18.

(a) Translate the triangle below by the vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$.



(1)

(b) Describe fully the single transformation that maps triangle A onto triangle B.



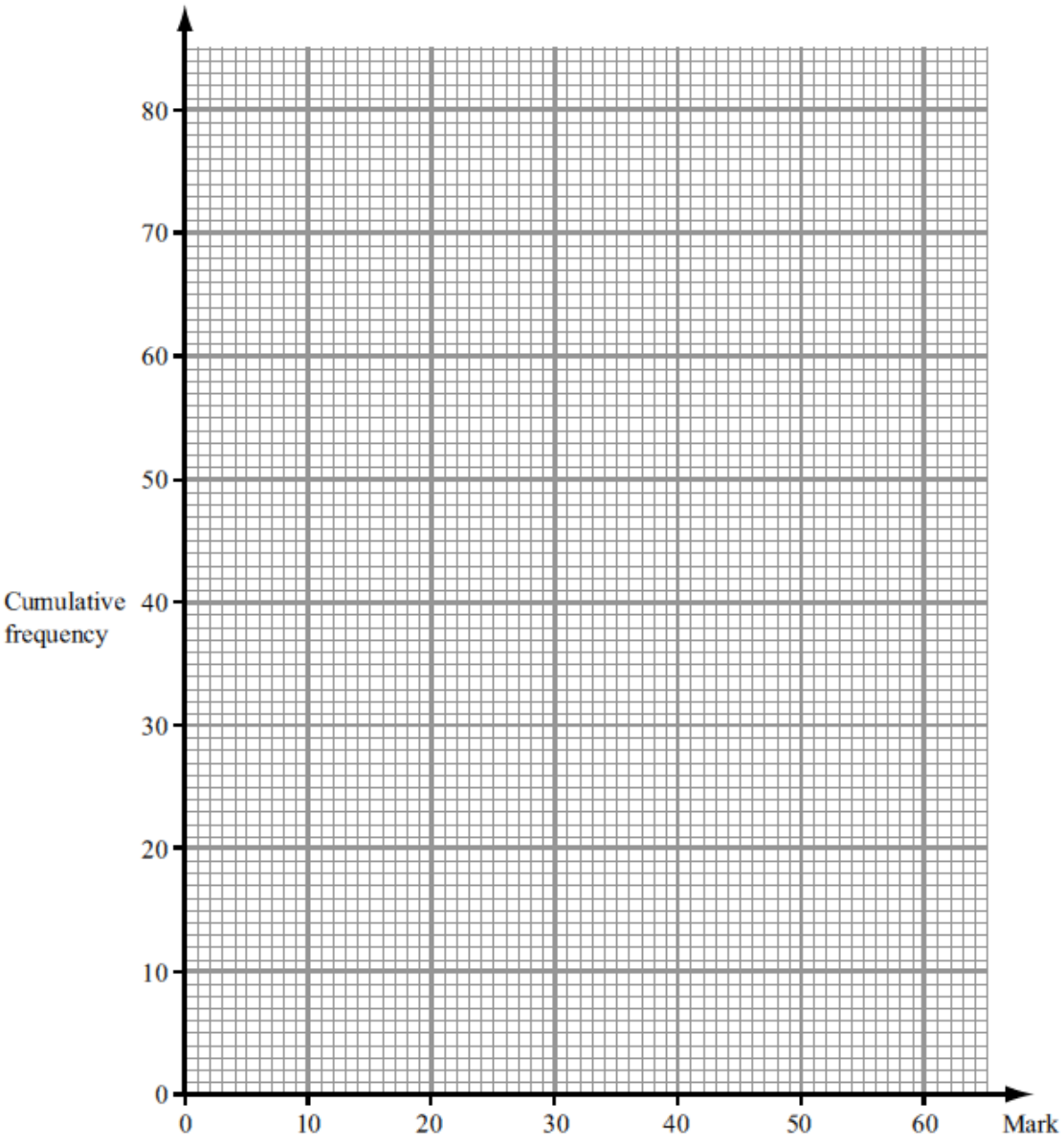
……

…… **(3)**

19. 80 students took a maths exam. The cumulative frequency table gives information about the marks scored in this exam.

Mark *(m)*	**Cumulative frequency**
$0 < m \leq 10$	8
$0 < m \leq 20$	21
$0 < m \leq 30$	46
$0 < m \leq 40$	67
$0 < m \leq 50$	76
$0 < m \leq 60$	80

(a) On the grid below, draw a cumulative frequency graph for the data in the table.



(2)

(b) Use your graph to find an estimate for the median mark scored in the exam.

Answer…….. **(1)**

(c) Give an estimate for the inter-quartile range (IQR).

Answer…….. **(1)**

(d) Complete the following calculation table.

Mark *(m)*	**mid-point *m***	**frequency *f***	***m* × *f***
$0 < m \leq 10$			
$10 < m \leq 20$			
$20 < m \leq 30$			
$30 < m \leq 40$			
$40 < m \leq 50$			
$50 < m \leq 60$			
		Total =	**Total =**

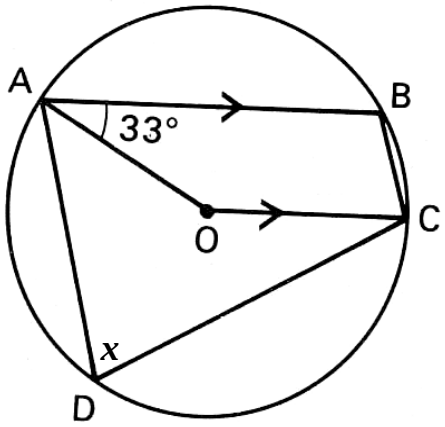
(3)

(e) Use the table above to find an estimate for the mean mark scored in the exam.

Answer…….. **(1)**

20. Find the angles marked *x* and *y*. O is the centre of the circle. Give reasons for your answers.

(a)

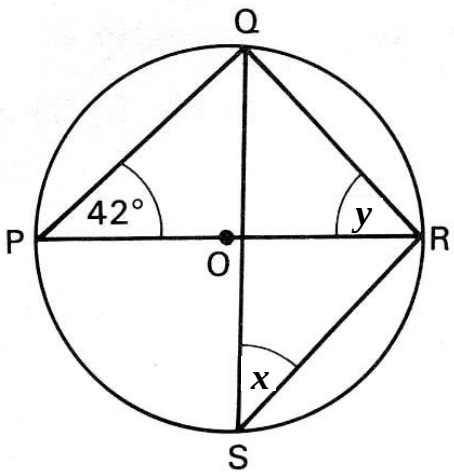


Answer x = **…….** **(1)**

Reason **……**

…… **(1)**

(b)



Answer x = **…….** **(1)**

Reason **……**

…… **(1)**

Answer y = **…….** **(1)**

Reason **……**

…… **(1)**

21. The density (ρ) of an object is calculated using the formula

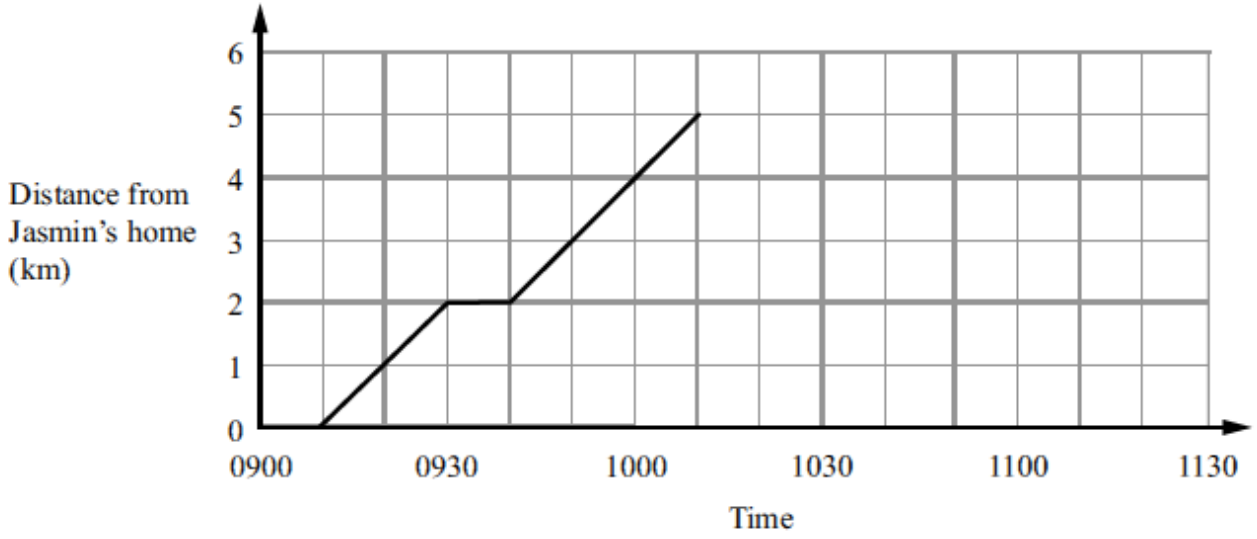
$$\rho = \frac{m}{V}$$

where m is the mass in kg and V is the volume in m^3.

The mass of a solid shape is 6460 kg correct to 3 significant figures. The volume of the solid shape is 2.8 m^3 correct to 2 significant figures.
Calculate, correct to 4 significant figures the lower bound of the density.

Answer…….. **(2)**

22. Jasmin walked from her home to the park. Here is a travel graph for Jasmin's journey from her home to the park.



(a) For how long did she stop? Give your answer in minutes.

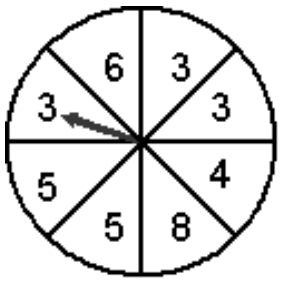
Answer…….. **(1)**

Jasmin stayed at the park for half an hour. She then walked home at a speed of 7.5 km/h.

(b) Complete the travel graph.

(3)

23. The diagram shows a pointer which spins about the centre of a fixed disc.



NOT TO SCALE

When the pointer is spun, it stops on one of the numbers 3, 4, 5, 6 or 8. The probability that it will stop on one of the numbers is given in the table.

Number	3	4	5	6	8
Probability	0.38	0.14		0.12	0.11

Beckham is going to spin the pointer once.

(a) Work out the probability that the pointer will stop on 5.

Answer…….. (1)

(b) Work out the probability that the pointer will stop on a prime number.

Answer…….. (1)

Frank is going to spin the pointer 125 times.

(c) Work out an estimate for the number of times the pointer will stop on 8.

Answer…….. (1)

24. The diagram below shows a 6-sided shape.

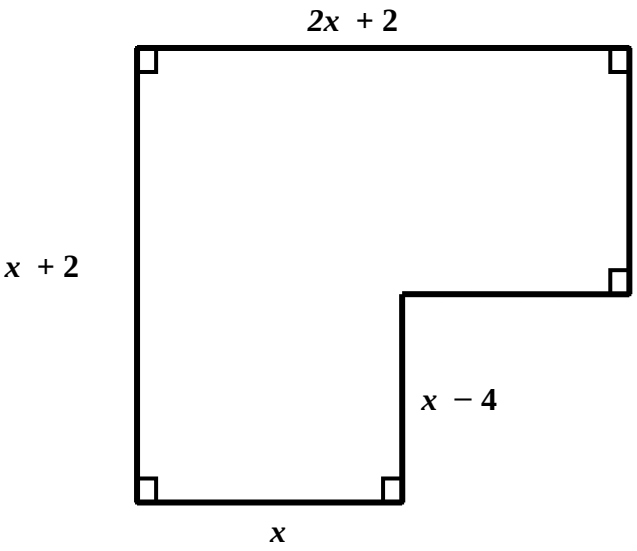


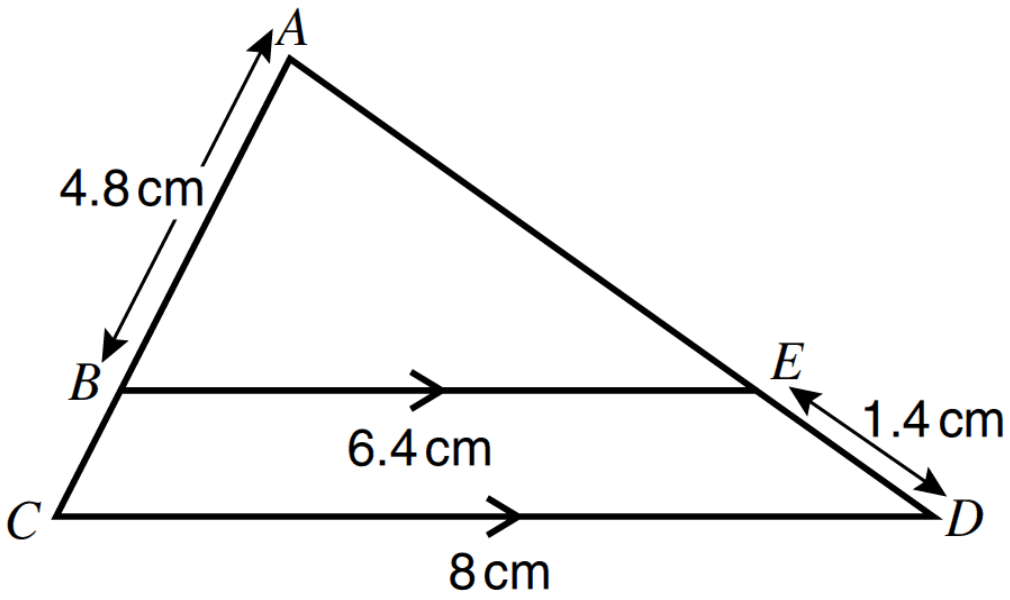
Diagram **NOT** accurately drawn

All the measurements are in centimetres. The area of this shape is 140 cm^2.

Form a suitable quadratic equation and solve it to find the length of the longest side of the shape.

Answer…….. **(6)**

25. In the diagram below, *BE* and *CD* are parallel.
AB = 4.8 cm, BE = 6.4 cm, ED = 1.4 cm and CD = 8 cm.



(a) Show, giving reasons, that triangle *ABE* and triangle *ACD* are similar.

(2)

(b) Calculate the length of *AE*

Answer…….. **(3)**

End of paper