

THE ENGLISH SCHOOL, NICOSIA



FOR ENTRY INTO YEAR 4
SAMPLE PAPER 3

MATHEMATICS - 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 24 questions.
There are 18 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.

Surname:	Name:

	Total Marks:

1. Calculate the following, giving your final answer correct to 3 significant figures

$$\sqrt{\frac{246}{1.4^2}} - 4.9$$

Answer..... (1)

2. The age of the Universe is approximately 13 750 million years.

- (a) (i) Write the number 13 750 million in standard form.

Answer..... (1)

1 Gigayear = 10^9 years.

- (ii) Express the age of the Universe in Gigayears.

Answer..... (1)

3. Express the recurring decimal $0.\dot{0}7\dot{5}$ as a fraction in simplest form.

Answer..... (2)

4. Simplify the following expressions.

(a) $\frac{2a^2+2ab}{a+b}$

Answer..... (2)

(b) $\frac{30}{xy^2} \div \frac{(3x)^3}{x^3y}$

Answer..... (3)

(c) $\frac{x+1}{7} - \frac{x-3}{21}$

Answer..... (3)

5. Fully factorise the following expressions:

(a) $6mn - 4m^2$

Answer..... (1)

(b) $25x^2 - 100y^2$

Answer..... (3)

6. Given the sequence 13, 8, 3, -2, ...

(a) Write down the next two terms in the sequence.

Answers , (1)

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

$u_n = \dots\dots\dots$ (2)

7. Cement, sand, aggregate and water are used to make concrete, in the ratio:

Cement : Sand: Aggregate : Water = 2: 5: 8: 1

Eddie wants to make concrete. He uses 0.25 m^3 of cement.

(a) How much sand does he need?

Answer..... (1)

(b) When water and aggregate have been added, how much concrete will he have?

Answer..... (2)

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

(a) $5(6x + 2) - 7(3x - 5) = 72$

Answer..... (2)

(b) $\sqrt{x} + 27 = 31$

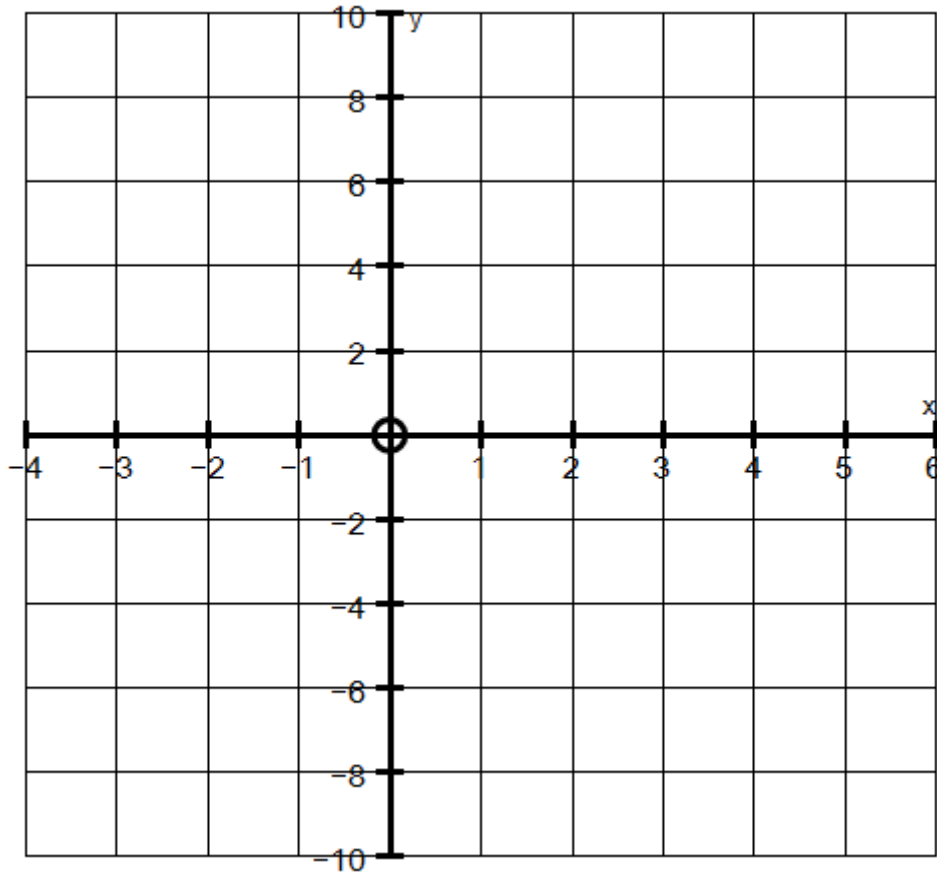
Answer..... (2)

(c) $\frac{3x-5}{2} - \frac{x}{3} = 4$

Answer..... (3)

9. On the grid, **shade** the region which satisfies all three of the following inequalities:

$$y \leq 6, x \geq -2, y > 2x - 4$$



(4)

10. $P = \{\text{Prime numbers between 20 and 30}\}$
 $M = \{\text{Multiples of 7 between 20 and 30}\}$

(a) List the members of P.

Answer..... (1)

(b) List the members of $P \cup M$.

Answer..... (1)

(c) What is $M \cap P$?

Answer..... (1)

(d) Why is $27 \notin P$? Explain your answer.

.....

..... (1)

11. Elizabeth bought a car for €17 500. The car depreciated by 15% each year. Work out the value of the car 3 years after she bought it.

Answer..... (2)

12. Solve the following simultaneous equations.

$$\begin{aligned}2x - 3y &= 3 \\4x + 4y &= 1\end{aligned}$$

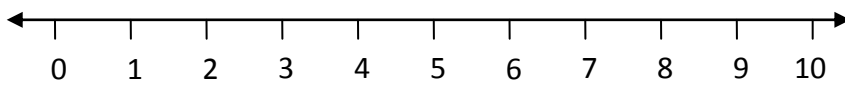
Answer..... (4)

13.

- (a) Solve the inequality $7x + 2 < 4x + 23$.

Answer..... (2)

- (b) Illustrate the solution set on the number line provided.



(1)

- (c) n is an integer such that $-1 < n \leq 2$. List all the possible values of n .

Answer..... (1)

14. Given the formula

$$v^2 = u^2 + 2as$$

- (a) Work out the value of v when $u = 6$, $a = 2.5$, and $s = 9$.

Answer..... (2)

- (b) Make s the subject of the formula.

Answer..... (2)

15.

- (a) Find the gradient of the straight line **L** which passes through the points (1, 6) and (5, -2).

Answer..... (2)

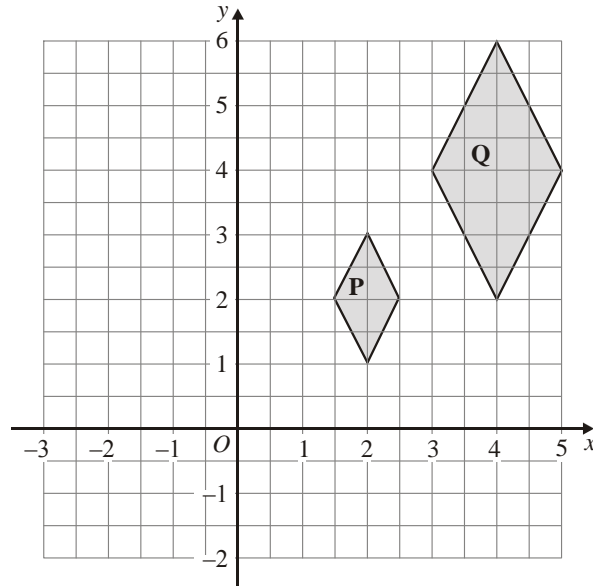
- (b) The line **M** is parallel to line **L** and intersects the y-axis at the point (0, 1). Write down the equation of **M** in the form $y = mx + c$.

Answer..... (2)

- (c) The point (3, k), where k is an integer, lies on the line **M**. Find the value of k .

Answer..... (1)

16.



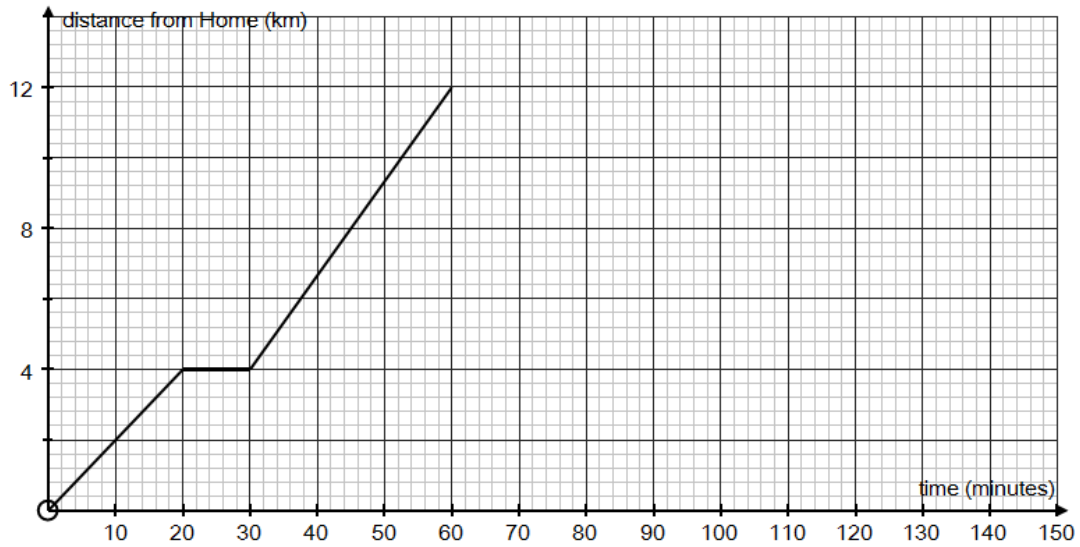
- (a) Describe fully the single transformation that maps shape **P** onto shape **Q**.

.....

.....(2)

- (b) Reflect shape **P** in the line $x = 1$. Label the image **R**. (1)

17. Xavier cycled from his home to visit his uncle.
 Xavier stopped at a shop on the way to buy his uncle a present.
 The diagram shows his distance/time graph for the journey to his uncle's house.



- (a) Find the distance from Xavier's home to his uncle's house.

Answer..... (1)

- (b) Calculate the speed at which Xavier cycled from home to the shop.
 Give your answer in kilometres per hour.

Answer..... (2)

Xavier stayed at his uncle's house for 30 minutes.
 He then travelled back home at 36 km/h in his uncle's car.

- (c) Complete the distance/time graph above. (2)

18. Sarah recorded the time, in minutes, taken to repair 80 car tyres. Information about these times is shown in the table below.

Time (t minutes)	Frequency f	Mid-point t	$t \times f$
$0 < t \leq 6$	15		
$6 < t \leq 12$	22		
$12 < t \leq 18$	20		
$18 < t \leq 24$	15		
$24 < t \leq 30$	8		
	Total =		Total =

- (a) Complete the table. (2)
- (b) Use the table above to calculate an estimate for the mean time taken to repair each car tyre.

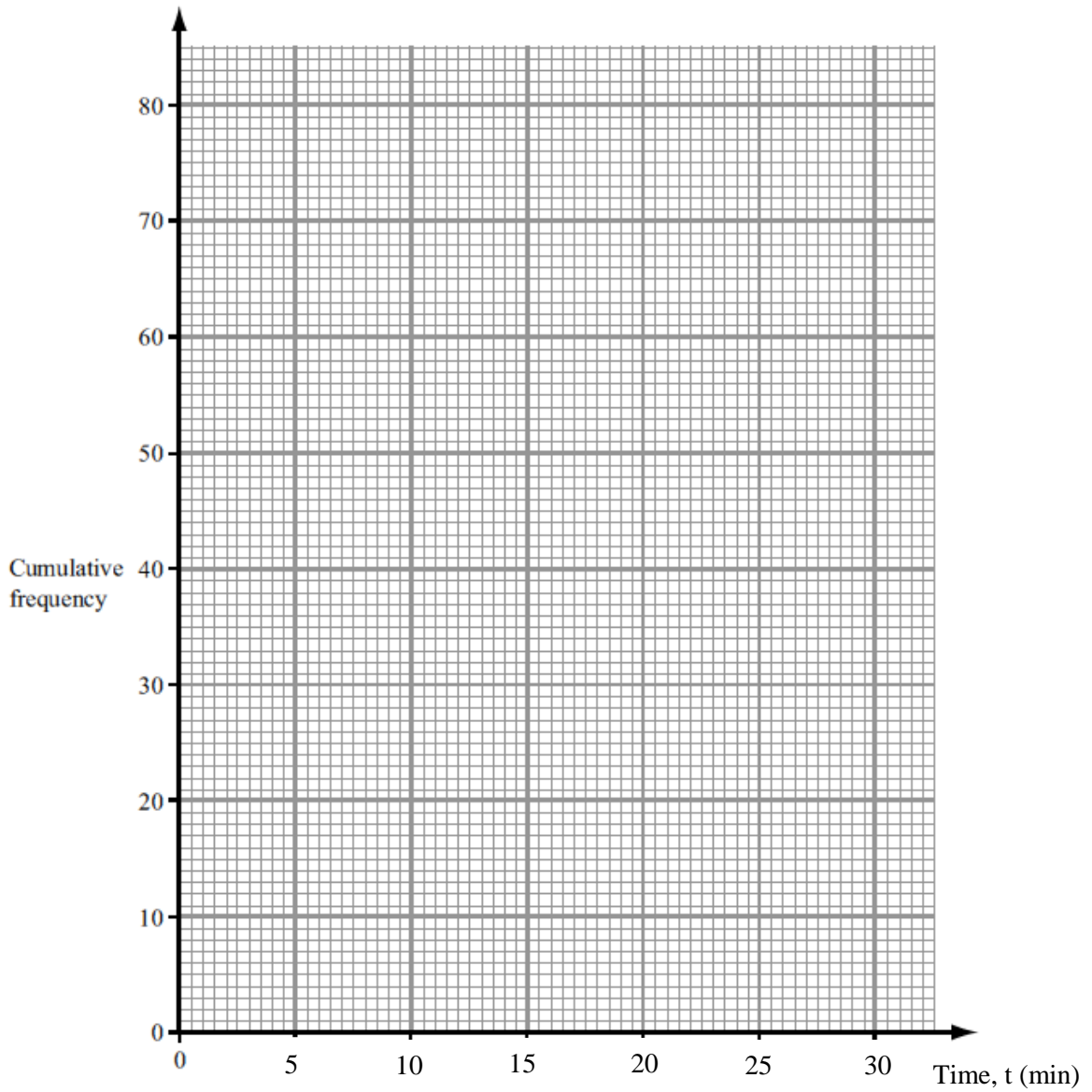
Mean \approx (2)

Sarah created another table which shows the cumulative frequency of the time taken to repair the 80 tyres.

- (c) Complete the cumulative frequency table below. (1)

Time (t minutes)	Cumulative Frequency
$0 < t \leq 6$	15
$0 < t \leq 12$	
$0 < t \leq 18$	
$0 < t \leq 24$	
$0 < t \leq 30$	

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

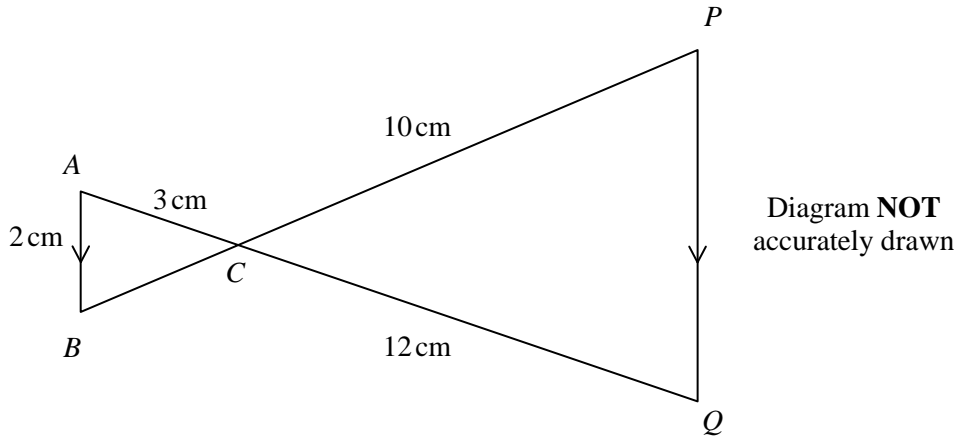


(2)

(e) Use your graph to find an estimate for the inter-quartile range (IQR).

IQR \approx (2)

19.



ACQ and BCP are straight lines.
AB is parallel to PQ.
AB = 2 cm; AC = 3 cm; CQ = 12 cm; CP = 10 cm.

(a) Show that $\triangle ABC$ is similar to $\triangle QPC$. Give a reason for each step in your proof.

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.....
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.....
.....

(2)

(b) Work out the length of BP .

Answer.....

(2)

20.

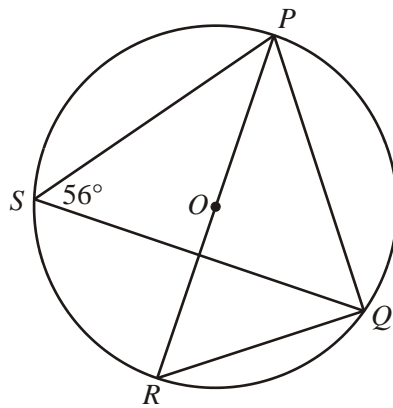


Diagram **NOT** accurately drawn

P, Q, R and S are points on the circumference of a circle, centre O.
PR is a diameter of the circle.
 $\angle PSQ = 56^\circ$

(a) Find the size of $\angle PQR$. Give a reason for your answer.

Answer (1)

Reason
..... (1)

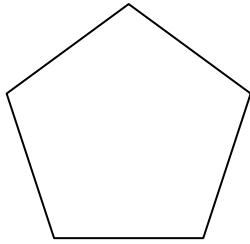
(b) Find the size of $\angle POQ$. Give a reason for your answer.

Answer (1)

Reason
..... (1)

21.

(a) Work out the size of an interior angle of a regular pentagon.



Answer..... (2)

The area of the pentagon is $8\,560\text{ cm}^2$.

(b) Change $8\,560\text{ cm}^2$ to m^2 .

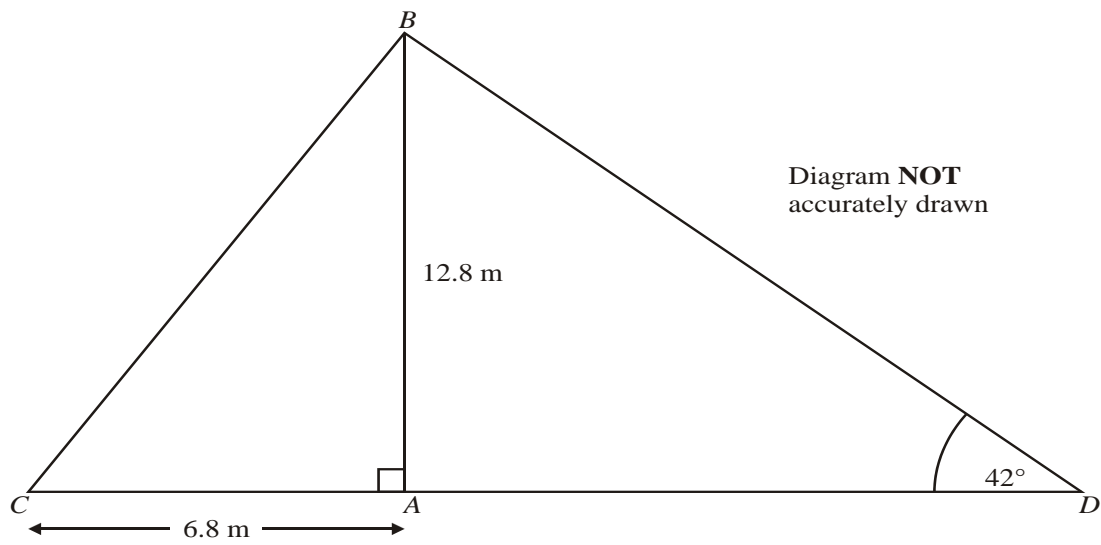
Answer..... (1)

Each side of another regular pentagon has a length of 101 mm, correct to the nearest millimetre.

(c) Write down the **greatest** possible length of each side.

Answer..... (1)

22. In the diagram below, $\angle BDA = 42^\circ$, $AB = 12.8$ m and $AC = 6.8$ m.



Find the length of CD correct to 1 decimal place.

Answer..... (3)

23. The table shows information about the number of fillings the students in a class had last year.

Number of fillings	Number of Students
0	10
1	5
2	4
3	2
More than 3	1

The Head Teacher is to choose a student at random from the class.

Find the probability that he will choose a student who had

- (a) exactly 1 filling,

Answer..... (1)

- (b) 2 or more fillings,

Answer..... (1)

- (c) either 1 filling or 2 fillings.

Answer..... (1)

24.

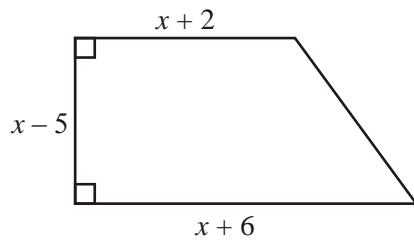


Diagram **NOT**
accurately drawn

The diagram shows a trapezium. The lengths of three of the sides of the trapezium are $x - 5$, $x + 2$ and $x + 6$. All measurements are given in centimetres.

The area of the trapezium is 36 cm^2 .

(a) Show that $x^2 - x - 56 = 0$.

(4)

(b) Solve the equation $x^2 - x - 56 = 0$.

Answer..... (2)

(c) Hence find the perimeter of the trapezium.

Answer..... (2)

END