

Mathematics

Stage 9

Paper 1

2023

Cambridge Lower Secondary Progression Test

Name

Class

Date

1 hour

Additional materials: Geometrical instruments
Tracing paper (optional)

INSTRUCTIONS

- Answer **all** questions.
- Write your answer to each question in the space provided.
- You should show all your working on the question paper.
- You are **not** allowed to use a calculator.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [].

- 1 Tick (✓) to show which of these expressions is the number 87 000 000 written in standard form.



870×10^5

87×10^6

8.7×10^7

0.87×10^8

[1]

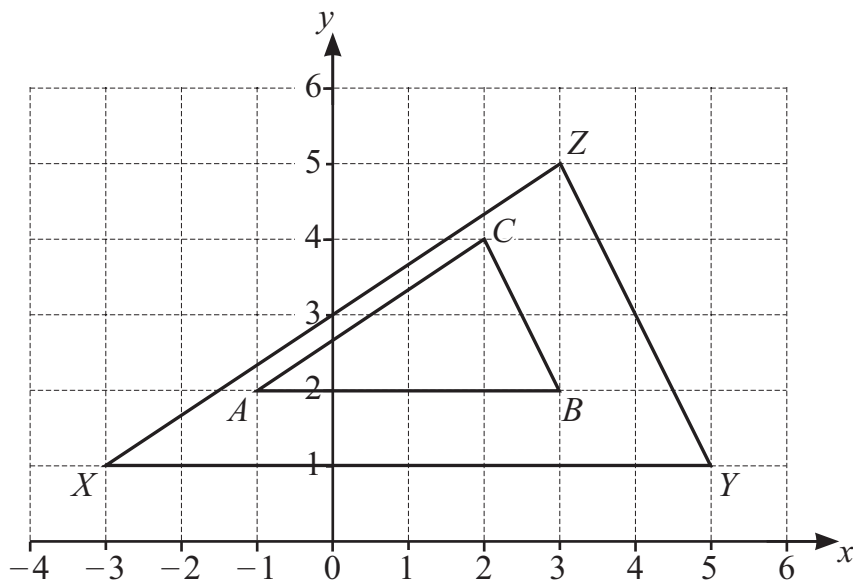
- 2 Complete the table of values for $y = x^2 + 4$



x	-2	-1	0	1	2
y		5	4		8

[1]

- 3 Here are two triangles, ABC and XYZ .



Describe fully the enlargement that maps triangle ABC onto triangle XYZ .

.....

[2]

4 Here are two inequality symbols.



Write the correct inequality symbol in each box to complete these statements.

$$12.62 \times 0.91 \quad \square \quad 12.62$$

$$12.62 \div 0.91 \quad \square \quad 12.62$$

$$0.91 \div 12.62 \quad \square \quad 12.62$$

[1]

5 In a game a player either wins, draws or loses.



Gabriella plays the game.

The probability that Gabriella wins is 0.55 and the probability that she draws is 0.15

Find the probability that Gabriella draws or loses her next game.

..... [2]

6 Here is an algebraic fraction.



$$\frac{12x + 4}{4}$$

Tick (✓) to show which expression is equivalent to this fraction.

$12x$

$3x$

$12x + 1$

$3x + 1$

$3x + 4$

[1]

7 Here are the first four terms in a sequence.



1, 8, 27, 64

(a) Find the next term in this sequence.

..... [1]

(b) Find the n th term of this sequence.

..... [1]

8 Given that $8.95 \times 5.62 = 50.299$ complete these calculations.

7

$$895 \times 0.562 = \dots\dots\dots$$

$$502.99 \div 56.2 = \dots\dots\dots$$

[2]

9 (a) Find the **exterior** angle of a regular pentagon.

7

..... ° [1]

(b) Find the **interior** angle of a regular pentagon.

..... ° [1]


(c) Tick (✓) to show which of these regular polygons will tessellate and which will not tessellate.

One has been done for you.

Regular polygons	Will tessellate	Will not tessellate
Equilateral triangles		
Squares	✓	
Regular pentagons		
Regular hexagons		

[1]

10 Eleven students each take a physics test and a chemistry test.

 Mike starts to draw this back-to-back stem-and-leaf diagram showing the marks from the chemistry test.

Physics test					Chemistry test			
				4	9			
				5	2	8		
				6	1	1	7	8
				7	0	6	9	
				8	2			

Key: 2 | 4 | 9 represents 42 marks in physics and 49 marks in chemistry.

Here are the marks from the physics test.

64	73	60	55	46	42
69	88	55	71	57	

(a) Complete the back-to-back stem-and-leaf diagram. [2]

(b) Complete the table.

	Physics	Chemistry
Mean	61.8	65.7
Median	60	
Mode	55	61
Range	46	33

[1]

(c) Tick (✓) to show which subject has marks that have a greater spread.

Physics

Chemistry

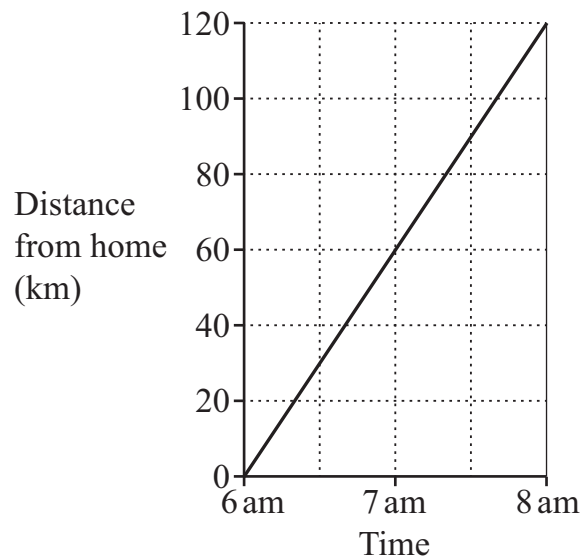
Explain how you know using appropriate values from the table in part (b).

.....

.....

[1]

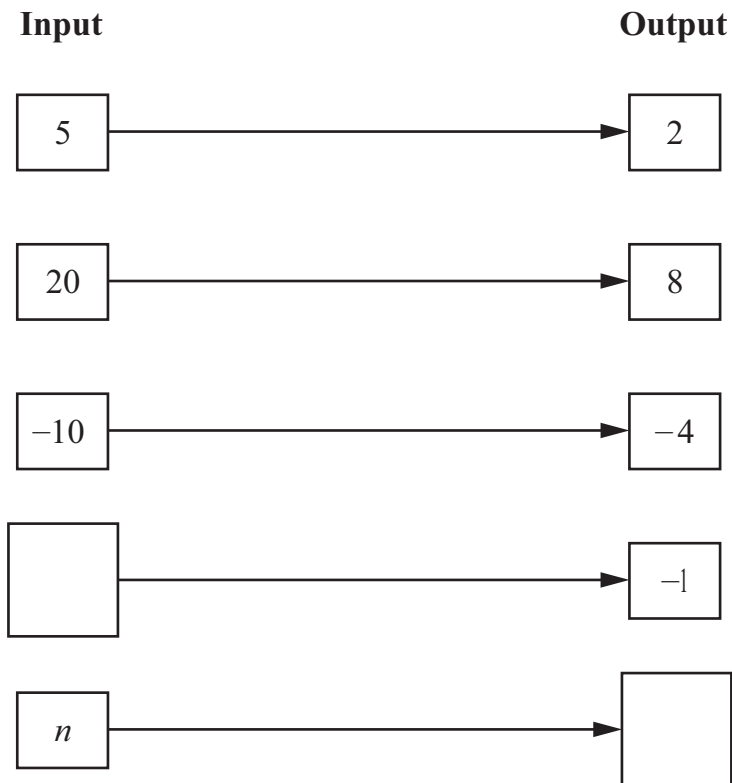
11 Here is the distance–time graph for a journey.



Calculate the speed for this journey.
Give your answer in km/h.

..... km/h [1]

12 Here are some inputs and outputs of the same function machine.



Complete the missing input and the missing output.

[2]

13 A speed camera records the speeds of 50 cars in one hour.



Speed, s (km/h)	Number of cars
$20 \leq s < 30$	9
$30 \leq s < 40$	17
$40 \leq s < 50$	18
$50 \leq s < 60$	4
$60 \leq s < 70$	2

(a) Write down the class interval that contains the median speed.

..... $\leq s <$ [1]

(b) Draw a ring around the value that **could** be the range of the 50 speeds.

10 16 18 48 70

[1]

14 When $n = -1$ **three** of these expressions have the same value.

R

$$2 - n^2$$

$$1 - 2n$$

$$n^2$$

$$4n + 5$$

$$\frac{n}{2} + \frac{1}{2}$$

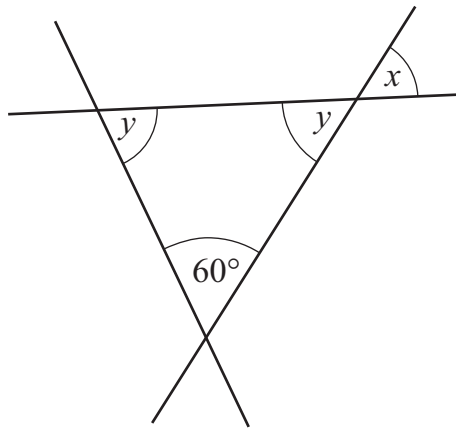
Draw a ring around **each** of the three expressions.

[2]

15 The diagram shows three straight lines crossing each other.

R

Some of the angles are marked.



NOT TO
SCALE

Explain why angle x is 60° .

Give geometrical reasons in your answer.

.....

.....

..... [2]

16 The equation of a line is $5x + 2y = 6$



Find the gradient and the y -intercept of this line.

gradient =

y -intercept =

[3]

17 Work out.



$$1\frac{5}{6} + 2\frac{2}{3} \times \frac{3}{16}$$

Give your answer as a mixed number in its simplest form.

..... [4]

18 (a) Naomi thinks of a number n .



She changes her number using this rule

- multiply by 3
- then square
- then add 4

Tick (✓) to show the expression for her number after using this rule.

$9n + 4$

$3n^2 + 4$

$9n^2 + 4$

$3(n + 4)^2$

[1]

(b) Mia thinks of a number m .

She changes her number using the rule $4(m - 5)^2$

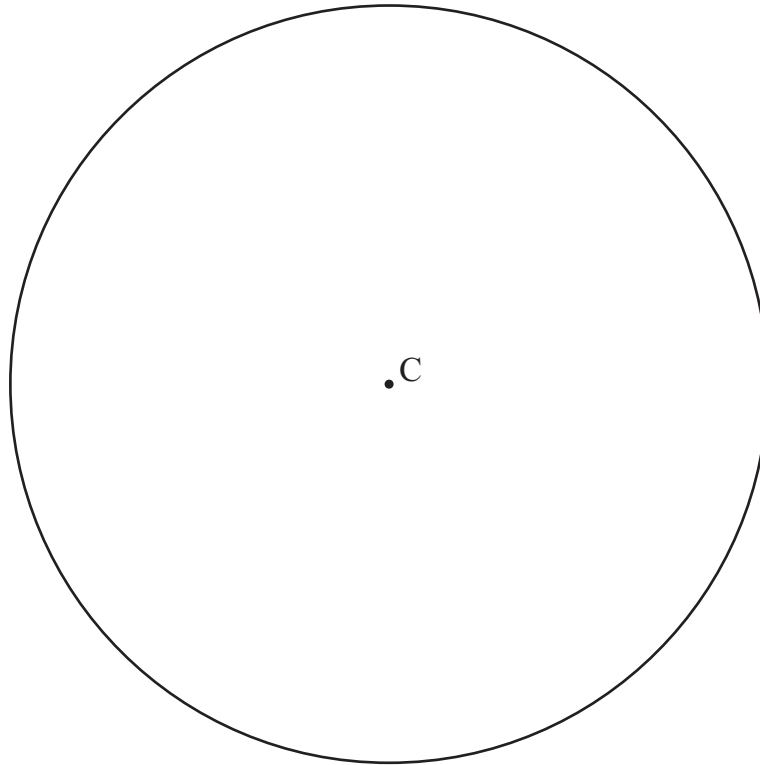
Complete the rule for Mia's number.

Her rule is

-
- then
- then

[1]


19 Here is a circle with centre C.



Use a straight edge and compasses only to construct an inscribed square.
Do **not** rub out your construction arcs and lines.

[2]

20 A straight line joins the points $A(2, 1)$ and $B(8, 10)$.

 The point $C(6, y)$ lies on the line AB .

Find the y -coordinate of C .

$y = \dots\dots\dots$ [1]

21 (a) In this question x is a **whole** number.

7

Find the **largest possible** value of x for which the inequality is correct.

$$\frac{27}{x} > \frac{x}{27}$$

$x =$ [1]


(b) In this question y is a **whole** number.

Find the **largest possible** value of y for which the inequality is correct.

$$\frac{2}{y} > \frac{y}{8}$$

$y =$ [1]

22 Yuri and Chen are playing a game.

 They each have four cards numbered 1 to 4



They place their cards face down.

Each child turns over one of his cards at random.

The winner is the child who turns over the largest number.

If they turn over the same number, then neither of them wins.

Show that the probability that Yuri wins the game is $\frac{3}{8}$

[2]

23 Here are some equations involving indices.



$$(2^3)^2 \div 2^{-2} = 2^w$$

$$4^{-2} \times 4 \times 4^x = 4^{12}$$

$$6^y \times 6^y = 6^{-16}$$

Find the values of w , x and y .

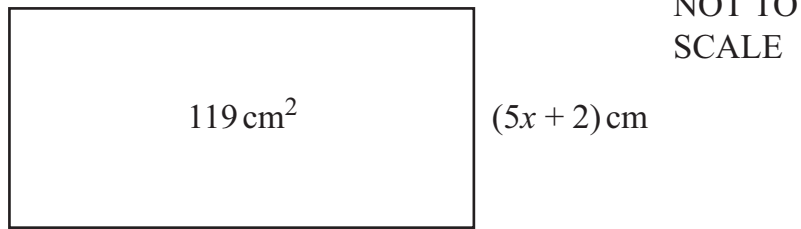
$w =$

$x =$

$y =$

[3]

24 Here is a rectangle.



The area of the rectangle is 119 cm^2 .

The length of the shorter side of the rectangle is $(5x + 2) \text{ cm}$.

- (a) Write down an expression in terms of x for the length of the longer side of the rectangle.

..... cm [1]

- (b) The longer side of the rectangle is 7 cm.

Find the value of x .

$x =$ [2]