

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL GCSE MATHEMATICS EXTENSION

Paper 1E

E

Monday 09 November 2020

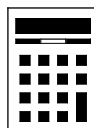
07:00 GMT

Time allowed: 2 hours

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.
- If your calculator does not have a π button, take the value of π to be 3.142

Advice

- Show all necessary working; otherwise marks for method may be lost.

For Examiner's Use

Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
26–27	
28	
TOTAL	



N 0 V 2 0 9 2 6 0 1 E 0 1

Answer **all** questions in the spaces provided.**1** Work out 1.8 as a fraction of 0.75

Circle your answer.

[1 mark]

$$\frac{6}{25}$$

$$\frac{25}{6}$$

$$\frac{5}{12}$$

$$\frac{12}{5}$$

2 A is the point (1, 15) and B is the point (20, 3)Circle the midpoint of AB .**[1 mark]**

$$(10.5, 9)$$

$$(9.5, 6)$$

$$(8, 11.5)$$

$$(7, 8.5)$$

3 Circle the correct statement.**[1 mark]**

$$5x + x \equiv 4 - x$$

$$6x \equiv 7x - x$$

$$4x \equiv 28$$

$$2x + 1 \equiv 3x$$



4 The equation of a straight line is $2y = x + 5$

Circle the gradient of the line.

[1 mark]

1

5

$\frac{1}{2}$

$\frac{5}{2}$

5 (a) Factorise $x^2 - 5x + 6$

[2 marks]

Answer _____

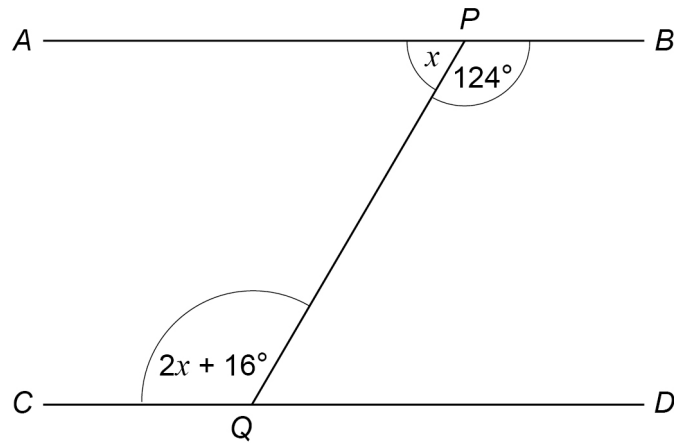
5 (b) Factorise fully $a^3b^5 + 2a^2b^3$

[2 marks]

Answer _____



6 AB , CD and PQ are straight lines.



Not drawn
accurately

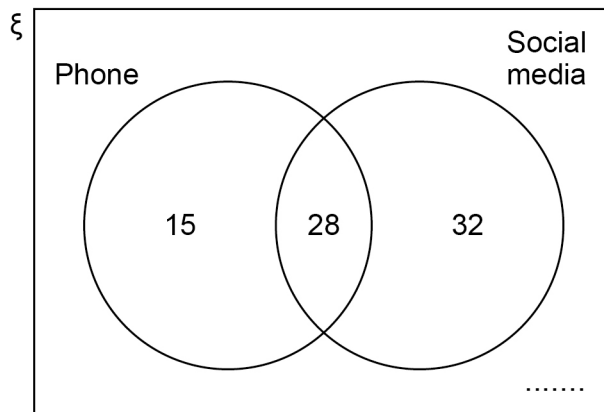
Is AB parallel to CD ?

You **must** show your working.

[3 marks]



- 7** 79 students were asked how they communicate with friends.
The Venn diagram shows some of the results.



One of the 79 students is chosen at random.

- 7 (a)** Write down the probability that the student uses both the phone and social media.

[1 mark]

Answer _____

- 7 (b)** Work out the probability that the student uses neither the phone nor social media.

[2 marks]

Answer _____



- 8 Rashid started with 3000 shares in a company.
His number of shares increased by 4%
He then sold 20% of his shares.

How many shares does he have now?

[3 marks]

Answer _____

- 9 Show that $3\frac{1}{3} \div \frac{5}{9}$ simplifies to an integer.

You **must** show your working.

[3 marks]

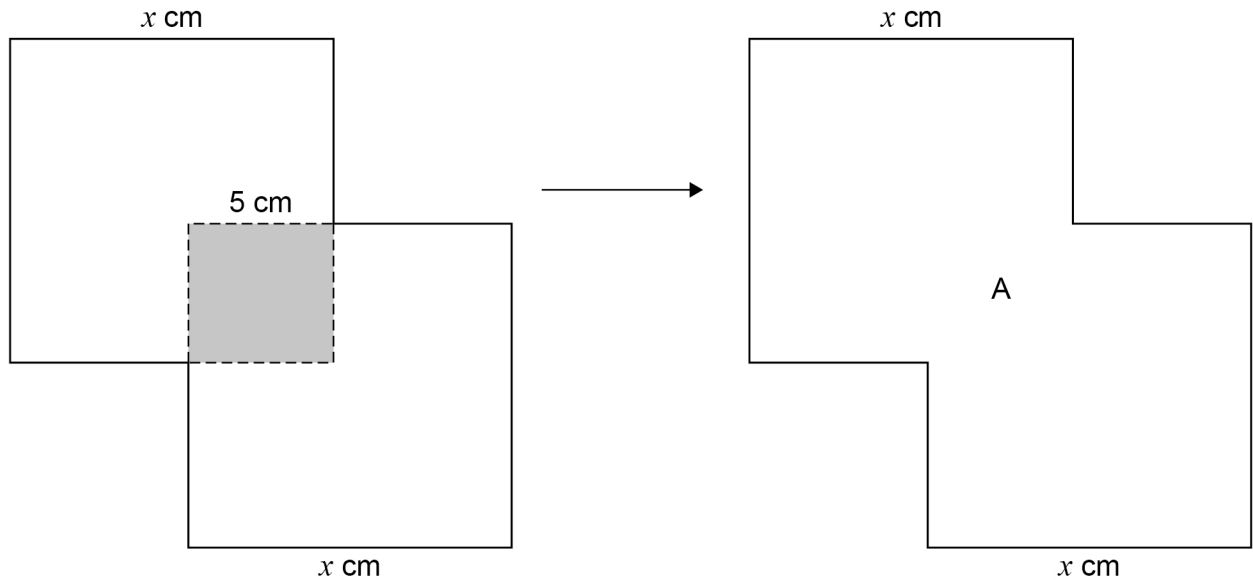


10

Shape A is made by overlapping two squares with side length x cm

The overlap is a square with side length 5 cm

Not drawn
accurately



The perimeter of shape A is 90 cm

Work out the value of x .

[4 marks]

Answer _____



- 11 (a)** Write $\frac{1}{64}$ in the form 2^a where a is an integer.

[2 marks]

Answer _____

- 11 (b)** Work out $\left(5^4\right)^{10} \div 125$ as a single power of 5

[3 marks]

Answer _____



12

Coach A and coach B each have less than 30 passengers.

There are the **same** number of adults on each coach.

On coach A the ratio of adults to children is 3 : 2

On coach B the ratio of adults to children is 5 : 4

Work out the **total** number of passengers.

[3 marks]

Answer _____

Turn over for the next question

Turn over ►



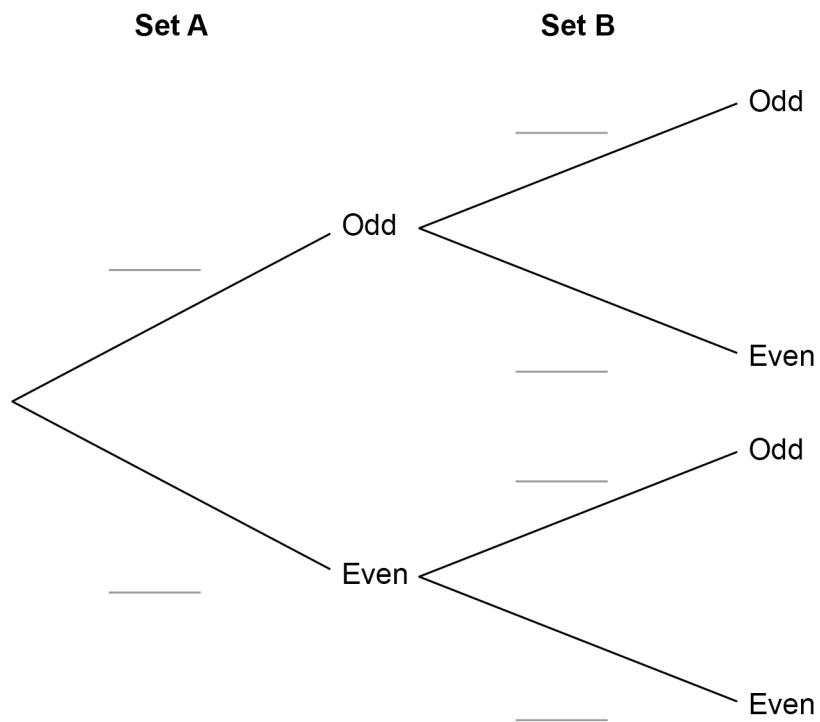
13 Set A = {2, 3, 5, 7}

Set B = {1, 4, 6, 8, 9}

One number is chosen at random from each set.

13 (a) Complete the tree diagram.

[2 marks]



13 (b) Work out the probability that **exactly one** of the numbers is odd.

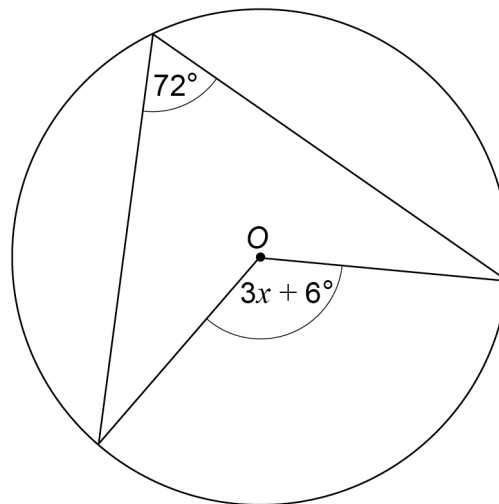
[3 marks]

Answer _____



14

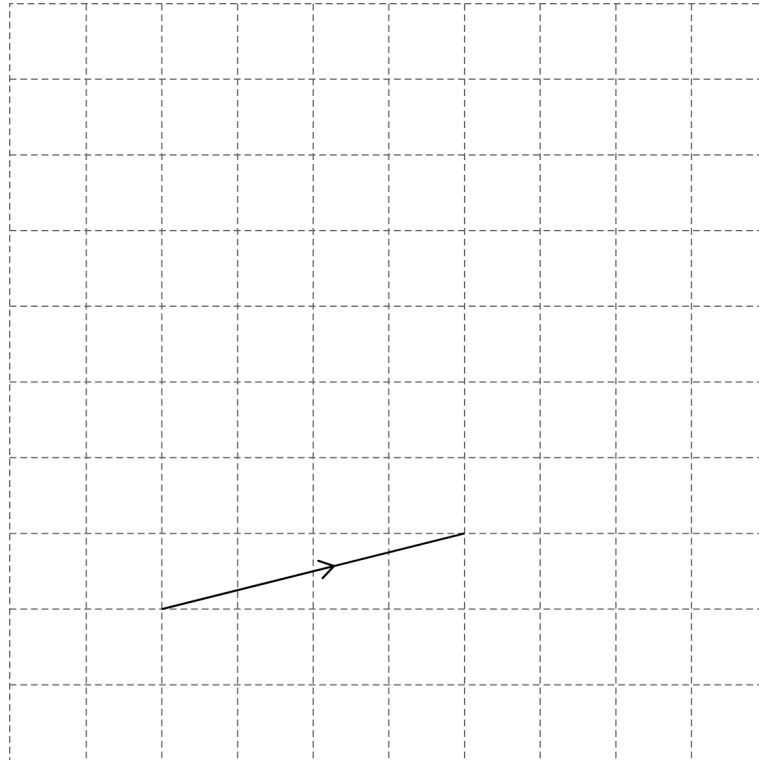
O is the centre of the circle.

Not drawn
accuratelyWork out the value of x .**[2 marks]**

Answer _____°

Turn over for the next question**Turn over ►**

15 (a) Vector $\begin{pmatrix} 4 \\ 1 \end{pmatrix}$ is shown on the grid.

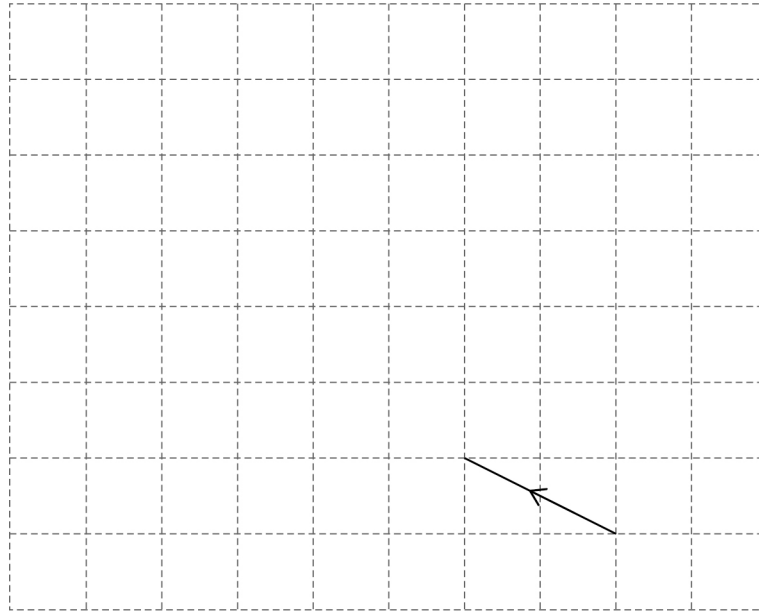


On the grid, draw a vector that represents $\begin{pmatrix} 4 \\ 1 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix}$

[2 marks]



15 (b) Vector $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$ is shown on this grid.



On this grid, draw a vector that is

parallel to $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$

and

three times the length of $\begin{pmatrix} -2 \\ 1 \end{pmatrix}$

[2 marks]

Turn over for the next question

Turn over ►



16 (a) $\mathbf{M} = \begin{pmatrix} 1 & -4 \\ -3 & 2 \end{pmatrix}$

Work out $\mathbf{M}^2$

[2 marks]

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$

16 (b) $\begin{pmatrix} a & 3 \\ 2 & -1 \end{pmatrix} \begin{pmatrix} 4 \\ 5 \end{pmatrix} = 6 \begin{pmatrix} 3 \\ b \end{pmatrix}$

Work out the values of a and b .

[3 marks]

$a =$ _____ $b =$ _____



17

Tariq played in 15 basketball matches.

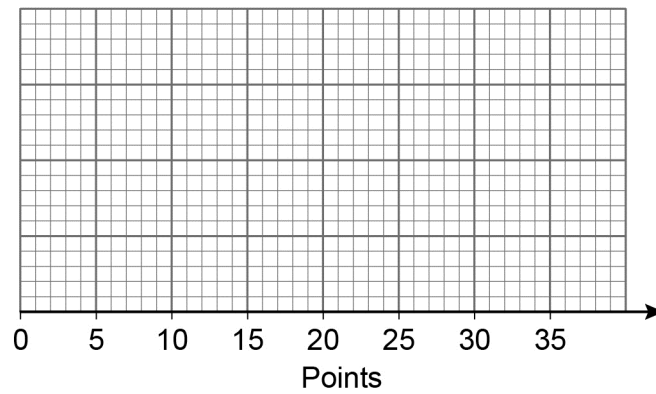
The stem-and-leaf diagram shows the number of points he scored in each match.

Key: 2 | 5 represents 25 points

0	5	7	8	9				
1	1	4	6	7	8	8	9	
2	3	5	9					
3	2							

Draw a box plot to represent the data.

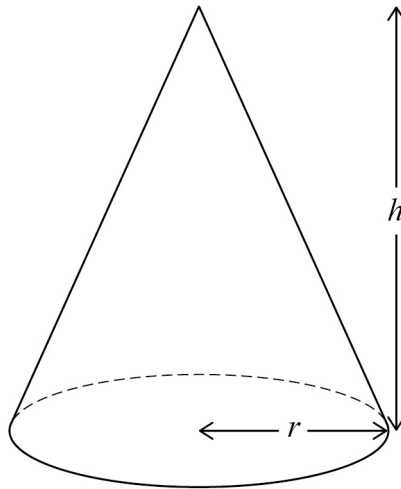
[4 marks]





18

A cone has base radius r and perpendicular height h



$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

The volume of the cone is $72.9\pi \text{ cm}^3$

$h : r = 12 : 5$

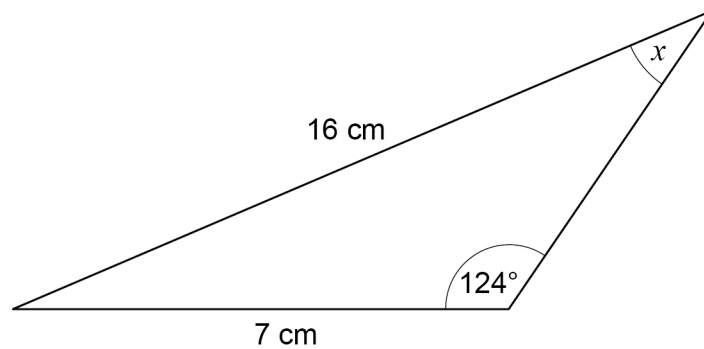
Work out the value of r .

[4 marks]

Answer _____ cm



19

Work out the size of angle x .Not drawn
accurately

[3 marks]

Answer _____ °

20

Circle the expression that is equivalent to

$$\frac{3a^2 + 3a}{3a}$$

[1 mark]

$3a^2$

$a^2 + 3$

$a + 1$

$a + 3$

Turn over ►

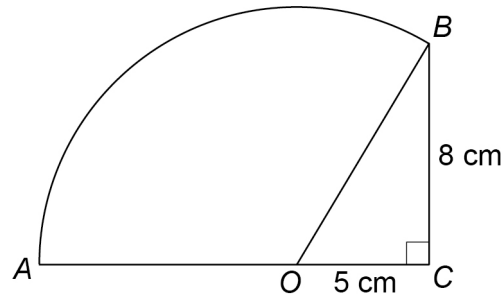


21

A design is made by joining right-angled triangle OCB to the sector of a circle AOB .

AOC is a straight line.

$OC = 5 \text{ cm}$ and $CB = 8 \text{ cm}$



Not drawn
accurately

Work out the total area of the design.

[5 marks]

Answer _____ cm^2



22 (a) $f(x) = x^2 + 5$ with domain $x < 0$

Solve $f(x) = 14$

[2 marks]

$x =$ _____

22 (b) $g(x) = 7x$

Circle the expression for $g^{-1}(x)$

[1 mark]

$$\frac{x}{7}$$

$$\frac{1}{7x}$$

$$\frac{7}{x}$$

$$-7x$$

22 (c) $h(x) = \frac{1}{2}x^3$

Circle the expression for $h(2x)$

[1 mark]

$$x^3$$

$$x^6$$

$$4x^3$$

$$4x^6$$



Here are the first four terms of a quadratic sequence.

Work out an expression for the n th term.

[3 marks]

[illegible]

Answer _____



[4 marks]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Answer _____

$$\frac{\quad}{7}$$

25

The population of a town increases by $r\%$ each year.

The population of the town was

16 000 at the start of 2014

28 000 at the start of 2018

Work out the value of r .

[3 marks]

Answer _____



26

A curve has a minimum point at $(10, 7a + b)$ where a and b are constants.

The equation of the curve is $y = x^2 - 4ax + 6a^2$

By completing the square, work out the values of a and b .

You **must** show your working.

[4 marks]

$a =$ _____ $b =$ _____

Turn over for the next question

Turn over ►



27

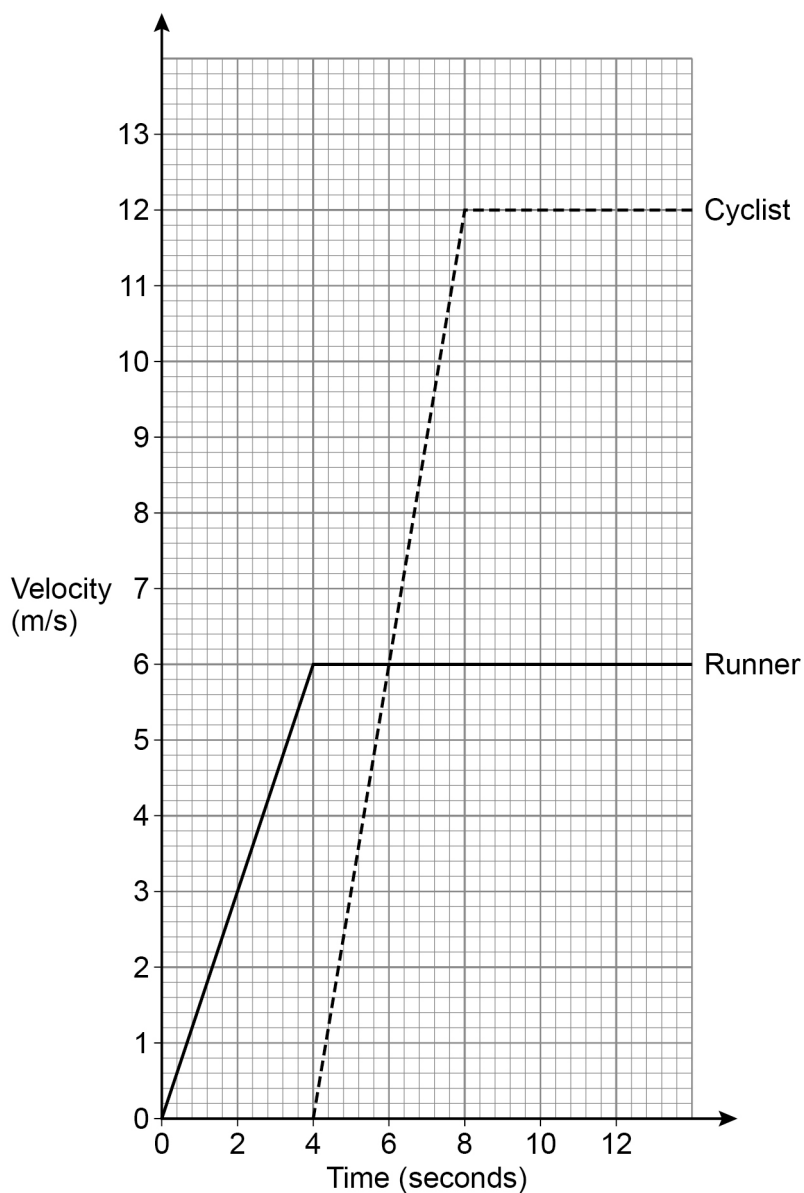
A runner and a cyclist

start from the same point

travel in the same direction.

The cyclist starts 4 seconds after the runner.

Their velocity-time graphs are shown.



27 (a) Circle the acceleration, in m/s^2 , of the **runner** during the first 4 seconds.

[1 mark]

$\frac{2}{3}$

$\frac{3}{2}$

3

$\frac{1}{3}$



- 27 (b)** Show that the cyclist overtakes the runner 10 seconds after the runner starts.

[3 marks]

- 28** The equation of a curve is $y = 2x^3 + x$

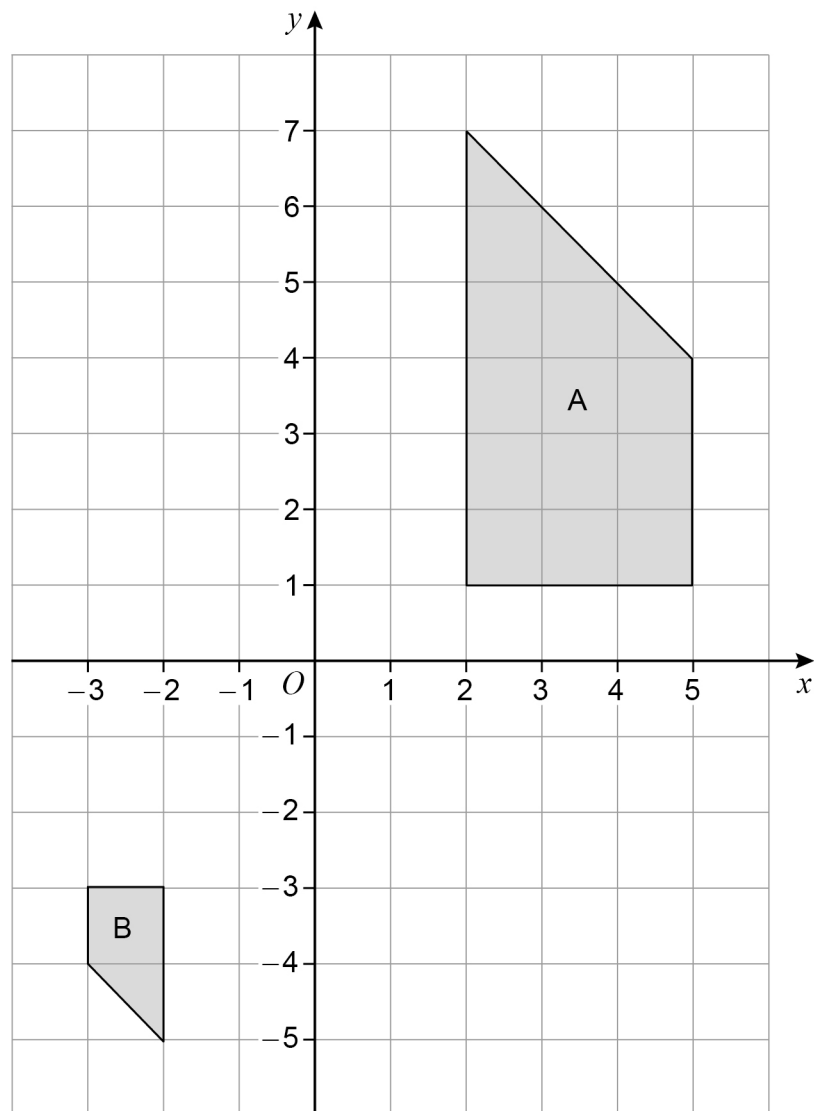
Work out the gradient of the tangent to the curve at the point where $x = 7$

[3 marks]

Answer _____

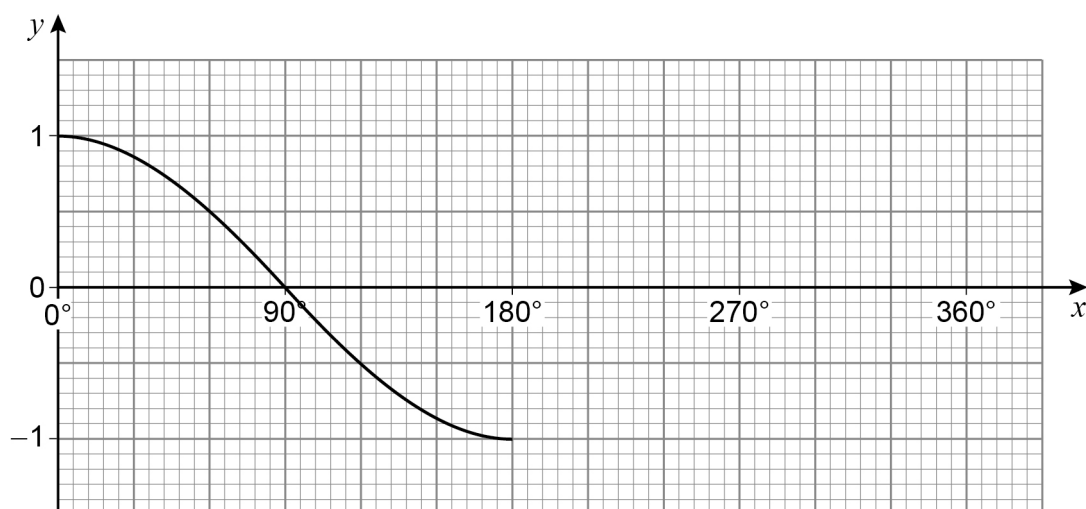


29

Describe the **single** transformation that maps shape A to shape B.**[3 marks]**



30

Here is the graph of $y = \cos x$ for values of x from 0° to 180° Solve $\cos x = 0.5$ for values of x from 0° to 720° **[3 marks]**

Answer _____

Turn over for the next question



31

Prisha drives 15.5 kilometres, correct to the nearest 500 metres.

The journey takes 14 minutes, correct to the nearest minute.

Work out the upper bound of her average speed in km/h

You **must** show your working.

[4 marks]

Answer _____ km/h

END OF QUESTIONS

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