

OXFORD

INTERNATIONAL  
AQA EXAMINATIONS

Please write clearly in block capitals.

Centre number

9 6 2 4 2

Candidate number

5 7 6 8

Surname

Shi

Forename(s)

Hongbin

Candidate signature

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I declare this is my own work.

# INTERNATIONAL GCSE MATHEMATICS EXTENSION

Paper 2E

E

Wednesday 18 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  $\pi$  button, take the value of  $\pi$  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	
28–29	
TOTAL	77



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

IB/M/Nov20/E8

9260/2E

Answer all questions in the spaces provided.

- 1 Circle the lowest common multiple of 6, 12 and 18

[1 mark]

6

18

36

72

- 2 The first four terms of a linear sequence are

$$12 \cancel{, 5} \quad \cancel{7} \quad \cancel{5} \quad 2 \cancel{, 5}^{-3}$$

Circle the expression for the  $n$ th term.

$5n + 12$

$n - 5$

$5n + 7$

$12 \cancel{+ 5} (n-1)$

$12 - 5n + 5$

$17 \cancel{+ 8} - 5n$

[1 mark]

$\cancel{17 - 5n}$

- 3 Circle the calculation that **decreases** 320 by two fifths.

[1 mark]

$320 \div \frac{2}{5}$

$320 \times \frac{2}{5}$

$\cancel{320 \times \frac{3}{5}}$

$320 \div \frac{3}{5}$

3 20



0 2

- 4 Circle the pair of values of  $x$  for which  $(x + 1)(3x - 2) = 0$

[1 mark]

-1 and  $\frac{2}{3}$

-1 and  $-\frac{3}{2}$

1 and  $-\frac{3}{2}$

1 and  $-\frac{2}{3}$

- 5  $\xi$  is the set of single-digit positive numbers.

A is the set of square numbers.

B is the set of odd numbers.

C is the set of numbers less than 5

- 5 (a) List the elements of  $A'$

$$\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

$$A: \{1, 4, 9\}$$

$$B: \{1, 3, 5, 7, 9\}$$

$$C: \{1, 2, 3, 4\}$$

[1 mark]

Answer

~~$$\{2, 3, 4, 5, 6, 7, 8\}$$~~

$$\{2, 3, 5, 6, 7, 8\}$$

- 5 (b) List the elements of  $B \cup C$

[1 mark]

Answer

~~$$\{1, 3\}$$~~

$$\{1, 2, 3, 4, 5, 7, 9\}$$

40

6

Turn over ►



0 3

6 (a) Work out  $(6.8 \times 10^{-4}) \times (7.5 \times 10^9)$

Give your answer in standard form.

[2 marks]

$$5.1 \times 10^6$$

Answer  $5.1 \times 10^6$

6 (b) Write  $8 : 125$  in the form  $n : 1$

Give the value of  $n$  in standard form.

[2 marks]

Answer 0.064

$$6.4 \times 10^{-2}$$

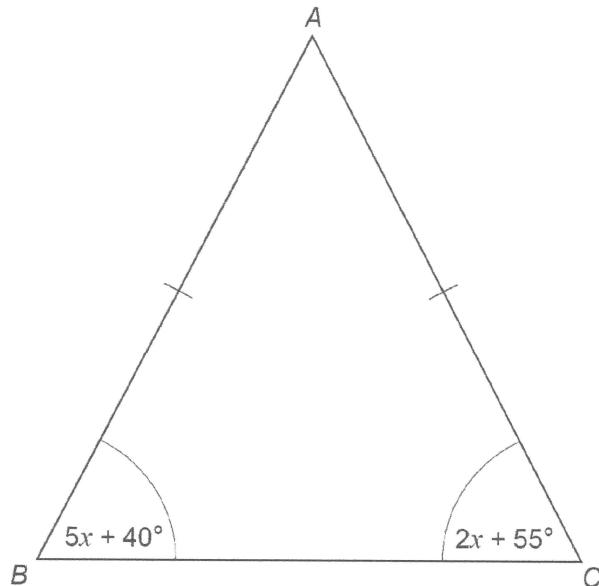


7

*ABC is an isosceles triangle.*

$$AB = AC$$

*Do not write outside the box*



*Not drawn accurately*

Work out the size of angle  $BAC$ .

[5 marks]

$$5x + 40^\circ = 2x + 55^\circ$$

$$x = 5.$$

$$180^\circ + (5x + 40^\circ) - (2x + 55^\circ) = 125^\circ$$

Answer

~~70~~ 50 °

8

9

Turn over ►

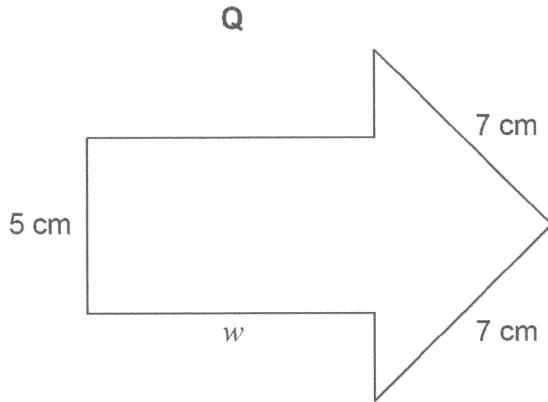
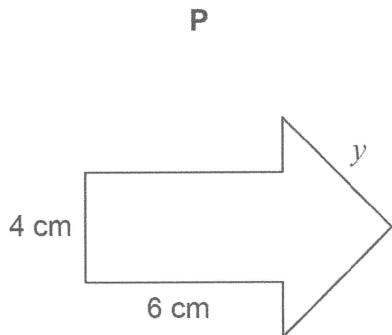


0 5

IB/M/Nov20/9260/2E

8

Shape Q is an enlargement of shape P.

Do not write  
outside the  
boxNot drawn  
accuratelyWork out the values of  $w$  and  $y$ .

[3 marks]

$$w = 7 \cdot 5$$

$$y = 5 \cdot 6$$

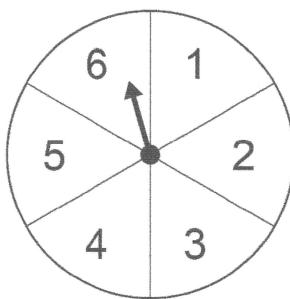
$$w = 7.5 \text{ cm} \quad y = 5.6 \text{ cm}$$



0 6

IB/M/Nov20/9260/2E

- 9 (a) A fair spinner has 6 equal sections.



Here are the results of 8 spins.

5      2      1      4      3      5      5

Write down the probability that the next spin is a 5

[1 mark]

Answer

$\frac{1}{6}$

- 9 (b) Xin is going to toss a fair coin 50 times.

She says,

"I will definitely get 25 heads and 25 tails."

Give a reason why she is not correct.

[1 mark]

The probability of each coin face is random  
So the chance will not be same.



10

Ling and Su share \$168 in the ratio 3 : 5

How much money does Ling get?

[2 marks]

$$168 \times \frac{3}{8} = 63$$

Do not write outside the box

Answer \$

63

11

Simplify fully  $\frac{11x}{12} - \left( \frac{x}{3} + \frac{x}{2} \right)$ 

[3 marks]

$$\begin{aligned} &= \frac{11x}{12} - \left( \frac{4x}{12} + \frac{6x}{12} \right) \\ &= \frac{11x}{12} - \frac{10x}{12} \\ &= \frac{x}{12} \end{aligned}$$

Answer

$$-\frac{x}{12}$$



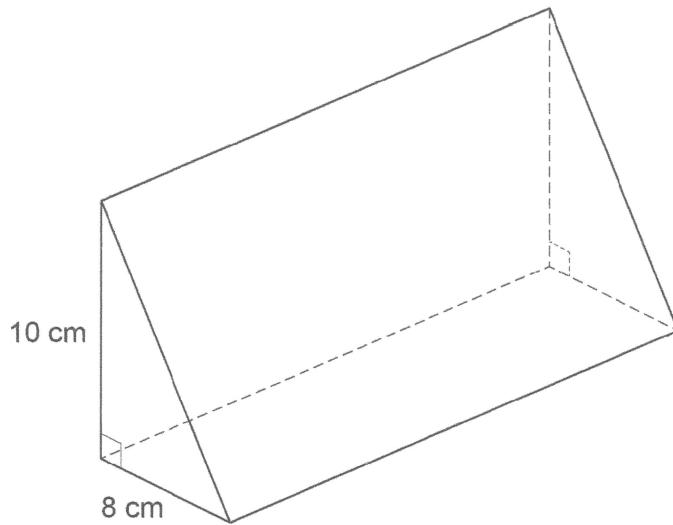
0 8

IB/M/Nov20/9260/2E

12

Here is a triangular prism.

Do not write  
outside the  
box



The volume of the prism is  $960 \text{ cm}^3$

Work out the length of the prism.

[3 marks]

$$\begin{aligned}(10 \times 8)/2 \times L &= 960 \\ L &= 24 \text{ cm}\end{aligned}$$

Answer

24 cm

cm

6  
8  
—  
8

Turn over ►



0 9

IB/M/Nov20/9260/2E

13 (a) A polygon has 9 sides.

Circle the sum of the interior angles of the polygon.

[1 mark]

1260°

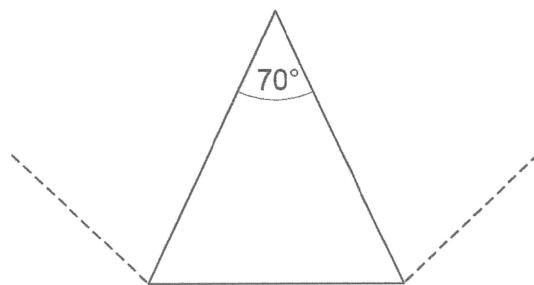
1440°

1620°

1980°

13 (b) The angle at the centre of a different polygon is 70°

Not drawn  
accurately



Is this a regular polygon?

Tick one box.

Yes

No

Cannot tell

Give a reason for your answer.

[1 mark]

Ie cannot decided by 360 ✗.

14

John sells cars.

Last year

he sold 30 red cars

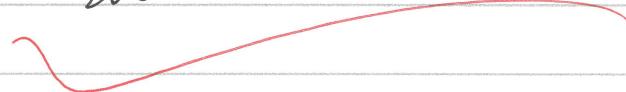
the relative frequency of a car he sold being red was 0.15

Do not write  
outside the  
box

14 (a) Show that he sold 200 cars in total last year.

[1 mark]

$$0.15 = \frac{30}{200}$$



14 (b) The table shows information about the 200 cars John sold last year.

	Red	Black	Silver	White
Number of cars	30	$n + 50$	$3n$	$2n$

Work out the relative frequency of a car he sold being white.

[4 marks]

$$30 + (n + 50) + 3n + 2n = 200$$

$$n = 20$$

$$2 \times 20 = 40$$

-4  
4

Answer

40 0.2

3  
—  
7

Turn over ►



1 1

IB/M/Nov20/9260/2E

15

Rearrange  $3x + a = cx + 5$  to make  $x$  the subject.

[3 marks]

$$\begin{aligned}3x - cx &= 5 - a \\(3 - c)x &= 5 - a \\x &= \frac{5-a}{3-c}\end{aligned}$$

Do not write  
outside the  
box

Answer  $x = \frac{5-a}{3-c}$

16

The value of a computer decreases by 55%

The new value is \$1170

Work out the original value.

[3 marks]

$$\begin{aligned}(1 - 55\%) \text{ Original} &= \$1170 \\ \text{Original} &= \$2600\end{aligned}$$

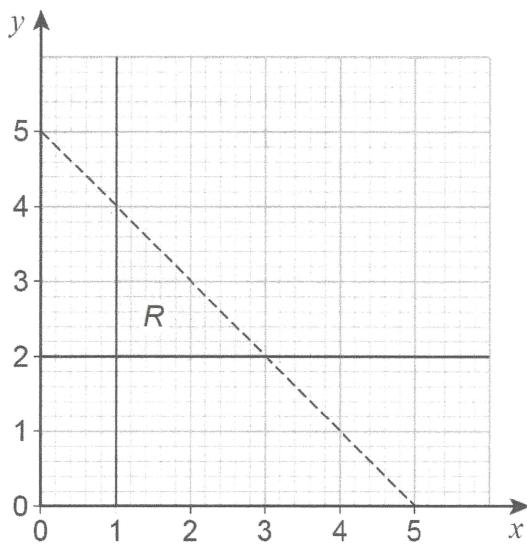
Answer \$

2600



1 2

17

Do not write  
outside the  
box

Which set of inequalities describes the region  $R$ ?

Tick one box.

[1 mark]

$$x > 1, \quad x + y \leq 5, \quad y > 2$$

$$x \geq 1, \quad x + y < 5, \quad y \geq 2$$

$$x > 1, \quad x + y \geq 5, \quad y > 2$$

$$x \geq 1, \quad x + y > 5, \quad y \geq 2$$



Turn over ►



1 3

18

Fuel efficiency can be measured in miles per gallon (mpg).

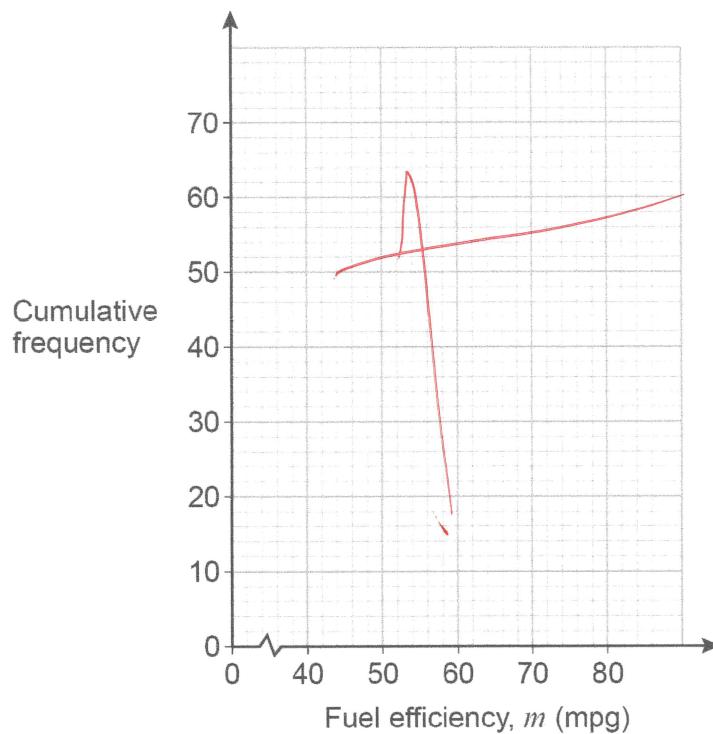
*Do not write outside the box*

The table shows some information about the fuel efficiency,  $m$ , of 70 vans.

Fuel efficiency, $m$ (mpg)	Cumulative frequency
$m \leq 40$	0
$m \leq 50$	8
$m \leq 60$	43
$m \leq 70$	66
$m \leq 80$	70

- 18 (a) Draw a cumulative frequency diagram to represent the information.

[2 marks]

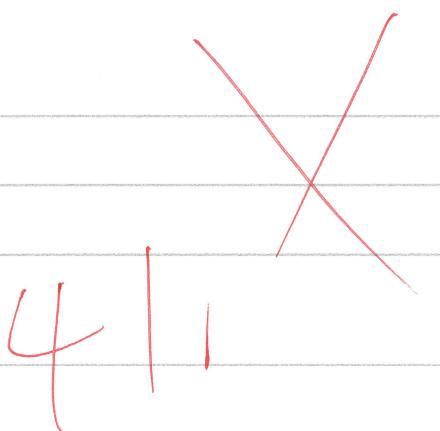


- 18 (b) Estimate the number of these vans that have a fuel efficiency of more than 56 mpg

Do not write  
outside the  
box

[2 marks]

Answer



- 19 The point (2, 3) lies on the graph  $y = \frac{k}{x}$  where  $k$  is a constant.

Work out the value of  $y$  when  $x = 0.2$

[3 marks]

$$3 = \frac{k}{2}$$

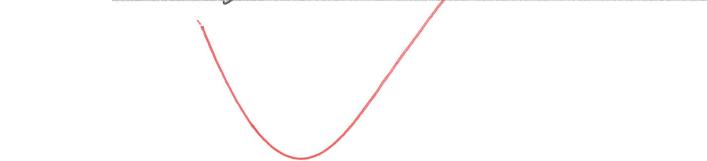
$$k = 6.$$

$$y = \frac{6}{x}, \text{ if } x = 0.2$$

$$y = \frac{6}{0.2} = 30$$

Answer

30



20

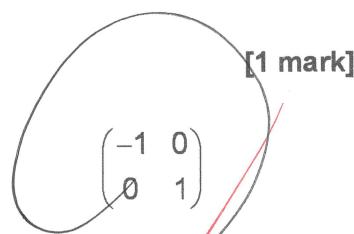
Circle the matrix that represents a reflection in the  $y$ -axis.

Do not write outside the box

$$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$



21

Differentiate

$$\frac{7x^5 - 3x^8}{x^3}$$

[3 marks]

$7x^2 - 3x^5$   
 $14x - 15x^4$

Answer

$14x - 15x^4$



1 6

22

Two sets of students took a test.

The table shows information about their marks.

Do not write outside the box

	Lower quartile	Median	Interquartile range
Set E	48	51	11
Set F	43	54	16

Here are some statements about the data.

Tick one box for each statement.

[4 marks]

Set F had more consistent marks than Set E.

True

False

Cannot tell

The highest mark was scored by a student in Set F.




The upper quartile for both sets was the same.




A student in Set F scored 54 marks.




Turn over for the next question

14  
—  
8

Turn over ►



1 7

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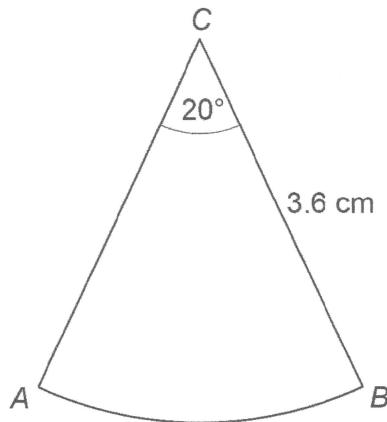
23

The diagram shows an earring made from wire.

$AB$  is an arc of a circle, centre  $C$ .

Do not write  
outside the  
box

Not drawn  
accurately



Work out the **total length** of wire used to make the earring.

Give your answer as a decimal.

[3 marks]

$$3.6\pi \times 2 \times \frac{20}{360} + 3.6 \times 2$$

Answer

8.4566

cm



1 8

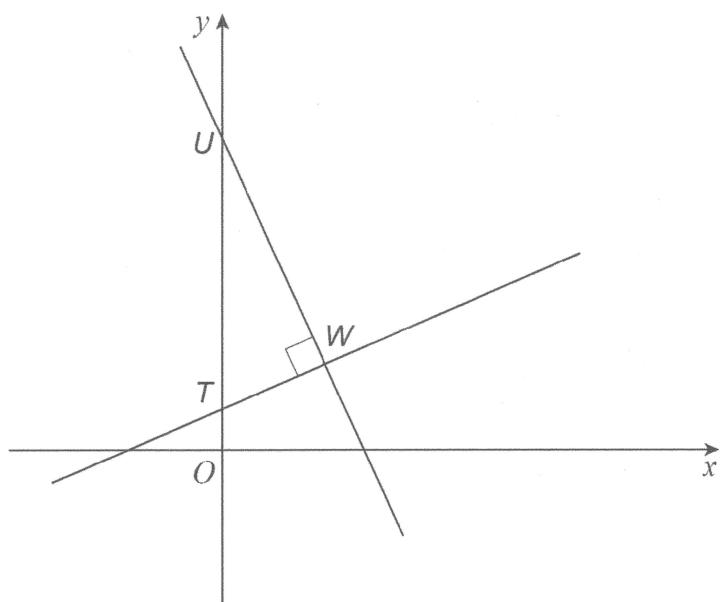
24

Two perpendicular lines intersect at point  $W$ .

The lines intersect the  $y$ -axis at points  $T$  and  $U$ .

$T$  is  $(0, 3)$  and  $W$  is  $(6, 5)$

Do not write outside the box



Not drawn  
accurately

Work out the  $y$ -coordinate of  $U$ .

[4 marks]

Set line  $TW$  equation  $y = ax + b$ .

$$\begin{cases} 3 = b \\ 5 = 6a + b \end{cases}$$

$$5 = 6a + b$$

$$y = \frac{1}{3}x + 3$$

Line  $UV$  equation  $y = -3x + b$ .

$$5 = -18 + b$$

$$b = 23.$$

$$y = -3x + 23$$

Answer

~~$y = -3x + 23$~~

7

Turn over ►



1 9

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25  $P = \frac{x-16}{x+1} + \frac{2x+5}{x}$

25 (a) Show that  $P = \frac{3x^2 - 9x + 5}{x(x+1)}$

$$P = \frac{(x-16)x + (x+1)(2x+5)}{(x+1)x}$$

$$P = \frac{x^2 - 16x + 2x^2 + 5x + 2x + 5}{x(x+1)}$$

$$P = \frac{3x^2 - 9x + 5}{x(x+1)}$$

[3 marks]

25 (b) Hence work out the values of  $x$  when  $P = 0$

$$\frac{3x^2 - 9x + 5}{x(x+1)} = 0$$

[3 marks]

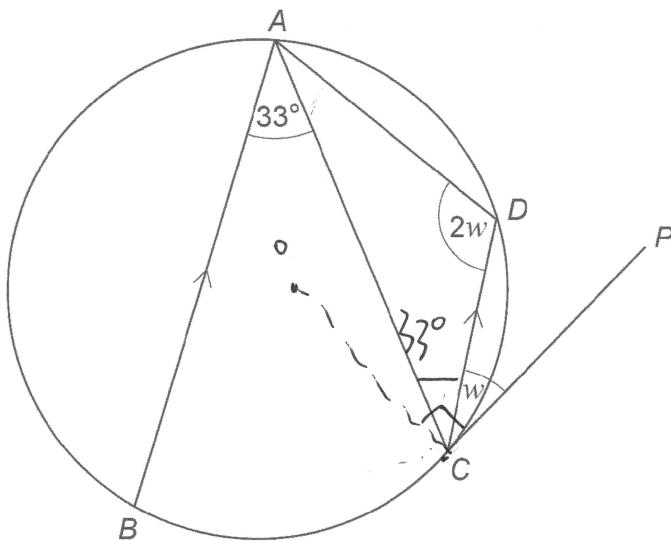
$$3x^2 - 9x + 5 = 0$$

$$x_1 = \frac{9 + \sqrt{21}}{6} \quad x_2 = \frac{9 - \sqrt{21}}{6}$$

Answer  $x = \frac{9 \pm \sqrt{21}}{6}$



26

*A, B, C and D are points on a circle.**BA is parallel to CD.**PC is a tangent.**Angle  $DCP = w$* *Do not write outside the box**Not drawn accurately*Work out the size of angle  $w$ .

[3 marks]

$$\begin{aligned} \angle CAD &= w \text{ or } \angle ACD = 33^\circ \\ 33 + w + 2w &= 180 \end{aligned}$$

Answer

49

9
---

Turn over ►



2 1

IB/M/Nov20/9260/2E

27

$$2x - y = -2 \quad \text{and} \quad 3^{(x+y)} = 3$$

Work out the values of  $x$  and  $y$ .

[3 marks]

$$x + y = 1.$$

$$x = 1 - y$$

$$2 - 2y - y = -2$$

$$-3y = -4$$

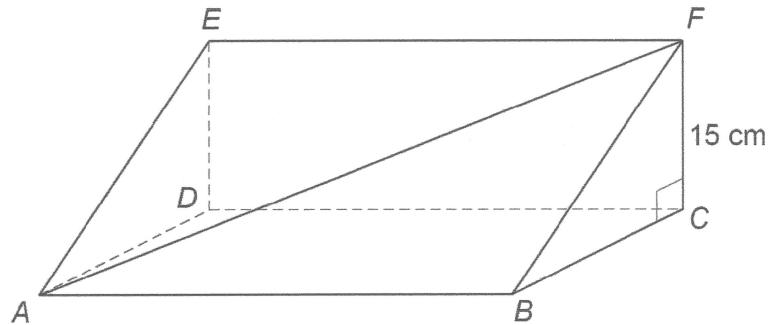
$$y = \frac{4}{3}$$

$$x = -\frac{1}{3}$$

$$x = -\frac{1}{3} \quad y = \frac{4}{3}$$



28

*ABCDEF* is a right-angled triangular prism.Do not write  
outside the  
box

$$AF = 27 \text{ cm}$$

Work out the angle between  $AF$  and the plane  $ABCD$ .

[2 marks]

$$\sin^{-1}\left(\frac{15}{27}\right) = 34$$

Answer 34

5

Turn over ►



2 3

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29

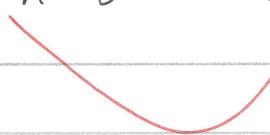
Two consecutive numbers can be written as  $n$  and  $(n + 1)$

Use algebra to prove that the sum of the **squares** of two consecutive numbers is an odd number.

[3 marks]

$$\begin{aligned} n+n+1 &= h^2 + (h+1)^2 \\ &= h^2 + h^2 + 2h + 1 \\ &= 2h^2 + 2h + 1 \end{aligned}$$

$2h^2, 2h$  must be even  
if add one,  
will be must be an odd.



30

$a$  is a positive number less than 1

Circle the expression that has a value less than  $a$ .

*Do not write outside the box*

[1 mark]

$$a^{\frac{1}{2}}$$

$$a^{-\frac{1}{2}}$$

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

$$a - \frac{3}{2}$$

31

Convert  $0.\overline{84}$  to a fraction in its simplest form.

**You must show your working.**

[3 marks]

### Answer

$$\begin{array}{r} 38 \\ \hline 48 \end{array}$$



- 32  $M$  is inversely proportional to the square of  $d$ .

$M = 6.5$  when  $d = 8$

- 32 (a) Work out an equation connecting  $M$  and  $d$ .

[3 marks]

$$M = kd \quad M = \frac{k}{d^2} =$$

$$6.5 = 8k$$

$$k = 0.8125$$

$$M = 0.8125d$$

Answer

$$M = 0.8125d$$

$$M = \frac{40}{d^2}$$

- 32 (b) Work out  $d$  when  $M = 4.8$

[2 marks]

$$4.8 = 0.8125d$$

$$d = \frac{384}{65}$$

Answer

~~384/65~~



33

Bahram and Callan start cycling at the same time.

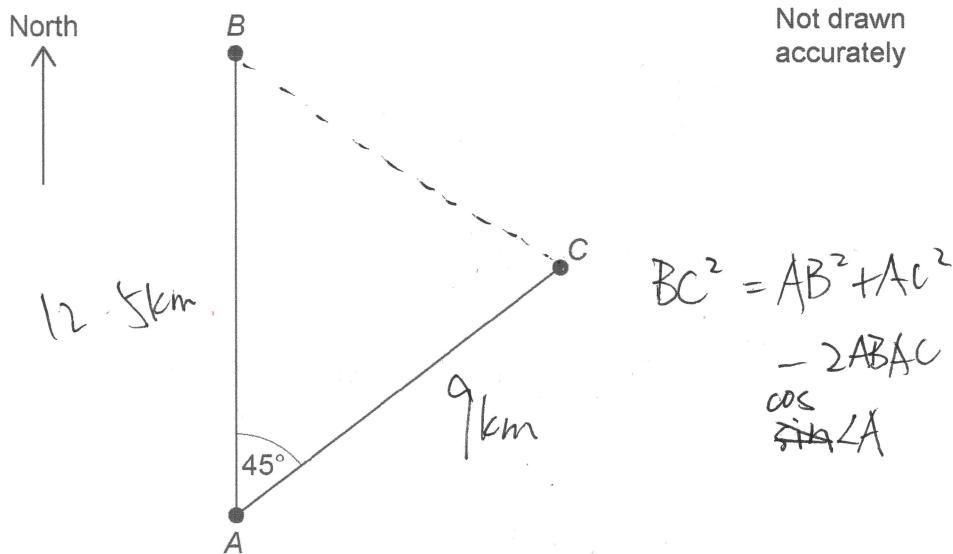
They both start from point A.

Bahram cycles North at an average speed of 25 km/h

Callan cycles North East at an average speed of 18 km/h

The diagram shows the positions of Bahram (B) and Callan (C) after 30 minutes.

Do not write outside the box



Work out the distance BC.

[4 marks]

$$BC = \sqrt{12.5^2 + 9^2 - 2 \times 12.5 \times 9 \times \cos 45^\circ}$$

$$BC = 8.8403 \text{ km}$$

Answer

8.8403

km

9

Turn over ►



2 7

- 34 By rationalising the denominator, show that  $\frac{21+\sqrt{7}}{3-\sqrt{7}}$  simplifies to  $a+b\sqrt{7}$   
where  $a$  and  $b$  are integers.

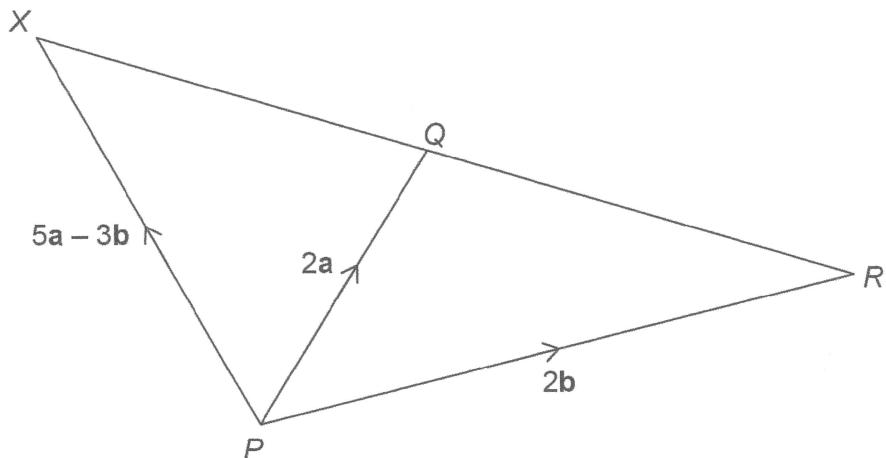
You must show your working.

[3 marks]

$$\begin{aligned}
 &= \cancel{21 + \frac{\sqrt{7}}{3}} - \cancel{3\sqrt{7}} - \cancel{21 + \frac{2\sqrt{7}}{3}} \\
 &\quad \cancel{(3-\sqrt{7})} \\
 &= \cancel{21} + \cancel{\frac{21}{3}} + \cancel{\frac{\sqrt{7}}{3}} \\
 &= \cancel{21} + \cancel{\frac{21}{3}} + \cancel{\frac{\sqrt{7}}{3}} \\
 &\equiv \cancel{3\cancel{7}} \\
 &= (21 + \sqrt{7})(3 + \sqrt{7}) / 9 - 7 \\
 &= 35 + 12\sqrt{7} \\
 &\quad \cancel{a=35}, \cancel{b=12}
 \end{aligned}$$



35

Not drawn  
accurately

$$\vec{RX} = k \vec{RQ}$$

Work out the value of  $k$ .

[3 marks]

$$\begin{aligned}
 \vec{RX} &= \sqrt{(5a-3b)^2 + (2b)^2 - (5a-3b)2b \cdot \cos XPR} \\
 &= \sqrt{25a^2 - 30ab + 9b^2 + 4b^2 - (10ab + 6b^2) \cdot \cos XPR}
 \end{aligned}$$

Answer \_\_\_\_\_

5  
/  
2

END OF QUESTIONS

3  
6



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outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**



3 0

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