



PRESBYTERIAN HIGH SCHOOL
2021 END-OF-YEAR EXAMINATION
SECONDARY ONE EXPRESS
MATHEMATICS (4052)

Name: _____ () Class: 1 _____

Duration: 2 hours 30 minutes

Date: 6 Oct 2021

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

INSTRUCTIONS TO CANDIDATES:

This paper consists of Section A and Section B.

Write your name, index number and class on the cover pages of **Section A** and **Section B**.

Write in dark blue or black ink pen. You may use a soft pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

Write your answers on the spaces provided below the questions.

Omission of essential working will result in loss of marks.

Calculators should be used where appropriate.

INFORMATION FOR CANDIDATES:

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.

For π , use either your calculator value or 3.142, unless the question requires the answer in terms of π .

You are reminded of the need for clear presentation in your answers.

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for **Section A** and **Section B** is **50** each.

Setter: Mr Wong Shao Mun
 Vetter: Mdm Chung Bee Chee

For Examiner's Use

Section A

50

This paper consists of **12** printed pages (including this cover page) and **0** blank pages.

Section A (50 marks)
Answer ALL questions.

- 1** The table below gives information on the number of applications received for two primary schools.
AO2

Complete the table.

School	Number of applications	Number of vacancies	Ratio of applications to vacancies
Delta Primary	45	15	3 : 1
Echo Primary	28	7	4 : 1 B1

[1]

- 2** (a) Express 0.021 38 correct to 2 significant figures.
AO1

0.021 **B1**
Answer [1]

- (b) The number of students in a school hall is given as 200, correct to the nearest hundred.
AO2

Write down the maximum number of students that could be in the school hall at that time.

249 **B1**
Answer [1]

3
AO2

$$y = 3x + 2$$

$$y = 3x - 2$$

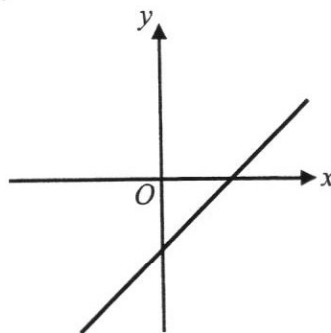
$$y = -3x + 2$$

$$y = -3x - 2$$

The diagrams below show sketches of two of these lines.

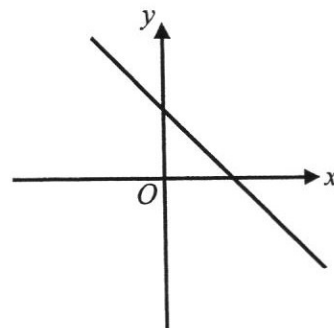
Write the correct equation below each diagram.

Answer



$$y = 3x - 2 \quad \mathbf{B1}$$

.....



$$y = -3x + 2 \quad \mathbf{B1}$$

.....

[2]

4 Find the square root of $3^2 \times 5^4$ without using a calculator. **Show your steps clearly.**
AO1

Method 1:

$$3^2 \times 5^4 = (3 \times 5^2) \times (3 \times 5^2) \quad \text{M1: Factors correctly grouped into 2 groups.}$$

$$\sqrt{3^2 \times 5^4} = 3 \times 5^2 \quad \text{If above not seen, award M1 here if see this.}$$

$$\sqrt{3^2 \times 5^4} = 75$$

Method 2:

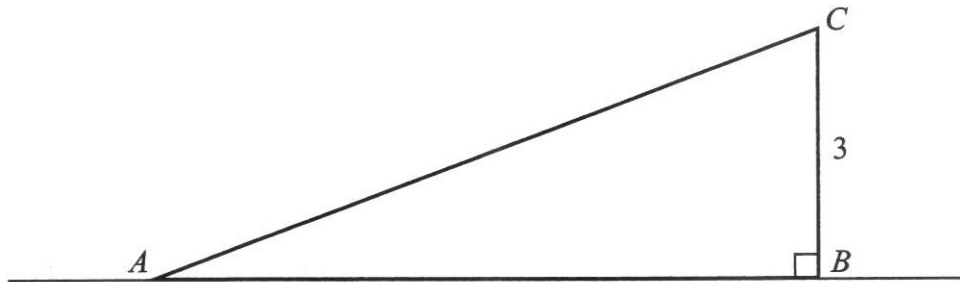
$$3^2 \times 5^4 = (3 \times 5^2)^2 \quad \text{M1: Factors correctly grouped into 2 groups.}$$

$$\sqrt{3^2 \times 5^4} = 3 \times 5^2 \quad \text{If above not seen, award M1 here if see this.}$$

$$\sqrt{3^2 \times 5^4} = 75$$

Answer 75 A1 [2]

5
AO2



A slide in the shape of the triangle ABC lies on the ground.

$BC = 3$ m.

The area of triangle ABC is 7.8 m^2 .

Find AB .

$$\frac{1}{2} \times AB \times 3 = 7.8 \quad \text{M1: Form equation.}$$

$$1.5AB = 7.8$$

$$\frac{1.5AB}{1.5} = \frac{7.8}{1.5}$$

$$AB = 5.2 \text{ m}$$

Answer 5.2 A1 m [2]

- 6 It is given that $D = b^2 - 4ac$.

Find the value of

- (a) D when $b = -3$, $a = 1$ and $c = -2$.
AO1

$$\begin{aligned} D &= b^2 - 4ac \\ D &= (-3)^2 - 4(1)(-2) \\ D &= 17 \end{aligned}$$

Answer $D =$ 17 B1 [1]

- (b) c when $D = 3$, $b = 7$ and $a = 5$.
AO1

$$\begin{aligned} D &= b^2 - 4ac \\ 3 &= (7)^2 - 4(5)c \quad \text{M1: Seen correct substitution.} \\ 3 &= 49 - 20c \\ 3 - 49 &= -20c \\ -46 &= -20c \\ \frac{-46}{-20} &= \frac{-20c}{-20} \\ 2.3 &= c \\ c &= 2.3 \end{aligned}$$

2.3 A1
Accept $2\frac{3}{10}$.
Answer $c =$ [2]

- 7 Consider these four numbers,

$$-0.\dot{3} \qquad \frac{\pi}{2} \qquad -2\sqrt{2} \qquad \frac{7}{2}$$

- (a) write down the irrational number(s),

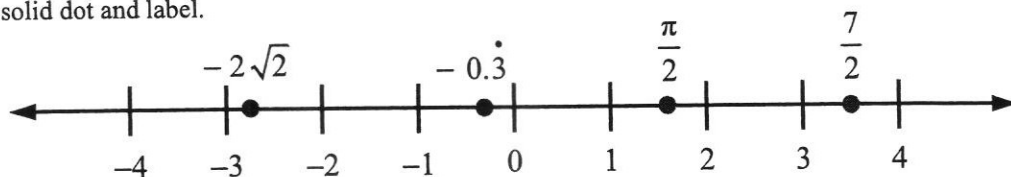
AO1

$\frac{\pi}{2}, -2\sqrt{2}$ B1
Answer [1]

- (b) represent the four numbers on the below number line.

AO1

B1 mark for every 2 correct answers. B1 mark for all 4 correct dots but above number line.
Each correct answer comprises of a B1 mark for all 4 correct dots but no label above dot.
solid dot and label.



[2]

- 8 (a) Factorise $3de + 9d^2$ completely.

AO1

Answer $3d(e + 3d)$ B1 [1]

- (b) Simplify $2 \times m \times v + mv + 1$.

AO1

$$\begin{aligned} & 2 \times m \times v + mv + 1 \\ &= 2mv + mv + 1 \quad \text{M1: Seen } 2mv. \\ &= 3mv + 1 \end{aligned}$$

Answer $3mv + 1$ A1 [2]

- 9 $ABCD$ is a quadrilateral.

$BC = 7$ cm, $\angle ABC = 110^\circ$, $AD = 9$ cm and $\angle BAD = 75^\circ$.

AB is drawn below.

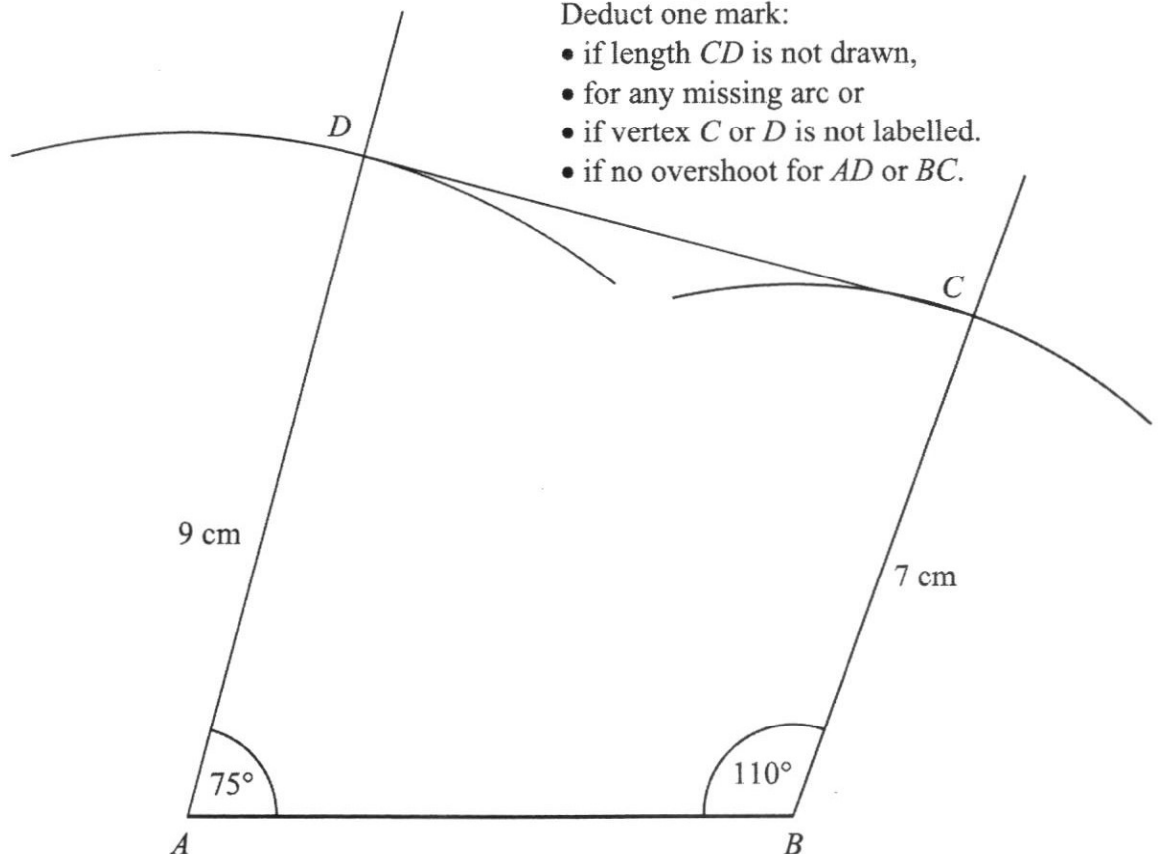
Answer (a)

Q9(a) B1 for length BC .

B1 for length AD .

Deduct one mark:

- if length CD is not drawn,
- for any missing arc or
- if vertex C or D is not labelled.
- if no overshoot for AD or BC .



- (a) With the help of a pair of compasses, protractor and ruler, construct the quadrilateral $ABCD$.

AO1

[2]

- (b) Measure length CD . Note: General Office's printing machine in 2021 enlarged AB from 8 cm to 8.1 cm, thus CD is (8.4 ± 0.1) cm. If not, CD should have been (8.3 ± 0.1) cm.

AO1

Answer $8.4 \pm 0.1 = 8.3$ to 8.5 B1 [1]

- 10 (a) Express the following as a single fraction in its simplest form.
AO1

$$\frac{x+1}{4} - \frac{1-2x}{3}$$

$$\begin{aligned} & \frac{x+1}{4} - \frac{1-2x}{3} \\ = & \frac{x+1}{4} \times \frac{3}{3} - \frac{1-2x}{3} \times \frac{4}{4} \quad \text{M1: Find common denominator.} \\ = & \frac{3(x+1) - 4(1-2x)}{12} \\ = & \frac{3x+3-4+8x}{12} \\ = & \frac{11x-1}{12} \end{aligned}$$

Answer $\frac{11x-1}{12}$ A1 [2]

- (b) Solve $5y - 13 = 3y + 8$.
AO1

$$\begin{aligned} 5y - 13 &= 3y + 8 \\ 5y - 3y &= 8 + 13 \quad \text{M1: Terms correctly collected on each side of equation.} \\ 2y &= 21 \\ \frac{2y}{2} &= \frac{21}{2} \\ y &= 10.5 \end{aligned}$$

10.5 A1
Accept $10\frac{1}{2}$.
Answer $y =$ [2]

- 11 (a)** A ceiling has an area of 120 000 cm².
AO1 Convert 120 000 cm² to m².

Method 1:

$$100 \text{ cm} \times 100 \text{ cm} = 1 \text{ m} \times 1 \text{ m}$$

$$10\,000 \text{ cm}^2 = 1 \text{ m}^2 \quad \mathbf{M1}$$

$$\frac{10\,000 \text{ cm}^2}{10\,000} = \frac{1 \text{ m}^2}{10\,000}$$

$$1 \text{ cm}^2 = \frac{1}{10\,000} \text{ m}^2$$

$$120\,000 \times 1 \text{ cm}^2 = 120\,000 \times \frac{1}{10\,000} \text{ m}^2$$

$$120\,000 \text{ cm}^2 = 12 \text{ m}^2$$

Method 2:

$$120\,000 \text{ cm}^2 = 120\,000 \times 1 \text{ cm} \times 1 \text{ cm}$$

$$120\,000 \text{ cm}^2 = 120\,000 \times \frac{1}{100} \text{ m} \times \frac{1}{100} \text{ m} \quad \mathbf{M1}$$

$$120\,000 \text{ cm}^2 = 12 \text{ m}^2$$

Method 3:

$$1 \text{ cm} \times 1 \text{ cm} = \frac{1}{100} \text{ m} \times \frac{1}{100} \text{ m}$$

$$1 \text{ cm}^2 = \frac{1}{10\,000} \text{ m}^2 \quad \mathbf{M1}$$

$$120\,000 \times 1 \text{ cm}^2 = 120\,000 \times \frac{1}{10\,000} \text{ m}^2$$

$$120\,000 \text{ cm}^2 = 12 \text{ m}^2$$

Answer 12 A1 m² [2]

- (b)** 1 litre of paint covers 16 m².
AO2 Calculate the amount of paint needed to paint 11.2 m².

Amount of paint needed

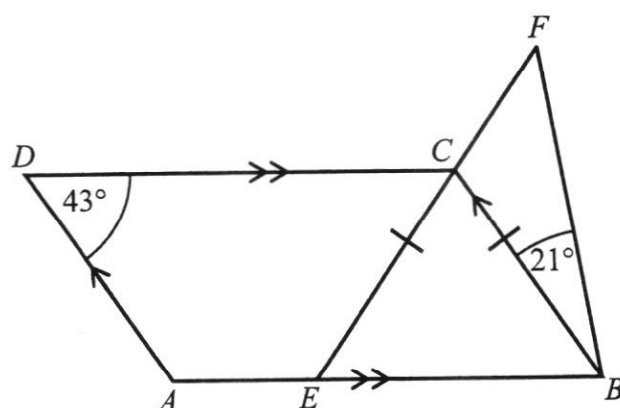
$$= \frac{11.2}{16} \quad \mathbf{M1}$$

$$= 0.7 \text{ l}$$

Answer 0.7 A1 l [2]

12
AO2

Not to scale



$ABCD$ is a parallelogram.

ECF and BF are straight lines.

$CE = CB$, $\angle ADC = 43^\circ$ and $\angle CBF = 21^\circ$.

E is a point on AB .

Stating your reasons clearly, find $\angle EFB$.

$\angle EBC = 43^\circ$ (opp. \angle s of //gram) **M1:** Seen geometrical reason.

$\angle CEB = 43^\circ$ (base \angle s of isos. Δ) **M1:** Seen geometrical reason.

$\angle EFB = 180^\circ - 43^\circ - 43^\circ - 21^\circ$ (\angle sum of Δ) **M1:** Seen geometrical reason.

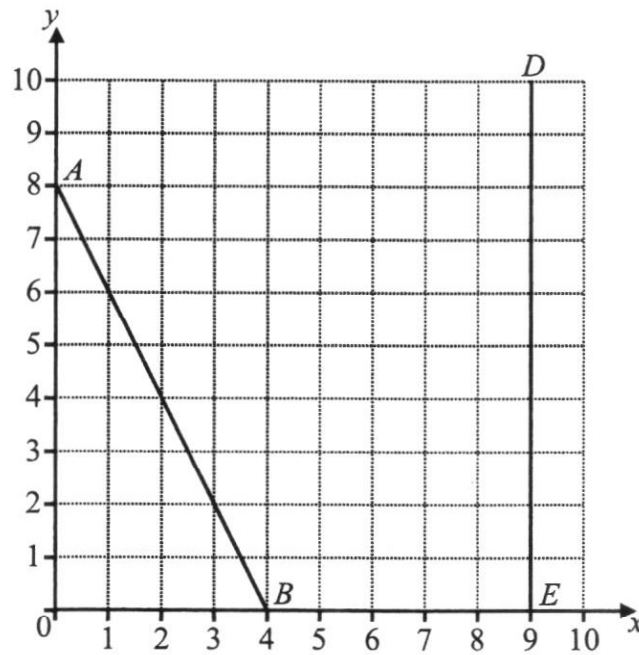
$\angle EFB = 73^\circ$

Deduct 1 mark for any missing/wrong geometrical reason from above three.

Deduct 1 mark for two or more non-standard geometrical reason from above three.

Answer $\angle EFB = 73$ **A1** $^\circ$ [4]

- 13 Straight lines AB and DE are drawn on the grid.



(a)
AO2

Find the gradient of the line AB .

$$\begin{aligned} &\text{Gradient} \\ &= \frac{\text{Vertical change}}{\text{Horizontal change}} \\ &= \frac{-8}{4} \\ &= -2 \end{aligned}$$

- 2 B1
Answer [1]

(b)
AO2

Write down the equation of the line AB .

$y = -2x + 8$ B1
Answer [1]

(c)
AO2

Point C lies in the middle of line AB .
Write down the coordinates of point C .

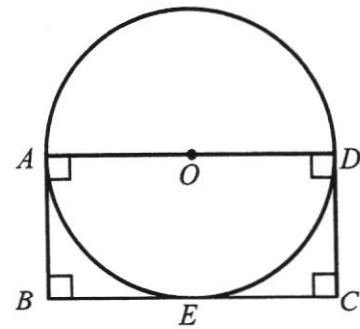
2 4 B1
Answer (..... ,) [1]

(d)
AO1

Write down the equation of the line DE .

$x = 9$ B1
Answer [1]

- 14 The diagram shows a circle, centre O .
 AD is the diameter of the circle.
 The area of the circle is $9.9225\pi \text{ cm}^2$.
 $ABCD$ is a rectangle.
 E is a point on BC such that it touches the circle.



- (a) Show that the radius of the circle is 3.15 cm.
AO1

$$\begin{aligned}\pi r^2 &= 9.9225\pi & \text{M1} \\ \frac{\pi r^2}{\pi} &= \frac{9.9225\pi}{\pi} \\ r^2 &= 9.9225 \\ r &= \sqrt{9.9225} \\ r &= 3.15 \text{ cm (shown)} & \text{A1}\end{aligned}$$

[2]

- (b) Calculate the perimeter of $ABCD$.
AO2

$$\begin{aligned}\text{Length of } ABCD &= 6(3.15) & \text{M1} \\ &= 18.9 \text{ cm}\end{aligned}$$

Answer 18.9 A1 cm [2]

- 15 The following table of values is for a straight line $y = -5x + 4$.

x	-1	0	3
y	p	4	-11

- (a) Find the value of p .
AO1

$$\begin{aligned}\text{When } x &= -1, \\ p &= -5x + 4 \\ p &= -5(-1) + 4 \\ p &= 9\end{aligned}$$

Answer $p =$ 9 B1 [1]

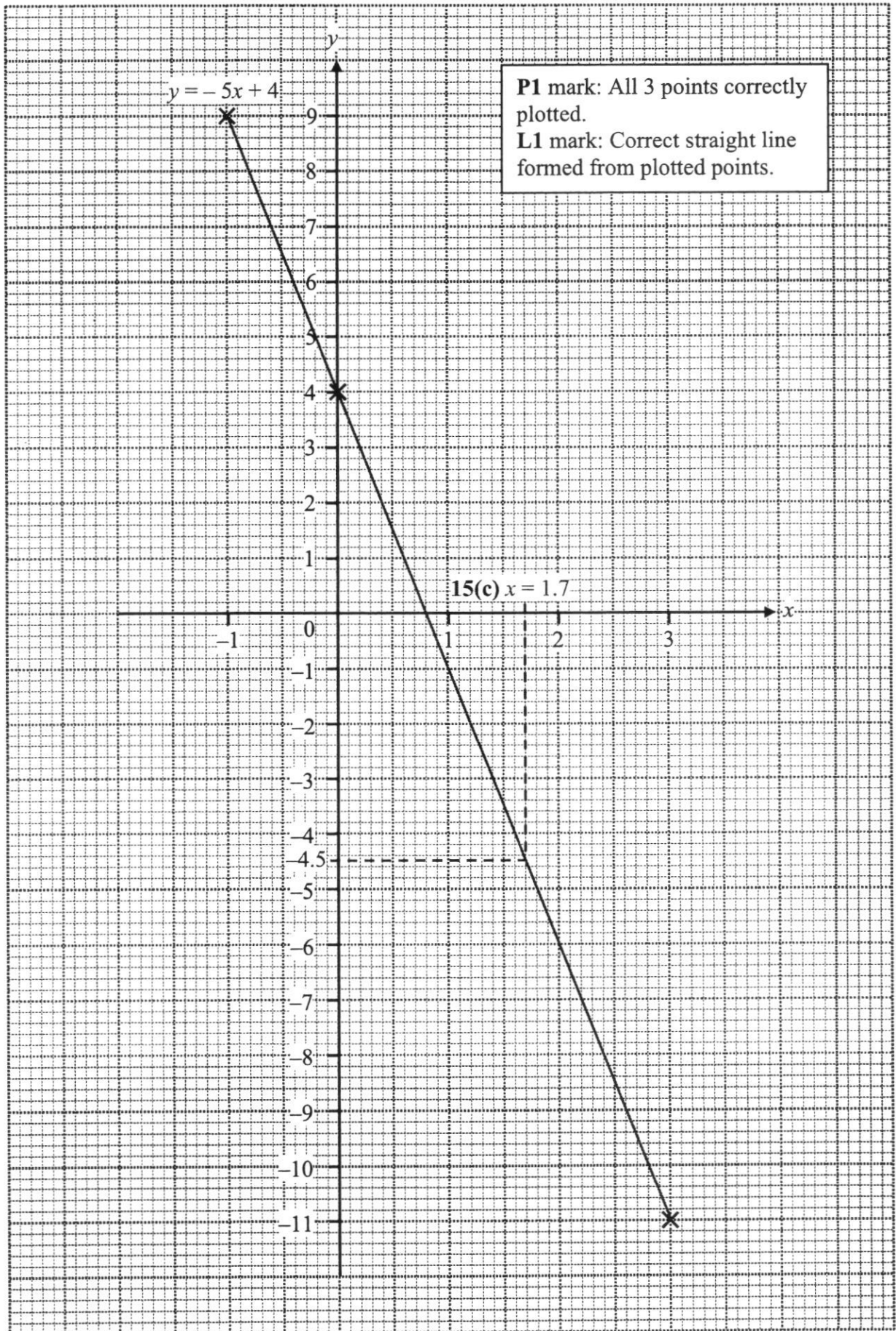
- (b) On the grid on the next page, draw the graph of $y = -5x + 4$ for the range $-1 \leq x \leq 3$.
AO1

[2]

- (c) Using your graph, find the value of x when $y = -4.5$.
AO1 Mark your working clearly on the grid.

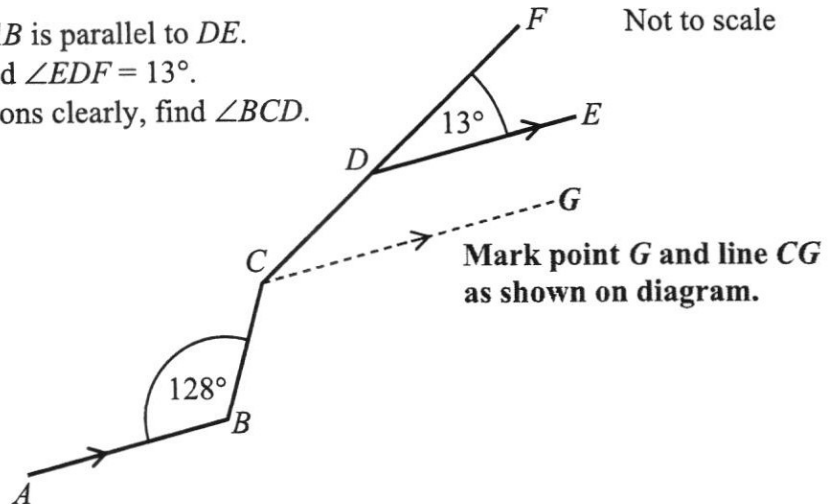
B1: Seen dotted line working and answer labelled on grid.

Answer $x =$ $1.7 \pm 0.05 = 1.65 \text{ to } 1.75$ [1]



[Turn over

- 16 (a) In the diagram, AB is parallel to DE .
 AO2 $\angle ABC = 128^\circ$ and $\angle EDF = 13^\circ$.
 Stating your reasons clearly, find $\angle BCD$.



$$\angle BCG = 128^\circ \text{ (alt. } \angle\text{s, } AB \parallel CG \text{) M1: Seen geometrical reason.}$$

$$\angle FCG = 13^\circ \text{ (corr. } \angle\text{s, } DE \parallel CG \text{) M1: Seen geometrical reason.}$$

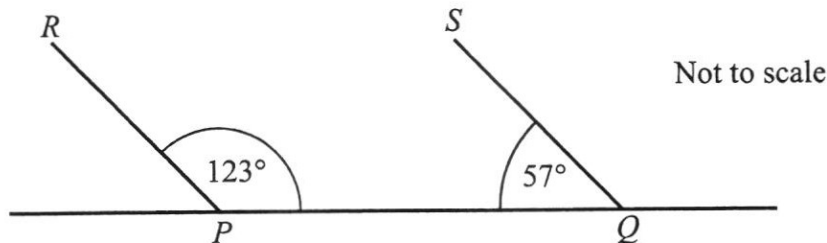
$$\angle BCD = 128^\circ + 13^\circ$$

$$\angle BCD = 141^\circ$$

Deduct 1 mark for any missing/wrong geometrical reason.

$$\text{Answer } \angle BCD = \underline{\quad 141 \text{ A1} \quad}^\circ [3]$$

(b)
 AO3



Drone P and drone Q are launched from the ground in the direction of R and S respectively.

Stating your reasons clearly, explain whether their flight paths will cross one another.

Their flight paths will not cross one another because they are **parallel** [B1] as

$$\angle QPR + \angle PQS = 123^\circ + 57^\circ = 180^\circ \text{ (int. } \angle\text{s, } PR \parallel QS \text{). [B1: Seen geometrical reason.]}$$

END OF SECTION A