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WJEC GCSE Mathematics and Numeracy (Double Award) – Question Pack

Solving linear equations (single bracket, brackets both sides, fractions, unknown on both sides) and linear inequalities (including listing integer solutions)

REVISE
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2.11 – Linear equations & inequalities

Spec 2.2.1, 2.2.2, 2.2.3, 2.2.4 – Unit 2 (no calculator)

Solving linear equations (single bracket, brackets both sides, fractions, unknown on both sides) and linear inequalities (including listing integer solutions and shading regions on a grid). Sourced from legacy WJEC GCSE Mathematics Higher non-calculator papers, organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~4 hours 10 minutes

Derived from the GCSE Higher pace of ~1.5 min/mark (167 marks across 45 questions).

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification. Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working – method marks are awarded for clear setup.

*A calculator is **not** permitted on any question in this pack (Unit 2 is the non-calculator paper).*

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Linear equations & inequalities – what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 2: non-calculator.

Solving linear equations 2.2.1

- Inverse operations to isolate the unknown.
- Expand any brackets and collect like terms.
- Check by substituting your answer back in.

Unknown on both sides 2.2.2

- Move x -terms one way, numbers the other.
- Avoid negatives by collecting on the larger side.
- Divide last, only when one x -term remains.

Equations with fractions 2.2.3

- Multiply every term by the LCM of the denominators.
- Then proceed as for an ordinary linear equation.
- Re-check that no term was missed.

Linear inequalities 2.2.4

- Treat like an equation – same operations.
- Flip the inequality on \times or \div by a negative.
- List integers carefully; mind $<$ vs \leq .

Linear equations & inequalities in one page

Quick-reference notes – revisit before each question. Don't use during the questions.

Balance both sides

Whatever you do to one side, do to the other – that keeps the equation balanced.

$$3x + 4 = 19 \Rightarrow 3x = 15 \Rightarrow x = 5.$$

Check by substituting back: $3(5) + 4 = 19 \checkmark$.

Brackets – expand first

$$3(x - 2) = 12 \Rightarrow 3x - 6 = 12 \Rightarrow 3x = 18 \Rightarrow x = 6.$$

Mind the sign: $-2(x - 5) = -2x + 10$,
not $-2x - 10$.

Unknown on both sides

Collect x terms on one side, numbers on the other.

$$5x - 3 = 2x + 9 \Rightarrow 3x = 12 \Rightarrow x = 4.$$

Subtract the smaller x coefficient to keep things positive where possible.

Clearing fractions

Multiply *every* term by the common denominator.

$$\frac{x}{3} + \frac{x}{4} = 7: \text{ multiply by 12: } 4x + 3x = 84 \Rightarrow x = 12.$$

Don't multiply only one fraction – it must be every term.

Inequality rules

flip the sign when \div or \times by a negative

$$5 - 2x > 1 \Rightarrow -2x > -4 \Rightarrow x < 2 \text{ (sign flipped).}$$

Adding or subtracting from both sides leaves the sign alone.

Integer solutions

$$13 < 2n < 19 \Rightarrow 6.5 < n < 9.5, \text{ so } n \in \{7, 8, 9\}.$$

List every integer in range; the endpoints may or may not be included depending on $<$ vs \leq .

Forming equations from words

Translate the sentence into algebra, then solve.

'Perimeter of a rectangle is 30 cm, length is 3 cm more than width': $2(w + w + 3) = 30 \Rightarrow w = 6$.

State the unknown clearly before solving.

Common traps

- Forgetting to flip the inequality on \div by a negative.
- Dropping a term when clearing fractions.
- Listing endpoints in strict ($<$) inequalities.

Examiner
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9. (a) Factorise $x^2 - 2x - 24$, and hence solve $x^2 - 2x - 24 = 0$. [3]

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(b) Solve the equation $\frac{4x-3}{2} + \frac{7x+1}{6} = \frac{29}{2}$. [4]

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Examiner
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14. Aled has three concrete slabs.
Two of the slabs are square, with each side of length x metres.
The third slab is rectangular and measures 1 metre by $(x + 1)$ metres.
The three concrete slabs cover an area of 7 m^2 .

(a) Show that $2x^2 + x - 6 = 0$. [1]

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(b) Solve the equation to find the length of each side of the square slabs.
You must justify any decisions that you make. [4]

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Examiner
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3. Bethan builds a rectangular sheep pen.



- (a) The perimeter fence of the sheep pen is 18 m long.
The length of Bethan's sheep pen is two times its width.
Find the length and width of this sheep pen.
You must show your working.

[2]

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Length is metres

Width is metres



Examiner
only

- (b) Bethan decides to build a new sheep pen.
The perimeter fence of the new sheep pen is 16 m long.
The length of the new sheep pen is 3 metres longer than the width.

Form an equation and solve it to find the dimensions of this new sheep pen. [3]

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Length is metres

Width is metres

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- (b) (i) What is the greatest possible value of x such that all three conditions are met? [1]

$x =$

- (ii) What is the greatest possible value of y such that all three conditions are met? [1]

$y =$

Examiner
only



Examiner
only

9. (a) Show that $(10w + 3)(w - 1) - (2 - 3w)^2 \equiv w^2 + 5w - 7$. [4]

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(b) Use the quadratic formula to solve the equation $w^2 + 5w - 7 = 0$.
Give your answers correct to 2 decimal places. [3]

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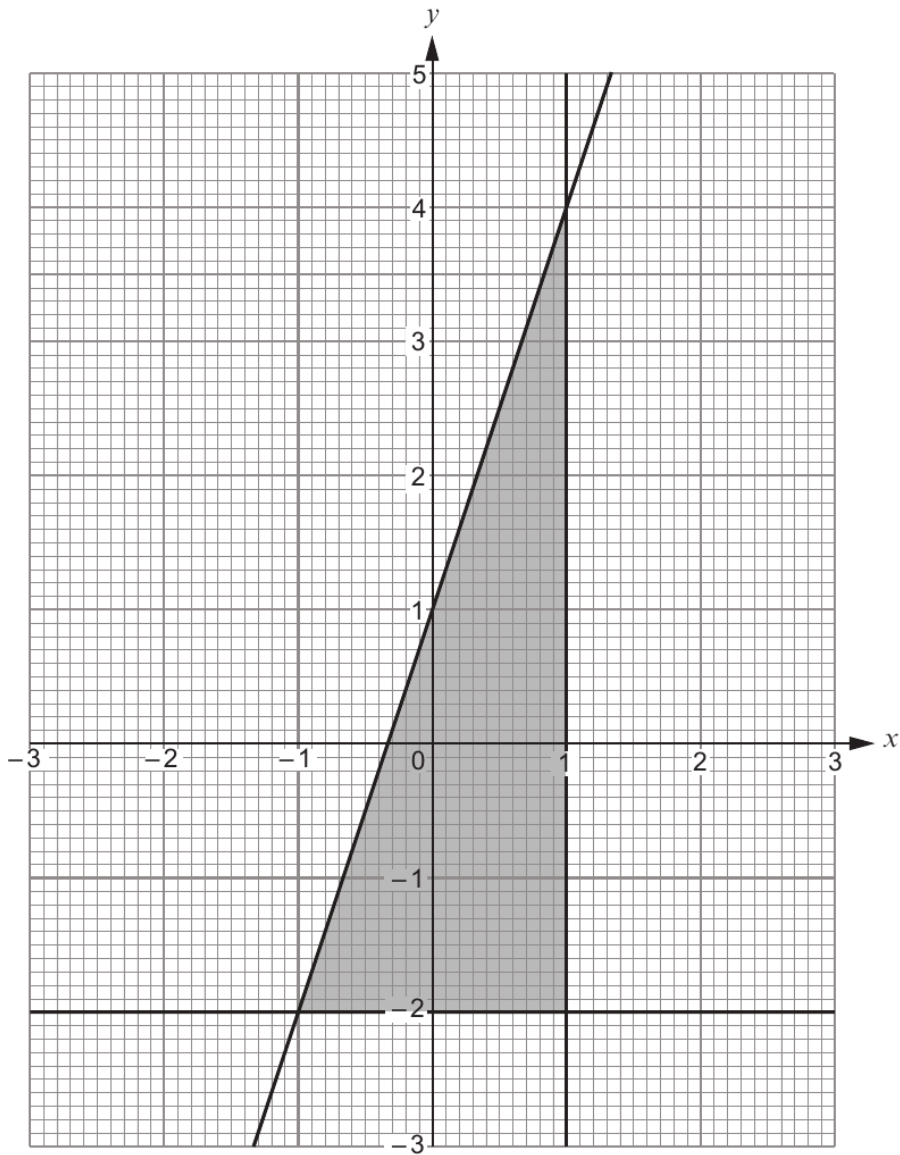
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11.



Complete the following table to give the set of inequalities that describes the shaded region shown above. [3]

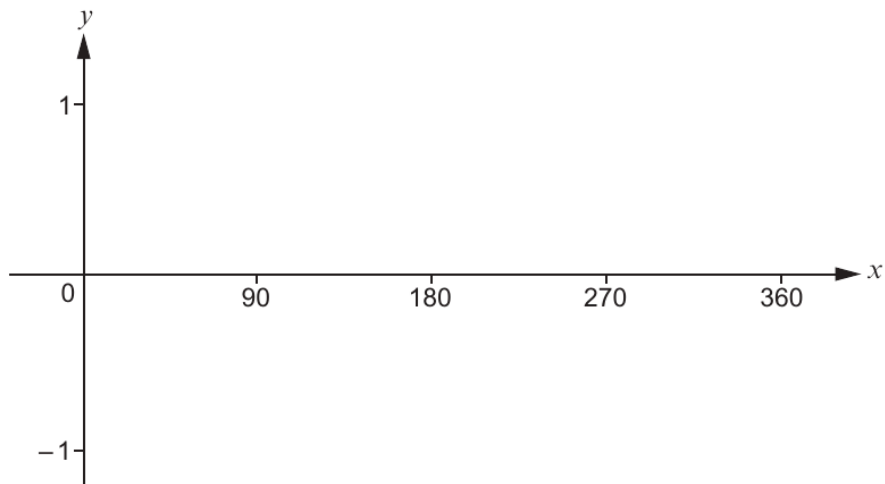
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$x \leq 1$



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14. (a) Sketch the curve $y = \sin x$, for values of x in the range $x = 0^\circ$ to $x = 360^\circ$. [1]



(b) Solve each of the following equations.
Give all answers in the range $x = 0^\circ$ to $x = 360^\circ$.

(i) $\sin x = 0.3$ [2]

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(ii) $\sin x + 1 = 0$ [1]

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Examiner
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13. A ball is thrown upwards from a height of 1 m above the ground.

After t seconds, its height above the ground is h metres, where h is given by

$$h = 1 + 8t - 5t^2.$$

(a) Show that the time taken to reach a height of 4 metres satisfies the equation

$$5t^2 - 8t + 3 = 0. \quad [1]$$

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(b) Solve the equation

$$5t^2 - 8t + 3 = 0. \quad [3]$$

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(c) Interpret your answer to part (b) in the context of the question. [1]

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16. (a) Draw the graph of the curve $y = 2^x$ for values of x from -2 to 2 .
Use the graph paper below.

[3]

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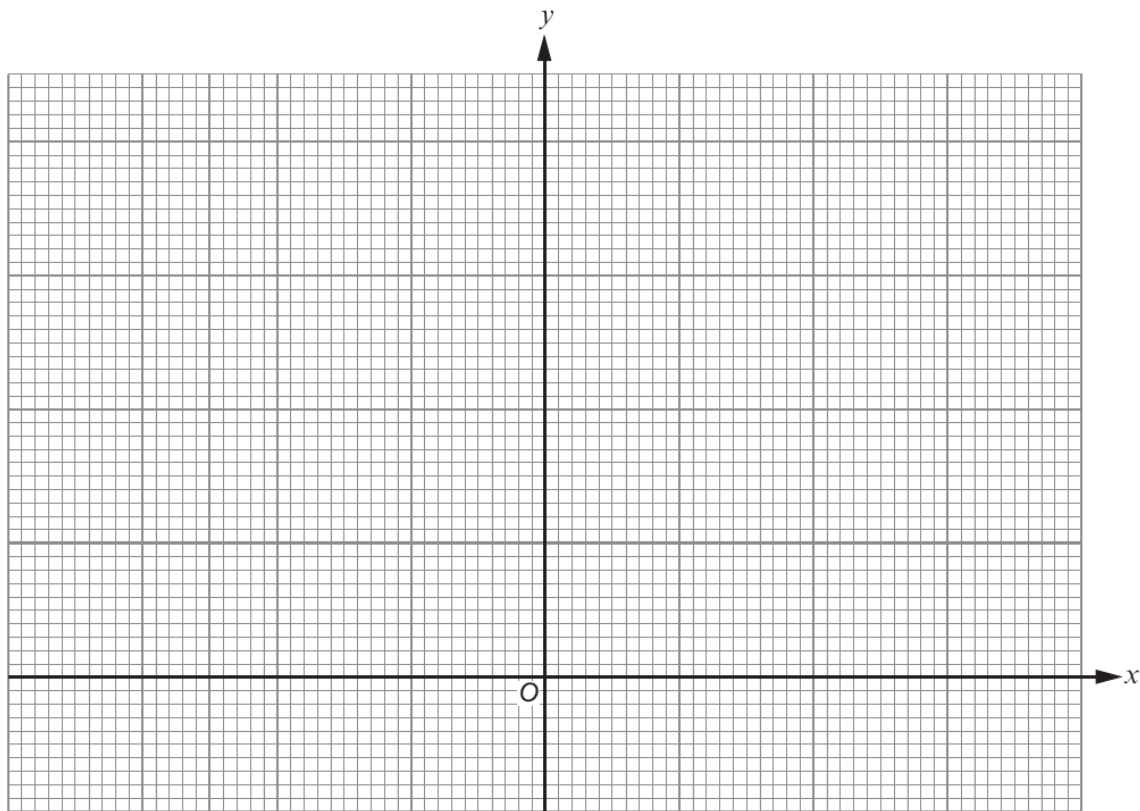
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- (b) Use your graph to find the value of $2^{1.4}$.

[1]

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- (c) Use your graph to solve the equation $2^x = 1.4$.

[1]

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1. (a) Expand $3x(x^2 - 2)$. [2]

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(b) Make g the subject of the formula $f = 2 - 3g$. [2]

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(c) (i) Solve $7x - 3 < 29$. [2]

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(ii) What is the greatest integer value of x that satisfies the above inequality? [1]

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9. A cuboid has sides x cm, 5 cm and 7 cm.
The total surface area of the cuboid is 142 cm^2 .

Form an equation in terms of x .
Solve the equation to find x .

[4]

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only



Examiner
only

9. Arthur, Sian and Kezia are all given some £1 coins.

Arthur receives £ n .

Sian is given five times as much money as Arthur.

Kezia receives three times as much money as Arthur, plus an extra £7.

Sian was given less money than Kezia.

(a) Write down an inequality in terms of n that illustrates the fact that Sian received less money than Kezia. [2]

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(b) What was the greatest amount of money that Arthur could have been given? [2]

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10. Using the axes below, find the region which satisfies the following inequalities.

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$$x \geq -2$$

$$y + x \leq 1$$

$$2y \geq x$$

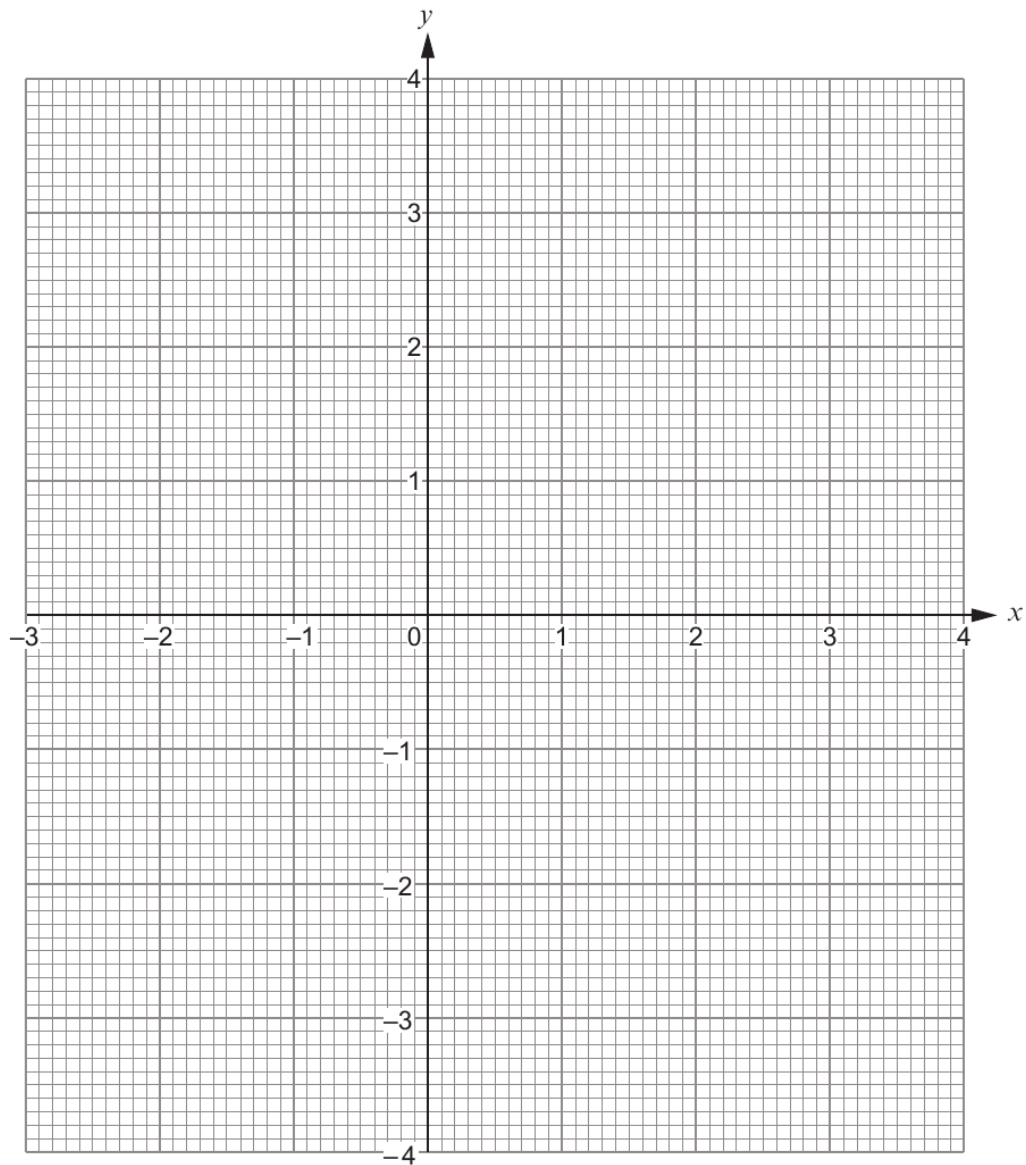
Make sure that you clearly indicate the region that represents your answer.

[3]

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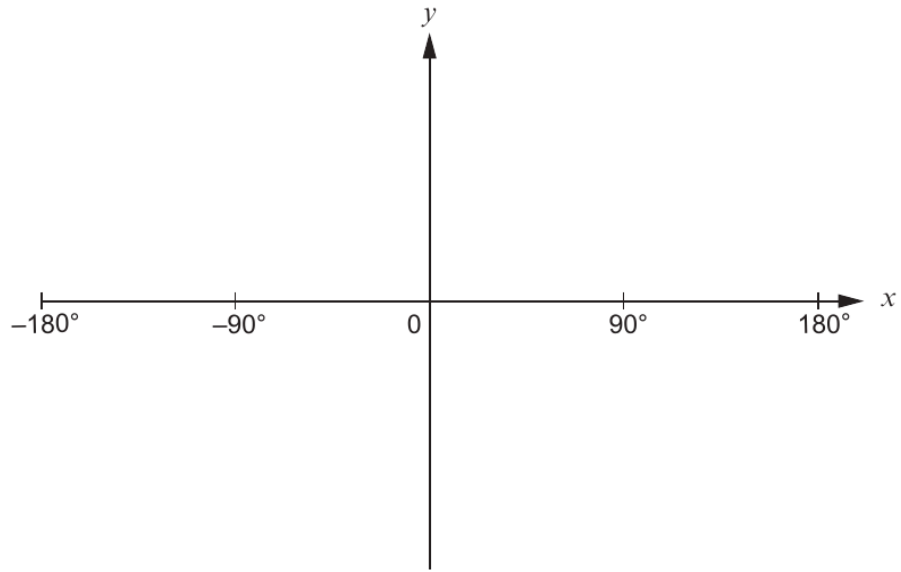
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16. (a) Sketch the curve $y = \sin x$ on the axes below.
You must indicate any important values on the y -axis.

[2]



- (b) Solve the equation $\sin x = -0.5$.
Give all answers in the range $x = -180^\circ$ to $x = 180^\circ$.

[2]

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Examiner
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19. (a) Write the following expression as a single fraction.
Give your answer in its simplest form.

[2]

$$\frac{1}{x-a} - \frac{1}{x}$$

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- (b) Solve the following equation.

[5]

$$\frac{x-1}{x(4x+3)} + 2 = 0$$

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8. (a) Factorise $x^2 + 4x - 21$. Hence, solve $x^2 + 4x - 21 = 0$.

[3]

Examiner
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- (b) Solve the equation $\frac{2x-3}{5} + \frac{4x+5}{2} = \frac{11}{2}$.

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11. (a) The area of the trapezium $ABCD$ is 25 cm^2 .

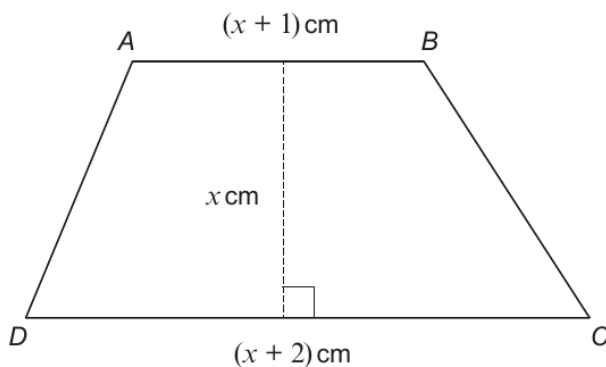


Diagram not drawn to scale

(i) Show that $2x^2 + 3x - 50 = 0$. [3]

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(ii) Solve the equation $2x^2 + 3x - 50 = 0$ to calculate the lengths AB and DC . Give your answers correct to 1 decimal place. [4]

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Length of AB = cm Length of DC = cm



(b) A rhombus has an area of 36.8 cm^2 .
The rhombus is enlarged by a scale factor of 7.
Calculate the area of the enlarged rhombus.

[2]

Examiner
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Examiner
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4. (a) Which one of the following options describes $2x + 5y$?
Circle your answer. [1]

- an equation a formula an expression
- an inequality none of these

(b) Which one of the following options describes $3x - 2 = 7$?
Circle your answer. [1]

- an equation a formula an expression
- an inequality none of these

5. Data for different values of t are shown in the table below.

t	Frequency
$0 \leq t < 5$	8
$5 \leq t < 10$	0
$10 \leq t < 15$	7
$15 \leq t < 20$	5

Calculate an estimate for the mean value of t . [4]

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Examiner
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17. (a) Sketch the curve $y = \cos x$, for values of x in the range $x = 0^\circ$ to $x = 360^\circ$.
You must indicate any important values on the axes.

[2]



- (b) Solve the equation $\cos x = 0.7$.
Give all solutions in the range $x = 0^\circ$ to $x = 360^\circ$.

[2]

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Examiner
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6. (a) (i) Expand $x(x^2 + 7)$. [2]

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(ii) Expand and simplify $(x - 5)(3x - 4)$. [2]

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(b) Sarah buys and sells antique clocks.
On Monday, Sarah had n clocks.
At the end of the day on Tuesday, she had 5 times as many clocks as she had on Monday.
On Wednesday, she sold 27 clocks.

(i) At the end of the day on Wednesday, Sarah had fewer clocks than she had on Monday.
Write an inequality, in terms of n , that shows this information. [2]

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(ii) Solve your inequality to find the greatest number of clocks that Sarah could have had on the Monday. [3]

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13. Solve the equation

$$4x^2 - x - 3 = 0.$$

You must use an algebraic method and show all your working.

[3]

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(b) Solve the equation

$$2x^2 + x - 27 = 0.$$

You must use an algebraic method and show all your working.
Give your answers correct to 2 decimal places.

[3]

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(c) Evaluate the length of AC.
You must justify any decision that you make.

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2. The table below shows some of the values of $y = x^2 + x - 4$ for values of x from -3 to 3 .

x	-3	-2	-1	0	1	2	3
$y = x^2 + x - 4$	2	-2		-4		2	8

(a) Complete the table by finding the values of y for $x = -1$ and for $x = 1$. [2]

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(b) On the graph paper opposite, draw the graph of $y = x^2 + x - 4$ for values of x from -3 to 3 . [2]

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(c) Use your graph to solve the equation $x^2 + x - 4 = 0$.
Give your answers correct to 1 decimal place. [1]

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$x =$ or $x =$



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12. Solve the equation $59x^2 - 7x - 13 = 0$.
Give your answers correct to 2 decimal places.
You must show all your working.

[3]

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13. Two similar shapes have perimeters of 241 cm and 719 cm.
The area of the smaller shape is 2063 cm^2 .

Calculate the area of the larger shape.
Give your answer in m^2 .

[4]

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Examiner
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14. Using the axes below, find the region which satisfies the following inequalities.

$$y \leq \frac{1}{2}x + 1$$

$$y + x \geq 0$$

$$x \leq 3$$

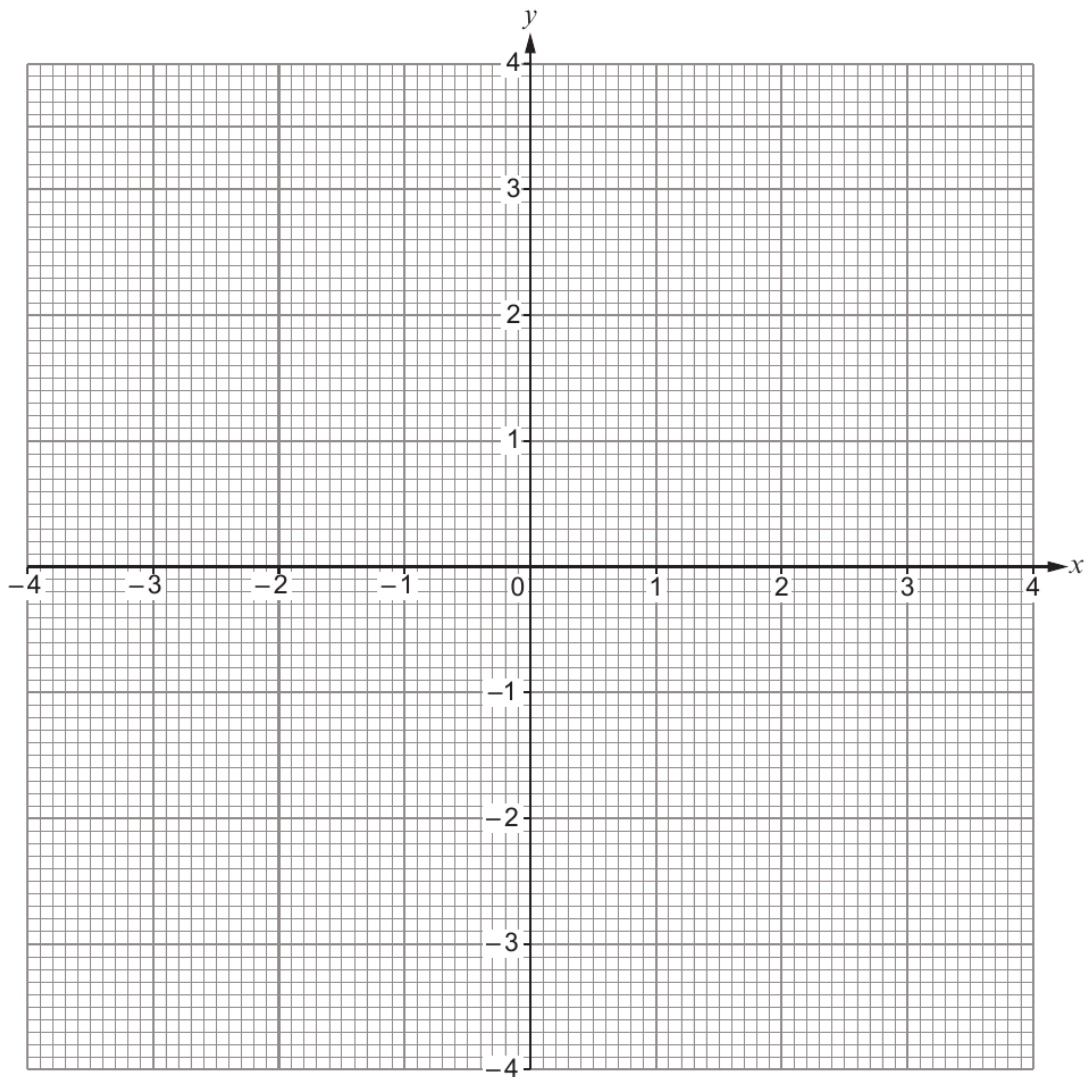
You must clearly indicate the region that represents your answer.

[3]

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1. (a) Solve the equation $7 + 5(x - 2) = 3x + 8$. [3]

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(b) Make f the subject of the formula $h = 13 - 2f$. [2]

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(c) Factorise $15x - 35y$. [1]

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3. (a) Simplify each of the following.
Circle your answer in each case.

(i) $m^4 \times m^3 =$

[1]

m^7

m^{12}

m^{43}

$7m$

$12m$

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(ii) $\frac{m^{15}}{m^5} =$

[1]

m^{75}

$\frac{1}{m^3}$

m^3

m^{10}

$\frac{1}{m^{10}}$

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(b) Write down an expression for the n th term of the following sequence.

[2]

4,

11,

18,

25,

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(c) List all of the integers that satisfy the following inequality.

[2]

$$13 < 2n < 19$$

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Integers are

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Examiner
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12. (a) Factorise $8x^2 - 18$.

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(b) Hence solve $8x^2 - 18 = 0$.

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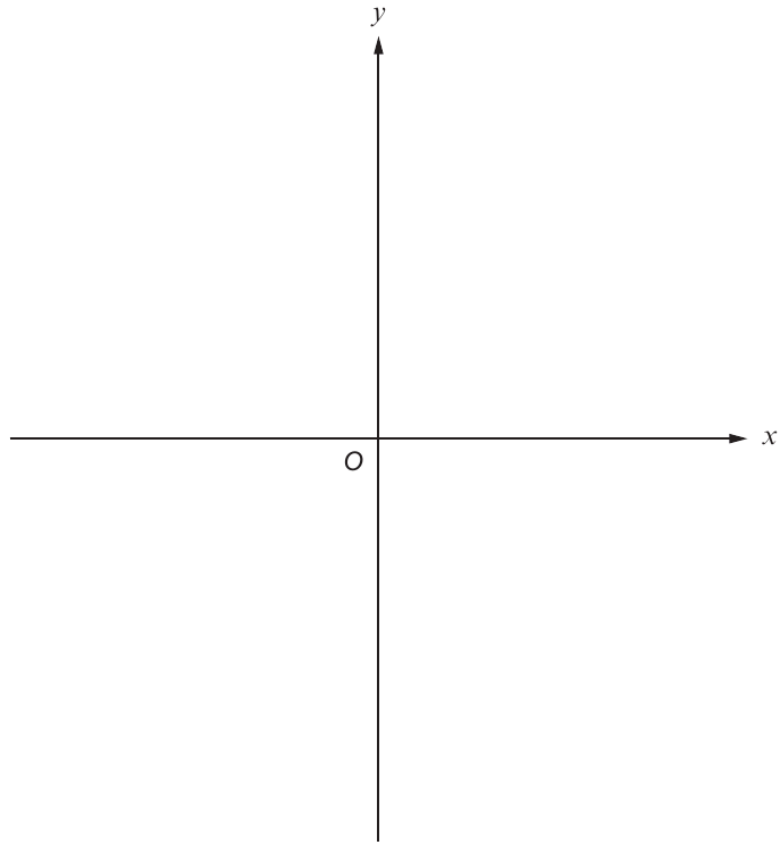
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- (c) Hence, sketch the graph of $y = 8x^2 - 18$ on the axes below.
Mark clearly the coordinates of any point where this graph crosses an axis. [2]



Space for working:

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13. Triangle ABC is right-angled.
The area of triangle ABC is 0.75 m^2 .

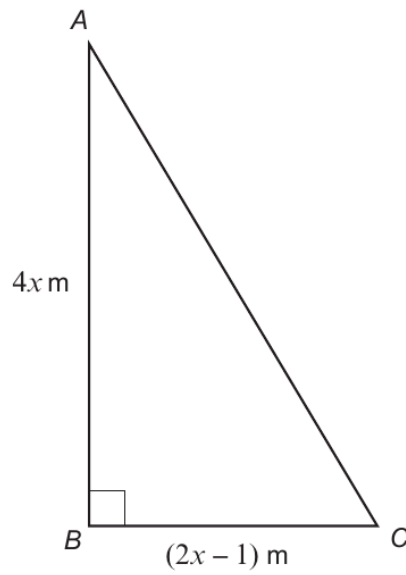


Diagram not drawn to scale

- (a) Show that $16x^2 - 8x - 3 = 0$. [3]

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Examiner
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- (b) (i) Solve the equation $16x^2 - 8x - 3 = 0$.
You must use an algebraic method.

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- (ii) Find the length of BC .
You must **justify** any decision that you make.

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Examiner
only

14. The table below shows some of the values of $y = x + \frac{1}{x}$ for values of x from 0.2 to 4.

x	0.2	0.5	0.8	1	2	3	4
$y = x + \frac{1}{x}$	5.2		2.05	2	2.5	3.3	4.25

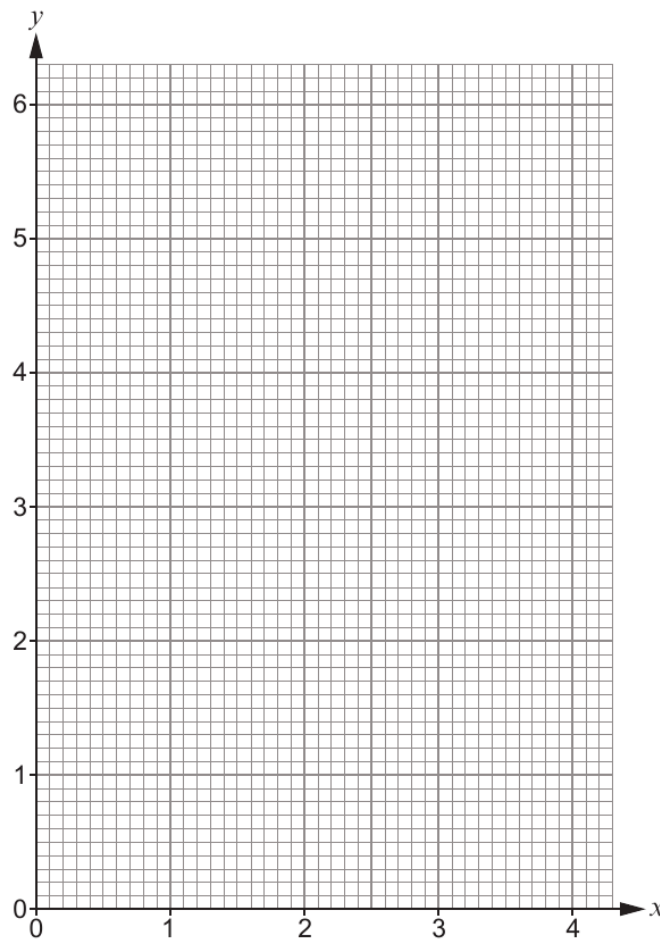
(a) (i) Complete the table by finding the value of y for $x = 0.5$. [1]

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(ii) On the graph paper below, draw the graph of $y = x + \frac{1}{x}$ for values of x from 0.2 to 4. [2]



Examiner
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11. Solve the equation $\frac{10x+2}{3} - \frac{7x-3}{5} = 9$.

[4]

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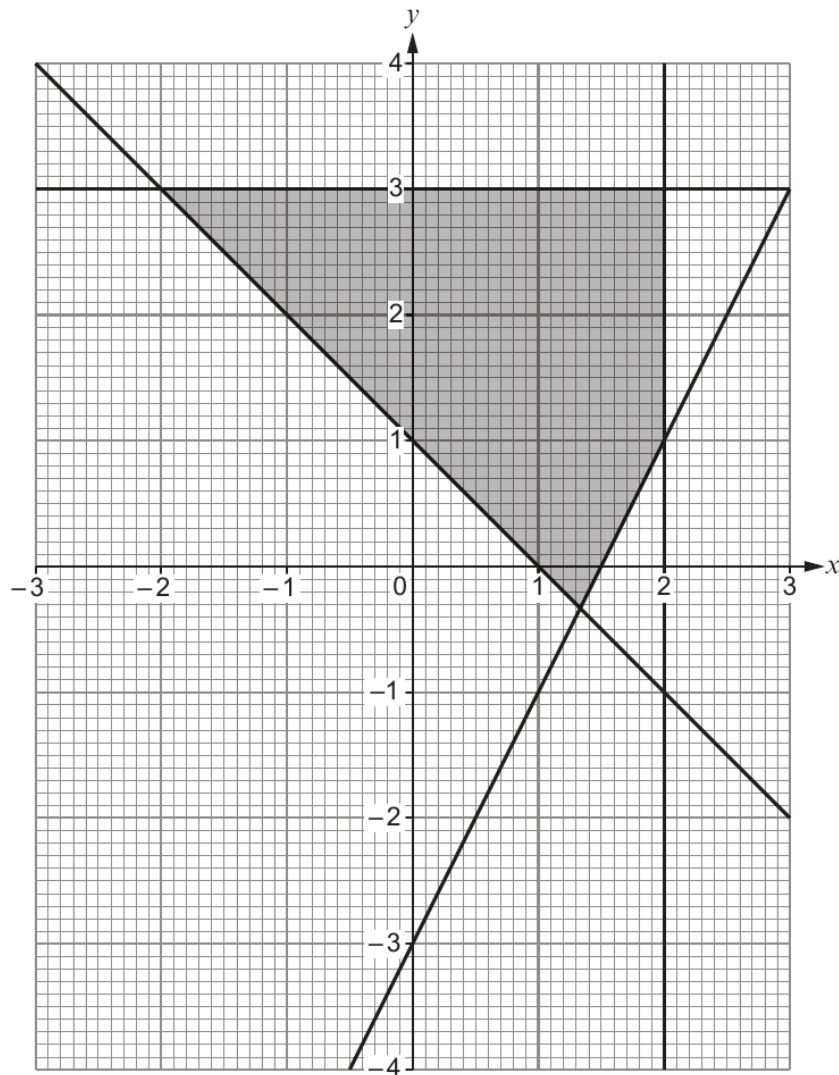
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12.

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Complete the following table to give the set of inequalities that describes the shaded region shown above.

One inequality has already been written for you.

[4]

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$y \geq 2x - 3$



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4. The diagram below shows a shape made by joining two rectangles together. The area of the whole shape is 89 cm^2 .

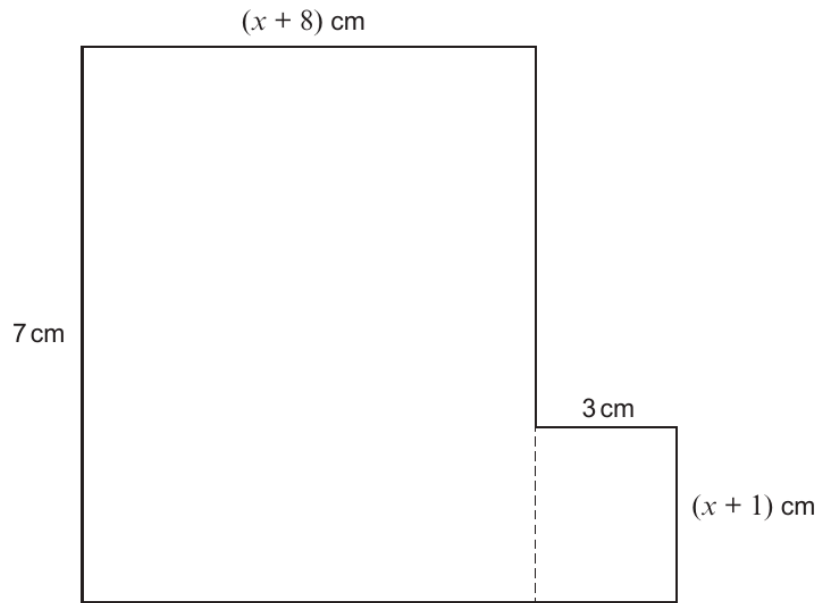


Diagram not drawn to scale

Form and solve an equation to find the value of x .

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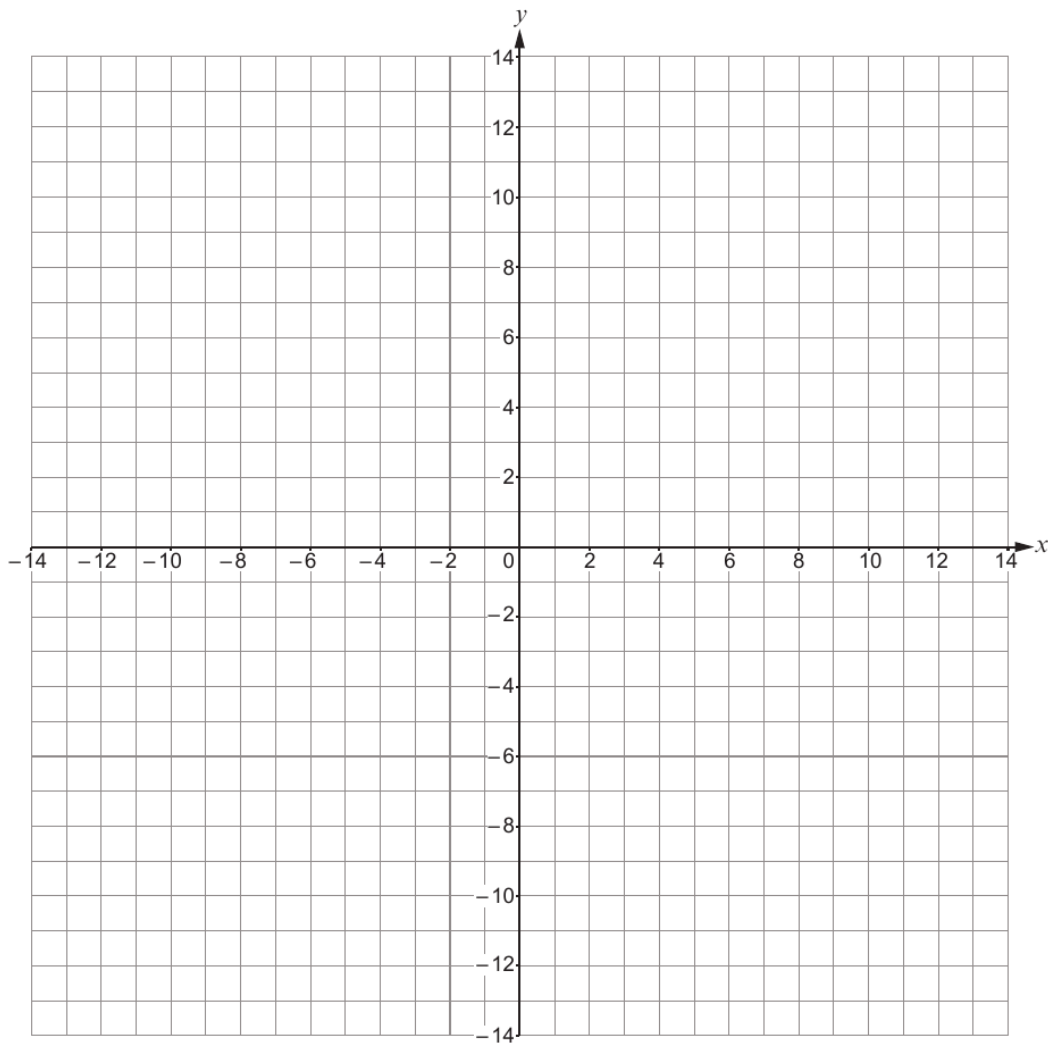
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13. Using the axes below, find the region which satisfies the following inequalities:

$$\begin{aligned}y &\geq 2 \\y &\geq 2x - 10 \\y &\leq x\end{aligned}$$

Make sure that you clearly indicate the region that represents your answer.

[3]



Examiner
only

16. (a) Sketch the curve $y = \cos x$ on the axes below, for values of x from 0° to 360° .
You must indicate any important values on both axes. [2]



- (b) Solve the equation $2 \cos x = 1$.
Give all answers in the range $x = 0^\circ$ to $x = 360^\circ$. [2]

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