

CHAPTER 6 / 6C

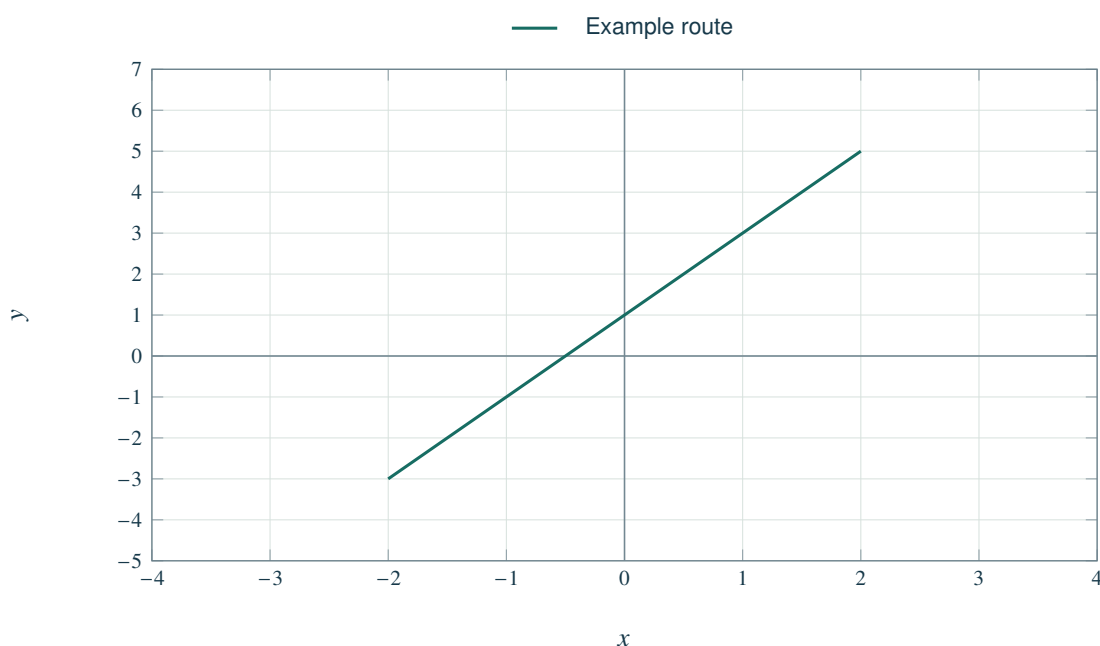
Graphing straight lines

Name: _____ Class: _____ Date: _____

Build straight-line graphs from equations and tables. Work across all four quadrants, check suspect coordinates, and use a graph to find missing values.

What you will learn

- Interpret and plot signed coordinates.
- Build a value table from a linear equation.
- Check whether points belong to a line and use the line to recover missing coordinates.

See the mathematics

Learning map: a table of matching horizontal and vertical coordinates makes a straight route.

Key ideas

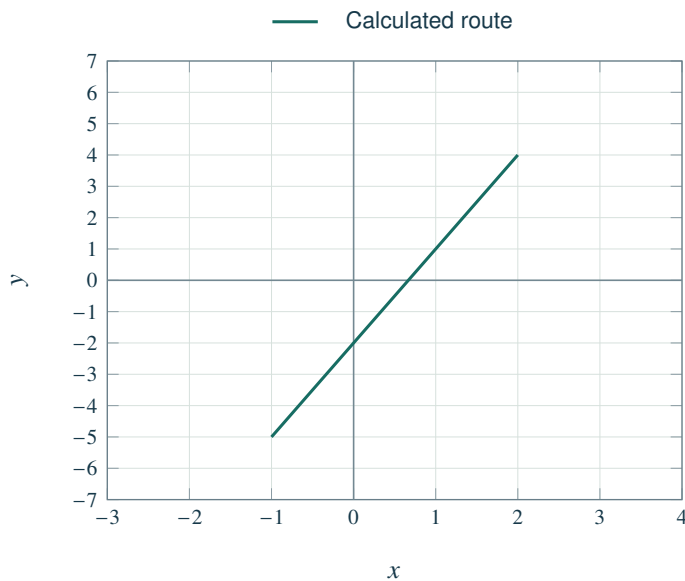
- Coordinates are ordered (x, y) : horizontal position first, vertical position second.
- Substitute each x -value into the equation to obtain its matching y -value.
- Two distinct points determine a straight line; extra points provide a useful check.
- A point lies on a line only when its coordinates satisfy the equation.

Pages 1–8: student resource. Pages 9–10: worked answers.

Worked examples / connect the calculation to the graph

1. Complete and plot a table

For $y = 3x - 2$, find the points when $x = -1, 0$ and 2 .



1. Substitute each x -value: $y = -3 - 2$, $y = 0 - 2$, and $y = 6 - 2$.
2. Pair each result with the x -value that produced it.

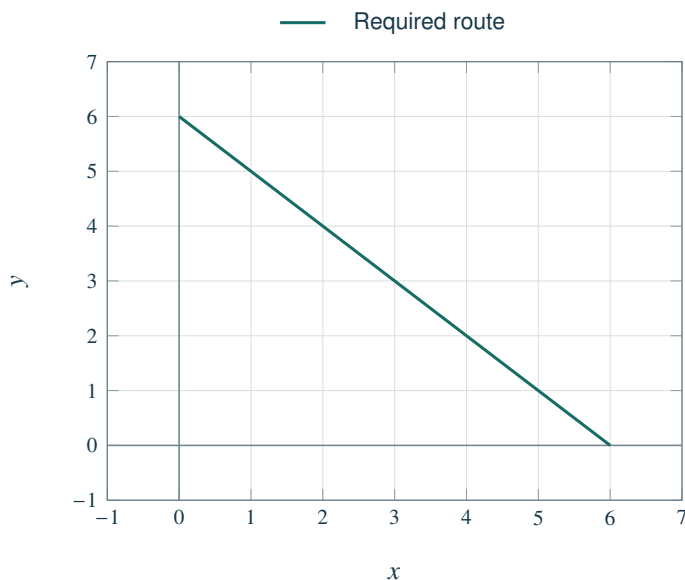
Result

$(-1, -5), (0, -2), (2, 4)$.

Worked example: the table supplies three points on the same straight line.

2. Audit a transmitted point

A beacon reports $(4, 1)$ on $y = -x + 6$. Is it correct?



1. Substitute $x = 4$ to obtain $y = -4 + 6 = 2$.
2. The reported y -value is 1, not 2.

Result

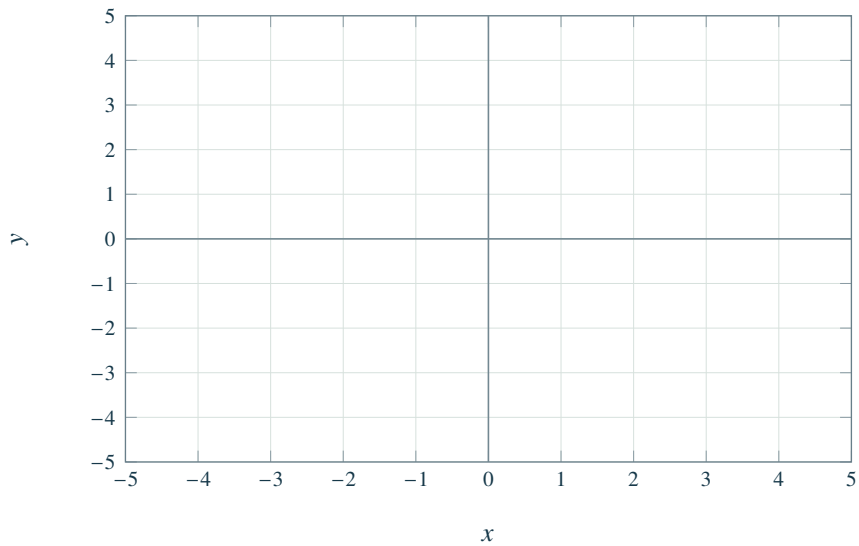
No. At $x = 4$ the correct point is $(4, 2)$.

Worked example: compare a reported beacon with the route at its horizontal position.

Coordinates and tables

Use the graph to record your thinking. Show calculations and include units where needed.

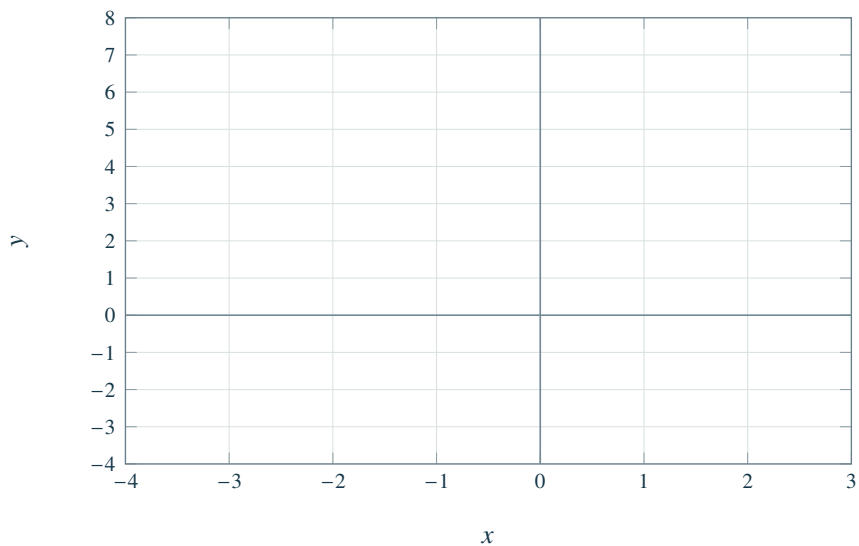
1. Plot $P(-4, 2)$, $Q(3, -3)$, $R(-2, -4)$ and $S(4, 3)$ on the grid. State the quadrant of each point.



Use these labelled axes to construct and check the requested graph.

WORKING / DECISION

2. Complete the y -values for $y = 2x + 3$ when $x = -3, -1, 0$ and 2 . Write the resulting coordinate pairs.



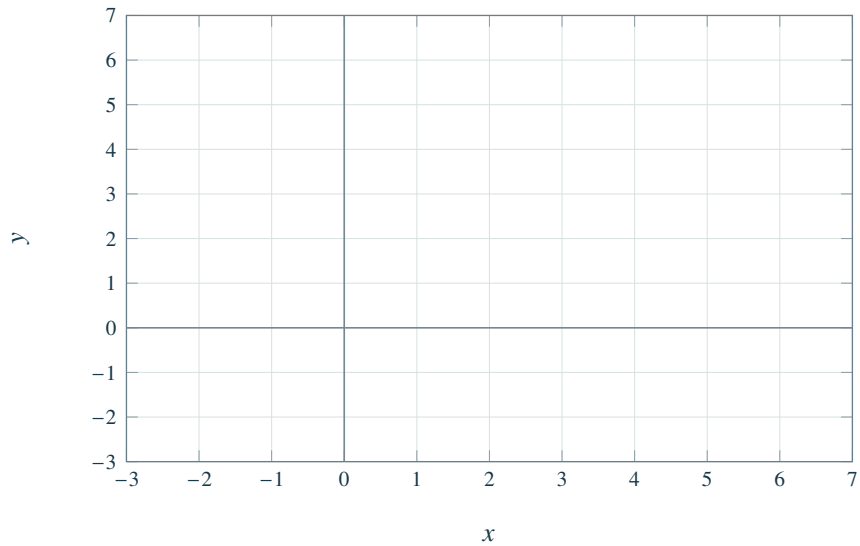
Plot the coordinates from your completed table.

WORKING / DECISION

Coordinates and tables

Use the graph to record your thinking. Show calculations and include units where needed.

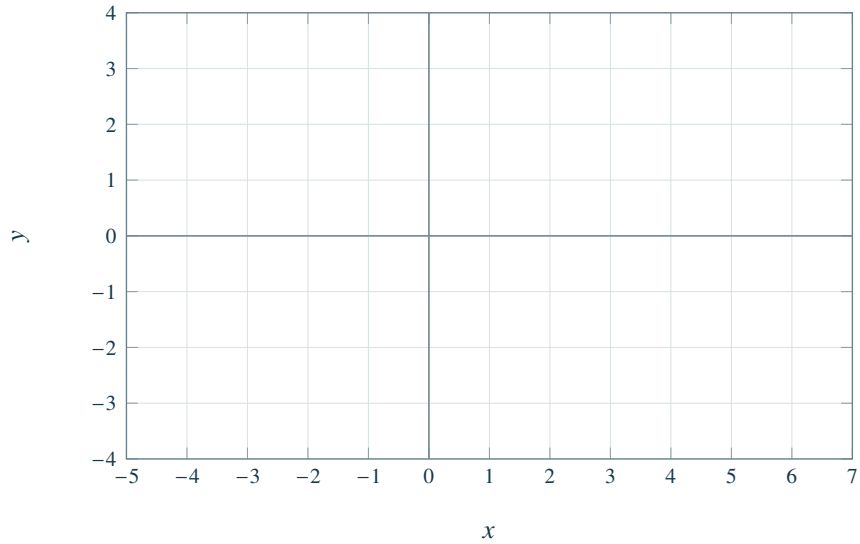
3. Complete the table for $y = -x + 4$ at $x = -2, 0, 3$ and 6 . Which of these points lies below the x -axis?



WORKING / DECISION

Place your calculated points and mark any point below the horizontal axis.

4. For $y = \frac{x}{2} - 1$, calculate y when $x = -4, 0, 2$ and 6 . Explain why these even x -values are convenient.



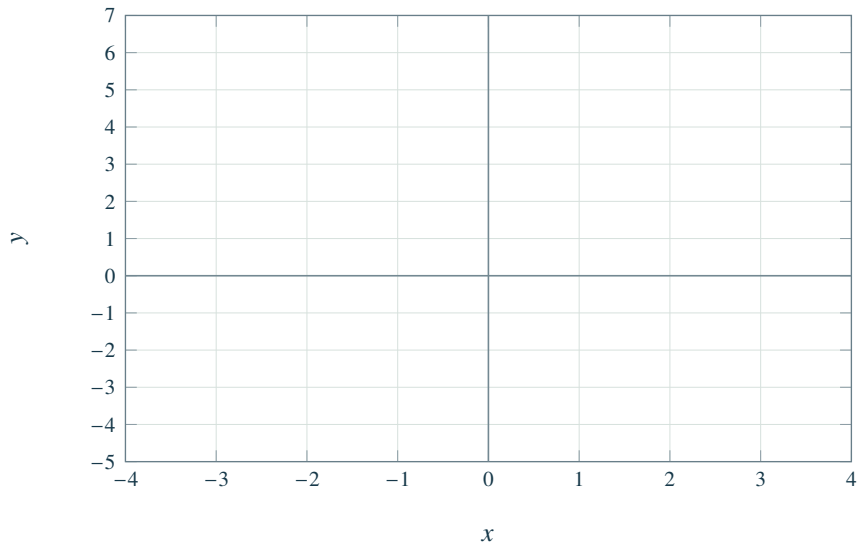
WORKING / DECISION

Use the chosen even inputs to build your fractional-rule graph.

Construct and repair

Use the graph to record your thinking. Show calculations and include units where needed.

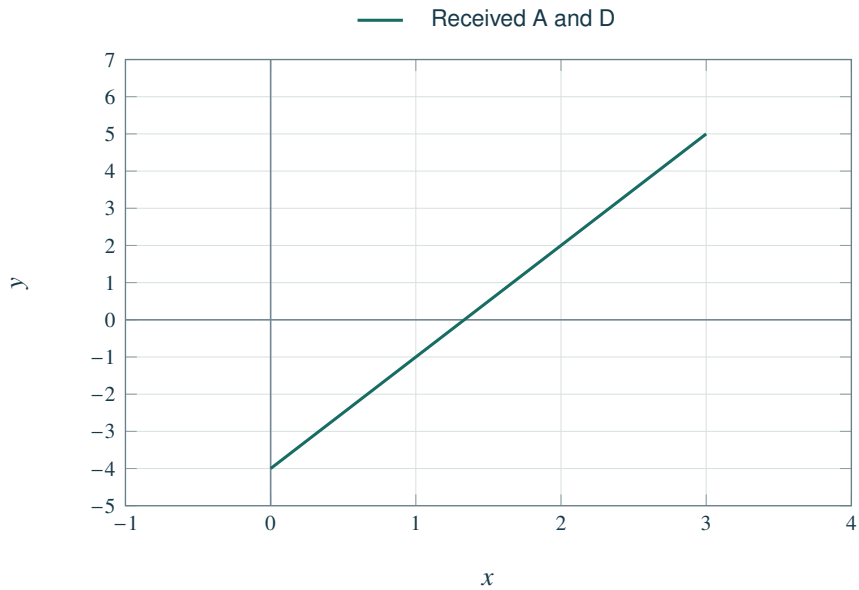
5. Complete a table at $x = -2, 0$ and 2 for $y = -2x + 1$. Plot the three points and draw the straight line.



Use these labelled axes to construct and check the requested graph.

WORKING / DECISION

6. A route should follow $y = 3x - 4$. Received coordinates are $A(0, -4)$, $B(1, -1)$, $C(2, 3)$ and $D(3, 5)$. Identify and correct the faulty coordinate.



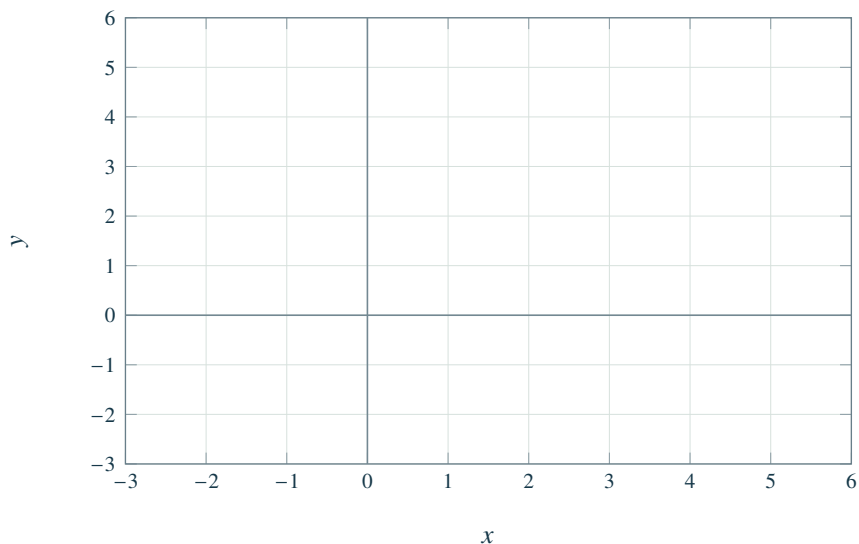
The end records are shown. Check the other received coordinates against the stated rule.

WORKING / DECISION

Construct and repair

Use the graph to record your thinking. Show calculations and include units where needed.

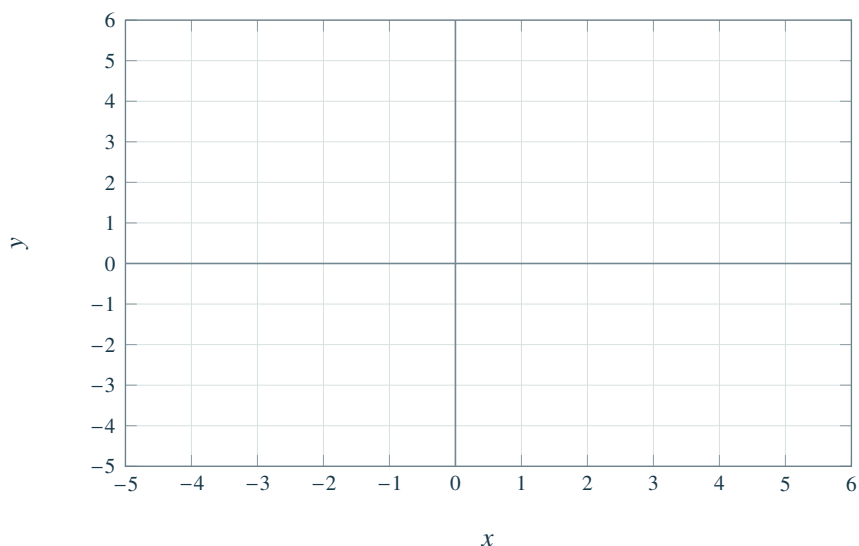
7. Plot the line $x + y = 3$ using $x = -2, 0$ and 5 . Write the equation in a form that makes calculating y easy.



WORKING / DECISION

Use these labelled axes to construct and check the requested graph.

8. A student turns the point $(-3, 5)$ into $(5, -3)$ when plotting. Explain the error and describe how to locate the correct point.



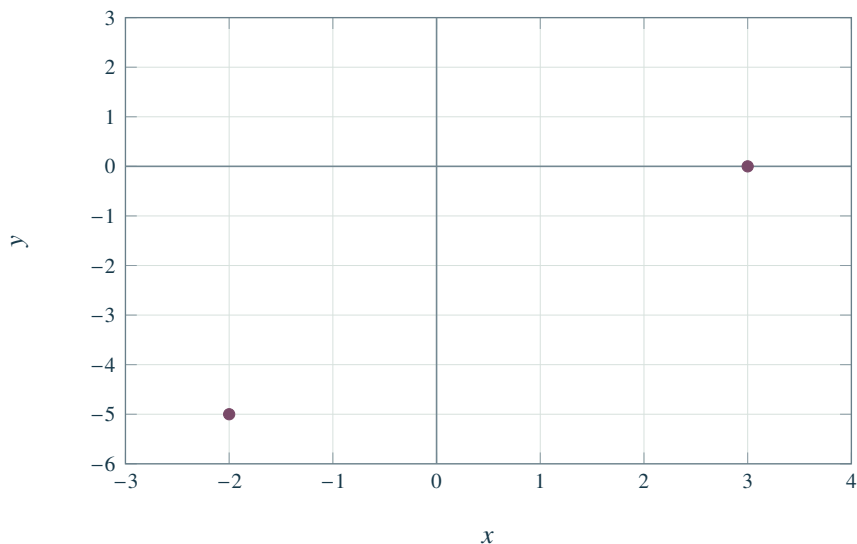
WORKING / DECISION

Plot and label the reported point and the mistakenly reversed point.

Use and test the graph

Use the graph to record your thinking. Show calculations and include units where needed.

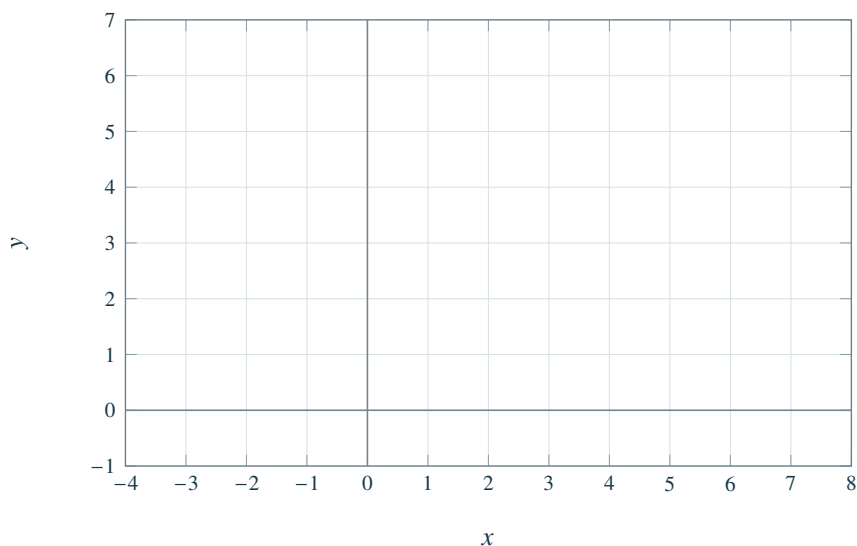
9. Two beacons are $Q(-2, -5)$ and $R(3, 0)$. Which equation fits both: $Ay = 2x - 1$, $By = x - 3$, or $Cy = -x + 3$?



WORKING / DECISION

The two surviving records are supplied. Test the candidate equations without moving these points.

10. The route $y = \frac{x}{2} + 2$ must reach a gate at height $y = 5$. Find the gate's x -coordinate and check it by substitution.



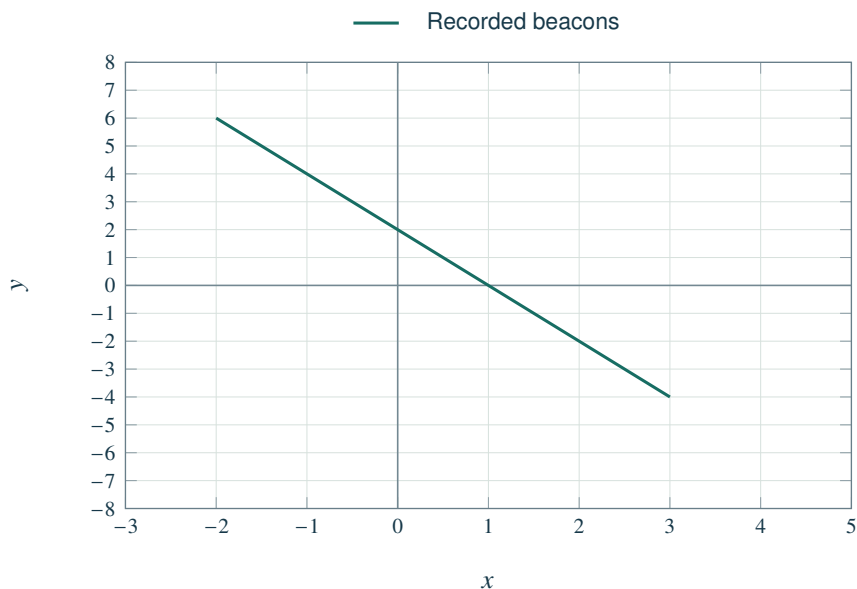
WORKING / DECISION

Draw enough of the route to locate a gate at the stated height.

Use and test the graph

Use the graph to record your thinking. Show calculations and include units where needed.

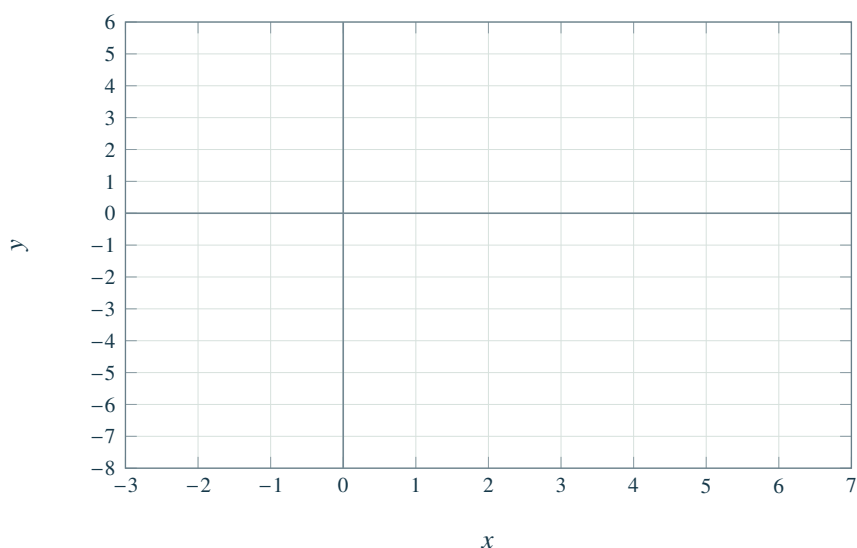
- 11.** A straight line passes through $(-2, 6)$, $(0, 2)$ and $(3, -4)$. Does the beacon $(4, -5)$ continue the same pattern? If not, give its corrected y -value.



WORKING / DECISION

The three reliable records are shown; add and check the proposed extra beacon.

- 12.** For $y = -3\frac{x}{2} + 2$, calculate and plot points at $x = -2, 0$ and 4 . Then find x when $y = -7$.



WORKING / DECISION

Use these labelled axes to construct and check the requested graph.

6C / Worked answers

Teacher appendix. Equivalent exact forms are accepted. Use the reasoning to check student work.

1. P: II; Q: IV; R: III; S: I.

- P has negative x and positive y ; Q has positive x and negative y .
 - R has two negative coordinates; S has two positive coordinates.
-

2. $(-3, -3), (-1, 1), (0, 3), (2, 7)$.

- Substitute each x : $-6 + 3, -2 + 3, 0 + 3, 4 + 3$.
 - The y -values are $-3, 1, 3$ and 7 .
-

3. $(-2, 6), (0, 4), (3, 1), (6, -2)$; only $(6, -2)$ is below.

- Calculate $y = 6, 4, 1$ and -2 respectively.
 - A point is below the x -axis when its y -coordinate is negative.
-

4. $y = -3, -1, 0, 2$; even x -values give integer y -values.

- Divide each x -value by 2, then subtract 1.
 - The coordinates are $(-4, -3), (0, -1), (2, 0), (6, 2)$.
-

5. Points $(-2, 5), (0, 1), (2, -3)$, joined by a straight line.

- Substitution gives $y = 5, 1$ and -3 .
 - The three points align and the line falls from left to right.
-

6. C should be $(2, 2)$.

- At $x = 2$ the equation gives $y = 6 - 4 = 2$.
 - The other three pairs satisfy the equation.
-

6C / Worked answers

Teacher appendix. Equivalent exact forms are accepted. Use the reasoning to check student work.

7. $y = 3 - x$; points $(-2, 5)$, $(0, 3)$, $(5, -2)$.

- Rearrange $x + y = 3$ by subtracting x .
 - Substitute the three x -values and join their plotted points.
-

8. They reversed x and y . Move 3 units left and 5 units up from the origin.

- The first coordinate controls horizontal movement.
 - The second coordinate controls vertical movement.
-

9. B: $y = x - 3$.

- At $x = -2$, B gives -5 ; at $x = 3$, B gives 0 .
 - A fits Q but not R; C does not fit either pair.
-

10. $x = 6$; gate $(6, 5)$.

- $5 = \frac{x}{2} + 2$ gives $\frac{x}{2} = 3$ and $x = 6$.
 - Substitution gives $\frac{6}{2} + 2 = 5$.
-

11. No; at $x = 4$ the correct y -value is -6 .

- The pattern decreases y by 2 for every increase of 1 in x .
 - From $(3, -4)$, moving one unit right gives $(4, -6)$.
-

12. $(-2, 5)$, $(0, 2)$, $(4, -4)$; $x = 6$ when $y = -7$.

- Substitution gives the three coordinates.
 - Solve $-7 = -3\frac{x}{2} + 2$: $-9 = -3\frac{x}{2}$, so $x = 6$.
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