

Name _____

Date _____

11.2 Straight-line graphs — worked answers

Plot and read straight-line graphs, and connect the rule $y = mx + c$ to the gradient and the y-intercept. · 58 questions

A · Fluency — Substitute, and read off the graph.

- 1 For the line $y = x$, what is y when $x = 2$?
Answer: 2
Substitute $x = 2$: $y = 2$.
- 2 For the line $y = x$, what is y when $x = -2$?
Answer: -2
Substitute $x = -2$: $y = -2$.
- 3 For the line $y = 2x$, what is y when $x = 2$?
Answer: 4
Substitute $x = 2$: $y = 4$.
- 4 For the line $y = 2x$, what is y when $x = -2$?
Answer: -4
Substitute $x = -2$: $y = -4$.
- 5 For the line $y = x + 2$, what is y when $x = 2$?
Answer: 4
Substitute $x = 2$: $y = 4$.
- 6 For the line $y = x + 2$, what is y when $x = -2$?
Answer: 0
Substitute $x = -2$: $y = 0$.
- 7 For the line $y = 2x + 1$, what is y when $x = 2$?
Answer: 5
Substitute $x = 2$: $y = 5$.
- 8 For the line $y = 2x + 1$, what is y when $x = -2$?
Answer: -3
Substitute $x = -2$: $y = -3$.
- 9 For the line $y = 3x - 1$, what is y when $x = 2$?
Answer: 5
Substitute $x = 2$: $y = 5$.
- 10 For the line $y = x - 3$, what is y when $x = 2$?
Answer: -1
Substitute $x = 2$: $y = -1$.

- 11 For the line $y = x - 3$, what is y when $x = -2$?

Answer: -5

Substitute $x = -2$: $y = -5$.

- 12 For the line $y = 2x - 2$, what is y when $x = 2$?

Answer: 2

Substitute $x = 2$: $y = 2$.

- 13 For the line $y = -x$, what is y when $x = 2$?

Answer: -2

Substitute $x = 2$: $y = -2$.

- 14 For the line $y = -x$, what is y when $x = -2$?

Answer: 2

Substitute $x = -2$: $y = 2$.

- 15 For the line $y = -2x + 1$, what is y when $x = 2$?

Answer: -3

Substitute $x = 2$: $y = -3$.

- 16 For the line $y = -2x + 1$, what is y when $x = -2$?

Answer: 5

Substitute $x = -2$: $y = 5$.

- 17 For the line $y = -x + 3$, what is y when $x = 2$?

Answer: 1

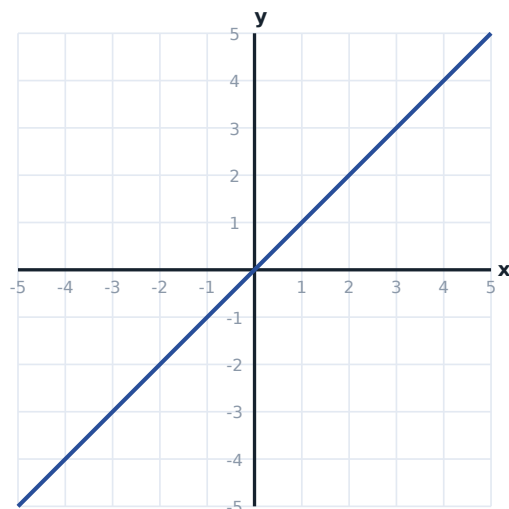
Substitute $x = 2$: $y = 1$.

- 18 For the line $y = -x + 3$, what is y when $x = -2$?

Answer: 5

Substitute $x = -2$: $y = 5$.

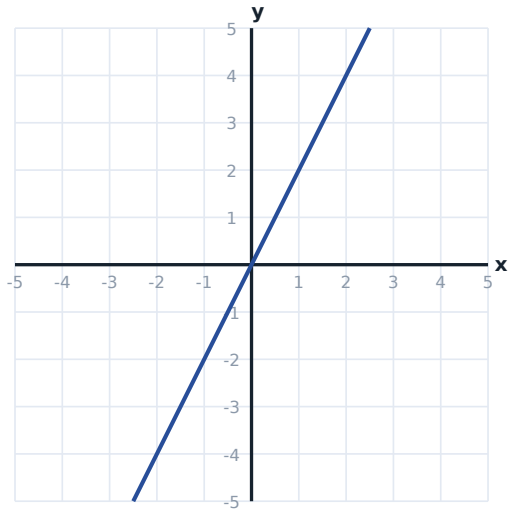
- 19 This is the line $y = x$. Where does it cross the y -axis? Give the y -coordinate.



Answer: 0

The line crosses the y -axis where $x = 0$, and that gives $y = 0$. The constant in the rule is always the y -intercept.

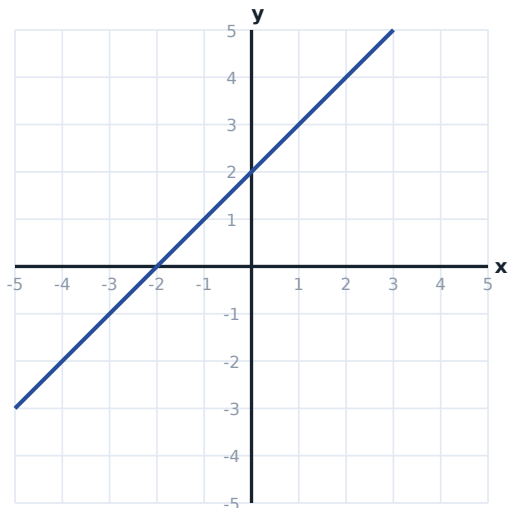
- 20** This is the line $y = 2x$. Where does it cross the y-axis? Give the y-coordinate.



Answer: 0

The line crosses the y-axis where $x = 0$, and that gives $y = 0$. The constant in the rule is always the y-intercept.

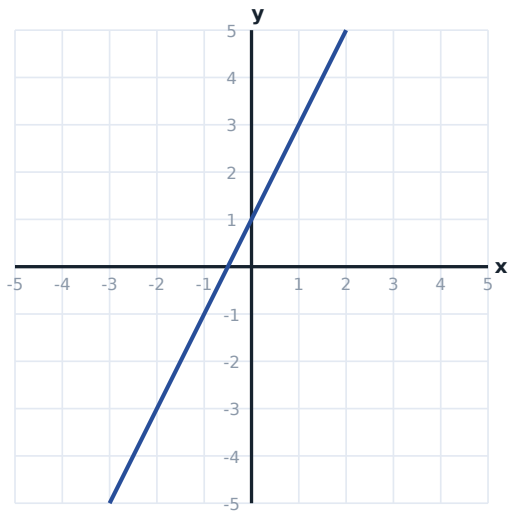
- 21** This is the line $y = x + 2$. Where does it cross the y-axis? Give the y-coordinate.



Answer: 2

The line crosses the y-axis where $x = 0$, and that gives $y = 2$. The constant in the rule is always the y-intercept.

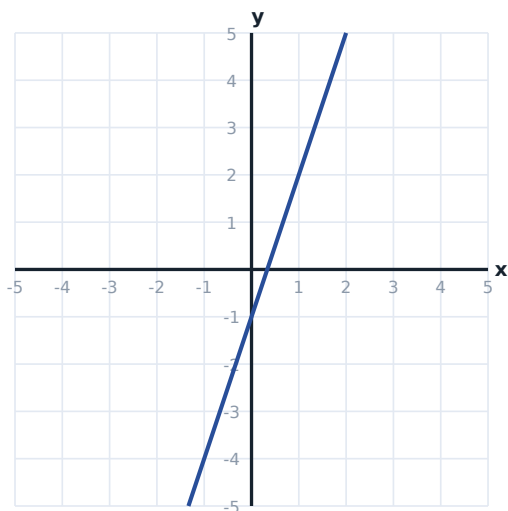
- 22** This is the line $y = 2x + 1$. Where does it cross the y-axis? Give the y-coordinate.



Answer: 1

The line crosses the y-axis where $x = 0$, and that gives $y = 1$. The constant in the rule is always the y-intercept.

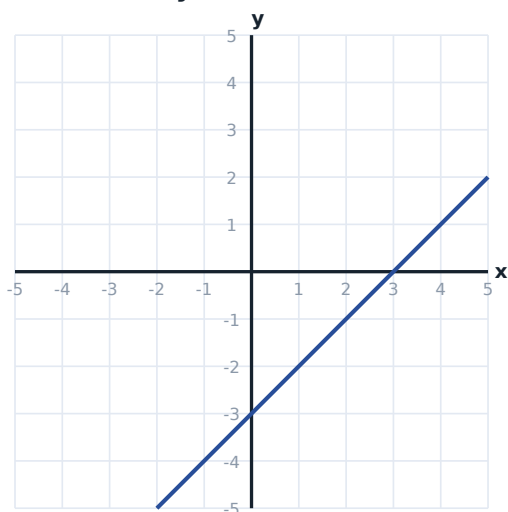
- 23** This is the line $y = 3x - 1$. Where does it cross the y-axis? Give the y-coordinate.



Answer: -1

The line crosses the y-axis where $x = 0$, and that gives $y = -1$. The constant in the rule is always the y-intercept.

- 24** This is the line $y = x - 3$. Where does it cross the y-axis? Give the y-coordinate.



Answer: -3

The line crosses the y-axis where $x = 0$, and that gives $y = -3$. The constant in the rule is always the y-intercept.

- 25** For the line $y = x$, how much does y go up each time x goes up by 1?

Answer: 1

The number in front of x is the gradient: 1.

- 26** For the line $y = 2x$, how much does y go up each time x goes up by 1?

Answer: 2

The number in front of x is the gradient: 2.

- 27** For the line $y = x + 2$, how much does y go up each time x goes up by 1?

Answer: 1

The number in front of x is the gradient: 1.

- 28** For the line $y = 2x + 1$, how much does y go up each time x goes up by 1?

Answer: 2

The number in front of x is the gradient: 2.

- 29** For the line $y = 3x - 1$, how much does y go up each time x goes up by 1?

Answer: 3

The number in front of x is the gradient: 3.

- 30** For the line $y = x - 3$, how much does y go up each time x goes up by 1?

Answer: 1

The number in front of x is the gradient: 1.

- 31** Does the point (3, 7) lie on the line $y = 2x + 1$? Answer 1 for yes, 0 for no.

Answer: 1

Substituting $x = 3$ gives $y = 7$, which matches, so the point is on the line.

- 32** Does the point (2, 6) lie on the line $y = 3x$? Answer 1 for yes, 0 for no.

Answer: 1

Substituting $x = 2$ gives $y = 6$, which matches, so the point is on the line.

- 33** Does the point (1, 5) lie on the line $y = x + 4$? Answer 1 for yes, 0 for no.

Answer: 1

Substituting $x = 1$ gives $y = 5$, which matches, so the point is on the line.

- 34** Does the point (4, 5) lie on the line $y = 2x - 3$? Answer 1 for yes, 0 for no.

Answer: 1

Substituting $x = 4$ gives $y = 5$, which matches, so the point is on the line.

- 35** Does the point (2, 3) lie on the line $y = -1x + 5$? Answer 1 for yes, 0 for no.

Answer: 1

Substituting $x = 2$ gives $y = 3$, which matches, so the point is on the line.

B · Reasoning — What m and c mean.

- 36** In $y = 3x + 2$, what does the 3 tell you?

- ☐ Where the line crosses the y-axis
- ☐ How steep the line is
- ☐ The value of x
- ☐ Nothing

Answer: How steep the line is

It is the gradient: y goes up 3 for every 1 across.

- 37** In $y = 3x + 2$, what does the 2 tell you?

- ☐ The gradient
- ☐ Where the line crosses the y-axis
- ☐ The value of x
- ☐ The number of points

Answer: Where the line crosses the y-axis

Put $x = 0$ and you get $y = 2$, so the line passes through (0, 2).

- 38** How many points do you need to draw a straight line?

- ☐ One
- ☐ Two, but three is safer
- ☐ Ten
- ☐ As many as possible

Answer: Two, but three is safer

Two points fix a line; the third is a check. If it does not lie on the line, one of the three is wrong.

- 39** The line $y = 2x$ passes through which point?

- ☐ (0, 2)
- ☐ (2, 0)
- ☐ (0, 0)
- ☐ (1, 1)

Answer: (0, 0)

There is no constant, so the line goes through the origin.

40 A line has a negative gradient. What does it look like?

- ☐ It goes up from left to right
- ☐ It goes down from left to right
- ☐ It is horizontal
- ☐ It is vertical

Answer: It goes down from left to right

As x increases, y decreases.

41 What does the line $y = 4$ look like?

- ☐ Vertical
- ☐ Horizontal, four units above the x -axis
- ☐ Diagonal
- ☐ Through the origin

Answer: Horizontal, four units above the x -axis

Every point has $y = 4$, whatever x is.

42 What does the line $x = -2$ look like?

- ☐ Horizontal
- ☐ Vertical, two units left of the y -axis
- ☐ Diagonal
- ☐ Through the origin

Answer: Vertical, two units left of the y -axis

Every point has $x = -2$, whatever y is.

43 Do the lines $y = 2x + 1$ and $y = 2x + 5$ ever cross?

- ☐ Yes
- ☐ No

Answer: No

They have the same gradient, so they are parallel.

44 How do you check whether a point lies on a line?

- ☐ Look at the graph only
- ☐ Substitute its coordinates into the rule
- ☐ Measure with a ruler
- ☐ You cannot

Answer: Substitute its coordinates into the rule

If the two sides agree, the point is on the line.

C · Challenge — Missing coordinates and intercepts.

45 The line $y = 2x + 3$ passes through $(4, k)$. What is k ?

Answer: 11

$2(4) + 3 = 11$.

46 The line $y = 3x - 5$ passes through $(h, 7)$. What is h ?

Answer: 4

$3h - 5 = 7$, so $3h = 12$ and $h = 4$.

47 Where does $y = 2x - 6$ cross the x -axis? Give the x -coordinate.

Answer: 3

It crosses the x -axis where $y = 0$: $2x - 6 = 0$, so $x = 3$.

- 48** Two lines are $y = 3x + 1$ and $y = 3x + 7$. What is the vertical gap between them?

Answer: 6

Same gradient, so they are parallel; $7 - 1 = 6$.

- 49** The line $y = mx$ passes through (3, 12). What is m ?

Answer: 4

$3m = 12$, so $m = 4$.

- 50** The line $y = 2x + c$ passes through (1, 5). What is c ?

Answer: 3

$2(1) + c = 5$, so $c = 3$.

D · Word problems — Fares, growth and burning candles.

- 51** A taxi charges $y = 2x + 3$ dollars for x km. What is the fare for 6 km, in dollars?

Answer: 15

$2(6) + 3 = 15$.

- 52** In that taxi rule, what does the 3 represent, in dollars?

Answer: 3

The fixed charge before you travel at all — the y-intercept.

- 53** A plant's height is $y = 3x + 5$ cm after x weeks. How tall at the start, in cm?

Answer: 5

$x = 0$ gives $y = 5$.

- 54** A plant's height is $y = 3x + 5$ cm after x weeks. How many cm does it grow each week?

Answer: 3

The gradient is 3.

- 55** A phone plan costs $y = 0.5x + 10$ dollars for x minutes. What is the cost of 40 minutes, in dollars?

Answer: 30

$0.5(40) + 10 = 30$.

- 56** A candle burns down: $y = 20 - 2x$ cm after x hours. How tall after 6 hours, in cm?

Answer: 8

$20 - 12 = 8$.

- 57** For that candle, after how many hours does it burn out?

Answer: 10

$20 - 2x = 0$ gives $x = 10$.

- 58** A pool fills as $y = 15x$ litres after x minutes. How many litres after 8 minutes?

Answer: 120

$15 \times 8 = 120$.