MATHEMATICS · GRADES 7-9

# Finding Equations from Tables

**Difficulty level: Intermediate**

**Mathematics: Grades 7-9**

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## *Overview of the concept*

This is how you turn a table of numbers into one rule. A table of hours and wages hides a pay rate, and finding it gives you a rule that predicts next week's pay. Instead of looking up every value in a table, you calculate it from the rule. One equation replaces the whole table.



## *Rule*

**Equation of a line: $y = mx + b$, where m is the slope and b is the y-intercept.**

In a table, b is the y value when x is 0, and m is how much y changes each time x goes up by 1.

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## Worked examples

EXAMPLE 1

**Q** Table x: 0, 1, 2 and y: 1, 4, 7. Find the equation.

SOLUTION

When x = 0, y = 1, so the y-intercept b = 1

Each step y rises 3, so slope m = 3

The equation is y = 3x + 1

EXAMPLE 2

**Q** Table x: 0, 1, 2 and y: 5, 3, 1. Find the equation.

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 5 | 3 | 1 |

SOLUTION

When x = 0, y = 5, so b = 5

Each step y falls 2, so m = -2

The equation is y = -2x + 5

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## Practice questions

**1** A taxi charges a starting fee and then the same amount for each kilometre. The table shows the total cost y for x kilometres. Find the equation that gives y for x kilometres.

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 2 | 5 | 8 |

A. y = 3x - 2

B. y = 3x + 2

C. y = 4x + 2

D. y = 2x + 2

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**2** **A plant grows the same amount each week. The table shows its height y after x weeks. Find the equation that gives y for x weeks.**

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 0 | 2 | 4 |

A. y = 3x

B. y = x

C. y = 2x

D. y = -2x

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**3** A tank holds the same amount of water each day. The table shows the amount y after x days. Find the equation that gives y for x days.

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 6 | 6 | 6 |

A y = 7

B y = 5

C y = -6

D y = 6

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**4** The temperature falls the same amount each hour. The table shows the temperature y after x hours. Find the equation that gives y for x hours.

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 10 | 8 | 6 |

A $y = -2x + 10$

B $y = -2x - 10$

C $y = -x + 10$

D $y = -3x + 10$

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**5** Sara saves the same amount each week, starting with some money saved. The table shows her total savings y after x weeks. What will her savings be after 5 weeks?

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 3 | 7 | 11 |

A 19

B 23

C 27

D 15

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**6** A shop sells pens in packs. The table shows the total cost y for x packs. How much does one pack cost?

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 4 | 9 | 14 |

A $4

B $5

C $9

D $14

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**7** A candle burns down the same amount each hour. The table shows its height y after x hours. Find the equation that gives y for x hours.

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 1 | 0 | -1 |

A y = -x - 1

B y = -2x + 1

C y = x + 1

D y = -x + 1

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**8** A phone plan charges a starting fee and then the same amount for each minute. The table shows the total cost y for x minutes. What is the starting fee?

| | 0 | 1 | 2 |
|---|---|---|---|
| x | 0 | 1 | 2 |
| y | 7 | 5 | 3 |

A $7

B $2

C $5

D $3

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**9** A car travels at a steady speed. The table shows the distance y after x hours, starting from a point 1 km ahead. Use $y = 3x + 1$ to predict y when $x = 5$.

| | 0 | 1 | 2 | 5 |
|---|---|---|---|---|
| x | 0 | 1 | 2 | 5 |
| y | 1 | 4 | 7 | ? |

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**10** A tank is being emptied at a steady rate. The table shows the amount y left after x hours. Use $y = -2x + 5$ to predict y when $x = 4$.

| | 0 | 1 | 2 | 4 |
|---|---|---|---|---|
| x | 0 | 1 | 2 | 4 |
| y | 5 | 3 | 1 | ? |

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## ANSWER KEY

**1.** $y = 3x + 2$

**2.** $y = 2x$

**3.** $y = 6$

**4.** $y = -2x + 10$

**5.** 23

**6.** $5

**7.** $y = -x + 1$

**8.** $7

**9.** 16

**10.** -3

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