MATHEMATICS · GRADES 10-12

Function notation

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you write a rule once and reuse it, like a phone plan formula that turns minutes used into the bill you owe. Function notation is just a short way of naming a rule so you can use it again with different numbers without rewriting it. Your phone bill, a taxi fare, and a gym membership all run on rules like this, and writing them this way lets you work out the cost for any amount in seconds.



Rule

Function notation: f(x) names a rule, and f(a) means put a in wherever x appears in the rule.

So for f(x) = 2x + 3, f(4) = 2 × 4 + 3 = 11.

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Worked examples

EXAMPLE 1

Q For f(x) = 2x + 3, find f(4)

SOLUTION

Replace every x with 4: f(4) = 2 × 4 + 3

Work out 2 × 4 = 8

Add 3: 8 + 3 = 11, so f(4) = 11

EXAMPLE 2

Q For $g(x) = x^2 - 1$, find g(5)

SOLUTION

Replace every x with 5: $g(5) = 5^2 - 1$

Work out $5^2 = 25$

Subtract 1: 25 - 1 = 24, so g(5) = 24

Practice questions

1 For f(x) = 3x + 2, find f(4).

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2 For $f(x) = x^2 + 3$, find $f(2)$.

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3 A jug holds 5 litres of juice. You pour out x litres, so the amount left is $f(x) = 5 - x$ litres. How much is left when $x = 2$?

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4 A gardener earns $2 per lawn mowed and pays $7 for petrol, so the money kept is $f(x) = 2x - 7$ dollars. How much is kept after 5 lawns?

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5 A stall's profit is $f(x) = x^2 - 4x$ dollars, where x is the number of items sold. What is the profit when $x = 3$?

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6 A rope 10 m long is cut into x equal pieces. Each piece is $f(x) = 10 \div x$ metres long. How long is each piece when $x = 5$?

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7 A taxi charges a $1 booking fee plus $4 per kilometre, so the fare is $f(x) = 4x + 1$ dollars. What is the fare for a 0 km trip?

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8 A square patio has side $(x + 1)$ m, so its area is $f(x) = x^2 + 2x + 1$ square metres. What is the area when $x = 2$?

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9 A 6 m rope has $2x$ m cut off it, so the length left is $f(x) = 6 - 2x$ metres. How much is left when $x = 3$?

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10 Three square fields each have side x m, so their total area is $f(x) = 3x^2$ square metres. What is the total area when $x = 3$?

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ANSWER KEY

1. 14

2. 7

3. 3

4. 3

5. -3

6. 2

7. 1

8. 9

9. 0

10. 27

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