MATHEMATICS · GRADES 10-12

Finding x- and y-intercepts

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you find where a graph crosses the axes. The starting cost of a taxi ride before you travel is the y-intercept, and the moment a phone battery hits zero is the x-intercept. Those two points tell you where something starts and where it runs out. They are the first things you read off any graph of a real situation.



Rule

Intercepts: the y-intercept is where the graph crosses the y-axis, found by setting x = 0.

The x-intercepts are where it crosses the x-axis, found by setting y = 0 and solving.

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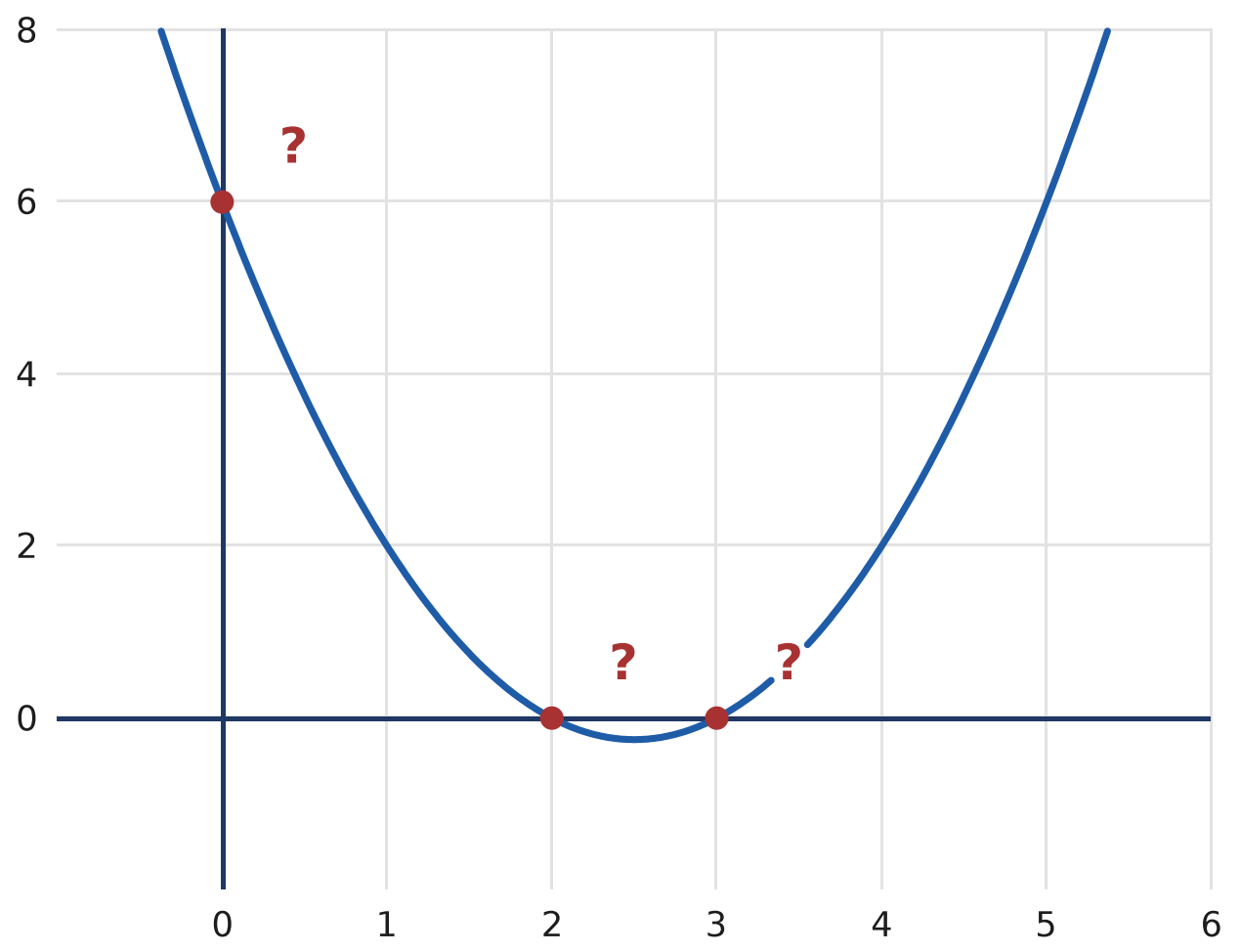
Worked examples

EXAMPLE 1

Q Find the intercepts of $y = x^2 - 5x + 6$



SOLUTION

For the y-intercept, set $x = 0$: $y = 6$, so the point is $(0, 6)$.

For the x-intercepts, set $y = 0$ and factor: $(x - 2)(x - 3) = 0$

So the x-intercepts are $(2, 0)$ and $(3, 0)$

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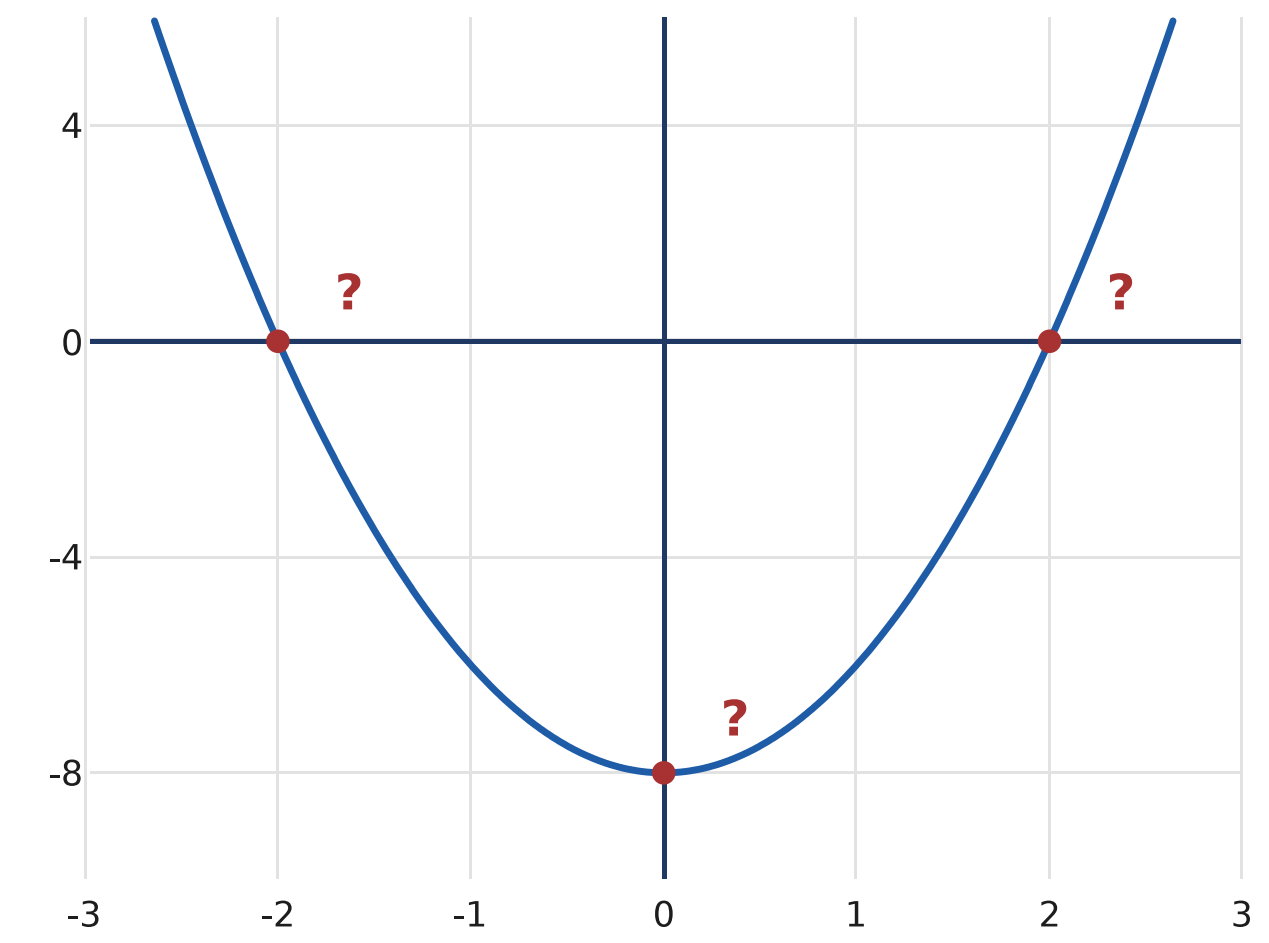
EXAMPLE 2

Q Find the intercepts of $y = 2x^2 - 8$



SOLUTION

For the y-intercept, set $x = 0$: $y = -8$, so the point is $(0, -8)$.

For the x-intercepts, set $y = 0$: $2x^2 = 8$, so $x^2 = 4$

So the x-intercepts are $(2, 0)$ and $(-2, 0)$

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Practice questions

1 **A ball's height is $y = x^2 - 3x + 2$. Find the intercepts.**

- **A** x-intercepts (1, 0) and (-2, 0); y-intercept (0, -2)
- **B** x-intercepts (1, 0) and (2, 0); y-intercept (0, -2)
- **C** x-intercepts (1, 0) and (2, 0); y-intercept (0, 2)
- **D** x-intercepts (-1, 0) and (2, 0); y-intercept (0, 2)

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2 **A parabola crosses the x-axis at 1 and -5 and the y-axis at -5. Which equation is it?**

- **A** $y = x^2 + 4x - 5$
- **B** $y = x^2 - 4x - 5$
- **C** $y = x^2 + 4x + 5$
- **D** $y = x^2 - 4x + 5$

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3 A valley is shaped like $y = x^2 - 9$. Find where the curve crosses the x-axis and where it crosses the y-axis.

- **A** x-intercepts (3, 0) and (-3, 0); y-intercept (0, 9)
- **B** x-intercepts (9, 0) and (-9, 0); y-intercept (0, -9)
- **C** x-intercepts (3, 0) and (-3, 0); y-intercept (0, -3)
- **D** x-intercepts (3, 0) and (-3, 0); y-intercept (0, -9)

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4 For $y = 3x^2 - 12$, which point is the y-intercept?

- **A** (0, -12)
- **B** (0, 12)
- **C** (2, 0)
- **D** (-2, 0)

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5 A bridge arch is $y = x^2 + 2x - 8$. Which x-intercept is positive?

- **A** 2
- **B** -4
- **C** 8
- **D** -8

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6 A ball's height is $y = x^2 - 7x + 12$. What is the sum of the x-intercepts?

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7 A hill's shape is $y = x^2 - 16$. What is the product of the x-intercepts?

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8 For $y = 2x^2 - 18$, how many x-intercepts does the graph have?

- **A** 2
- **B** 1
- **C** 0
- **D** 3

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9 For $y = x^2 + 5x + 6$, the point $(0, 6)$ is which intercept?

- **A** The y-intercept
- **B** An x-intercept
- **C** Both an x- and a y-intercept
- **D** Neither

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10 A ball's height is $y = x^2 - x - 6$. Its x-intercepts are 3 and -2. What is the y-intercept?

A (0, -6)

B (0, 6)

C (0, 3)

D (0, -2)

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ANSWER KEY

1. x-intercepts (1, 0) and (2, 0); y-intercept (0, 2)

2. $y = x^2 + 4x - 5$

3. x-intercepts (3, 0) and (-3, 0); y-intercept (0, -9)

4. (0, -12)

5. 2

6. 7

7. -16

8. 2

9. The y-intercept

10. (0, -6)

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