MATHEMATICS · GRADES 10-12

Standard form

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you set up a problem about area or motion, like working out when a thrown ball hits the ground, in the standard form every solving method expects. A quadratic in standard form lines its terms up in a familiar order, so each solving method knows exactly where to look. That setup is what lets you factor it, complete the square, or use the quadratic formula without rearranging first. It is the starting point for any problem where something is thrown, grows, or covers an area.



Rule

Standard form: a quadratic in standard form is written $y = ax^2 + bx + c$, with the x^2 term first, then the x term, then the constant. a is the number in front of x^2, b is the number in front of x, and c is the number on its own.

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Worked examples

EXAMPLE 1

Q Identify a, b, and c in $y = 2x^2 - 5x + 3$

SOLUTION

Standard form is $y = ax^2 + bx + c$.

Match term by term: the x^2 coefficient is 2, the x coefficient is -5, and the constant is 3.

So $a = 2$, $b = -5$, $c = 3$

EXAMPLE 2

Q Identify a, b, and c in $y = x^2 + 7x - 4$

SOLUTION

Match term by term: the x^2 coefficient is 1, the x coefficient is 7, and the constant is -4.

Note the unwritten 1 in front of x^2.

So $a = 1$, $b = 7$, $c = -4$

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Practice questions

1 $y = 3x^2 + 2x + 1$. Identify a, b, and c.

- **A** a = 3, b = 1, c = 2
- **B** a = 2, b = 3, c = 1
- **C** a = 3, b = 2, c = 1
- **D** a = 1, b = 2, c = 3

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2 $y = x^2 - 4x + 6$. Identify a, b, and c.

- **A** a = 1, b = 4, c = 6
- **B** a = 1, b = -4, c = 6
- **C** a = 1, b = -4, c = -6
- **D** a = -1, b = -4, c = 6

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3 $y = -2x^2 + 5x - 3$. Identify a, b, and c.

- **A** a = -2, b = 5, c = -3
- **B** a = 2, b = 5, c = -3
- **C** a = -2, b = -5, c = -3
- **D** a = -2, b = 5, c = 3

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4 Find a, b, and c in $y = 5x^2 - 1$

- **A** a = 5, b = -1, c = 0
- **B** a = 5, b = 1, c = -1
- **C** a = -5, b = 0, c = -1
- **D** a = 5, b = 0, c = -1

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5 $y = x^2 + x$. Identify a, b, and c.

- **A** a = 1, b = 0, c = 1
- **B** a = 1, b = 1, c = 0
- **C** a = 0, b = 1, c = 1
- **D** a = 1, b = 1, c = 1

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6 Find a, b, and c in $y = 4x^2 - 9x$.

- **A** a = 4, b = -9, c = 0
- **B** a = 4, b = 9, c = 0
- **C** a = 4, b = 0, c = -9
- **D** a = -4, b = -9, c = 0

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7 $y = -x^2 + 3x + 2$. Identify a, b, and c.

- **A** a = 1, b = 3, c = 2
- **B** a = -1, b = -3, c = 2
- **C** a = -1, b = 3, c = 2
- **D** a = -1, b = 3, c = -2

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8 Which equation is written in standard form?

- **A** $y = 2x^2 + 3x + 1$
- **B** $y = 3x + 2x^2 + 1$
- **C** $y = 1 + 3x + 2x^2$
- **D** $y = 2x^2 + 1 + 3x$

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9 If a = 2, b = 0, and c = -5, which equation is in standard form?

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

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10 Find a, b, and c in $y = -3x^2 - 2x - 5$

- **A** a = -3, b = -2, c = -5
- **B** a = 3, b = -2, c = -5
- **C** a = -3, b = 2, c = -5
- **D** a = -3, b = -2, c = 5

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ANSWER KEY

1. a = 3, b = 2, c = 1

2. a = 1, b = -4, c = 6

3. a = -2, b = 5, c = -3

4. a = 5, b = 0, c = -1

5. a = 1, b = 1, c = 0

6. a = 4, b = -9, c = 0

7. a = -1, b = 3, c = 2

8. $y = 2x^2 + 3x + 1$

9. $y = 2x^2 - 5$

10. a = -3, b = -2, c = -5

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