MATHEMATICS · GRADES 10-12

Converting between quadratic forms

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you switch a quadratic between its different forms. One form (see Vertex form) shows a ball's highest point, another shows where it lands, and the right form depends on the question you are asking. Converting between forms is what lets you read the answer straight off the equation instead of working it out from scratch.



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Worked examples

EXAMPLE 1

Q Convert $y = x^2 + 6x + 5$ to vertex form

SOLUTION

Complete the square: $x^2 + 6x + 9 = (x + 3)^2$

Adjust for the extra 9: $x^2 + 6x + 5 = (x + 3)^2 - 4$

So the vertex form is $y = (x + 3)^2 - 4$.

EXAMPLE 2

Q Convert $y = (x - 1)(x + 5)$ to standard form

SOLUTION

Expand the brackets: $x^2 + 5x - x - 5$

Combine like terms: $x^2 + 4x - 5$

So the standard form is $y = x^2 + 4x - 5$.

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Practice questions

1 Write $y = x^2 + 4x + 3$ in vertex form.

A $y = (x - 2)^2 - 1$

B $y = (x + 2)^2 + 1$

C $y = (x + 2)^2 - 1$

D $y = (x + 3)^2 - 1$

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2 Write $y = (x - 2)(x + 6)$ in standard form.

A $y = x^2 - 4x - 12$

B $y = x^2 + 4x + 12$

C $y = x^2 + 4x - 10$

D $y = x^2 + 4x - 12$

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3 Write $y = x^2 - 8x + 12$ in vertex form.

A $y = (x - 4)^2 - 4$

B $y = (x + 4)^2 - 4$

C $y = (x - 4)^2 + 4$

D $y = (x - 3)^2 - 4$

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4 Write $y = (x + 3)(x - 5)$ in standard form.

A $y = x^2 + 2x - 15$

B $y = x^2 - 2x - 15$

C $y = x^2 - 2x + 15$

D $y = x^2 - 2x - 13$

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5 Write $y = x^2 + 10x + 16$ in vertex form.

A $y = (x - 5)^2 - 9$

B $y = (x + 5)^2 + 9$

C $y = (x + 5)^2 - 9$

D $y = (x + 6)^2 - 9$

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6 Write $y = (x - 4)(x - 3)$ in standard form.

A $y = x^2 + 7x + 12$

B $y = x^2 - 7x - 12$

C $y = x^2 - 7x + 14$

D $y = x^2 - 7x + 12$

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7 **Write $y = x^2 - 2x - 8$ in vertex form.**

A $y = (x - 1)^2 - 9$

B $y = (x + 1)^2 - 9$

C $y = (x - 1)^2 + 9$

D $y = (x - 2)^2 - 9$

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8 **Write $y = (x + 7)(x + 2)$ in standard form.**

A $y = x^2 - 9x + 14$

B $y = x^2 + 9x + 14$

C $y = x^2 + 9x - 14$

D $y = x^2 + 9x + 16$

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9 Write $y = x^2 + 12x + 27$ in vertex form.

A $y = (x - 6)^2 - 9$

B $y = (x + 6)^2 + 9$

C $y = (x + 6)^2 - 9$

D $y = (x + 7)^2 - 9$

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10 Write $y = (x - 8)(x + 1)$ in standard form.

A $y = x^2 + 7x - 8$

B $y = x^2 - 7x + 8$

C $y = x^2 - 7x - 6$

D $y = x^2 - 7x - 8$

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ANSWER KEY

1. $y = (x + 2)^2 - 1$

2. $y = x^2 + 4x - 12$

3. $y = (x - 4)^2 - 4$

4. $y = x^2 - 2x - 15$

5. $y = (x + 5)^2 - 9$

6. $y = x^2 - 7x + 12$

7. $y = (x - 1)^2 - 9$

8. $y = x^2 + 9x + 14$

9. $y = (x + 6)^2 - 9$

10. $y = x^2 - 7x - 8$

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