

Chapter 2: Quadratic Functions

Lesson 3: Completing the Square

⑩ Question #1: Question 11037

Reference Q.11037

Graph the equation $-4x^2 - 16x - 15$ (by expressing it in vertex form) and state following:

- a. vertex form
- b. the domain
- c. the range
- d. y-intercept
- e. maximum value

⑩ Question #2: Question 11038

Reference Q.11038

Convert the quadratic function $f(x) = 3x^2 + 24x + 47$ into vertex form and state the following:

- a. axis of symmetry
- b. maximum or minimum value
- c. x-intercept
- d. y-intercept

⑩ Question #3: Question 11039

Reference Q.11039

Convert the equation $y = x^2 - \frac{3}{2}x - \frac{1}{4}$ into vertex form and state the following key features:

- a. direction of opening
- b. vertex
- c. y-intercept
- d. minimum value

⑩ Question #4: Find the Mistake

Reference Q.13743

A high school student was asked to arrange the equation $y = -3x^2 - 6x - 5$ in the form $y = a(x - p)^2 + q$ by completing the square. The student's procedure is shown:

Step I: $y = -3(x^2 + 2x \quad \quad) - 5$

Step II: $y = -3(x^2 + 2x + 1 - 1) - 5$

Step III: $y = -3(x + 1)^2 - 5 - 1$

Step IV: $y = -3(x + 1)^2 - 6$

The student made an error in

- A. Step I
- B. Step II
- C. Step III
- D. Step IV

⑩ Question #5: Express the Equation in Completed Square Form

Reference Q.13737

Express the following in completed square form.

- a. $y = x^2 + 10x + 3$
- b. $y = x^2 - 4x - 21$
- c. $y = x^2 + 14x - 2$
- d. $f(x) = x^2 + 9x + 22$
- e. $g(x) = x^2 - x + 1$
- f. $h(x) = x^2 + bx + c$

⑩ Question #6

Reference Q.11040

Complete the square to find the x-intercepts of the graph of $f(x) = 4x^2 - 24x + 14$.

⑩ Question #7: Find the Vertex and the Axis of Symmetry

Reference Q.13738

Express $f(x) = x^2 - 14x - 40$ in completed square form. Hence state the coordinates of the vertex and the equation of the axis of symmetry of the graph of the function.

⑩ Question #8: Completing Square

Reference Q.13739

Express the following in completed square form.

- a. $f(x) = 2x^2 + 12x + 5$
- b. $y = 3x^2 - 18x - 19$
- c. $P(x) = 2x^2 + 14x - 11$
- d. $y = -x^2 + 10x + 20$
- e. $y = -4x^2 - 8x + 7$
- f. $f(x) = -x^2 + bx + c$
- g. $g(x) = 11x - x^2$
- h. $y = 5x^2 - 20x + m$
- i. $y = -3x^2 + 12x - 11$

⑩ Question #9: Question 11062

Reference Q.11062

Consider the equation $y = x^2 - 8x + k$. What should k be in order to ensure that the equation represents a perfect square (i.e., $= (x - b)^2$)?

⑩ Question #10

Reference Q.11063

(Try this!) Complete the square: $y = x^2 + ax + 1$.

⑩ Question #11

Reference Q.11064

(Try this!) Complete the square: $y = x^2 + x + a$.

Ⓢ **Question #12**

Reference Q.11065

(Try this!) Complete the square: $y = x^2 - bx + 12$.

Ⓢ **Question #13**

Reference Q.11066

(Try this!) Complete the square: $y = x^2 - 4x + c$.

Ⓢ **Question #14**

Reference Q.11067

(Try this!) Complete the square: $y = ax^2 + x + 1$.

Ⓢ **Question #15: Question 11068**

Reference Q.11068

(Try this!) Complete the square to find all solutions of $0 = ax^2 + ax + a$.

Ⓢ **Question #16: General Completed Square Form**

Reference Q.13740

Write the function $f(x) = ax^2 + bx + c$ in completed square form.

Ⓢ **Question #17: Completing Square**

Reference Q.13741

When $y = 2x^2 + 5x + 10$ is converted to the form $y = a(x - p)^2 + q$, the value of q is

A. -2.5

B. 3.75

C. 6.87

D. 8.4375

Ⓢ **Question #18: Find the x-intercept**

Reference Q.13744

The x-intercepts of the graph of the function $f(x) = x^2 - 8x - 4$ are

A. $2 \pm 4\sqrt{5}$

B. $4 \pm \sqrt{5}$

C. $4 \pm 2\sqrt{5}$

D. $-4 \pm 2\sqrt{5}$

Ⓢ **Question #19: Find the Maximum Value**

Reference Q.13745

The maximum value, to the nearest tenth, of the function

$g(x) = -5x^2 + 10x + 12$ is ____.