True or False?

completing the square

Question 1

The process of completing the square can only be applied to quadratic equations where the coefficient of x^2 is 1.

Answer: FALSE

Explanation: False. While it's often easier when the coefficient is 1, we can complete the square for any quadratic equation by first factoring out the leading coefficient from the x^2 and x terms.

Question 2

When completing the square for $x^2 + 6x + 5$, the perfect square trinomial formed is $(x + 3)^2$.

Answer: FALSE

Explanation: True. For $x^2 + 6x + 5$, we take half of 6 (which is 3) and square it to get 9. The perfect square is $(x + 3)^2 = x^2 + 6x + 9$, and we adjust the constant term accordingly.

Question 3

Completing the square always results in a perfect square trinomial equal to a constant.

Answer: FALSE

Explanation: True. The fundamental purpose of completing the square is to rewrite a quadratic expression in the form $a(x - h)^2 + k$, where $(x - h)^2$ is a perfect square trinomial.

Question 4

The vertex of the parabola $y = 2x^2 - 8x + 5$ can be found at (2, -3) using completing the square.

Answer: FALSE

Explanation: True. Completing the square: $2(x^2 - 4x) + 5 = 2(x^2 - 4x + 4 - 4) + 5 = 2[(x - 2)^2 - 4] + 5 = 2(x - 2)^2 - 8 + 5 = 2(x - 2)^2 - 3$, so vertex is (2, -3).

Question 5

Completing the square can be used to derive the quadratic formula.

Answer: FALSE

Explanation: True. The quadratic formula $x = [-b \pm \sqrt{(b^2 - 4ac)}]/(2a)$ is derived by completing the square for the general quadratic equation $ax^2 + bx + c = 0$.

Question 6

For the equation $x^2 - 10x = -24$, completing the square gives $(x - 5)^2 = 1$.

Answer: FALSE

Explanation: True. $x^2 - 10x = -24 \rightarrow x^2 - 10x + 25 = -24 + 25 \rightarrow (x - 5)^2 = 1$. Half of -10 is -5, squared gives 25.

Question 7

Completing the square is only useful for solving quadratic equations, not for graphing parabolas.

Answer: FALSE

Explanation: False. Completing the square is extremely useful for graphing parabolas as it reveals the vertex form $y = a(x - h)^2 + k$, where (h,k) is the vertex.

Question 8

When completing the square for $3x^2 + 12x - 5$, the first step is to factor out 3 from all terms.

Answer: FALSE

Explanation: False. We only factor out 3 from the x^2 and x terms: $3(x^2 + 4x) - 5$. We don't factor the constant term -5.

Question 9

The expression $x^2 + 8x + 16$ is already a perfect square trinomial and doesn't require completing the square.

Answer: FALSE

Explanation: True. $x^2 + 8x + 16 = (x + 4)^2$, so it's already in perfect square form. Completing the square would simply confirm this.

Question 10

Completing the square can be used to find the maximum or minimum value of any quadratic function.

Answer: FALSE

Explanation: True. By rewriting in vertex form $y = a(x - h)^2 + k$, if $a > 0$, the minimum is k; if $a < 0$, the maximum is k, both occurring at $x = h$.

Question 11

For the quadratic $2x^2 - 12x + 19$, completing the square gives $2(x - 3)^2 + 1$.

Answer: FALSE

Explanation: True. $2x^2 - 12x + 19 = 2(x^2 - 6x) + 19 = 2(x^2 - 6x + 9 - 9) + 19 = 2[(x - 3)^2 - 9] + 19 = 2(x - 3)^2 - 18 + 19 = 2(x - 3)^2 + 1$.

Question 12

Completing the square always requires adding and subtracting the same number to maintain equality.

Answer: FALSE

Explanation: True. This is the key principle - we add a number to create a perfect square trinomial, but must subtract the same number to keep the equation balanced.

Question 13

The process of completing the square works equally well for cubic equations as it does for quadratic equations.

Answer: FALSE

Explanation: False. Completing the square is specifically designed for quadratic expressions. Cubic equations require different methods of solution.

Question 14

When solving $x^2 + 6x - 7 = 0$ by completing the square, the solutions are $x = 1$ and $x = -7$.

Answer: FALSE

Explanation: True. $x^2 + 6x - 7 = 0 \rightarrow x^2 + 6x = 7 \rightarrow x^2 + 6x + 9 = 7 + 9 \rightarrow (x + 3)^2 = 16 \rightarrow x + 3 = \pm 4 \rightarrow x = 1$ or $x = -7$.

Question 15

Completing the square can be used to convert the general form of a circle equation to standard form.

Answer: FALSE

Explanation: True. For circle equations like $x^2 + y^2 + Dx + Ey + F = 0$, we complete the square separately for x and y terms to get $(x - h)^2 + (y - k)^2 = r^2$ form.

Question 16

For the quadratic $-x^2 + 4x - 3$, completing the square gives $-(x - 2)^2 + 1$.

Answer: FALSE

Explanation: True. $-x^2 + 4x - 3 = -(x^2 - 4x) - 3 = -(x^2 - 4x + 4 - 4) - 3 = -[(x - 2)^2 - 4] - 3 = -(x - 2)^2 + 4 - 3 = -(x - 2)^2 + 1$.

Question 17

Completing the square is the only method that can solve quadratic equations with irrational roots.

Answer: FALSE

Explanation: False. The quadratic formula can also solve equations with irrational roots, and in fact, factoring can sometimes work if the irrational factors are recognizable.

Question 18

When completing the square for $x^2 + bx$, the number to add and subtract is $(b/2)^2$.

Answer: FALSE

Explanation: True. This is the fundamental rule: take half of the coefficient of x, square it, and add and subtract that value.

Question 19

The quadratic $x^2 + 2x + 5$ cannot be solved by completing the square because it has no real roots.

Answer: FALSE

Explanation: False. We can still complete the square: $x^2 + 2x + 5 = (x + 1)^2 + 4$. Setting equal to zero gives $(x + 1)^2 = -4$, which has complex solutions $x = -1 \pm 2i$.

Question 20

Completing the square for $4x^2 + 16x + 15$ gives $4(x + 2)^2 - 1$.

Answer: FALSE

Explanation: True. $4x^2 + 16x + 15 = 4(x^2 + 4x) + 15 = 4(x^2 + 4x + 4 - 4) + 15 = 4[(x + 2)^2 - 4] + 15 = 4(x + 2)^2 - 16 + 15 = 4(x + 2)^2 - 1$.