TRUE FALSE

The quadratic equation $x^2 + 4x + 4 = 0$ has two distinct real roots.

The quadratic equation $x^2 + 4x + 4 = 0$ has two distinct real roots.

False. The discriminant is $b^2 - 4ac = 4^2 - 4(1)(4) = 16 - 16 = 0$, which means the equation has one real repeated root ($x = -2$).

TRUE FALSE

If the discriminant of a quadratic equation is negative, the equation has no real solutions.

If the discriminant of a quadratic equation is negative, the equation has no real solutions.

True. A negative discriminant indicates that the quadratic equation has two complex conjugate roots, but no real solutions.

TRUE FALSE

The vertex of the parabola $y = 2x^2 - 8x + 6$ is at (2, -2).

The vertex of the parabola $y = 2x^2 - 8x + 6$ is at (2, -2).

True. Using the vertex formula $x = -b/(2a) = 8/(4) = 2$, then $y = 2(2)^2 - 8(2) + 6 = 8 - 16 + 6 = -2$.

TRUE FALSE

The quadratic equation $(x-3)(x+2) = 0$ has roots $x = 3$ and $x = -2$.

The quadratic equation $(x-3)(x+2) = 0$ has roots $x = 3$ and $x = -2$.

True. Using the zero product property, if $(x-3)(x+2) = 0$, then either $x-3 = 0$ or $x+2 = 0$, giving roots $x = 3$ and $x = -2$.

TRUE FALSE

The sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is equal to b/a.

The sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is equal to b/a.

False. The sum of the roots is -b/a, not b/a. For a quadratic equation $ax^2 + bx + c = 0$, if the roots are r_1 and r_2, then $r_1 + r_2 = -b/a$.

TRUE FALSE

The quadratic equation $x^2 - 5x + 6 = 0$ can be factored as $(x-2)(x-3) = 0$.

The quadratic equation $x^2 - 5x + 6 = 0$ can be factored as $(x-2)(x-3) = 0$.

True. The factors multiply to give $x^2 - 5x + 6$, and when set equal to zero, give the correct roots $x = 2$ and $x = 3$.

TRUE FALSE

The axis of symmetry of the parabola $y = x^2 + 6x + 8$ is $x = -3$.

The axis of symmetry of the parabola $y = x^2 + 6x + 8$ is $x = -3$.

True. The axis of symmetry for a parabola in the form $y = ax^2 + bx + c$ is $x = -b/(2a) = -6/(2) = -3$.

TRUE FALSE

If a quadratic equation has a positive leading coefficient and a negative discriminant, the parabola opens upward and touches the x-axis at two points.

If a quadratic equation has a positive leading coefficient and a negative discriminant, the parabola opens upward and touches the x-axis at two points.

False. If the discriminant is negative, the parabola does not intersect the x-axis at all. A positive leading coefficient means it opens upward, but it will be entirely above the x-axis.

TRUE FALSE

The quadratic formula can be used to solve any quadratic equation, regardless of whether it can be factored or not.

The quadratic formula can be used to solve any quadratic equation, regardless of whether it can be factored or not.

True. The quadratic formula $x = [-b \pm \sqrt{(b^2-4ac)}]/(2a)$ provides solutions for any quadratic equation $ax^2 + bx + c = 0$.

TRUE FALSE

The product of the roots of the quadratic equation $2x^2 - 7x + 3 = 0$ is 3/2.

The product of the roots of the quadratic equation $2x^2 - 7x + 3 = 0$ is 3/2.

True. For a quadratic equation $ax^2 + bx + c = 0$, the product of the roots is $c/a = 3/2$.

TRUE FALSE

The quadratic equation $x^2 + 1 = 0$ has no real solutions.

The quadratic equation $x^2 + 1 = 0$ has no real solutions.

True. Solving $x^2 + 1 = 0$ gives $x^2 = -1$, which has no real solutions since the square of a real number cannot be negative.

TRUE FALSE

Completing the square for $x^2 + 8x + 15$ gives $(x+4)^2 - 1$.

Completing the square for $x^2 + 8x + 15$ gives $(x+4)^2 - 1$.

True. $x^2 + 8x + 15 = (x^2 + 8x + 16) - 16 + 15 = (x+4)^2 - 1$.

TRUE FALSE

If the vertex of a parabola is at (2,5) and it opens downward, then the maximum value of the quadratic function is 5.

If the vertex of a parabola is at (2,5) and it opens downward, then the maximum value of the quadratic function is 5.

True. For a downward-opening parabola, the vertex represents the maximum point, so the maximum value is the y-coordinate of the vertex, which is 5.

TRUE FALSE

The quadratic equation $3x^2 - 12x + 12 = 0$ has two distinct real roots.

The quadratic equation $3x^2 - 12x + 12 = 0$ has two distinct real roots.

False. The discriminant is $(-12)^2 - 4(3)(12) = 144 - 144 = 0$, so it has one real repeated root ($x = 2$).

TRUE FALSE

The graph of $y = -2x^2 + 4x - 1$ opens downward.

The graph of $y = -2x^2 + 4x - 1$ opens downward.

True. The coefficient of x^2 is -2, which is negative, so the parabola opens downward.

TRUE FALSE

The quadratic equation $x^2 - 9 = 0$ can be solved by taking the square root of both sides, giving $x = 3$.

The quadratic equation $x^2 - 9 = 0$ can be solved by taking the square root of both sides, giving $x = 3$.

False. Taking square roots gives $x = \pm 3$, not just $x = 3$. The equation has two solutions: $x = 3$ and $x = -3$.

TRUE FALSE

If a quadratic equation has roots 4 and -2, then the equation can be written as $x^2 - 2x - 8 = 0$.

If a quadratic equation has roots 4 and -2, then the equation can be written as $x^2 - 2x - 8 = 0$.

True. Using the sum and product of roots: sum = $4 + (-2) = 2$, product = $4 \times (-2) = -8$, so the equation is $x^2 - (\text{sum})x + \text{product} = x^2 - 2x - 8 = 0$.

TRUE FALSE

The minimum value of the quadratic function $y = x^2 - 6x + 10$ occurs at $x = 3$.

The minimum value of the quadratic function $y = x^2 - 6x + 10$ occurs at $x = 3$.

True. The vertex occurs at $x = -b/(2a) = 6/(2) = 3$, and since the coefficient of x^2 is positive, this represents the minimum point.

TRUE FALSE

All quadratic equations have exactly two solutions.

All quadratic equations have exactly two solutions.

False. While quadratic equations are degree 2 polynomials, they can have two distinct real roots, one repeated real root, or two complex roots. The number of real solutions can be 0, 1, or 2.

TRUE FALSE

The quadratic equation $2x^2 + 5x - 3 = 0$ can be solved using the quadratic formula as $x = [-5 \pm \sqrt{(25 + 24)}]/4$.

The quadratic equation $2x^2 + 5x - 3 = 0$ can be solved using the quadratic formula as $x = [-5 \pm \sqrt{(25 + 24)}]/4$.

True. Using the quadratic formula with a=2, b=5, c=-3: $x = [-5 \pm \sqrt{(5^2 - 4(2)(-3))}]/(2\times 2) = [-5 \pm \sqrt{(25 + 24)}]/4$.