Quadratic Equations Practice

Use this key to check answers and read the explanations.

1. Which equation is quadratic after moving all terms to one side and combining like terms?

A. $5x^2 - 2x = 9$
B. $4x + 3 = 0$
C. $x^3 + x = 1$
D. $2x^2 + x = 2x^2 - 5$

Correct answer: A. $5x^2 - 2x = 9$
Moving 9 to the left gives $5x^2 - 2x - 9 = 0$, which has degree 2. In the equation with $2x^2$ on both sides, those terms cancel.

2. Move $7x$ to the left in $4x^2 + 5 = 7x$. In the resulting equation $ax^2 + bx + c = 0$, what is b?

A. 4
B. 7
C. -7
D. 5

Correct answer: C. -7
Subtracting $7x$ from both sides gives $4x^2 - 7x + 5 = 0$. The coefficient of x is -7.

3. Which listed value is a solution of $x^2 + 4x - 12 = 0$?

A. -2
B. 2
C. 3
D. -3

Correct answer: B. 2
Substituting 2 gives $4 + 8 - 12 = 0$, so 2 satisfies the equation.

4. What are all the real solutions of $6x^2 = 150$?

A. -6 and 6
B. 5 only
C. -25 and 25
D. -5 and 5

Correct answer: D. -5 and 5
Dividing by 6 gives $x^2 = 25$. Both -5 and 5 have square 25.

5. What are all the real solutions of $(x + 3)^2 = 49$?

A. -4 and 10
B. -10 and 4
C. -7 and 7
D. 4 only

Correct answer: B. -10 and 4
The quantity $x + 3$ equals -7 or 7. Subtracting 3 gives $x = -10$ or $x = 4$.

6. In $x^2 - 18x = 7$, what number should be added to both sides to make the left side a perfect square?

A. 81
B. 9
C. 36
D. 324

Correct answer: A. 81
Half of -18 is -9. Squaring -9 gives 81, so the left side becomes $(x - 9)^2$.

7. What are the exact real solutions of $x^2 + 10x + 11 = 0$?

A. $-5 \pm \sqrt{36}$
B. $5 \pm \sqrt{14}$
C. $-5 \pm \sqrt{11}$
D. $-5 \pm \sqrt{14}$

Correct answer: D. $-5 \pm \sqrt{14}$
Move 11 to the right and add 25 to both sides. This gives $(x + 5)^2 = 14$, so $x = -5 \pm \sqrt{14}$.

8. How many distinct real solutions does $2x^2 - 4x + 7 = 0$ have?

A. Two
B. One
C. None
D. Infinitely many

Correct answer: C. None
The discriminant is $(-4)^2 - 4 \times 2 \times 7 = -40$. A negative discriminant gives no real solutions.

9. What is the complete set of real solutions of $4x^2 + 12x + 9 = 0$?

A. $-3/2$ only
B. $3/2$ only
C. $-3/2$ and $3/2$
D. -3 only

Correct answer: A. $-3/2$ only
The discriminant is $144 - 144 = 0$. Both signs in the quadratic formula give $-12/8$, so there is one distinct solution, $-3/2$.

10. What are the exact solutions of $3x^2 - 4x - 1 = 0$?

A. $(-2 \pm \sqrt{7})/3$
B. $(4 \pm \sqrt{7})/3$
C. $(2 \pm \sqrt{7})/6$
D. $(2 \pm \sqrt{7})/3$

Correct answer: D. $(2 \pm \sqrt{7})/3$
The discriminant is $16 + 12 = 28$. The formula gives $(4 \pm \sqrt{28})/6$. Since $\sqrt{28} = 2\sqrt{7}$, this simplifies to $(2 \pm \sqrt{7})/3$.

11. Which equation has exactly the same real solutions as $2x^2 - 12x + 7 = 0$?

A. $(x - 6)^2 = 65/2$
B. $(x + 3)^2 = 11/2$
C. $(x - 3)^2 = 11/2$
D. $(x - 3)^2 = 25/2$

Correct answer: C. $(x - 3)^2 = 11/2$
Divide by 2 and subtract 7/2 to get $x^2 - 6x = -7/2$. Adding 9 to both sides gives $(x - 3)^2 = 11/2$.

12. Which values of k make $3x^2 + kx + 12 = 0$ have exactly one distinct real solution?

A. -6 and 6
B. -12 and 12
C. 12 only
D. -12 only

Correct answer: B. -12 and 12
Exactly one distinct real root requires a zero discriminant. Here $k^2 - 4 \times 3 \times 12 = k^2 - 144$, so $k = -12$ or $k = 12$.

13. The equation $(x - h)^2 = d$ has real solutions -3 and 7. What are h and d?

A. $h = -2$ and $d = 25$
B. $h = 2$ and $d = 5$
C. $h = 5$ and $d = 4$
D. $h = 2$ and $d = 25$

Correct answer: D. $h = 2$ and $d = 25$
The two roots are the same distance from h, so h is their midpoint, 2. That distance is 5, so d is its square, 25.

14. A rectangular tile has an area of 48 square centimeters. Its length is 3 centimeters greater than its width. What is its exact width in centimeters?

A. $(-3 + \sqrt{201})/2$
B. $(-3 - \sqrt{201})/2$
C. $(3 + \sqrt{201})/2$
D. $(-3 + \sqrt{57})/2$

Correct answer: A. $(-3 + \sqrt{201})/2$
A width w gives $w(w + 3) = 48$, or $w^2 + 3w - 48 = 0$. The formula gives $(-3 \pm \sqrt{201})/2$. The width must be positive, so choose the plus sign.

15. A fictional animation shows a light only from t = 2 through t = 7 seconds. Its height in meters is $h(t) = -2t^2 + 16t + 4$. At what time shown does the light reach 22 meters?

A. Both $4 - \sqrt{7}$ and $4 + \sqrt{7}$ seconds
B. $4 - \sqrt{7}$ seconds
C. $4 + \sqrt{7}$ seconds
D. $4 + \sqrt{14}$ seconds

Correct answer: C. $4 + \sqrt{7}$ seconds
Setting the height to 22 gives $t^2 - 8t = -9$, so $(t - 4)^2 = 7$. The smaller root is about 1.35 seconds, before the animation starts. The larger root is about 6.65 seconds and lies in the stated interval.