Solve each equation using any method. Leave in simplest radical form if needed.

1. \(6x^2 + 19x - 7 = 0\)
2. \(f(x) = 3x^2 + 15x - 18\)
3. \(9x^2 - 16 = 0\)
4. \(5x^2 + 5x - 7 = 0\)
5. \(-10x^2 + 5x = 0\)
6. \(0.5x^2 = 0.2x + 0.1\)
7. \(9x^2 - 169 = 0\)
8. \(y = x^2 - x - 6\)
9. \(y = 2x^2 - 50\)
10. \(4x^2 - 24 = 0\)

11. Find the discriminant and give the number of real solutions: \(y = 3x^2 + 5x - 7\)

12. Tamara’s little brother, Zane, likes to throw his baseball cap over the fence in their backyard. The motion of the cap is represented by the equation \(y = -3x^2 + 9.1x\), where \(x\) represents the number of seconds after Zane threw his cap in the air, and \(y\) represents the vertical height in feet of the cap with respect to the ground.
   a. How long is the cap in the air?
   b. At what time does the cap stop going up and start coming down?
   c. If Zane has a 6-foot fence, will his cap make it over the top? How do you know?

13. The height of a rocket launched into the air from an initial height of 320 feet with an initial velocity of 160 feet per second can be modeled with the equation \(h = -16t^2 + 160t + 320\), where \(h\) is the height in feet of the rocket and \(t\) is the time in seconds after the rocket is launched.
   a. After how many seconds does it reach its highest point and what is its height there?
   b. What was the height of the rocket 7 seconds after it was launched?

14. LeBron learned that the quadratic equation \(h = 20t - 5t^2\) \((h = \text{height in feet}, t = \text{time in seconds})\) can be used to find the height of a football after it was kicked directly into the air with a speed of 20 feet per second.
   a. How long does it take the football to hit the ground? How can you tell?
   b. What is the highest point reached during the flight of the ball? How can you tell?
   c. When was the ball exactly 15 feet off the ground? How do you know?

15. Rewrite in vertex form, then solve. Leave your answer in simplest radical form if needed
   a. \(y = x^2 - 6x - 8\)
   b. \(2x^2 + 4x - 6 = 0\)

16. Solve the system of equations:
   a. \(\begin{cases} y = x^2 - 4 \\ y = -x^2 + 4 \end{cases}\)
   b. \(\begin{cases} y = x - 5 \\ y = x^2 + 4x - 5 \end{cases}\)

17. Graph the solution the system of inequalities: \(\begin{cases} x + y > 2 \\ 2x - y > 1 \end{cases}\)
Answers:

1. $x = \frac{1}{3}, -\frac{7}{2}$  
2. $x = -6, 1$  
3. $x = \frac{4}{3}$  
4. $x = \frac{-5 + \sqrt{165}}{10}$  
5. $x = 0, -\frac{1}{2}$  
6. $x = 0.2 \pm \sqrt{0.24}$  
7. $x = \pm \frac{13}{3}$  
8. $x = 3, -2$  
9. $x = \pm 5$  
10. $x = \pm \sqrt{6}$  
11. 109; 2 real solutions  
12. a. 3 sec; b. 1.5 sec; c. yes, the maximum height is about 6.9 feet  
13. a. after 5 seconds it reaches 720 ft; b. 656 ft  
14. a. 4 sec, it’s the difference of the x-intercepts; b. 20 ft, it’s the y-value of the vertex; c. at 1 and 3 seconds  
15. a. $y = (x - 3)^2 - 17; x = 3 \pm \sqrt{17}$  
16. a. $(2, 0), (-2, 0)$  
17. a. $y = 2(x + 1)^2 - 8; x = 1, -3$  
18. a. $(0, -5), (-3, -8)$  
19. a. $(2, 0), (-2, 0)$  
20. a. $y = 2(x + 1)^2 - 8; x = 1, -3$  
21. a. $(0, -5), (-3, -8)$