Multiple Choice

1. Determine which of the following are and aren’t quadratic equations.
   a) $3x^2 - 4x - 1 = 0$
   d) $x^2 - 9x^3 - 2 = 6x$
   b) $5 - 2m^2 = 9m$
   e) $8 + 7k^2 = 3$
   c) $-0.5j^2 + 3j + 1.2 = 0$
   f) $2x^3 - 3x + 4 = 0$

2. How many roots/solutions do each of the following quadratic equations have?
   - $4x^2 + 4x + 1 = 0$
     A) No roots  B) 1 root  C) 2 roots
   - $8j - 2j^2 = 3$
     A) No roots  B) 1 root  C) 2 roots
   - $3k^2 - 5k + 6 = 0$
     A) No roots  B) 1 root  C) 2 roots
   - $44x^2 + 100 = 2x$
     A) No roots  B) 1 root  C) 2 roots

Short Answer

1. Solve the following by factoring.
   a) $4x^2 - 6x + 2 = 0$
   d) $3x^2 - 2x + 10 = 15x$
   b) $-9j^2 + 25 = 0$
   e) $2 = 5d^2 + 3d$
   c) $4k + 5 = k^2$
   f) $6y^2 + 20y + 6 = 0$

2. Solve the following using the quadratic formula. Round your answers to 2 decimal places.
   (Extra: Keep your answers exact and, if possible, simplify them by reducing radicals).
   a) $2x^2 + 5x + 1 = 0$
   d) $9k^2 - 5 = 2k$
   b) $y^2 + 5y = 7$
   e) $30x + 25x^2 - 3 = 0$
   c) $2x = 3 - 3x^2$
   f) $8j - 2j^2 = 3$

Word Problems (Real-Life Applications)

1. The height (in metres) of a ball being thrown off of the top of a building in relation to time (in seconds) can be described using the function $h(t) = 150 + 126t - 14t^2$. If the building is 150m tall, after how many seconds will the ball’s height be lower than the top of the building (150m)?
2. The hypotenuse of a right triangle is 20cm long and one of the other sides is 4cm longer than the third. Find the lengths of the other two sides of the triangle.
Answer Key

- **Multiple Choice**
  1. a), b), c), e) are quadratic equations; d), f) are not quadratic equations
  2. B), C), A), A)

- **Short Answer**
  1. a) \( x = \frac{1}{2}, x = -1 \)
     b) \( j = \frac{2}{3}, j = -\frac{2}{3} \)
     c) \( k = 5, k = -1 \)
     d) \( x = 5, x = \frac{2}{3} \)
     e) \( d = \frac{2}{3}, d = -1 \)
     f) \( y = \frac{1}{3}, x = -3 \)
  2. a) \( x = -0.22, x = -2.28 \) \((x = \frac{-5+\sqrt{17}}{4}, x = \frac{-5-\sqrt{17}}{4})\)
     b) \( y = 1.14, y = -6.14 \) \((y = \frac{-5+\sqrt{33}}{2}, y = \frac{-5-\sqrt{33}}{2})\)
     c) \( x = -1.38, x = 0.72 \) \((x = \frac{-1-\sqrt{10}}{3}, x = \frac{-1+\sqrt{10}}{3})\)
     d) \( k = 0.86, k = -0.64 \) \((k = \frac{1+\sqrt{46}}{9}, k = \frac{1-\sqrt{46}}{9})\)
     e) \( x = 0.09, x = -1.29 \) \((x = \frac{-3+2\sqrt{3}}{5}, x = \frac{-3-2\sqrt{3}}{5})\)
     f) \( j = 0.42, j = 3.58 \) \((j = \frac{4+\sqrt{11}}{2}, j = \frac{4-\sqrt{11}}{2})\)

- **Word Problems**
  1. The ball’s height will be lower than the top of the building (150m) after 9 seconds.
  2. The other two sides of the triangle are 12cm and 16cm long.