PreCalc 11 Chapter 3 Review Pack v1
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 0 DIF: Easy
REF: 3.1 Factoring Polynomial Expressions LOC: 11.RF1
TOP: Relations and Functions KEY: Procedural Knowledge

2. ANS: D PTS: 0 DIF: Easy
REF: 3.1 Factoring Polynomial Expressions LOC: 11.RF1
TOP: Relations and Functions KEY: Procedural Knowledge

3. ANS: B PTS: 0 DIF: Moderate
REF: 3.1 Factoring Polynomial Expressions LOC: 11.RF1
TOP: Relations and Functions KEY: Procedural Knowledge

4. ANS: D PTS: 0 DIF: Moderate
REF: 3.1 Factoring Polynomial Expressions LOC: 11.RF1
TOP: Relations and Functions KEY: Procedural Knowledge

5. ANS: A PTS: 0 DIF: Moderate
REF: 3.1 Factoring Polynomial Expressions LOC: 11.RF1
TOP: Relations and Functions KEY: Procedural Knowledge

6. ANS: B PTS: 0 DIF: Moderate
REF: 3.2 Solving Quadratic Equations by Factoring LOC: 11.AN3
TOP: Algebra and Number KEY: Conceptual Understanding

7. ANS: C PTS: 0 DIF: Easy
REF: 3.2 Solving Quadratic Equations by Factoring LOC: 11.RF5
TOP: Relations and Functions KEY: Conceptual Understanding

8. ANS: A PTS: 0 DIF: Easy
REF: 3.2 Solving Quadratic Equations by Factoring LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge

9. ANS: A PTS: 0 DIF: Moderate
REF: 3.2 Solving Quadratic Equations by Factoring LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge

10. ANS: C PTS: 0 DIF: Moderate
REF: 3.2 Solving Quadratic Equations by Factoring LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge

11. ANS: B PTS: 0 DIF: Easy
REF: 3.3 Using Square Roots to Solve Quadratic Equations LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge

12. ANS: A PTS: 0 DIF: Moderate
REF: 3.3 Using Square Roots to Solve Quadratic Equations LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge

13. ANS: C PTS: 0 DIF: Moderate
REF: 3.3 Using Square Roots to Solve Quadratic Equations LOC: 11.RF5
TOP: Relations and Functions KEY: Problem-Solving Skills | Procedural Knowledge

14. ANS: C PTS: 0 DIF: Moderate
REF: 3.4 Developing and Applying the Quadratic Formula LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge

15. ANS: A PTS: 0 DIF: Easy
REF: 3.4 Developing and Applying the Quadratic Formula LOC: 11.RF5
TOP: Relations and Functions KEY: Conceptual Understanding

16. ANS: D PTS: 0 DIF: Moderate
REF: 3.4 Developing and Applying the Quadratic Formula LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge

17. ANS: D PTS: 0 DIF: Moderate
REF: 3.4 Developing and Applying the Quadratic Formula LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge

18. ANS: A PTS: 0 DIF: Moderate
REF: 3.4 Developing and Applying the Quadratic Formula LOC: 11.AN3
TOP: Algebra and Number KEY: Procedural Knowledge

19. ANS: D PTS: 0 DIF: Moderate REF: 3.5 Interpreting the Discriminant
LOC: 11.RF5 TOP: Relations and Functions KEY: Conceptual Understanding

20. ANS: C PTS: 0 DIF: Moderate REF: 3.5 Interpreting the Discriminant
LOC: 11.RF5 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge

21. ANS: C PTS: 0 DIF: Easy REF: 3.5 Interpreting the Discriminant
LOC: 11.RF5 TOP: Relations and Functions KEY: Conceptual Understanding

SHORT ANSWER

22. ANS:
$1.5(x + 2)(3x - 5)$

PTS: 0 DIF: Moderate REF: 3.1 Factoring Polynomial Expressions
LOC: 11.RF1 TOP: Relations and Functions KEY: Procedural Knowledge

23. ANS:
$\frac{1}{3}(x + 3)(3x - 2)$

PTS: 0 DIF: Moderate REF: 3.1 Factoring Polynomial Expressions
LOC: 11.RF1 TOP: Relations and Functions KEY: Procedural Knowledge

24. ANS:
$3(16x + 10y + 11)(16x - 10y - 19)$

PTS: 0 DIF: Moderate REF: 3.1 Factoring Polynomial Expressions
LOC: 11.RF1 TOP: Relations and Functions KEY: Procedural Knowledge

25. ANS:
$(3x + 2)^2$

PTS: 0 DIF: Moderate REF: 3.1 Factoring Polynomial Expressions
LOC: 11.RF1 TOP: Relations and Functions KEY: Procedural Knowledge

26. ANS:
$x = 2$

PTS: 0 DIF: Moderate REF: 3.2 Solving Quadratic Equations by Factoring
LOC: 11.RF5 TOP: Relations and Functions
KEY: Problem-Solving Skills | Procedural Knowledge

27. ANS:
$x = \frac{5}{6}$

PTS: 0 DIF: Moderate REF: 3.2 Solving Quadratic Equations by Factoring
LOC: 11.AN3 TOP: Algebra and Number KEY: Procedural Knowledge

28. ANS:
There are 2 numbers: 5 and –8

PTS: 0 DIF: Moderate REF: 3.2 Solving Quadratic Equations by Factoring
LOC: 11.RF5 TOP: Relations and Functions
KEY: Problem-Solving Skills | Procedural Knowledge

29. ANS:
$x = -\frac{2}{5}$ or $x = \frac{4}{3}$

PTS: 0 DIF: Moderate REF: 3.2 Solving Quadratic Equations by Factoring
LOC: 11.RF5 TOP: Relations and Functions KEY: Procedural Knowledge

30. ANS:
a) The object will hit the ground after approximately 9.4 s.
b) The height of the object is 317 m.

PTS: 0 DIF: Moderate REF: 3.3 Using Square Roots to Solve Quadratic Equations
LOC: 11.RF5 TOP: Relations and Functions
KEY: Problem-Solving Skills | Procedural Knowledge

31. ANS:
$b \geq \sqrt{20}$ or $b \leq -\sqrt{20}$

PTS: 0 DIF: Difficult REF: 3.3 Using Square Roots to Solve Quadratic Equations
LOC: 11.RF5 TOP: Relations and Functions KEY: Procedural Knowledge

32. ANS:
Approximately 18.1 s

PTS: 0 DIF: Moderate REF: 3.4 Developing and Applying the Quadratic Formula
LOC: 11.RF5 TOP: Relations and Functions
KEY: Problem-Solving Skills | Procedural Knowledge

33. ANS:
a) $2x^2 - 16x + 3 = 0$
b) $x = 7.808$ or $x = 0.192$

PTS: 0 DIF: Moderate REF: 3.4 Developing and Applying the Quadratic Formula
LOC: 11.RF5 TOP: Relations and Functions KEY: Procedural Knowledge

34. ANS:

a) $b^2 - 4ac = 9.52$

b) The discriminant is positive, so there are 2 real roots.

PTS: 0 DIF: Moderate REF: 3.5 Interpreting the Discriminant
LOC: 11.RF5 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge

35. ANS:

Since the discriminant is negative, the equation has no real roots, and the rocket does not reach a height of 30 m.

PTS: 0 DIF: Moderate REF: 3.5 Interpreting the Discriminant
LOC: 11.RF5 TOP: Relations and Functions
KEY: Conceptual Understanding | Problem-Solving Skills

36. ANS:

a) $b^2 - 4ac = 169$

b) The discriminant is a perfect square, so use factoring.

$x = -\frac{4}{3}$ or $x = 3$

PTS: 0 DIF: Moderate REF: 3.5 Interpreting the Discriminant
LOC: 11.RF5 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge

PROBLEM

37. ANS:

$\sqrt{x+14} = x-16$ Square each side of the equation.

$(\sqrt{x+14})^2 = (x-16)^2$

$x+14 = x^2-32x+256$ Combine like terms.

$0 = x^2-33x+242$ Factor.

$0 = (x-11)(x-22)$ Solve using the zero product property.

Either $x-11=0$ or $x-22=0$

$x=11$ $x=22$

Check for extraneous roots.

In $\sqrt{x+14} = x-16$, substitute: $x=11$ and $x=22$

L.S. $= \sqrt{x+14}$ L.S. $= \sqrt{x+14}$

$= \sqrt{11+14}$ $= \sqrt{22+14}$

$= \sqrt{25}$ $= \sqrt{36}$

$= 5$ $= 6$

R.S. $= x-16$ R.S. $= x-16$

$= 11-16$ $= 22-16$

$= -5$ $= 6$

For $x=11$, the left side does not equal the right side, so $x=11$ is not a root of the radical equation.
For $x=22$, the left side is equal to the right side, so this solution is verified.
The root is: $x=22$

PTS: 0 DIF: Difficult REF: 3.2 Solving Quadratic Equations by Factoring
LOC: 11.AN3 TOP: Algebra and Number
KEY: Communication | Problem-Solving Skills

38. ANS:

Use the Pythagorean Theorem.

$x^2+(x+1)^2 = 29^2$

$x^2+x^2+2x+1 = 841$

$2x^2+2x+1-841 = 0$

$2x^2+2x-840 = 0$ Divide each term by 2.

$x^2+x-420 = 0$

Solve by factoring.

$x^2+x-420 = 0$

$(x-20)(x+21) = 0$

$x = 20$ or $x = -21$

Since length cannot be negative, $x=20$.
The length of the shorter leg is 20 cm.
The length of the longer leg is: $20\text{ cm} + 1\text{ cm} = 21\text{ cm}$

PTS: 0 DIF: Difficult REF: 3.2 Solving Quadratic Equations by Factoring
LOC: 11.RF5 TOP: Relations and Functions
KEY: Communication | Problem-Solving Skills

39. ANS:

$$x^2 - 13x - 7 = 0$$
$$x^2 - 13x = 7$$
$$x^2 - 13x + \frac{169}{4} = 7 + \frac{169}{4}$$
$$(x - \frac{13}{2})^2 = \frac{197}{4}$$
$$x - \frac{13}{2} = \pm\sqrt{\frac{197}{4}}$$
$$x = \frac{13}{2} \pm \sqrt{\frac{197}{4}}$$
$$x = \frac{13 \pm \sqrt{197}}{2}$$

The roots are: $x = \frac{13 + \sqrt{197}}{2}$ and $x = \frac{13 - \sqrt{197}}{2}$

PTS: 0 DIF: Moderate REF: 3.3 Using Square Roots to Solve Quadratic Equations
LOC: 11.RF5 TOP: Relations and Functions
KEY: Communication | Problem-Solving Skills

40. ANS:

$2x^2 + 10x + c = 0$ Divide each term by 2.

$x^2 + 5x + \frac{c}{2} = 0$ Complete the square.

$$x^2 + 5x + \frac{25}{4} = -\frac{c}{2} + \frac{25}{4}$$
$$(x + \frac{5}{2})^2 = -\frac{c}{2} + \frac{25}{4}$$

For 2 real solutions, the right side must be greater than 0.

$$-\frac{c}{2} + \frac{25}{4} > 0$$
$$c < \frac{50}{4}$$
$$c < \frac{25}{2}$$

The value of c must be less than $\frac{25}{2}$.

PTS: 0 DIF: Difficult REF: 3.3 Using Square Roots to Solve Quadratic Equations
LOC: 11.RF5 TOP: Relations and Functions
KEY: Communication | Problem-Solving Skills

41. ANS:
The student should have added 18 ($2 \times 9 = 18$) instead of 9 to the right side of the equation.

$$2x^2 - 12x - 13 = 0$$
$$2x^2 - 12x = 13$$
$$2(x^2 - 6x) = 13$$
$$2(x^2 - 6x + 9) = 13 + 18$$
$$2(x-3)^2 = 31$$
$$(x-3)^2 = \frac{31}{2}$$
$$x - 3 = \pm\sqrt{\frac{31}{2}}$$
$$x = 3 \pm \sqrt{\frac{31}{2}}$$

The roots are: $x = 3 + \sqrt{\frac{31}{2}}$ and $x = 3 - \sqrt{\frac{31}{2}}$

PTS: 0 DIF: Difficult REF: 3.3 Using Square Roots to Solve Quadratic Equations
LOC: 11.RF5 TOP: Relations and Functions
KEY: Communication | Problem-Solving Skills

42. ANS:

$h = -5t^2 + 20t$	Substitute: $h = 15$
$15 = -5t^2 + 20t$	Divide each term by 5.
$3 = -t^2 + 4t$	
$t^2 - 4t = -3$	Complete the square.
$t^2 - 4t + 4 = -3 + 4$	
$(t-2)^2 = 1$	

The left side is a perfect square and the right side is positive, so there is at least one solution to this equation. The ball will reach a height of 15 m.

PTS: 0 DIF: Moderate REF: 3.3 Using Square Roots to Solve Quadratic Equations
LOC: 11.RF5 TOP: Relations and Functions
KEY: Communication | Problem-Solving Skills

43. ANS:

a) $(x+2)^2 - 3(x+2) - 7 = 0$

$x^2 + 4x + 4 - 3x - 6 - 7 = 0$

$x^2 + x - 9 = 0$

Substitute: $a = 1$, $b = 1$, $c = -9$ in: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \dfrac{-1 \pm \sqrt{(1)^2 - 4(1)(-9)}}{2(1)}$

$x = \dfrac{-1 \pm \sqrt{37}}{2}$

b) Substitute: $a = 1$, $b = -3$, $c = -7$ in: $x + 2 = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x + 2 = \dfrac{3 \pm \sqrt{(-3)^2 - 4(1)(-7)}}{2(1)}$

$x = -2 + \dfrac{3 \pm \sqrt{37}}{2}$

$x = \dfrac{-1 \pm \sqrt{37}}{2}$

PTS: 0 DIF: Difficult REF: 3.4 Developing and Applying the Quadratic Formula
LOC: 11.RF5 TOP: Relations and Functions KEY: Problem-Solving Skills

44. ANS:

For an equation to have exactly one real root, $b^2 - 4ac = 0$

Substitute: $a = 9$, $b = -k$, $c = 1$

$(-k)^2 - 4(9)(1) = 0$

$k^2 - 36 = 0$

$k^2 = 36$

$k = \pm 6$

For $9x^2 - kx + 1 = 0$ to have exactly one real root, k must be equal to ± 6.

Sample response: A possible value of k is 6. So, an equation with exactly one real root is: $9x^2 - 6x + 1 = 0$

PTS: 0 DIF: Moderate REF: 3.5 Interpreting the Discriminant
LOC: 11.RF5 TOP: Relations and Functions
KEY: Communication | Problem-Solving Skills