

PreCalc 11 Chapter 3 Review Pack v2

Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 0 DIF: Easy
REF: 3.1 Factoring Polynomial Expressions LOC: 11.RF1
TOP: Relations and Functions KEY: Procedural Knowledge
2. ANS: C PTS: 0 DIF: Easy
REF: 3.1 Factoring Polynomial Expressions LOC: 11.RF1
TOP: Relations and Functions KEY: Procedural Knowledge
3. ANS: D 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: D 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: B PTS: 0 DIF: Easy
REF: 3.2 Solving Quadratic Equations by Factoring LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge
9. ANS: C PTS: 0 DIF: Moderate
REF: 3.2 Solving Quadratic Equations by Factoring LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge
10. ANS: B PTS: 0 DIF: Moderate
REF: 3.2 Solving Quadratic Equations by Factoring LOC: 11.RF5
TOP: Relations and Functions KEY: Procedural Knowledge
11. ANS: D 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: D 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: D 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: A 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: B 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: C 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: A 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:
 $\frac{1}{5}(x + 5)(5x - 4)$
- PTS: 0 DIF: Moderate REF: 3.1 Factoring Polynomial Expressions
LOC: 11.RF1 TOP: Relations and Functions KEY: Procedural Knowledge
24. ANS:
 $2(8x + 18y + 23)(8x - 18y - 31)$
- PTS: 0 DIF: Moderate REF: 3.1 Factoring Polynomial Expressions
LOC: 11.RF1 TOP: Relations and Functions KEY: Procedural Knowledge
25. ANS:
 $(4x - 5)^2$
- PTS: 0 DIF: Moderate REF: 3.1 Factoring Polynomial Expressions
LOC: 11.RF1 TOP: Relations and Functions KEY: Procedural Knowledge

26. ANS:

$$x = 3$$

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:

$$x = 4$$

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: 3 and -7

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:

$$x = -\frac{1}{4} \text{ or } x = \frac{5}{2}$$

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:

$$b \geq \sqrt{12} \text{ or } b \leq -\sqrt{12}$$

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 28.3 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) $-2x^2 - 3x + 4 = 0$
 b) $x = -2.351$ or $x = 0.851$

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) $b^2 - 4ac = 8.32$

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 positive, the equation has real roots, and the rocket reaches 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) $b^2 - 4ac = 81$

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

$$x = -7 \text{ or } x = 2$$

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:

$$\begin{aligned} \sqrt{x+14} &= x-16 && \text{Square each side of the equation.} \\ (\sqrt{x+14})^2 &= (x-16)^2 \\ x+14 &= x^2-32x+256 && \text{Combine like terms.} \\ 0 &= x^2-33x+242 && \text{Factor.} \\ 0 &= (x-11)(x-22) && \text{Solve using the zero product property.} \end{aligned}$$

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 $x=22$

$\begin{aligned} \text{L.S.} &= \sqrt{x+14} \\ &= \sqrt{11+14} \\ &= \sqrt{25} \\ &= 5 \end{aligned}$	$\begin{aligned} \text{L.S.} &= \sqrt{x+14} \\ &= \sqrt{22+14} \\ &= \sqrt{36} \\ &= 6 \end{aligned}$
$\begin{aligned} \text{R.S.} &= x-16 \\ &= 11-16 \\ &= -5 \end{aligned}$	$\begin{aligned} \text{R.S.} &= x-16 \\ &= 22-16 \\ &= 6 \end{aligned}$

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.

$$\begin{aligned} x^2 + (x+4)^2 &= 20^2 \\ x^2 + x^2 + 8x + 16 &= 400 \\ 2x^2 + 8x + 16 - 400 &= 0 \\ 2x^2 + 8x - 384 &= 0 && \text{Divide each term by 2.} \\ x^2 + 4x - 192 &= 0 \end{aligned}$$

Solve by factoring.

$$\begin{aligned} x^2 + 4x - 192 &= 0 \\ (x-12)(x+16) &= 0 \\ x &= 12 \text{ or } x = -16 \end{aligned}$$

Since length cannot be negative, $x=12$.

The length of the shorter leg is 12 cm.

The length of the longer leg is: $12 \text{ cm} + 4 \text{ cm} = 16 \text{ cm}$

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:

$$\begin{aligned}
 x^2 - 11x - 11 &= 0 \\
 x^2 - 11x &= 11 \\
 x^2 - 11x + \frac{121}{4} &= 11 + \frac{121}{4} \\
 \left(x - \frac{11}{2}\right)^2 &= \frac{165}{4} \\
 x - \frac{11}{2} &= \pm \sqrt{\frac{165}{4}} \\
 x &= \frac{11}{2} \pm \sqrt{\frac{165}{4}} \\
 x &= \frac{11 \pm \sqrt{165}}{2}
 \end{aligned}$$

The roots are: $x = \frac{11 + \sqrt{165}}{2}$ and $x = \frac{11 - \sqrt{165}}{2}$

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:

$$2x^2 + 6x + c = 0 \quad \text{Divide each term by 2.}$$

$$x^2 + 3x + \frac{c}{2} = 0 \quad \text{Complete the square.}$$

$$x^2 + 3x + \frac{9}{4} = -\frac{c}{2} + \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = -\frac{c}{2} + \frac{9}{4}$$

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

$$-\frac{c}{2} + \frac{9}{4} > 0$$

$$c < \frac{18}{4}$$

$$c < \frac{9}{2}$$

The value of c must be less than $\frac{9}{2}$.

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 8 ($2 \times 4 = 8$) instead of 4 to the right side of the equation.

$$2x^2 - 8x - 15 = 0$$

$$2x^2 - 8x = 15$$

$$2(x^2 - 4x) = 15$$

$$2(x^2 - 4x + 4) = 15 + 8$$

$$2(x - 2)^2 = 23$$

$$(x - 2)^2 = \frac{23}{2}$$

$$x - 2 = \pm \sqrt{\frac{23}{2}}$$

$$x = 2 \pm \sqrt{\frac{23}{2}}$$

The roots are: $x = 2 + \sqrt{\frac{23}{2}}$ and $x = 2 - \sqrt{\frac{23}{2}}$

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:

$$h = -5t^2 + 15t$$

Substitute: $h = 25$

$$25 = -5t^2 + 15t$$

Divide each term by 5.

$$5 = -t^2 + 3t$$

$$t^2 - 3t = -5$$

Complete the square.

$$t^2 - 3t + \frac{9}{4} = -5 + \frac{9}{4}$$

$$\left(t - \frac{3}{2}\right)^2 = \frac{-11}{4}$$

The left side is a perfect square and the right side is negative, so there is no solution to this equation. The ball will never reach a height of 25 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:

$$\begin{aligned} \text{a) } (x+2)^2 - 5(x+2) - 9 &= 0 \\ x^2 + 4x + 4 - 5x - 10 - 9 &= 0 \\ x^2 - x - 15 &= 0 \end{aligned}$$

$$\text{Substitute: } a = 1, b = -1, c = -15 \text{ in: } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4(1)(-15)}}{2(1)}$$

$$x = \frac{1 \pm \sqrt{61}}{2}$$

$$\text{b) Substitute: } a = 1, b = -5, c = -9 \text{ in: } x + 2 = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x + 2 = \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-9)}}{2(1)}$$

$$x = -2 + \frac{5 \pm \sqrt{61}}{2}$$

$$x = \frac{1 \pm \sqrt{61}}{2}$$

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