

PreCalc 11 Chp 8 Rev Pack v1

Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 0 DIF: Difficult REF: 8.1 Absolute Value Functions
LOC: 11.RF2 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge
2. ANS: C PTS: 0 DIF: Moderate REF: 8.1 Absolute Value Functions
LOC: 11.RF2 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge
3. ANS: C PTS: 0 DIF: Moderate REF: 8.1 Absolute Value Functions
LOC: 11.RF2 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge
4. ANS: A PTS: 0 DIF: Easy
REF: 8.2 Solving Absolute Value Equations LOC: 11.RF2
TOP: Relations and Functions KEY: Conceptual Understanding
5. ANS: B PTS: 0 DIF: Moderate
REF: 8.2 Solving Absolute Value Equations LOC: 11.RF2
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
6. ANS: B PTS: 0 DIF: Easy
REF: 8.3 Graphing Reciprocals of Linear Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding
7. ANS: A PTS: 0 DIF: Easy
REF: 8.3 Graphing Reciprocals of Linear Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding
8. ANS: B PTS: 0 DIF: Moderate
REF: 8.3 Graphing Reciprocals of Linear Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
9. ANS: C PTS: 0 DIF: Moderate
REF: 8.3 Graphing Reciprocals of Linear Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
10. ANS: B PTS: 0 DIF: Moderate
REF: 8.3 Graphing Reciprocals of Linear Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding
11. ANS: D PTS: 0 DIF: Moderate
REF: 8.3 Graphing Reciprocals of Linear Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
12. ANS: A PTS: 0 DIF: Easy
REF: 8.4 Using Technology to Graph Reciprocals of Quadratic Functions
LOC: 11.RF11 TOP: Relations and Functions KEY: Conceptual Understanding
13. ANS: C PTS: 0 DIF: Easy
REF: 8.4 Using Technology to Graph Reciprocals of Quadratic Functions
LOC: 11.RF11 TOP: Relations and Functions KEY: Conceptual Understanding
14. ANS: A PTS: 0 DIF: Moderate
REF: 8.3 Graphing Reciprocals of Linear Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge

15. ANS: A PTS: 0 DIF: Easy
REF: 8.4 Using Technology to Graph Reciprocals of Quadratic Functions
LOC: 11.RF11 TOP: Relations and Functions KEY: Conceptual Understanding
16. ANS: B PTS: 0 DIF: Moderate
REF: 8.4 Using Technology to Graph Reciprocals of Quadratic Functions
LOC: 11.RF11 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge
17. ANS: B PTS: 0 DIF: Difficult
REF: 8.4 Using Technology to Graph Reciprocals of Quadratic Functions
LOC: 11.RF11 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge
18. ANS: C PTS: 0 DIF: Easy
REF: 8.5 Graphing Reciprocals of Quadratic Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
19. ANS: D PTS: 0 DIF: Easy
REF: 8.5 Graphing Reciprocals of Quadratic Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
20. ANS: B PTS: 0 DIF: Difficult
REF: 8.5 Graphing Reciprocals of Quadratic Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
21. ANS: C PTS: 0 DIF: Moderate
REF: 8.5 Graphing Reciprocals of Quadratic Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
22. ANS: D PTS: 0 DIF: Moderate
REF: 8.5 Graphing Reciprocals of Quadratic Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
23. ANS: B PTS: 0 DIF: Difficult
REF: 8.5 Graphing Reciprocals of Quadratic Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge
24. ANS: A PTS: 0 DIF: Difficult
REF: 8.5 Graphing Reciprocals of Quadratic Functions LOC: 11.RF11
TOP: Relations and Functions KEY: Conceptual Understanding | Procedural Knowledge

SHORT ANSWER

25. ANS:

x	-2	-1	0	1	2	3
$y = x - 2$	-4	-3	-2	-1	0	1
$y = x - 2 $	4	3	2	1	0	1

PTS: 0 DIF: Easy REF: 8.1 Absolute Value Functions
LOC: 11.RF2 TOP: Relations and Functions
KEY: Conceptual Understanding | Procedural Knowledge

26. ANS:

x	-2	-1	0	1	2	3
$y = 2x^2 + 8x - 8$	-16	-14	-8	2	16	34
$y = 2x^2 + 8x - 8 $	16	14	8	2	16	34

PTS: 0 DIF: Easy REF: 8.1 Absolute Value Functions
 LOC: 11.RF2 TOP: Relations and Functions
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27. ANS:

x	-2	-1	0	1	2	3
$y = 2(2x - 5)^2 - 9$	153	89	41	9	-7	-7
$y = 2(2x - 5)^2 - 9 $	153	89	41	9	7	7

PTS: 0 DIF: Easy REF: 8.1 Absolute Value Functions
 LOC: 11.RF2 TOP: Relations and Functions
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28. ANS:

$$y = \begin{cases} 6x + 24, & \text{if } x \geq -4 \\ -6x - 24, & \text{if } x < -4 \end{cases}$$

PTS: 0 DIF: Moderate REF: 8.1 Absolute Value Functions
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29. ANS:

The solutions are: $x = 9$, $x = -4$, $x = -3$, and $x = 8$

PTS: 0 DIF: Moderate REF: 8.2 Solving Absolute Value Equations
 LOC: 11.RF2 TOP: Relations and Functions
 KEY: Conceptual Understanding | Procedural Knowledge

30. ANS:

$$y = \begin{cases} x^2 - 3x - 10, & \text{if } x \leq -2 \text{ or } x \geq 5 \\ -(x^2 - 3x - 10), & \text{if } -2 < x < 5 \end{cases}$$

PTS: 0 DIF: Moderate REF: 8.1 Absolute Value Functions
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31. ANS:

$$y = \begin{cases} (x + 3)^2 - 9, & \text{if } x \leq -6 \text{ or } x \geq 0 \\ -(x + 3)^2 + 9, & \text{if } -6 < x < 0 \end{cases}$$

PTS: 0 DIF: Moderate REF: 8.1 Absolute Value Functions
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32. ANS:

An equation for the linear function is $y = 6x - 3$ or $y = -6x + 3$.

PTS: 0 DIF: Difficult REF: 8.2 Solving Absolute Value Equations

LOC: 11.RF2 TOP: Relations and Functions

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33. ANS:

The student might have used the graph to solve the equation: $x + 7 = |2x^2 - 8|$

PTS: 0 DIF: Difficult REF: 8.2 Solving Absolute Value Equations

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34. ANS:

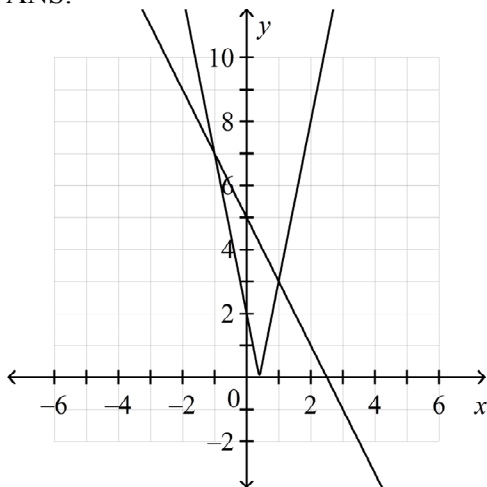
The student might have used the graph to solve the equation: $|-4x - 4| = 4$

PTS: 0 DIF: Moderate REF: 8.2 Solving Absolute Value Equations

LOC: 11.RF2 TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge

35. ANS:



The solutions are $x = -1$ and $x = 1$.

PTS: 0 DIF: Moderate REF: 8.2 Solving Absolute Value Equations

LOC: 11.RF2 TOP: Relations and Functions

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36. ANS:

An equation for the quadratic function is $y = 2x^2 - 4$.

PTS: 0 DIF: Difficult REF: 8.2 Solving Absolute Value Equations

LOC: 11.RF2 TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge

PROBLEM

37. ANS:

Simplify the equation:

$$6 - |2x^2 - 8x - 1| = -3$$

$$|2x^2 - 8x - 1| = 9$$

The absolute value function $|2x^2 - 8x - 1| = 9$ creates two quadratic equations:

$$2x^2 - 8x - 1 = 9 \quad \text{and} \quad -(2x^2 - 8x - 1) = 9$$

$$2x^2 - 8x - 10 = 0 \quad -2x^2 + 8x - 8 = 0$$

$$2(x-5)(x+1) = 0 \quad 2(x^2 - 4x + 4) = 0$$

$$x = 5 \text{ or } x = -1 \quad 2(x-2)(x-2) = 0$$

$$x = 2$$

So, the solutions are $x = -1$, $x = 2$, and $x = 5$.

PTS: 0 DIF: Moderate REF: 8.2 Solving Absolute Value Equations

LOC: 11.RF2 TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge | Communication

38. ANS:

The graph of $y = |f(x)|$ passes through the points (2, 6), (6, 6), (3, 3), and (5, 3).

Plot these points on the coordinate grid.

The points are symmetrical about the line $x = 4$, so plot a point at (4, 0).

Join the points with straight lines.

An equation for the right branch of the graph has the form $y = mx + b$.Use the points (4, 0) and (3, 3) to determine the slope, m .

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{3 - 0}{3 - (4)}$$

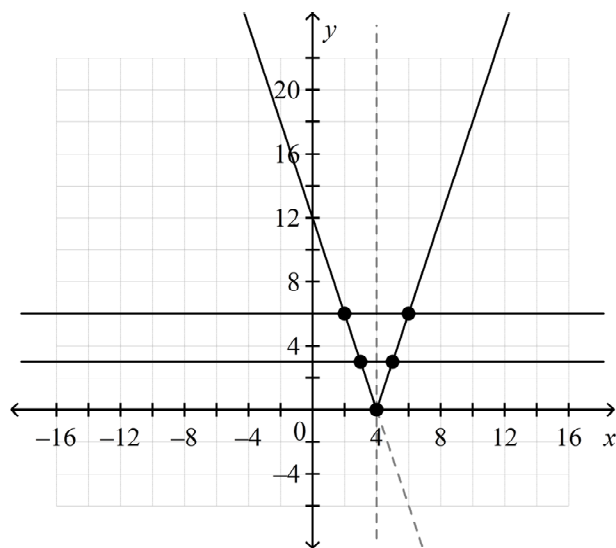
$$m = -3$$

An equation of the line is: $y = -3x + b$ Use the point (2, 6) to determine the y -intercept, b .

$$y = -3x + b$$

$$6 = -3(2) + b$$

$$b = 12$$

So, an equation for the absolute value function is $y = |-3x + 12|$.

PTS: 0 DIF: Difficult REF: 8.2 Solving Absolute Value Equations

LOC: 11.RF2 TOP: Relations and Functions

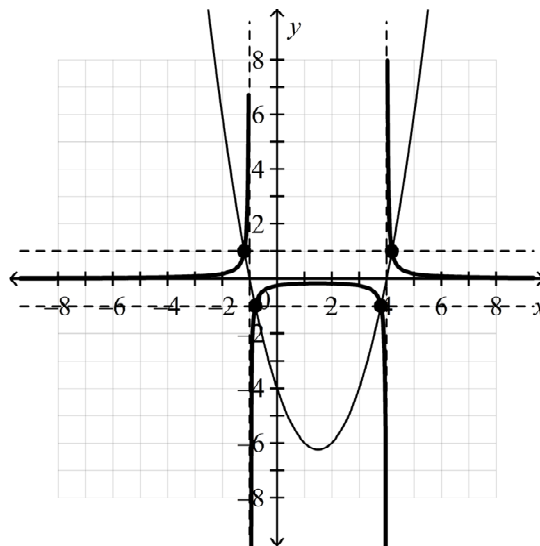
KEY: Conceptual Understanding | Procedural Knowledge | Communication

39. ANS:

The graph of $y = f(x)$ opens up and has x -intercepts -1 and 4 .

So, the graph of the reciprocal function has vertical asymptotes $x = -1$ and $x = 4$.

Plot points where the lines $y = 1$ and $y = -1$ intersect the graph of $y = f(x)$. These points are common to both graphs. Using these points and the asymptotes, draw smooth curves that approach the asymptotes but never touch them. The graph of the reciprocal function has Shape 3.



PTS: 0 DIF: Moderate REF: 8.5 Graphing Reciprocals of Quadratic Functions

LOC: 11.RF11 TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge | Communication

40. ANS:

a) After 1 h, the motorcycle has travelled 95 km. After t hours, the motorcycle has travelled $95t$ kilometres. The distance from the border after t h can be represented by the equation:

$$d = |255 - 95t|$$

b) Substitute: $t = 1.5$

$$d = |255 - 95t|$$

$$d = |255 - 95(1.5)|$$

$$d \approx 113$$

So, the motorcycle is approximately 113 km from the border after 1.5 h.

PTS: 0 DIF: Moderate REF: 8.2 Solving Absolute Value Equations

LOC: 11.RF2 TOP: Relations and Functions

KEY: Conceptual Understanding | Communication | Problem-Solving Skills

41. ANS:

If there is a value of x for which the y -values of the reciprocal functions are the same, then the graphs of the reciprocal functions intersect.

$$\begin{aligned}\frac{1}{f(x)} &= \frac{1}{g(x)} \\ \frac{1}{-2x-2} &= \frac{1}{0.5x+3} \\ -2x-2 &= 0.5x+3 \\ -2.5x &= 5 \\ x &= -2\end{aligned}$$

Substitute $x = -2$ in $y = \frac{1}{-2x-2}$:

$$y = \frac{1}{-2(-2)-2}$$

$$y = \frac{1}{2}$$

So, the graphs of the reciprocal functions intersect at $(-2, \frac{1}{2})$.

PTS: 0 DIF: Difficult REF: 8.3 Graphing Reciprocals of Linear Functions

LOC: 11.RF11 TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge | Communication

42. ANS:

a) Compare $y = \frac{1}{x^2 - 2}$ with $y = \frac{1}{ax^2 + q}$.

Since the value of a is positive and the value of q is negative, the related quadratic function $y = x^2 - 2$ has 2 x -intercepts.

So, the graph of the reciprocal function has 2 vertical asymptotes.

$$y = \frac{1}{x^2 - 2} \text{ is undefined when } x^2 - 2 = 0.$$

$$x^2 = 2$$

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

So, the lines $x = \sqrt{2}$ and $x = -\sqrt{2}$ are vertical asymptotes.

b) Compare $y = \frac{1}{-2x^2 + 8}$ with $y = \frac{1}{ax^2 + q}$.

Since the value of a is negative and the value of q is positive, the related quadratic function $y = -2x^2 + 8$ has 2 x -intercepts.

So, the graph of the reciprocal function has 2 vertical asymptotes.

$$y = \frac{1}{-2x^2 + 8} \text{ is undefined when } -2x^2 + 8 = 0.$$

$$8 = 2x^2$$

$$x = 2 \text{ and } x = -2$$

So, the lines $x = 2$ and $x = -2$ are vertical asymptotes.

PTS: 0

DIF: Difficult

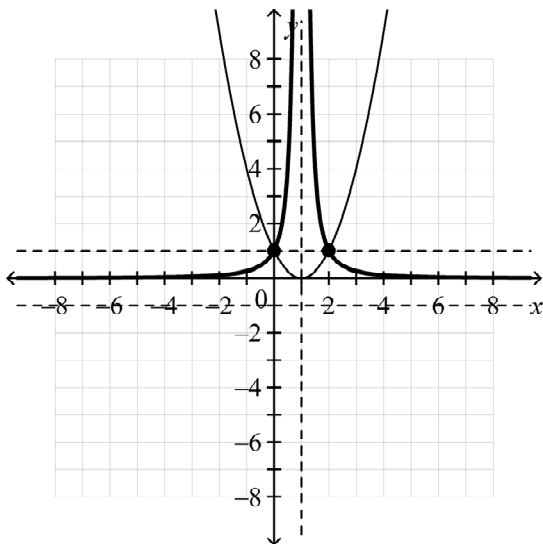
REF: 8.4 Using Technology to Graph Reciprocals of Quadratic Functions

LOC: 11.RF11 TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge | Communication

43. ANS:

- a) When the graph of a reciprocal function has one vertical asymptote, the graph of the corresponding quadratic function has one x -intercept. Since the vertical asymptote is $x = 1$, the graph of the quadratic function has vertex $(1, 0)$ and passes through the points $(2, 1)$ and $(0, 1)$. Since the points common to both graphs are above the x -axis, the graph of the quadratic function opens up.



- b) The equation of the quadratic function has the form $y = a(x - h)^2 + k$, where (h, k) is the vertex of the parabola, and a represents its size and direction. Substitute $h = 1$ and $k = 0$.

$$y = a(x - (1))^2 + 0$$

$$y = a(x - 1)^2$$

Use one of the points $(2, 1)$ and $(0, 1)$ to solve for a : $a = 1$

The equation of the quadratic function is: $y = (x - 1)^2$

The equation of the reciprocal function is: $y = \frac{1}{(x - 1)^2}$

PTS: 0 DIF: Difficult REF: 8.5 Graphing Reciprocals of Quadratic Functions

LOC: 11.RF11 TOP: Relations and Functions

KEY: Conceptual Understanding | Procedural Knowledge | Communication

44. ANS:

- a) The reciprocal function $y = \frac{1}{-x^2 + kx - 6}$ has no vertical asymptotes when the related function $y = -x^2 + kx - 6$ has no x -intercepts. That is, the equation has no real roots.

This occurs when $b^2 - 4ac < 0$.

$$b^2 - 4ac < 0$$

$$k^2 - 4(-1)(-6) < 0$$

$$k^2 - 24 < 0$$

$$k^2 < 24$$

$$-2\sqrt{6} < k < 2\sqrt{6}$$

- b) The reciprocal function $y = \frac{1}{x^2 + kx + 1}$ has one vertical asymptote when the related function $y = x^2 + kx + 1$ has one x -intercept. That is, the equation has equal roots. This occurs when $b^2 - 4ac = 0$.

$$b^2 - 4ac = 0$$

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

$$k^2 - 4 = 0$$

$$k^2 = 4$$

$$k = 2 \text{ or } k = -2$$

- c) The reciprocal function $y = \frac{1}{x^2 + kx + 8}$ has two vertical asymptotes when the related function $y = x^2 + kx + 8$ has two x -intercepts. That is, the equation has two real roots.

This occurs when $b^2 - 4ac > 0$.

$$b^2 - 4ac > 0$$

$$k^2 - 4(1)(8) > 0$$

$$k^2 - 32 > 0$$

$$k^2 > 32$$

$$k < -4\sqrt{2} \text{ or } k > 4\sqrt{2}$$

PTS: 0 DIF: Difficult REF: 8.5 Graphing Reciprocals of Quadratic Functions
 LOC: 11.RF11 TOP: Relations and Functions
 KEY: Conceptual Understanding | Procedural Knowledge | Communication