

Beautiful Dance Moves



$\sin(x)$



$\cos(x)$



$\tan(x)$



$\cot(x)$



$|x|$



x



x^2



$x^2 + y^2$



\sqrt{x}



$\sqrt{-x}$



$\frac{1}{x}$



crap.

Precalculus math II

Review of Quadratics

PRACTICE TEST

1. Multiple Choice Which set of data best describes the graph of the quadratic function $y = -4(x + 3)^2 - 7$?

- A. Vertex: $(3, -7)$; opens down; congruent to $y = 4x^2$
- B. Vertex: $(-3, -7)$; opens up; congruent to $y = 4x^2$
- C. Vertex: $(-3, 7)$; opens up; congruent to $y = 4x^2$
- D. Vertex: $(-3, -7)$; opens down; congruent to $y = 4x^2$

2. Multiple Choice Which equations represent quadratic functions?

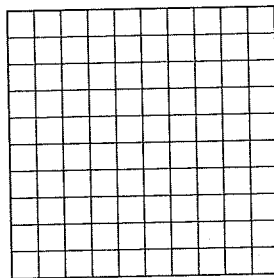
- I. $y = 2(x - 1)(x + 2)$
- II. $y = -3(x + 1)^2 + 1$
- III. $y = \frac{1}{x^2 - 1}$
- IV. $y = 0.5x^2 - 1$

- A. II only
- B. I and II
- C. I, II, and IV
- D. All of them

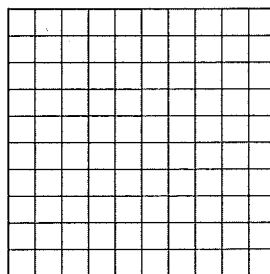
3. For the quadratic function below, sketch a graph, and identify:

- a) the intercepts
- b) the coordinates of the vertex
- c) the equation of the axis of symmetry
- d) the domain of the function
- e) the range of the function

$$y = 4x^2 + 8x - 60$$



4. A basketball is thrown into the air from ground level and its path is a parabola. It reaches a maximum height of 10 m and lands 15 m from where it was thrown.
- a) Determine an equation that models the path of the ball.



- b) What is the height of the ball at a point 3 m beyond where it was thrown, measured horizontally? How far is the ball from where it was thrown when its height has this value again? What assumptions did you make?

5. The sum of two numbers is 36. Their product is a maximum. Determine the numbers.

6. A store sells a calculator for \$8.00. At that price, the store sells approximately 1000 calculators per month. The store manager estimates that for every \$0.50 decrease in price, she will sell 200 more calculators. What is the price of a calculator that will maximize the revenue?

ANSWERS

1. D 2. C 3. a) $x: -5, 3; y: -60$ b) $(-1, -64)$ c) $x = -1$ d) $x \in \mathbb{R}$
e) $y \geq -64, y \in \mathbb{R}$ 4. a) $y = -\frac{8}{45}\left(x - \frac{15}{2}\right)^2 + 10$ b) 6.4 m, 12 m 5. 18, 18
6. \$5.50 or \$5

PRACTICE TEST

1. Multiple Choice What are the non-permissible values of x for

$$\frac{x^2 - 3x}{x^2 + 8x - 33}?$$

- A. -11, 0 B. -3, 0, 11 C. -11 D. -11, 3

2. Multiple Choice Which is the correct simplification of $\frac{x^2 - 4}{x^2 + 4x + 4}$?

- A. $\frac{x-2}{x+2}, x \neq -2$ B. $\frac{x-2}{x+2}, x \neq -2, 2$
C. $\frac{-1}{x+1}, x \neq -1$ D. $\frac{-1}{4x}, x \neq 0$

3. Simplify.

a) $\frac{p^2 - 9}{18} \cdot \frac{12p}{3 - p}$

b) $\frac{2b^2 - 3b + 1}{b^2 - b} \div \frac{6b - 3}{b^2}$

c) $\frac{8a}{5bc^2} \div \frac{20ab}{15c} \cdot \frac{2b}{3}$

d) $\frac{5x}{8} + \frac{3}{20x}$

e) $\frac{x+1}{5x+10} - \frac{3}{8-4x}$

f) $\frac{n}{n^2-16} - \frac{n+1}{n^2+5n+4}$

4. Solve each equation.

a) $\frac{a}{a-5} + 3 = \frac{5}{a-5}$

$$\text{b) } \frac{2b+1}{b-1} - \frac{3b}{b+2} = \frac{18}{b^2+b-2}$$

5. Pump A can drain a pond in 8 h. Working together, Pumps A and B can drain the same pond in 5 h. How long would it take Pump B to drain the pond on its own?

WERS

2. A 3. a) $\frac{-2p(p+3)}{3}, p \neq 3$ b) $\frac{b}{3}, b \neq 0, \frac{1}{2}, 1$ c) $\frac{4}{5bc}, a \neq 0, b \neq 0, c \neq 0$

$\frac{c^2+6}{40x}, x \neq 0$ e) $\frac{4x^2+11x+22}{20(x+2)(x-2)}, x \neq -2, 2$

$\frac{4}{(n-4)}, n \neq -4, -1, 4$ 4. a) no solution b) $b = 4$ 5. $\frac{40}{3}$ h, or 13 h 20 min

Precalculus Math. II

Absolute Value and Reciprocal Review

PRACTICE TEST

1. Multiple Choice Which solution is correct for $|x^2 - 6x + 5| = 5$?

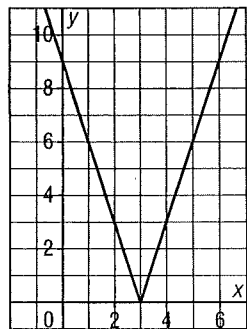
A. no solution

B. $x = 0$

C. $x = 0; x = 6; x = \frac{1}{3}; x = \frac{2}{3}$

D. $x = 0; x = 6$

2. Multiple Choice Which function describes this graph?



A. $y = |3x + 9|$

B. $y = |3x - 9|$

C. $y = |-\frac{1}{3}x + 9|$

D. $y = |9x + 3|$

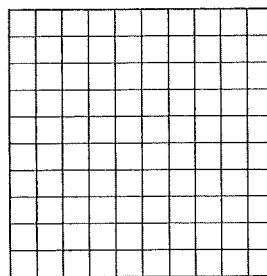
3. Solve each equation.

a) $|-4x + 4| = 2$

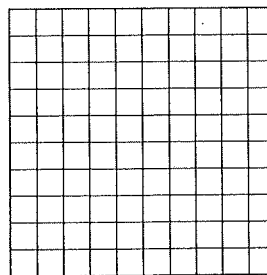
b) $x + 1 = |x^2 - 4x + 5|$

4. Sketch a graph of each absolute value function. Identify the intercepts, domain, and range. Write the functions in piecewise notation.

a) $y = |5x - 4|$

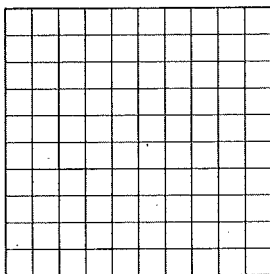


b) $y = |-x^2 + 2x + 8|$

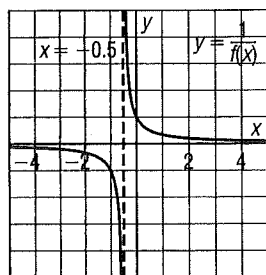


5. Sketch a graph of the function $y = \frac{1}{-3x(x-1)}$.

Label the asymptotes with their equations.



6. Use the graph of the reciprocal function $y = \frac{1}{f(x)}$ to graph the linear function $y = f(x)$. Describe your strategy.



ANSWERS

1. D 2. B 3. a) $x = \frac{1}{2}, x = \frac{3}{2}$ b) $x = 1, x = 4$

4. a) x-intercept: $\frac{4}{5}$; y-intercept: 4; domain: $x \in \mathbb{R}$; range: $y \geq 0$;

$$y = \begin{cases} 5x - 4, & \text{if } x \geq \frac{4}{5} \\ -5x + 4, & \text{if } x < \frac{4}{5} \end{cases}$$

- b) y-intercept: 8; x-intercepts: -2, 4; domain: $x \in \mathbb{R}$; range: $y \geq 0$;

$$y = \begin{cases} -x^2 + 2x + 8, & \text{if } -2 \leq x \leq 4 \\ x^2 - 2x - 8, & \text{if } x < -2 \text{ or } x > 4 \end{cases}$$

PRACTICE TEST

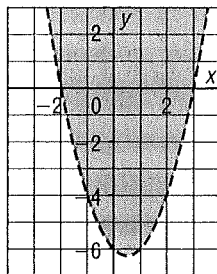
1. Multiple Choice Which inequality is not represented by this graph?

A. $y > x^2 - x - 6$

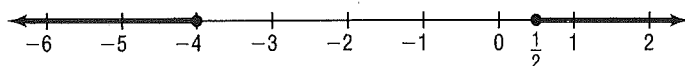
B. $y > \left(x - \frac{1}{2}\right)^2 - \frac{13}{2}$

C. $y > (x + 2)(x - 3)$

D. $y > (x + 3)(x - 2)$



2. Multiple Choice Which inequality below is represented by this number line?



A. $2x^2 + 7x - 4 \geq 0$

B. $2x^2 + 7x - 4 \leq 0$

C. $-2x^2 - 7x + 4 \geq 0$

D. $2x^2 - 7x + 4 \leq 0$

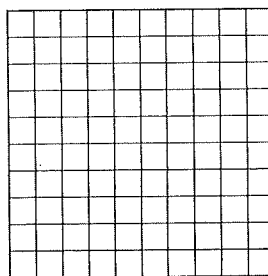
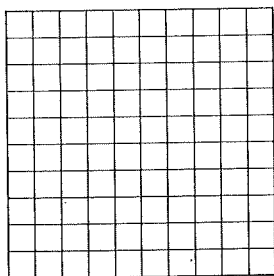
3. Graph each inequality. Give 2 possible solutions in each case.

a) $2x^2 - 5x < -2$

b) $-2 \geq -0.5(x - 6)^2$

c) $y \leq 0.5x - 2$

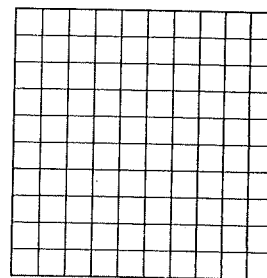
d) $y > -(x + 3)^2 + 4$



4. At a school cafeteria, an apple costs 75¢ and a banana costs 50¢. Ava has up to \$5 to spend on fruit for herself and her friends.

a) Write an inequality to represent this situation. What are the restrictions on the variables?

b) Graph the inequality.



c) Use the graph to determine 2 possible ways that Ava can spend up to \$5.

5. Solve each system of equations. Use algebra for one system and graphing technology for the other. How did you decide which strategy to use?

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

$$x + y = 12$$

b) $y = (x - 2)^2$

$$y = -x^2 + 4x - 4$$

6. The cross section of a pedestrian tunnel under a road is parabolic and is modelled by the equation $y = -0.3x^2 + 1.8x$, where y metres is the height of the tunnel at a distance of x metres measured horizontally from one edge of the path under the tunnel. In 2010, the tallest living person was about 2.56 m tall. Could he walk through the tunnel without having to bend over? How could you use an inequality to solve this problem?

ANSWERS

1. D 2. A 4. a) $75x + 50y \leq 500$, x and y whole numbers
5. a) $(-3.1, 15.1)$, $(2.1, 9.9)$ b) $(2, 0)$ 6. yes

Precalculus Math 11 Review

1. Identify this series as arithmetic or geometric, then determine its sum.

$$4 + 2.5 + 1 + \dots - 32$$

2. Solve each equation. Verify the roots.

a) $\sqrt{5x + 1} = \sqrt{3x + 8}$ b) $4 - 5\sqrt{2x} = 8 - 3\sqrt{2x}$

3. Solve each quadratic equation.

a) $(x - 2)(2x - 3) = 4$ b) $x(4x + 1) = 4(5 - 2x^2)$

4. An outdoor theatre sells 800 tickets for a show at \$26 per ticket. A survey indicates that if the ticket price is decreased, the number of tickets sold will increase by 50 for each \$1 decrease.

What ticket price will maximize the revenue?

What is the maximum revenue?

5. Graph each inequality.

a) $4x^2 + 3x \leq 10$

b) $y > -x^2 + 4x - 1$

6. An aircraft is 120 km from a radar antenna, in a direction E35°N. To the nearest kilometre, how far is the aircraft due east and due north of the antenna?

7. To the nearest degree, what values of α satisfy each equation for $0^\circ \leq \alpha \leq 360^\circ$?

a) $\tan \alpha = \frac{9}{7}$

b) $\cos \alpha = -0.3$

8. Solve each triangle. Give the angle measures to the nearest degree and the side lengths to the nearest tenth of a centimetre.

a) In $\triangle XYZ$, $\angle X = 72^\circ$, $YZ = 14.8$ cm, and $\angle Y = 61^\circ$

b) In $\triangle UVW$, $\angle W = 48^\circ$, $VW = 12.4$ cm, and $UW = 11.7$ cm

9. From the top of a 50-m observation tower, a fire ranger observes smoke in two locations. One is on a bearing of 040° with an angle of depression of 8° , and the other is on a bearing of 205° with an angle of depression of 13° . To the nearest metre, how far apart are the sources of smoke?

10. Determine the non-permissible values for each rational expression, then simplify it.

a) $\frac{16a^3b^4}{-8a^5b}$

b) $\frac{2x^2 - 7x - 15}{6x^2 + 13x + 6}$

11. Simplify each expression.

a) $\frac{6a^2 - 26a - 20}{a^2 - 12a + 35} \cdot \frac{2a^2 - 9a - 35}{3a^2 + 20a + 12}$

b) $\frac{8y^2 - 20y - 48}{6y^2 - 7y - 3} \div \frac{24y^2 - 88y - 32}{4y^2 - 12y + 9}$

12. Simplify.

a) $\frac{9a}{7b^2} + \frac{3a^2b}{4ab^2} - \frac{8b^4}{3ab^3}$

b) $\frac{x^2 - 1}{x^2 + 7x + 6} + \frac{x^2 + 5x - 14}{x^2 - 2x - 3}$

13. Solve each equation.

a) $\frac{x + 3}{x - 1} = \frac{8}{2x^2 - 2x}$

b) $\frac{6}{m^2 - 25} = \frac{18}{2m^2 - 2m - 12}$

14. Write an equation to model the following situation, then solve the equation.

Pump 1 can empty a swimming pool in 12 h. When Pump 2 is used as well, the pool is emptied in 7.5 h. How long would it take for Pump 2 alone to empty the pool?

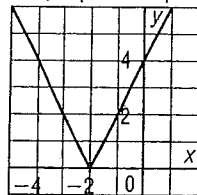
15. Sketch a graph of each absolute value function. Identify the domain and range of the function.

a) $y = |3x + 1|$

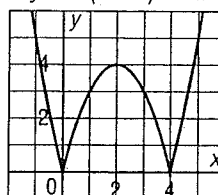
b) $y = |-(x + 1)^2 + 2|$

16. Write each absolute value function in piecewise notation.

a) $y = |-2x - 4|$



b) $y = |-(x - 2)^2 + 4|$



17. Solve by graphing. Give the solutions to the nearest tenth.

$|-x^2 + 3x - 6| = 9$

18. Use algebra to solve each equation.

a) $2|2x - 1| = 9 - x$

b) $|x^2 - 7x + 6| = 4$

19. Graph each pair of functions on the same grid. State the equations of the asymptotes, the domain, and the range of each reciprocal function.

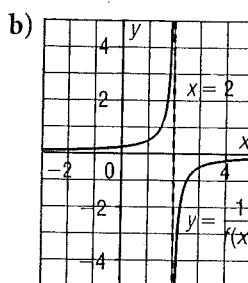
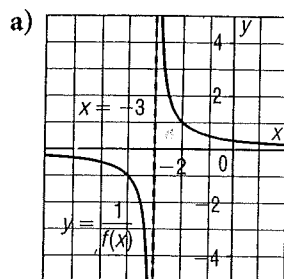
a) $y = 2x - 3$ and $y = \frac{1}{2x - 3}$ b) $y = -x + 2$ and $y = \frac{1}{-x + 2}$

20. Determine the equations of the vertical asymptotes of the graph of the reciprocal function $y = \frac{1}{(x + 3)^2 - 4}$.

21. Graph these functions on the same grid:

$$y = 2(x + 1)^2 \text{ and } y = \frac{1}{2(x + 1)^2}$$

22. Use each graph of the reciprocal function $y = \frac{1}{f(x)}$ to graph the linear function $y = f(x)$.



23. Use the graph of the quadratic function $y = f(x)$ to sketch a graph of the reciprocal function $y = \frac{1}{f(x)}$. Identify any vertical asymptotes.

ANSWERS

1. arithmetic; -350 2. a) $x = 3.5$ b) no solution 3. a) $x = \frac{7 \pm \sqrt{33}}{4}$
 b) $x = -\frac{4}{3}$ and $x = \frac{5}{4}$ 4. \$21; \$22 050 5. a) $-2 \leq x \leq 1.25$, $x \in \mathbb{R}$
 6. 98 km east; 69 km north 7. a) 52° , 232° b) 107° , 253°
 8. a) $\angle Z = 47^\circ$, $XY \doteq 11.4$ cm, $XZ \doteq 13.6$ cm b) $UV \doteq 9.8$ cm; $\angle V \doteq 62^\circ$,
 $\angle U \doteq 70^\circ$ 9. 568 m 10. a) $\frac{-2b^3}{a^2}$, $a, b \neq 0$ b) $\frac{x-5}{3x+2}$, $x \neq -\frac{3}{2}$, $-\frac{2}{3}$
 11. a) $\frac{2(2a+5)}{a+6}$, $a \neq -6, -\frac{2}{3}, 5, 7$ b) $\frac{(2y+3)(2y-3)}{2(3y+1)^2}$, $y \neq -\frac{1}{3}, \frac{3}{2}, 4$
 12. a) $\frac{108a^2 + 63a^2b - 224b^3}{84ab^2}$, $a, b \neq 0$ b) $\frac{2x^3 + 8x^2 + 15x - 81}{(x+1)(x+6)(x-3)}$, $x \neq -6, -1, 3$
 13. a) $x = -4$ b) $m = -9$, $m = 7$ 14. 20 h 15. a) $x \in \mathbb{R}$, $y \geq 0$ b) $x \in \mathbb{R}$, $y \geq 0$
 16. a) $y = \begin{cases} -2x - 4, & \text{if } x \leq -2 \\ 2x + 4, & \text{if } x > -2 \end{cases}$ b) $y = \begin{cases} -(x-2)^2 + 4, & \text{if } 0 \leq x \leq 4 \\ (x-2)^2 - 4, & \text{if } x < 0 \text{ or } x > 4 \end{cases}$
 17. $x \doteq -0.8$, $x \doteq 3.8$ 18. a) $x = 2.2$, $x = -2.3$ b) $x = \frac{7 \pm \sqrt{41}}{2}$, $x = 2$, $x = 5$
 19. a) $y = 0$, $x = 1.5$; $x \in \mathbb{R}$, $x \neq 1.5$; $y \in \mathbb{R}$, $y \neq 0$
 b) $y = 0$, $x = 2$; $x \in \mathbb{R}$, $x \neq 2$; $y \in \mathbb{R}$, $y \neq 0$ 20. $x = -1$, $x = -5$
 23. $x = -2$, $x = 3$