

Chapter 1 Sequences and Series Unit Review

Name _____

A _____ is an ordered list of objects or numbers.

- Each element of a sequence is called a _____.
 - Ex. 2, 5, 8, 11, ...

- An arithmetic sequence is a sequence in which the terms increase or decrease by a common value called the _____
- The general term of an arithmetic sequence is given by:

Example: Given the sequence: 6, 12, 18, 24, ...

a) Find the twentieth term

b) Find the general term

- A geometric sequence is a sequence in which the terms increase or decrease by a _____
- The general term of a geometric sequence is given by:

Example: Given the following sequence 4, 8, 16, ...

a) Find the twentieth term

b) Find the general term

An _____ geometric series is a geometric series with an infinite number of terms (goes on forever).

- A _____ infinite series approaches a finite value
- A _____ series does not approach a finite value
- If _____ then an infinite series has a sum (convergent)

Example: Find the sum of the following series, if possible:

a) $4 + 8 + 16 + 32 + \dots$

b) $18 + 6 + 2 + \dots$

Sequences and Series

Date _____

Determine if the sequence is arithmetic. If it is, find the common difference and the term named in the problem.

1) $-35, -43, -51, -59, \dots$

Find t_{28}

2) $2, -198, -398, -598, \dots$

Find t_{23}

Given two terms in an arithmetic sequence find the common difference and the term named in the problem.

3) $t_{11} = -75$ and $t_{37} = -257$

Find t_{40}

4) $t_{10} = -38$ and $t_{37} = -173$

Find t_{40}

Given a term in an arithmetic sequence and the common difference find the term named in the problem.

5) $t_{38} = -3661, d = -100$

Find t_{33}

6) $t_{10} = 18, d = 4$

Find t_{31}

Find the next three terms in each sequence.

7) 1, 2, 4, 8, 16, ...

8) -2.5, -5, -10, -20, -40, ...

Find the tenth term in each sequence.

9) -3, 9, -27, 81, -243, ...

10) -2, -6, -18, -54, -162, ...

Determine if the sequence is geometric. If it is, find the common ratio, the 8th term, and the explicit formula.

11) -2, 8, -32, 128, ...

12) -2, -6, -18, -54, ...

Find the missing term or terms in each geometric sequence.

13) ..., 2, , , , , 486, ...

14) ..., 1, , , , , 32, ...

Find the missing term or terms in each arithmetic sequence.

15) ..., 40, __, __, __, -80, ...

16) ..., 3, __, __, __, 23, ...

Evaluate each arithmetic series described.

17) $23 + 33 + 43 + 53 \dots, n = 19$

18) $(-16) + (-26) + (-36) + (-46) \dots, n = 17$

Evaluate each geometric series described.

19) $3 - 6 + 12 - 24 \dots, n = 8$

20) $3 - 6 + 12 - 24 \dots, n = 7$

21) $2 + 10 + 50 + 250 \dots, n = 9$

22) $2 + 10 + 50 + 250 \dots, n = 8$

Determine the number of terms n in each geometric series.

23) $t_1 = 2, r = 6, S_n = 18662$

24) $t_1 = 1, r = 6, S_n = 259$

25) $1 + 5 + 25 + 125 \dots, S_n = 97656$

26) $1 + 4 + 16 + 64 \dots, S_n = 87381$

Determine if each geometric series converges or diverges.

27) $\frac{9}{5} + \frac{9}{10} + \frac{9}{20} + \frac{9}{40} \dots$

28) $2 - \frac{1}{2} + \frac{1}{8} - \frac{1}{32} \dots$

Evaluate each infinite geometric series described.

29) $1.8 - 0.36 + 0.072 - 0.0144 \dots$

30) $1215 + 405 + 135 + 45 \dots$

Determine the common ratio of the infinite geometric series.

31) $t_1 = -3, S = -6$

32) $t_1 = 7.1, S = 4.4375$

More Review Questions for Chapter 1

Name _____

1. Determine the general term of the following:

a) 6, 13, 20, 27, ...

b) $\frac{1}{2}$, -1, 2, -4, 8, ...

2. Find the sum of the following series:

a) 5, 8, 11, 14, ..., 65

b) 1, 3, 9, ..., 59 049

3. In an arithmetic series, $S_{13} = 806$, $S_{14} = 938$ and $t_1 = 2$, find the common difference.

4. In a geometric sequence, $t_1 = 3$ and $t_4 = 192$. Find t_6 .

5. Find the sum of the following series: $14 - 56 + 224 - \dots - 3\,670\,016$

6. In a geometric series, $S_3 = 105$, $S_4 = 425$, and $S_5 = 1705$. Find the common ratio.

7. Use the infinite series formula to determine a fraction that is equal to $0.244444\dots$

Chapter 2 Radicals

Name _____

Radicals are any expression involving the root sign:

- An _____ radical has a coefficient of one or negative one.
- A _____ radical has a coefficient other than one or negative one.

We can convert from **mixed** to **entire radicals** and **entire** to **mixed radicals**.

Ex. a) $\sqrt{98}$

b) $2\sqrt{7}$

c) $\sqrt[3]{24n^7}$

We can **add or subtract like radicals** by adding or subtracting their coefficients.

Ex. a) $2\sqrt{5} - 3\sqrt{7} + \sqrt{5}$

b) $2\sqrt{28} - 5\sqrt{7}$

We **multiply** radicals by multiplying coefficient by coefficient and radicand by radicand. We can **divide** radicals by dividing coefficient by coefficient and radicand by radicand. Answers must be in **simplest form**.

Ex. a) $4\sqrt{6} \cdot 3\sqrt{2}$

b) $\frac{18\sqrt{2}}{3\sqrt{14}}$

Multiplying binomials: Use FOIL

Ex. $(8\sqrt{6} + 2)(\sqrt{2} - 3)$

Rationalizing binomial denominators—we multiply by the **conjugate**.

- The conjugate of $a + b$ is: _____ and vice versa

Ex. $\frac{5}{2-\sqrt{3}}$

Solving Radical Equations

1. Isolate the radical
2. Square both sides
3. Solve for 'x'
4. Check for extraneous roots

Ex. $\sqrt{x + 1} + 3 = 5$

Radicals Review

Simplify.

1) $\sqrt{216}$

2) $\sqrt{20}$

3) $\sqrt{54}$

4) $\sqrt{100}$

5) $-4\sqrt{64}$

6) $-6\sqrt{320}$

7) $\sqrt{96r^4}$

8) $\sqrt{18x^4}$

9) $\sqrt{12xy^3z}$

10) $\sqrt{63mp^4q^2}$

11) $-5\sqrt{54p^2q^2r^3}$

12) $8\sqrt{12x^2y^4z^2}$

13) $5\sqrt{10} \cdot \sqrt{6}$

14) $\sqrt{2} \cdot 5\sqrt{5}$

15) $-4\sqrt{3}(\sqrt{5} + \sqrt{3})$

16) $\sqrt{15}(\sqrt{10} + 5\sqrt{3})$

17) $\sqrt{10x}(2 - 4\sqrt{5})$

18) $\sqrt{15n}(-4\sqrt{5} + 3)$

$$19) (-4 + 4\sqrt{2})(3 + \sqrt{2})$$

$$20) (1 + \sqrt{5})(5 + \sqrt{5})$$

$$21) (\sqrt{2} + 4)(\sqrt{2}x - 5)$$

$$22) (5\sqrt{2n} - 2)(\sqrt{2n} - 1)$$

$$23) \frac{\sqrt{20}}{2\sqrt{25}}$$

$$24) \frac{\sqrt{20}}{\sqrt{16}}$$

$$25) \frac{2 - \sqrt{2}}{\sqrt{4}}$$

$$26) \frac{2 + \sqrt{2}}{4\sqrt{4}}$$

$$27) \frac{4+3\sqrt{2}}{5\sqrt{8}}$$

$$28) \frac{5-4\sqrt{3}}{3\sqrt{14}}$$

$$29) \frac{2}{4-5\sqrt{2}}$$

$$30) \frac{2}{5-\sqrt{5}}$$

$$31) \frac{\sqrt{2}-5}{5+\sqrt{2}}$$

$$32) \frac{-1+3\sqrt{2}}{3+\sqrt{2}}$$

$$33) -2\sqrt{3}-\sqrt{3}$$

$$34) -3\sqrt{6}+2\sqrt{6}$$

$$35) 2\sqrt{6} + 2\sqrt{54}$$

$$36) -2\sqrt{8} - \sqrt{2}$$

$$37) -\sqrt{54} + 3\sqrt{45} + 3\sqrt{24}$$

$$38) -2\sqrt{27} - 2\sqrt{45} - \sqrt{3}$$

$$39) 3\sqrt{18} + 3\sqrt{27} - \sqrt{2} - 2\sqrt{45}$$

$$40) 2\sqrt{6} - \sqrt{45} + 2\sqrt{2} - 3\sqrt{24}$$

Solve each equation. Remember to check for extraneous solutions.

$$41) 3 = \sqrt{x}$$

$$42) \sqrt{v} = 7$$

$$43) \sqrt{11x+4} = 9$$

$$44) \sqrt{5a+1} = 6$$

$$45) 15 = 6 + \sqrt{p}$$

$$46) 2 = \sqrt{k}$$

$$47) 1 = \sqrt{13-2n}$$

$$48) -2\sqrt{x+6} = -10$$

$$49) \sqrt{1-m} = \sqrt{-2-2m}$$

$$50) \sqrt{r+1} = \sqrt{13-2r}$$

Chapter 3 Solving Quadratics Review

Name _____

A quadratic function can be expressed in the following forms:

General Form

Standard Form (Vertex Form)

Solving Quadratic Equations:

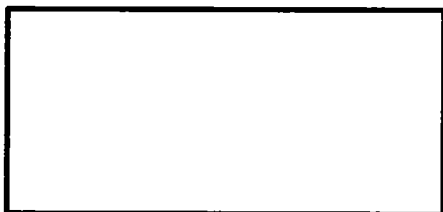
1. Solve by factoring—factor the quadratic and set each factor equal to _____
2. Solve by using the quadratic formula (radicals must be left in lowest form)
3. Solve by completing the square—complete the square and solve for x
4. Solve by graphing—graph the parabola and find the x-intercepts.

Solve by Factoring Review: Polynomial

When given an equation in the general form, the **quadratic formula** can always be used to solve a quadratic equation.

Quadratic Formula

Ex. Solve $2x^2 - 5x - 3 = 0$



The expression _____, is called the _____ of the quadratic equation, because it discriminates among the types of possible solutions.

Number of Roots of a Quadratic Equation

The quadratic equations $ax^2 + bx + c = 0$ has:

- two real roots when _____
- exactly one real root when _____
- no real roots when _____

To convert a quadratic from general form to standard form, we use a process called completing the square.

We can also solve a quadratic equation by **completing the square**.

Ex. $2x^2 - 12x - 32 = 0$

Solving Quadratic Equations

Solve each equation by factoring.

1) $(a+4)(5a+3)=0$

2) $(k+4)(k-7)=0$

3) $x^2+10x+21=0$

4) $p^2+16p+64=0$

5) $n^2+6n-18=-2$

6) $m^2-8m+8=-7$

7) $x^2-9x=-20$

8) $r^2-24=-5r$

9) $10n^2+13n-30=0$

10) $3b^2-b-4=0$

11) $2v^2-v-1=5$

12) $4x^2+21x+15=4x$

Solve each equation by taking square roots.

13) $64a^2 - 3 = 13$

14) $8x^2 - 10 = 22$

Solve each equation by completing the square.

15) $p^2 - 2p - 16 = 0$

16) $k^2 - 20k + 99 = 0$

17) $6k^2 - 12k - 18 = 0$

18) $7n^2 - 14n - 21 = 0$

Solve each equation with the quadratic formula.

19) $5r^2 + 6r - 56 = 0$

20) $4m^2 - 2m - 72 = 0$

21) $-4n^2 - 8n + 45 = 0$

22) $x^2 - 12x - 64 = 0$

23) $-3b^2 = -27$

24) $-4v^2 - 2v = -72$

Find the value of the discriminant of each quadratic equation.

25) $7x^2 - x - 9 = 0$

26) $-8n^2 + 10n + 8 = 0$

Use the discriminant to determine the number of real solutions to each equation.

27) $-5x^2 + 10x - 4 = 5$

28) $7x^2 - 2 = 9x^2 - 4x$

Answers to Solving Quadratic Equations (ID: 1)

1) $\left\{-4, -\frac{3}{5}\right\}$

2) $\{-4, 7\}$

3) $\{-3, -7\}$

4) $\{-8\}$

5) $\{-8, 2\}$

6) $\{5, 3\}$

7) $\{5, 4\}$

8) $\{-8, 3\}$

9) $\left\{-\frac{5}{2}, \frac{6}{5}\right\}$

10) $\left\{\frac{4}{3}, -1\right\}$

11) $\left\{-\frac{3}{2}, 2\right\}$

12) $\left\{-\frac{5}{4}, -3\right\}$

13) $\left\{\frac{1}{2}, -\frac{1}{2}\right\}$

14) $\{2, -2\}$

15) $\{1 + \sqrt{17}, 1 - \sqrt{17}\}$

16) $\{11, 9\}$

17) $\{3, -1\}$

18) $\{3, -1\}$

19) $\left\{\frac{14}{5}, -4\right\}$

20) $\left\{\frac{9}{2}, -4\right\}$

21) $\left\{-\frac{9}{2}, \frac{5}{2}\right\}$

22) $\{16, -4\}$

23) $\{-3, 3\}$

24) $\left\{-\frac{9}{2}, 4\right\}$

25) 253

26) 356

27) None

28) One

Chapter 3 More Review Questions

Name _____

Factor:

1. $3(x+y)^2 - 5(x+y) - 2$

2. $4(x-y) + 6x(y-x)$

3. $75(x+y)^2 - 108$

4. $10(x-y)^2 + 21(y-x) - 10$

Chapter 4 Analyzing Quadratics Review

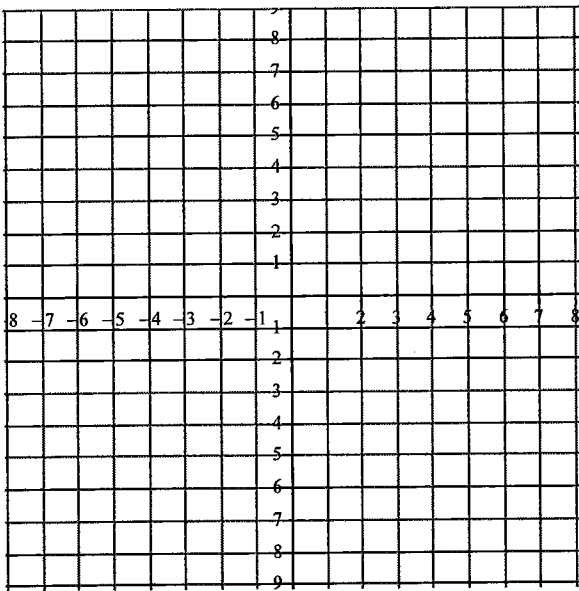
Name _____

To graph a quadratic function, it is easiest if the function is in Standard Form.

In order to convert a quadratic from standard to vertex form, we must “complete the square.”

a) $y = -x^2 - 12x - 33$

b) $y = 2x^2 - 20x + 47$

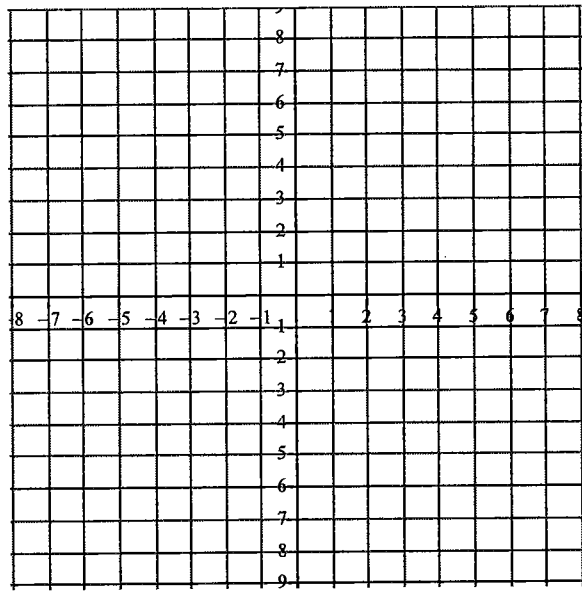


Vertex: _____

Axis of symmetry: _____

Domain: _____

Range: _____



Vertex: _____

Axis of symmetry: _____

Domain: _____

Range: _____

Different forms of the quadratic equation can be used depending on the information given.

General Form

Standard Form

Factored form

When given the vertex, use the Standard Form (Vertex form)

Ex. Determine the equation of the quadratic with a vertex $(2, -4)$ that passes through $(3, -2)$

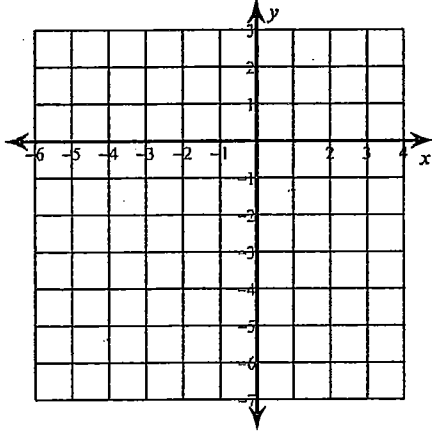
When given the x-intercepts, you can use the factored form of the quadratic equation

Ex. Determine the equation of the quadratic that passes through $A(2, 9)$ and has x-intercepts -1 and 3

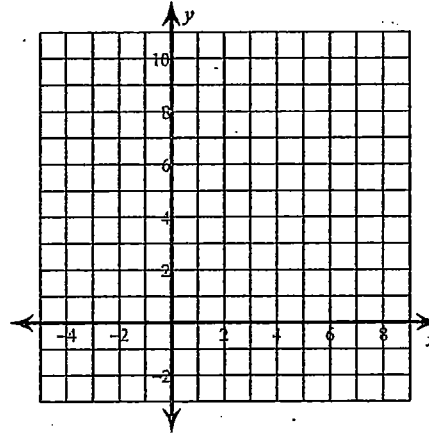
Graphing Quadratics

Sketch the graph of each function.

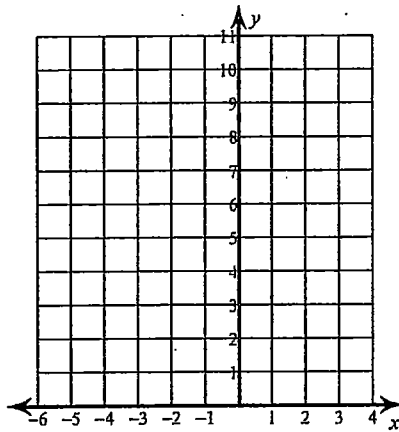
1) $y = -2(x+1)^2 + 2$



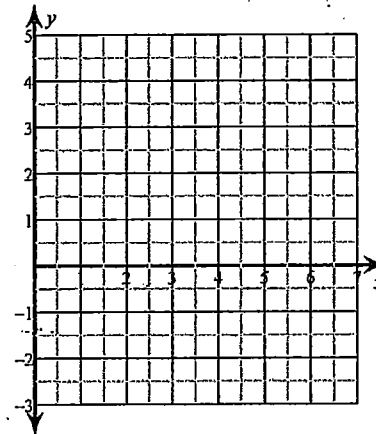
2) $y = 3(x+2)^2 - 2$



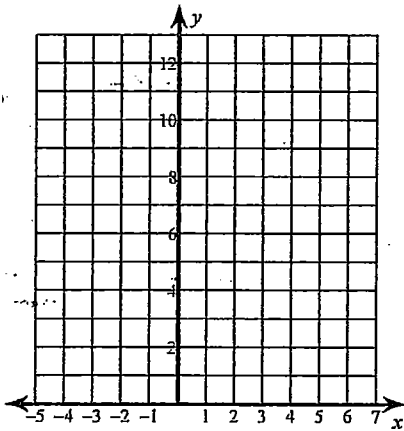
3) $y = 2(x+2)^2 + 2$



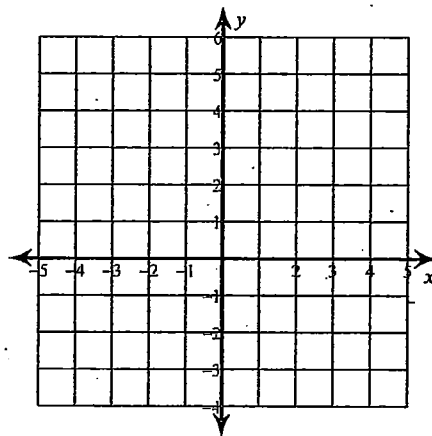
4) $y = (x-4)^2 - 1$



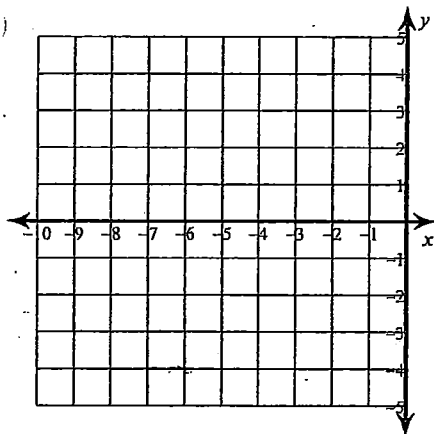
5) $y = 2x^2 - 8x + 12$



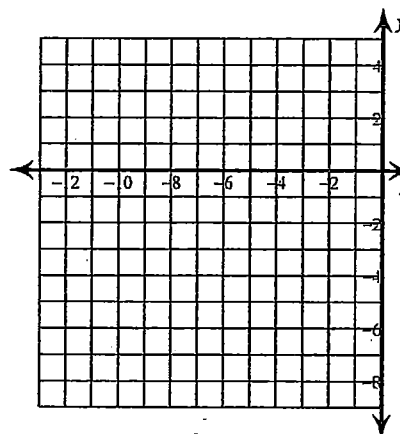
6) $y = 2x^2 + 4x - 1$



7) $y = 2x^2 + 12x + 14$

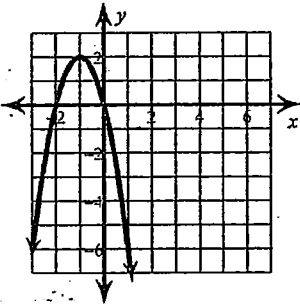


8) $y = -3x^2 - 24x - 44$

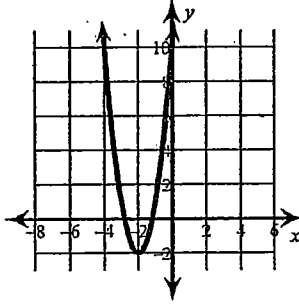


Answers to Assignment (ID: 1)

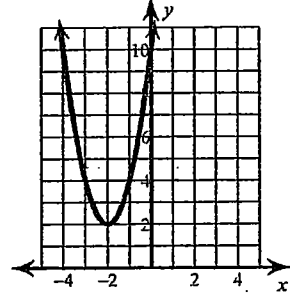
1)



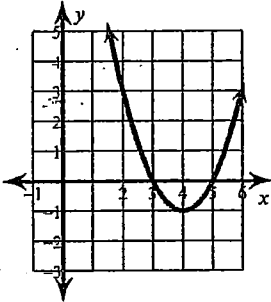
2)



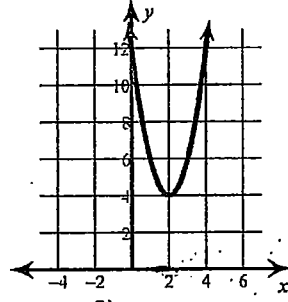
3)



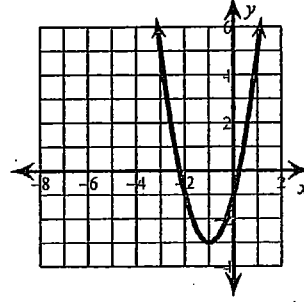
4)



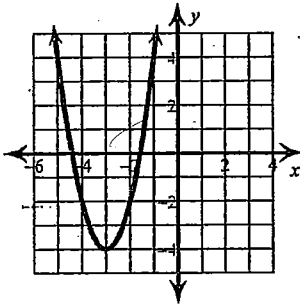
5)



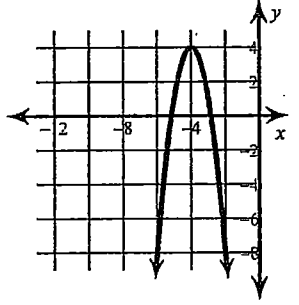
6)



7)



8)



Chapter 4 More Review Questions

Name _____

Write the equation of the quadratic given the following:

a) Vertex $(-2, -3)$ passing through the point $(-4, 9)$

b) Passing through $A(-4, 6)$ with x -intercepts -5 and -1 .

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c) State the equation of a quadratic in vertex form if the axis of symmetry is $x = 3$ and the range is $y \geq -5$ and passing through the point $(2, 1)$.

d) x-intercepts of -1 and 3 and range $y \leq 2$

Chapter 5 Inequalities and Systems of Equations Review

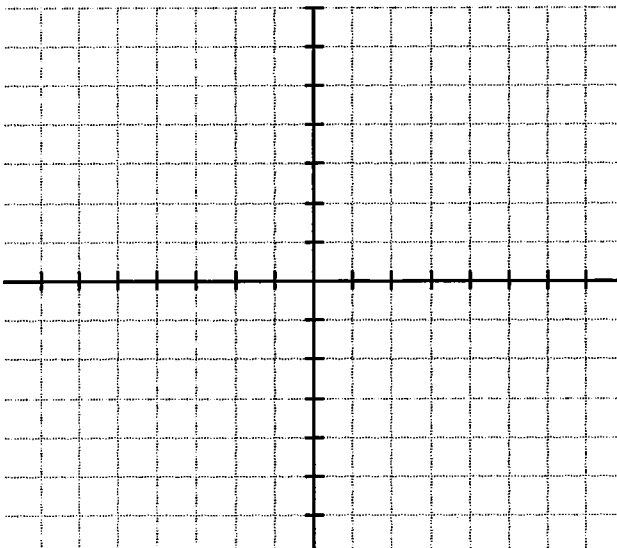
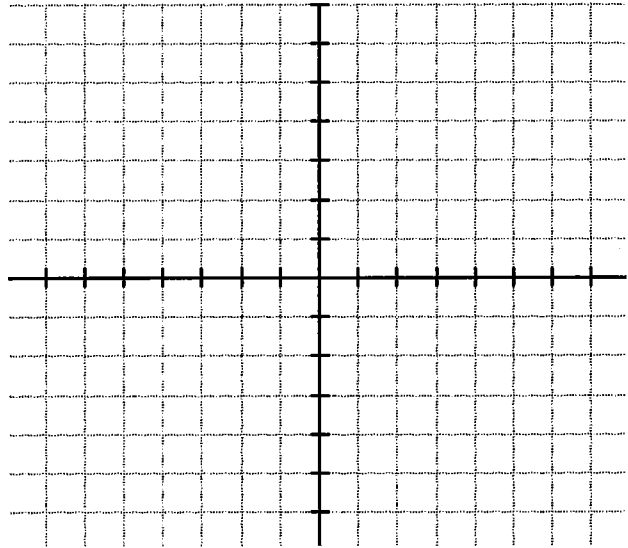
Name _____

Steps to Solving Quadratic Inequalities:

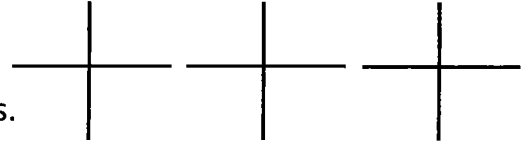
1. Move everything to one side of the inequality and factor it.
2. Using the zeros, sketch the graph.
3. Write the solution to satisfy the inequality.
4. Test points from each region to check the solution.

Ex. Solve $x^2 - 4x - 12 > 0$ **Steps to Graph a Linear or Quadratic Inequality:**

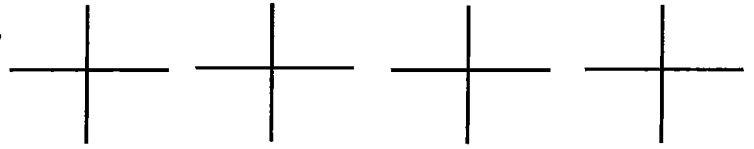
1. Graph the line or parabola on the coordinate grid. Make sure you identify if a dotted or solid line is required.
2. Choose a test point that is not on the curve. I suggest picking (0,0) unless it is on the curve.
3. Substitute the test point into the original equation:
 - If it satisfies the inequality shade on the region where the test point is
 - If it does not satisfy the inequality shade the opposite region

Ex. (a) Graph $y > 2x - 4$ (b) Graph $y \leq -2(x - 3)^2 + 4$ 

A solution of a linear-quadratic system of equations is an ordered pair, (x, y) , that satisfies both equations in the system. The system may have 0, 1, or 2 solutions.



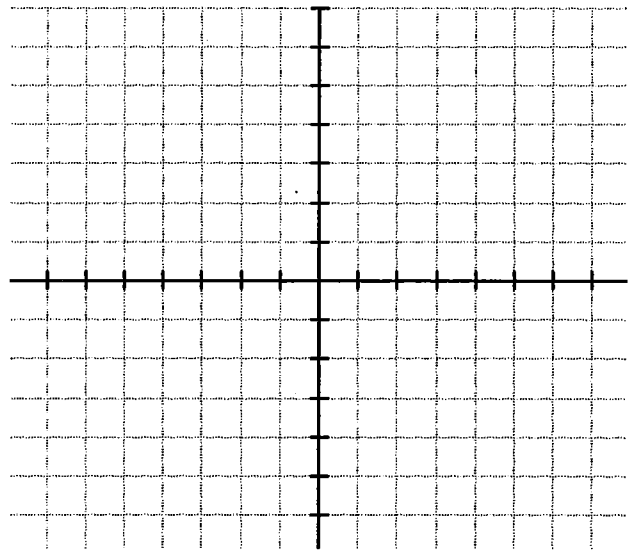
A solution of a quadratic-quadratic system of equations is an ordered pair, (x, y) , that satisfies both equations in the system. The system may have 0, 1, 2, or infinitely many solutions.



Ex. Solve this system algebraically and graphically.

$$y = x^2 - 4x + 3$$

$$y = 2x - 5$$

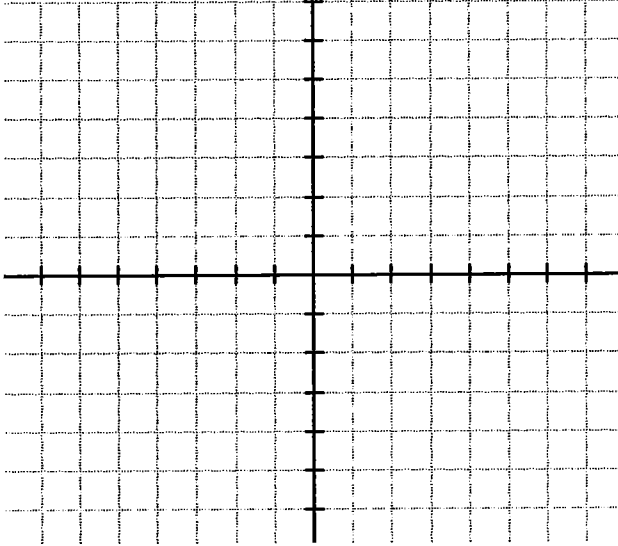


Chapter 5 Review Questions

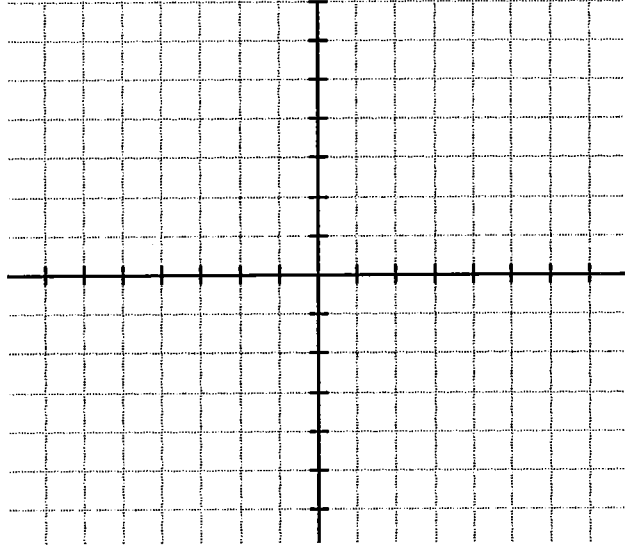
Name _____

1. Graph the following inequalities.

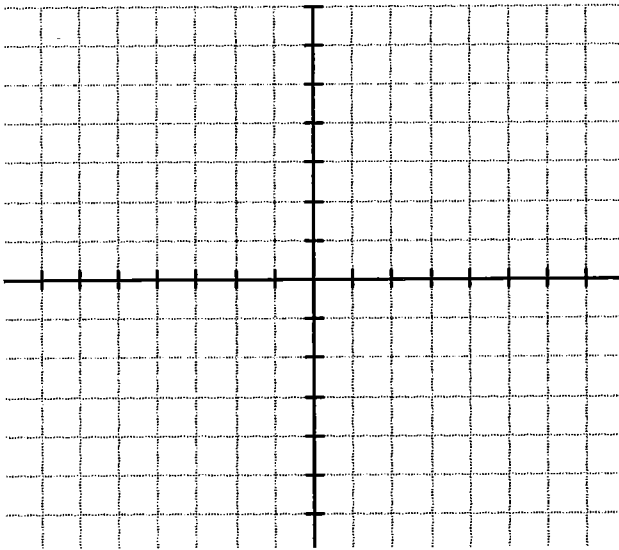
a) $-2x + y > 3$



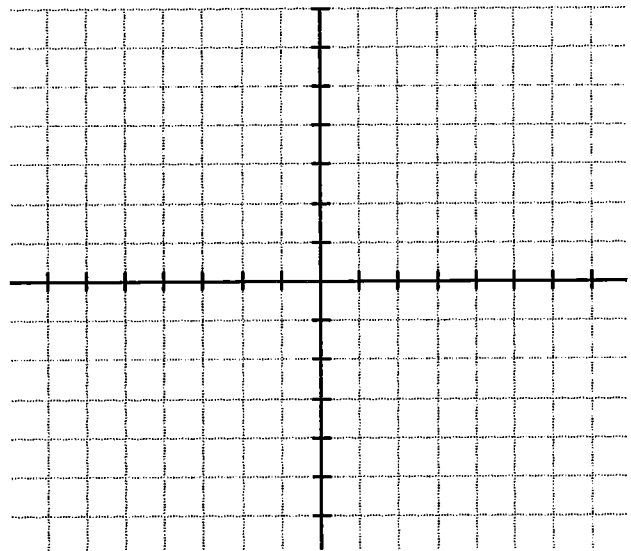
b) $3x - 2y + 4 \leq 0$



c) $y \leq x^2 - 4x - 1$



d) $y > -2x^2 - 12x - 13$



2. Solve the following quadratic inequalities. (Draw a rough sketch—it will help)

a) $x^2 + 11x + 30 < 0$

b) $-4x^2 + x < -5$

c) $3x^2 > 16x - 5$

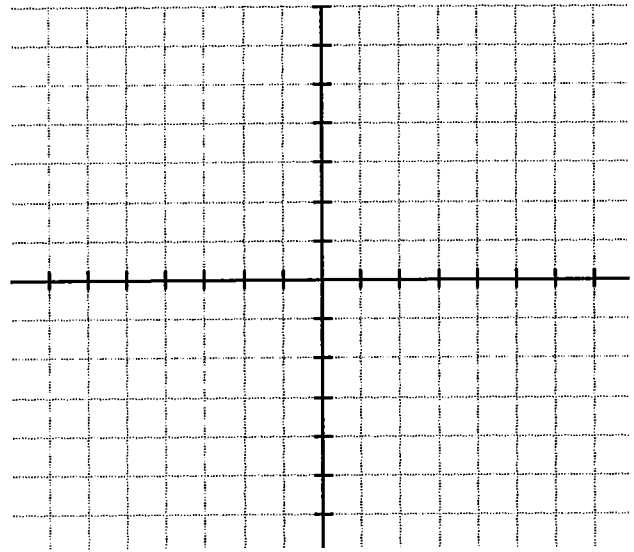
d) $4x^2 - 16 \geq 0$

3. Create an inequality that has the solution $x > 3$ and $x < -4$. Show solution in general form.

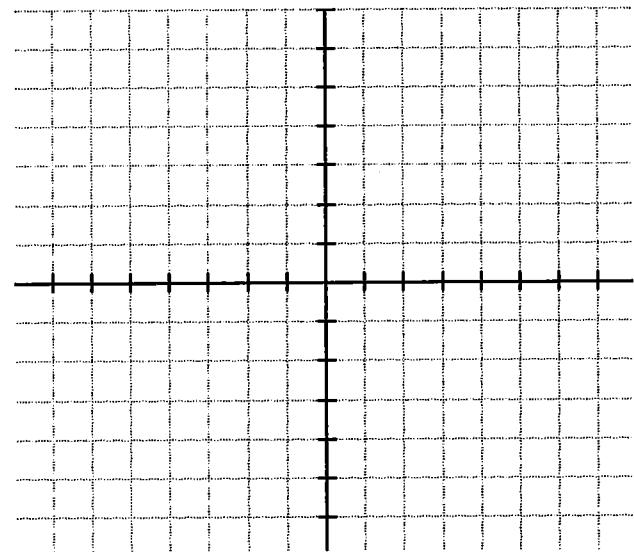
4. Create an inequality that has the solution $-5 \leq x \leq 2$. Show solution in general form.

5. Solve the following systems graphically and algebraically .

a) $y = -(x - 2)^2 + 4$
 $y = -x + 4$

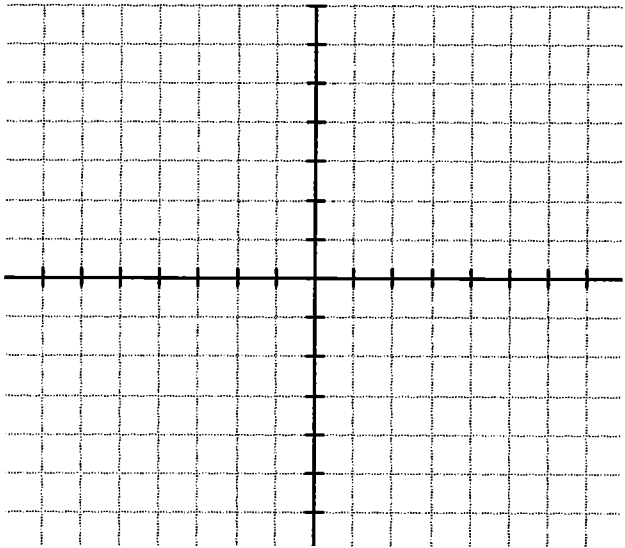


b) $y = 2(x + 1)^2 - 6$
 $y = 6x - 4$

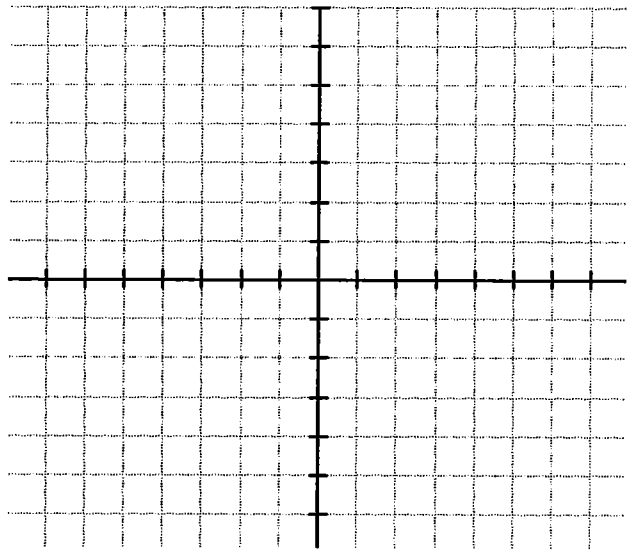


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c) $y = x^2 - 4x - 1$
 $3y = -6x + 6$



d) $2y - 6x = -6$
 $y = -3(x - 2)^2 + 3$



Trigonometry Review

Name _____

An angle is in **standard position** when its vertex is at the _____, its initial arm is on the _____. The angle of rotation is _____

The reference angle is the acute angle between the terminal arm and the _____

You can determine exact trig ratios for angles of 30° , 45° , and 60° using special triangles

Ex. Find the exact value of $\cos 240^\circ$

For a point $P(x, y)$ on the terminal arm of an angle in standard position

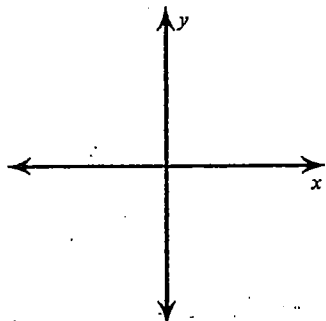
The Sine Law can be used to find the missing angle or side for any triangle where you know an angle and the side opposite

The Cosine Law can be used to find a missing angle or side for any triangle where you know all 3 sides or 2 sides and the contained angle.

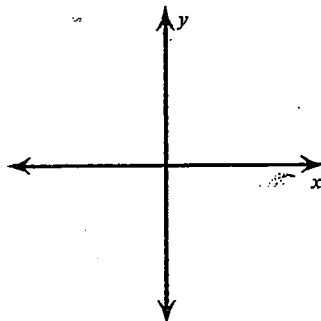
Trigonometry Review

Draw an angle with the given measure in standard position.

1) 110°

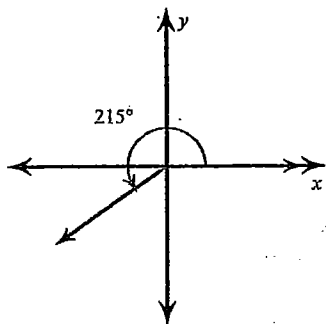


2) -120°

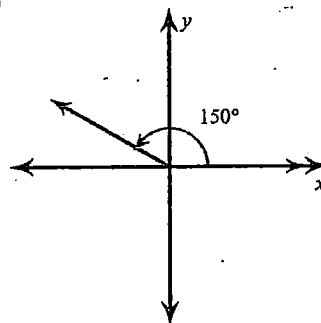


Find the reference angle.

3)

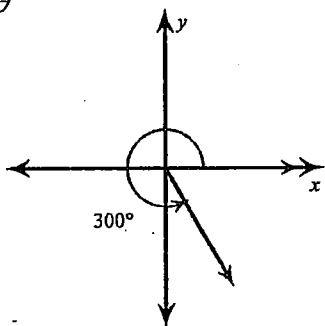


4)

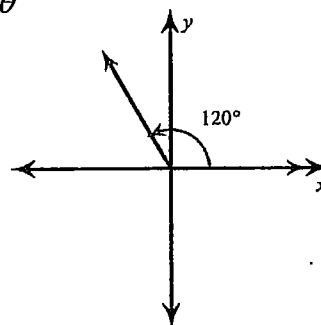


Find the exact value of each trigonometric function.

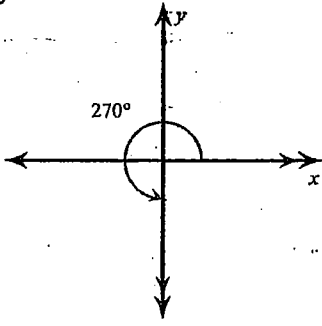
5) $\tan \theta$



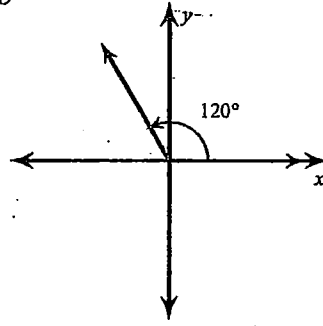
6) $\sin \theta$



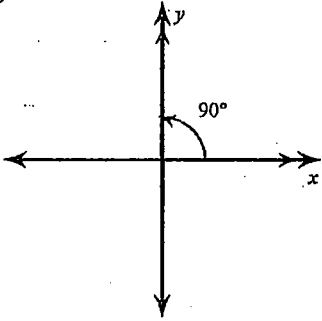
7) $\cos \theta$



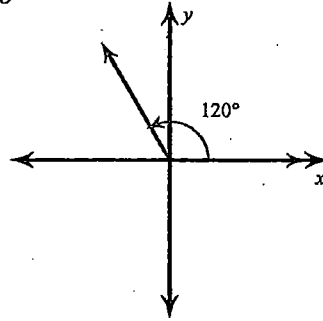
8) $\cos \theta$



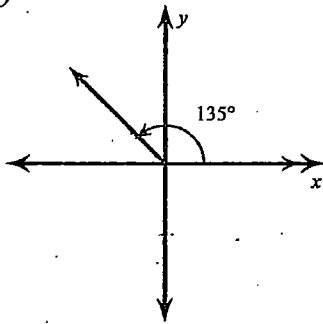
9) $\cos \theta$



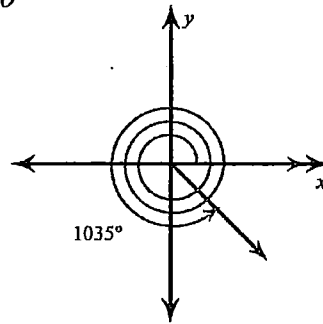
10) $\tan \theta$



11) $\cos \theta$

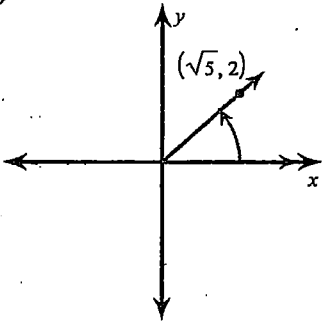


12) $\sin \theta$

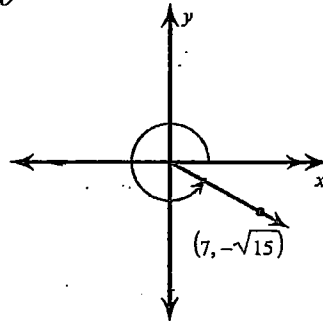


Use the given point on the terminal side of angle θ to find the value of the trigonometric function indicated.

13) $\sin \theta$

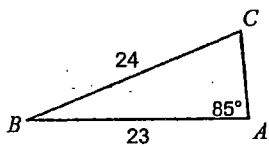


14) $\sin \theta$

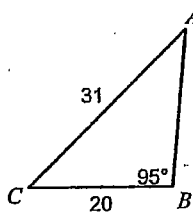


Find each measurement indicated. Round your answers to the nearest tenth.

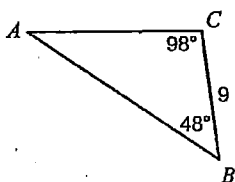
15) Find $m\angle C$



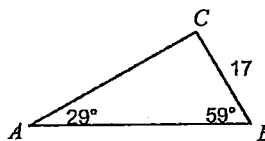
16) Find $m\angle A$



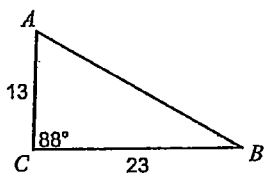
17) Find AB



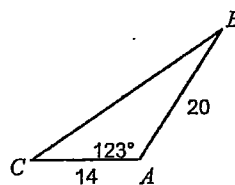
18) Find AC



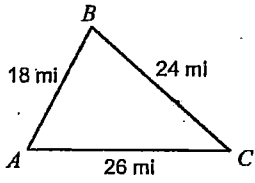
19) Find AB



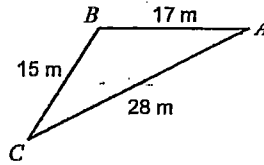
20) Find BC



21) Find $m\angle C$

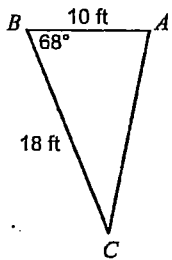


22) Find $m\angle A$

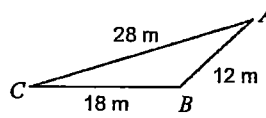


Solve each triangle. Round your answers to the nearest tenth.

23)



24)



25) In $\triangle CAB$, $a = 24$ cm, $m\angle C = 83^\circ$, $b = 25$ cm

26) In $\triangle QRP$, $m\angle Q = 126.7^\circ$, $p = 30$ in, $r = 15.6$ in

27) $m\angle B = 16^\circ$, $a = 27$, $b = 23$

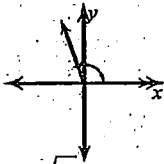
28) $m\angle C = 25^\circ$, $m\angle A = 22^\circ$, $b = 45$

29) $m\angle B = 57^\circ, a = 11, b = 7$

30) $m\angle B = 35^\circ, a = 30, b = 29$

Answers to Trigonometry Review (ID: 1)

1)



5) $-\sqrt{3}$

9) 0

13) $\frac{2}{3}$

17) 15.9

21) 42°

24) $m\angle C = 17^\circ, m\angle A = 26^\circ, m\angle B = 137^\circ$

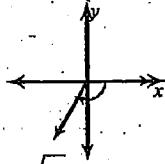
26) $m\angle R = 17.7^\circ, m\angle P = 35.6^\circ, q = 41.3$ in

28) $m\angle B = 133^\circ, a = 23, c = 26$ 29) Not a triangle

30) $m\angle C = 108.6^\circ, m\angle A = 36.4^\circ, c = 47.9$

Or $m\angle C = 1.4^\circ, m\angle A = 143.6^\circ, c = 1.2$

2)



6) $\frac{\sqrt{3}}{2}$

10) $-\sqrt{3}$

14) $-\frac{\sqrt{15}}{8}$

18) 30.1

22) 27°

3) 35°

7) 0

11) $-\frac{1}{\sqrt{2}}$

15) 72.7°

19) 26

23) $m\angle C = 33^\circ, m\angle A = 79^\circ, b = 17$ ft

25) $m\angle A = 47.2^\circ, m\angle B = 49.8^\circ, c = 32.5$ cm

27) $m\angle C = 145.1^\circ, m\angle A = 18.9^\circ, c = 47.7$
Or $m\angle C = 2.9^\circ, m\angle A = 161.1^\circ, c = 4.2$

4) 30°

8) $-\frac{1}{2}$

12) $-\frac{1}{\sqrt{2}}$

16) 40°

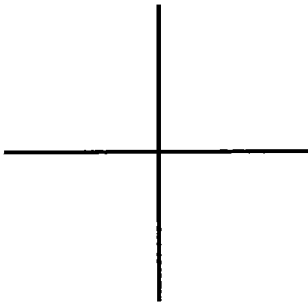
20) 30

More Trigonometry Review Questions

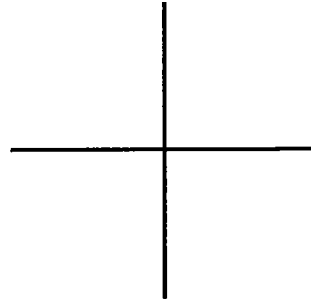
Name _____

1. Solve for θ .

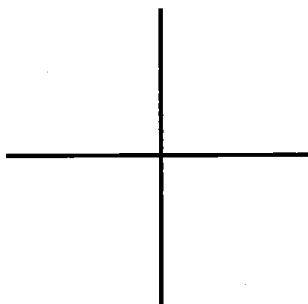
a) $\cos \theta = -\frac{1}{2}$ $0^\circ \leq \theta < 360^\circ$



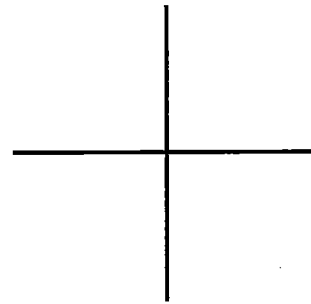
b) $\tan \theta = 1$ $0^\circ \leq \theta < 360^\circ$



c) $\sin \theta = \frac{-1}{\sqrt{2}}$ $0^\circ \leq \theta < 360^\circ$



d) $\cos \theta = \frac{\sqrt{3}}{2}$ $0^\circ \leq \theta < 360^\circ$



2. Without using a calculator, determine whether each statement is true or false. Show work.

a) $\cos 225^\circ = \sin 315^\circ$

b) $\tan 210^\circ = \tan 330^\circ$

c) $\sin 150^\circ = \cos 300^\circ$

Rationals Unit Review

Name _____

A rational expression is an algebraic fraction that could have a polynomial in the numerator and/or denominator.

Ex.

A non-permissible value or restriction is any value of the variable that makes the denominator equal to _____.

$$\frac{2x}{x^2 - x - 20}$$

Simplifying a rational expression means to cancel _____
from the numerator and denominator.

$$\frac{3x - 6}{2x^2 + x - 10}$$

Multiplying Rationals

$$\frac{x^2 + 7x + 12}{x^2 + 4x + 4} \cdot \frac{x^2 - x - 6}{x^2 - 9}$$

Dividing Rationals

$$\frac{x^2 + 15x + 56}{x^2 - 3x - 54} \div \frac{x^2 + 6x - 16}{x^2 + 4x - 12}$$

To add or subtract rational expressions we need a common denominator.

$$\frac{4}{x^2 + 5x + 6} - \frac{5}{x^2 - x - 12}$$

Solving Rational Equations

$$\frac{2x + 3}{x + 3} + \frac{1}{2} = \frac{x + 1}{x - 1}$$

Rational Expressions

Date _____

Simplify each expression.

1) $-\frac{12n^2}{18n^3}$

2) $\frac{40x}{20x^3}$

3) $\frac{6p^2 - 30p}{5 - p}$

4) $\frac{40k^2 - 16k}{40k}$

5) $\frac{n^2 - n - 30}{n^2 - 12n + 36}$

6) $\frac{x^2 + 19x + 90}{x^2 + 13x + 36}$

7) $\frac{7m^2 + 60m + 32}{3m^2 + 29m + 40}$

8) $\frac{5r^2 - 26r - 24}{12 + 28r - 5r^2}$

$$9) \frac{n+1}{(n-10)(n+1)} \cdot \frac{10n(n-10)}{10}$$

$$10) \frac{x+6}{(x-7)(x-4)} \cdot \frac{(x+8)(x-4)}{x+6}$$

$$11) \frac{4b^2}{b+10} \cdot \frac{b+10}{36b}$$

$$12) \frac{1}{3v} \cdot \frac{4v^3 - 32v^2}{4v^2}$$

$$13) \frac{4x}{18+7x-x^2} \cdot \frac{x^2-2x-63}{x^2-49}$$

$$14) \frac{n^2+18n+80}{3n+24} \cdot \frac{3n-24}{8n^2+80n}$$

$$15) \frac{k^2-19k+90}{k^2-10k+25} \div \frac{k^2-2k-80}{k+8}$$

$$16) \frac{12a^2-12a}{a-6} \div \frac{18a^2-18a}{9a^2-54a}$$

$$17) \frac{15b-3}{5b-1} \div \frac{3b-12}{80b}$$

$$18) \frac{3x^2-13x-30}{25x^2+45x} \div \frac{24x^2+40x}{25x^2+45x}$$

$$19) \frac{2u}{8u^3v^2} - \frac{u-4v}{8u^3v^2}$$

$$20) \frac{5x-4y}{8x^3} + \frac{x+3y}{8x^3}$$

$$21) \frac{5x}{x-3} + \frac{6}{6x}$$

$$22) \frac{3}{3r+1} + \frac{6}{r-1}$$

$$23) \frac{3b}{b+4} - \frac{2b}{b-5}$$

$$24) \frac{n+6}{n-5} + \frac{6}{2n}$$

Solve each equation. Remember to check for extraneous solutions.

$$25) \frac{1}{4x} = \frac{2}{x} - 1$$

$$26) \frac{1}{v^2} = \frac{1}{3v^2} + \frac{v+3}{3v^2}$$

$$27) \frac{6}{a^2+a} = \frac{1}{a^2+a} + \frac{1}{a+1}$$

$$28) \frac{2}{n^2-3n} = \frac{1}{n} + \frac{1}{n^2-3n}$$

$$29) \frac{x+4}{x} - \frac{6}{x-5} = \frac{1}{x-5}$$

$$30) \frac{6k+36}{k} = \frac{k-1}{k^2+5k} + \frac{6}{k^2+5k}$$

Answers to Rational Expressions (ID: 1)

1) $-\frac{2}{3n}$

5) $\frac{n+5}{n-6}$

9) n

13) $-\frac{4x}{(2+x)(x-7)}$

17) $\frac{80b}{b-4}$

21) $\frac{5x^2+x-3}{x(x-3)}$

25) $\left\{\frac{7}{4}\right\}$

29) $\{10, -2\}$

2) $\frac{2}{x^2}$

6) $\frac{x+10}{x+4}$

10) $\frac{x+8}{x-7}$

14) $\frac{n-8}{8n}$

18) $\frac{x-6}{8x}$

22) $\frac{21r+3}{(r-1)(3r+1)}$

26) $\{-1\}$

30) $\left\{-\frac{35}{6}\right\}$

3) $-6p$

7) $\frac{7m+4}{3m+5}$

11) $\frac{b}{9}$

15) $\frac{k-9}{(k-5)^2}$

19) $\frac{u+4v}{8u^3v^2}$

23) $\frac{b^2-23b}{(b-5)(b+4)}$

27) $\{5\}$

4) $\frac{5k-2}{5}$

8) $\frac{-5r-4}{2+5r}$

12) $\frac{v-8}{3v}$

16) $6a$

20) $\frac{6x-y}{8x^3}$

24) $\frac{n^2+9n-15}{n(n-5)}$

28) $\{4\}$

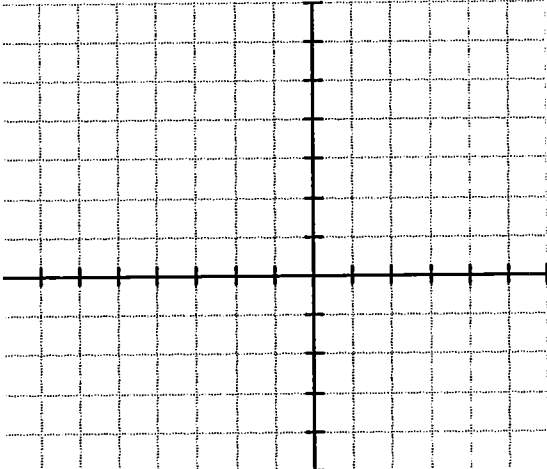
Chapter 8 Absolute Value and Reciprocal Functions

The absolute value of 'x' is defined as $y = |x|$ and can be written: $y = \begin{cases} x, & \text{if } x \geq 0 \\ -x, & \text{if } x < 0 \end{cases}$

Since the function is defined by two different rules for each interval in the domain, this is an example of a _____.

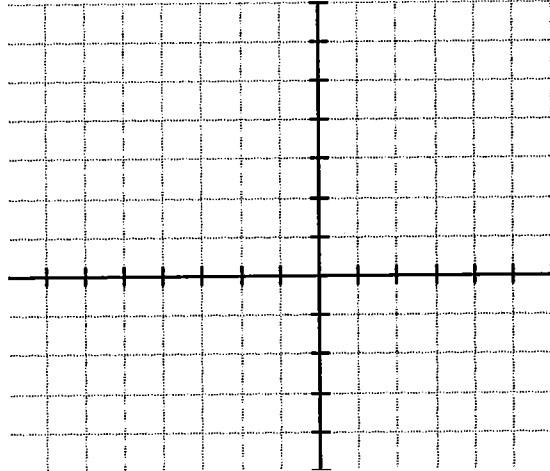
Graph the following:

(a) $y = |-x - 3|$



Express the equation as a piecewise function.

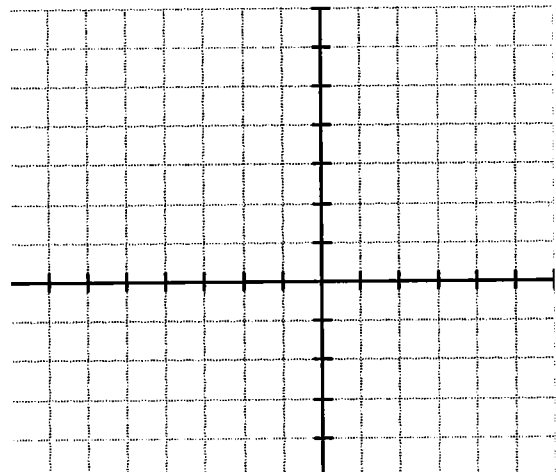
(b) $y = |(x + 2)^2 - 4|$



Express the equation as a piecewise function.

Solve Algebraically and Graphically

$$|x + 5| = x^2 + 6x + 5$$

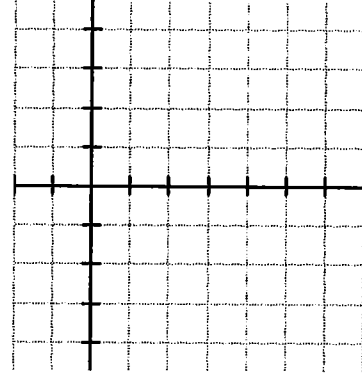


Properties of Reciprocal Functions

Original Function $f(x)$	Reciprocal Function $\frac{1}{f(x)}$
Equals 1	
Equals -1	
Equals 0	
Positive	
Negative	
Approaches 0	
Approaches ∞	

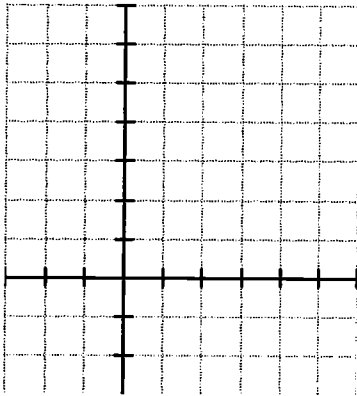
Sketch the following graph and it's reciprocal.

$$y = x - 3$$

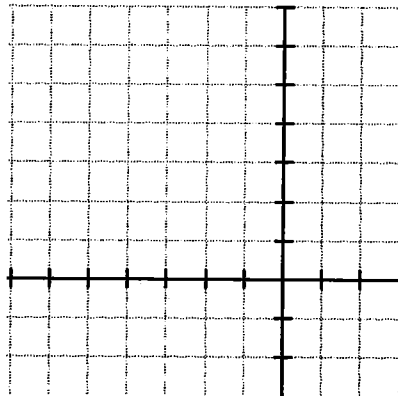


Graph the following:

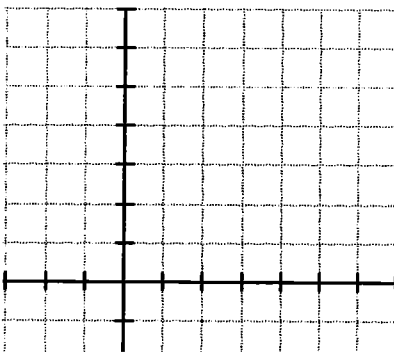
(a) $y = \frac{1}{-(x-1)^2+4}$



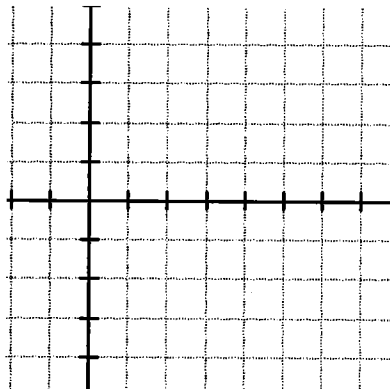
(b) $y = \frac{1}{(x+3)^2}$



(c) $y = \frac{1}{(x-1)^2+2}$



(d) $y = \frac{1}{|(x-3)^2-4|}$



Chapter 8 Review Worksheet

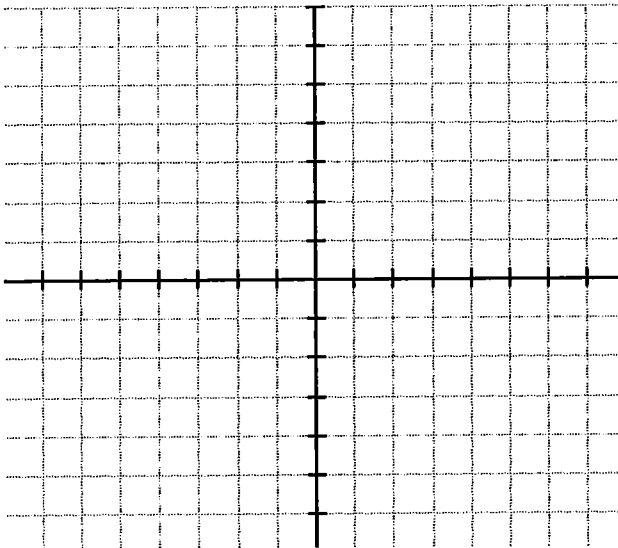
Name _____

1. Consider the following functions and determine the following properties.

i) $y = |-2x + 4|$

- a) Determine the x and y intercepts for the function.

- b) Sketch a graph of the function.



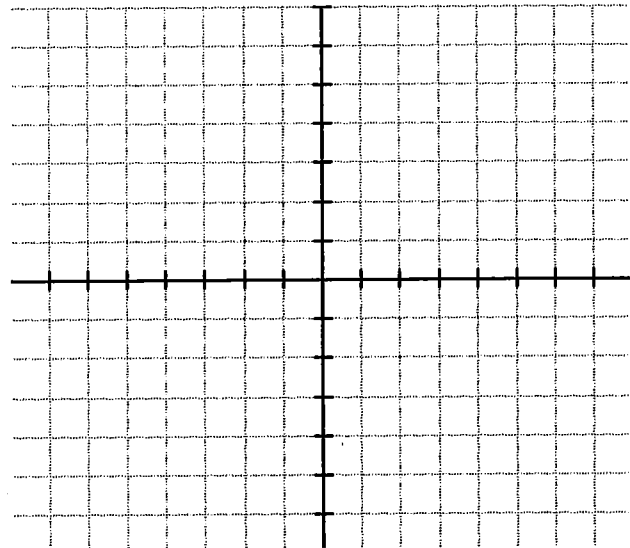
- c) State the domain and range.

- d) Express the equation as a piecewise function.

ii) $y = |-2(x + 3)^2 + 2|$

- a) Determine the x and y intercepts for the function.

- b) Sketch a graph of the function.

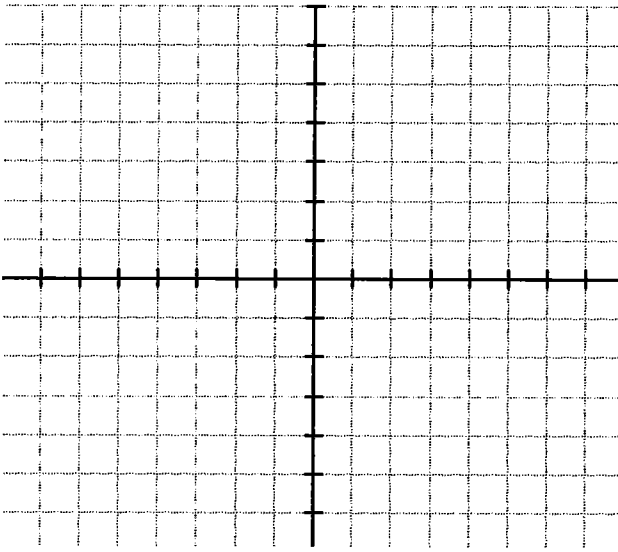


- c) State the domain and range.

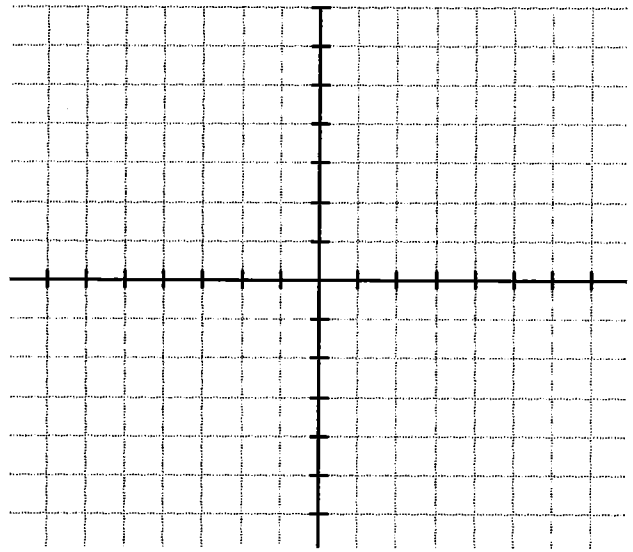
- d) Express the equation as a piecewise function.

2. Graph the following absolute value functions.

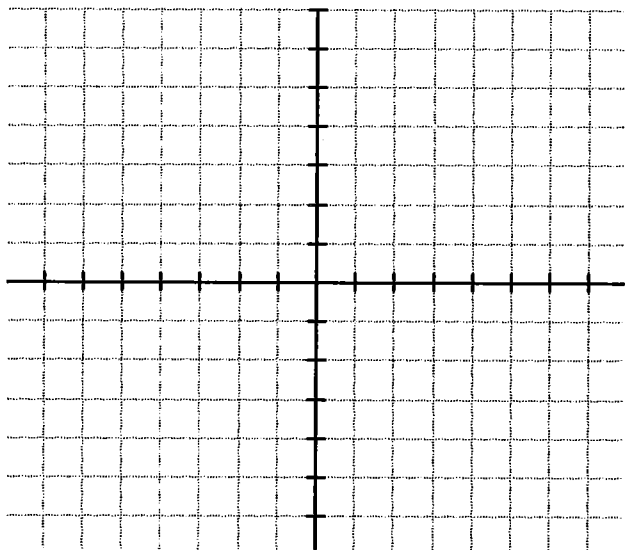
iii) $y = |(x + 5)^2 + 1|$



iv) $y = |-3(x - 2)^2 + 6|$



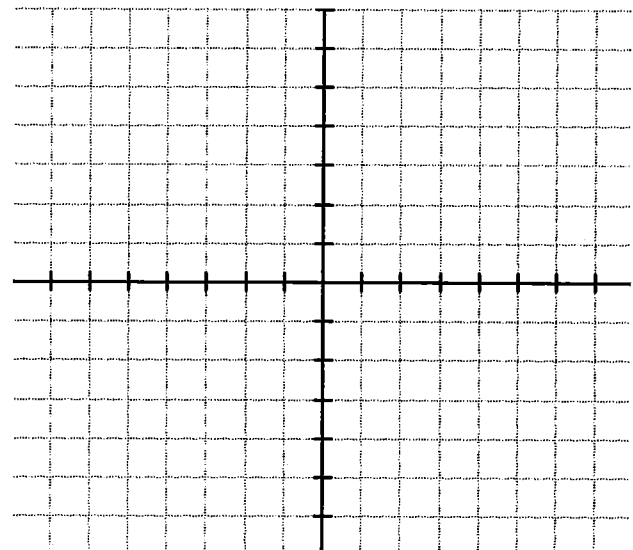
v) $y = |-x^2 - 6x - 5|$



3. Solve the following absolute value equations graphically

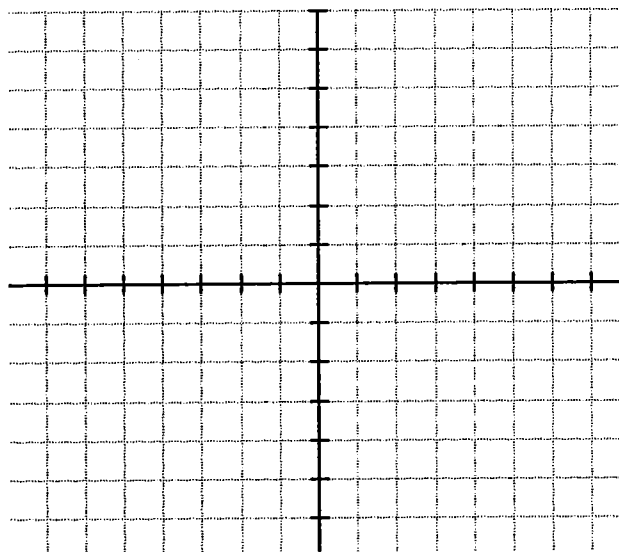
$$y = |-2(x - 2)^2 + 4|$$

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

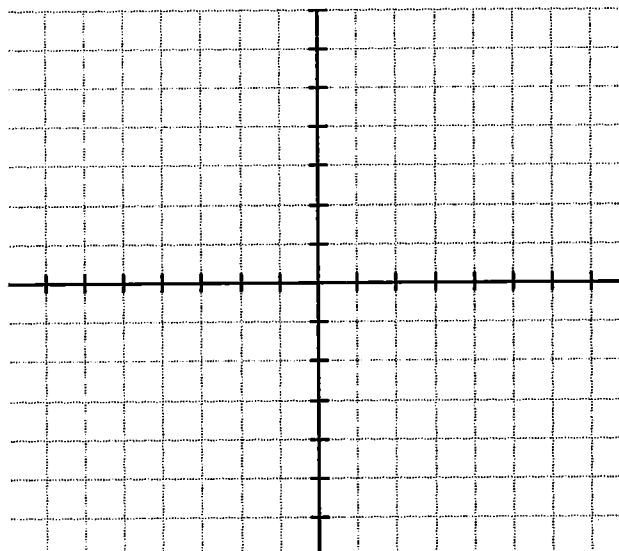


4. Solve the following absolute value equations algebraically and graphically.

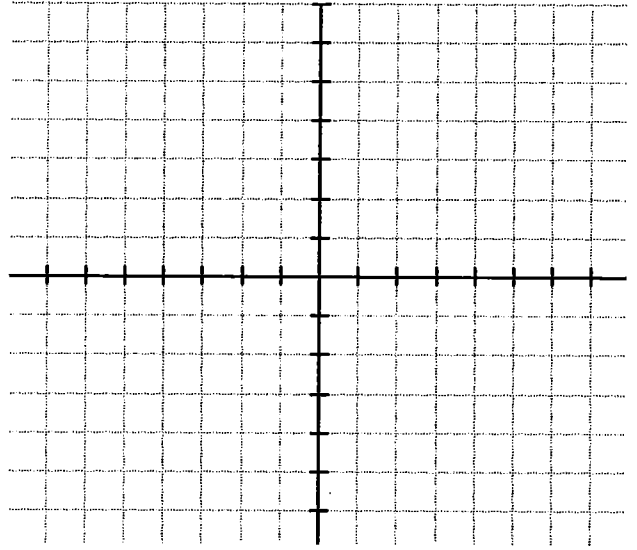
a) $|-4x + 6| = 2$



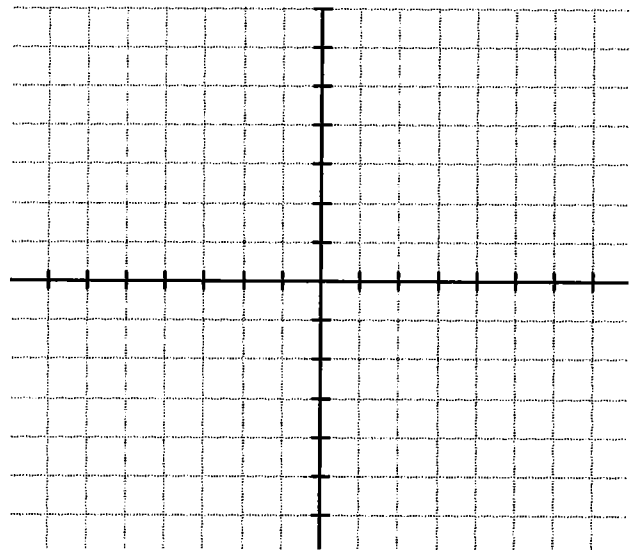
b) $\left|\frac{2}{3}x - 2\right| = x - 4$



c) $|-x + 1| = x^2 - 6x + 9$



d) $x + 4 = |-x^2 - 4x|$



5. Graph each of the following reciprocal functions and state the equation of the vertical & horizontal asymptotes and the domain & range.

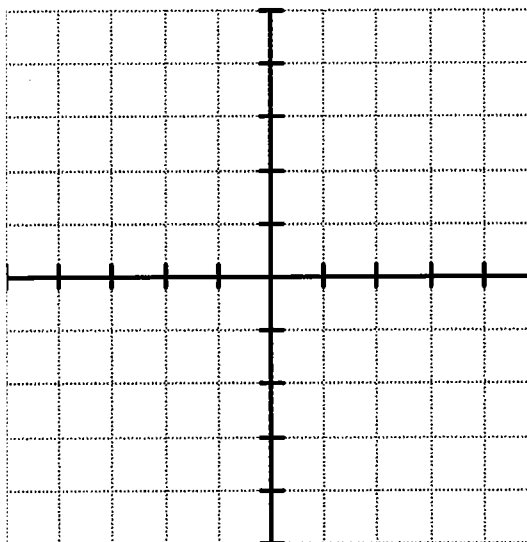
$$f(x) = \frac{1}{2x + 4}$$

Vertical Asymptote:

Horizontal Asymptote:

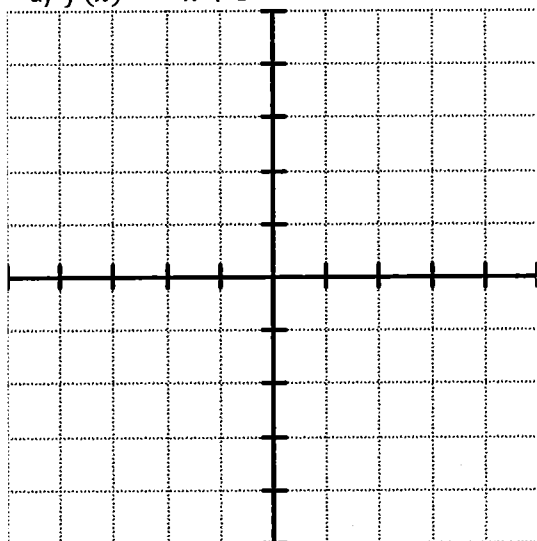
Domain:

Range:

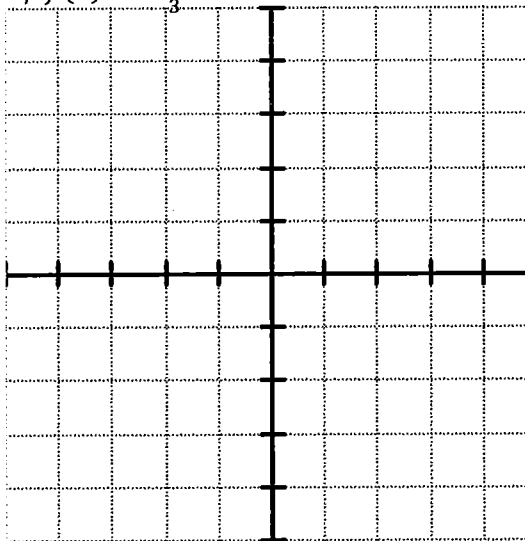


6. Graph the following functions and their reciprocals. State the equations of all asymptotes.

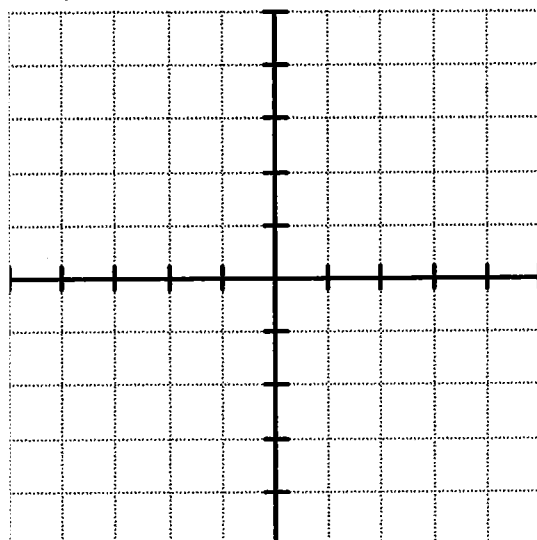
a) $f(x) = -x + 3$



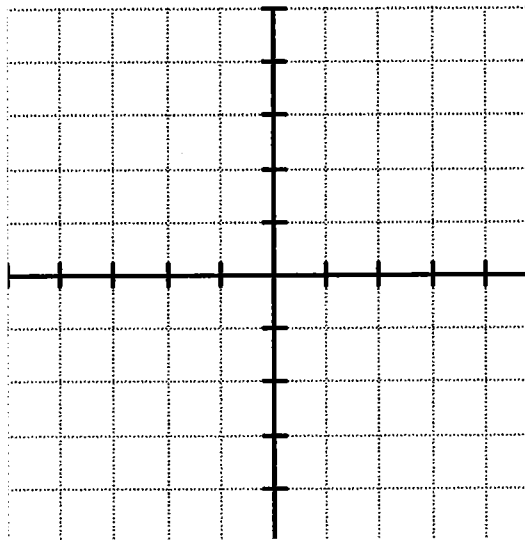
b) $f(x) = -\frac{2}{3}x + 1$



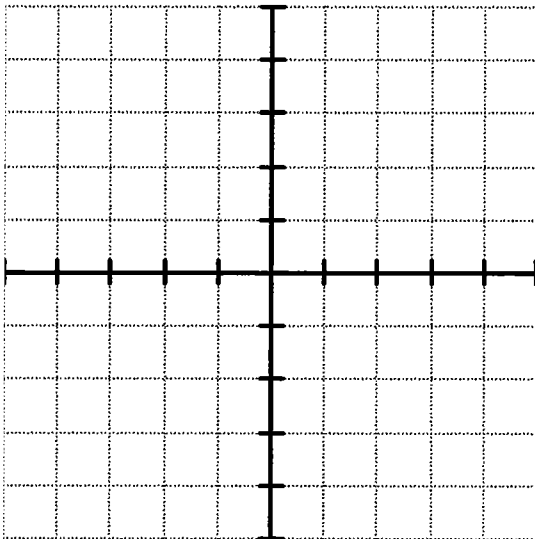
c) $f(x) = -(x + 1)^2 + 4$



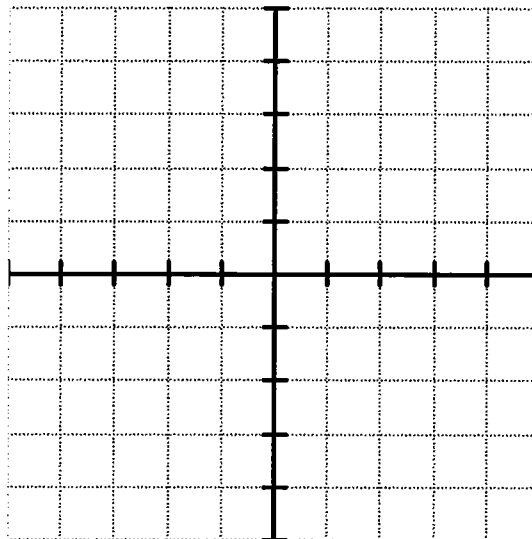
d) $f(x) = (x - 2)^2 + 1$



e) $f(x) = |-x^2 + 1|$

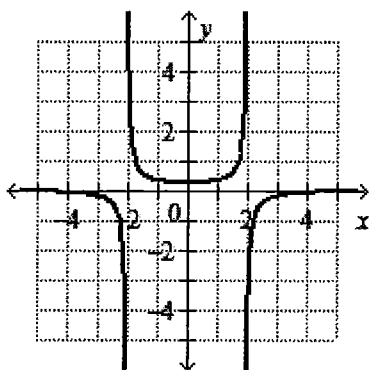


f) $f(x) = |-2(x - 2)^2 + 2|$



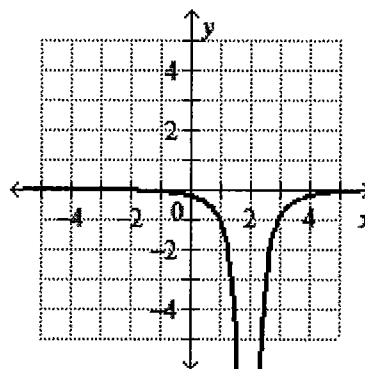
7. Given the graph of the following reciprocal function determine the equation of the original function.

a)



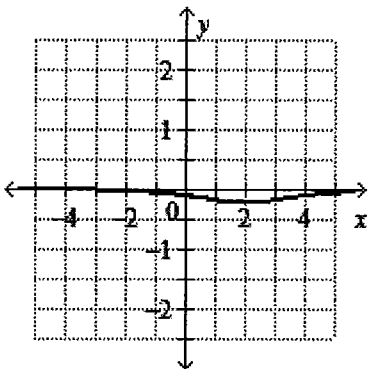
Original Function:

b)



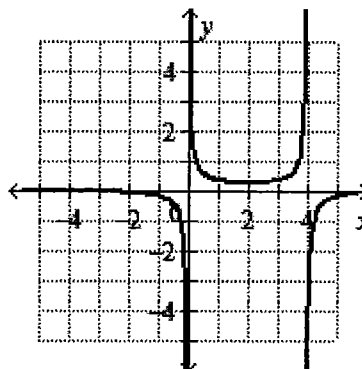
Original Function:

c)



Original Function:

d)



Original Function: