Key

Answers ONLY

work should be shown

DHS Summer Packet

Algebra 2 and Algebra 2 Honors

Week of:	Monday, July 20, 2015 – Friday, July 24, 2015	**Problems 1-8**
Week of:	Monday, July 27, 2015 – Friday, July 31, 2015	**Problems 9-16**
Week of:	Monday, August 3, 2015 – Friday, August 7, 2015	**Problems 17-24**
Week of:	Monday, August 10, 2015 – Friday, August 14, 2015	**Problems 25-32**
Week of:	Monday, August 17, 2015 – Friday, August 21, 2015	**Problems 33-40**

Formulas

Formulas you should be familiar with.

Equations of Lines

Slope-Intercept Form:	$y = mx + b$
Point-Slope Form:	$y - y_1 = m(x - x_1)$
Standard Form:	$Ax + By = C$

Exponential Function $y = a \cdot b^x$

Explicit Formula for an Arithmetic Sequence: $f(n) = f(0) + nd$ $\quad f(n) = f(1) + (n-1)d$

Explicit Formula for a Geometric Sequence: $f(n) = f(0) \cdot r^n$ $\quad f(n) = f(1) \cdot r^{n-1}$

Forms of quadratic functions

		Axis of symmetry
Vertex Form:	$f(x) = a(x-h)^2 + k$	$x = h$
Standard Form:	$f(x) = ax^2 + bx + c$	$x = -\frac{b}{2a}$
Factored Form:	$f(x) = (x-d)(x-e)$	$x = \frac{d+e}{2}$

Quadratic Formula: If $ax^2 + bx + c = 0$, then $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$.

Zero-product property: If $a \cdot b = 0$, then $a = 0$ or $b = 0$.

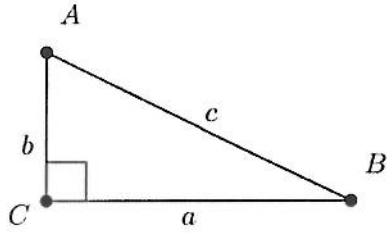
Pythagorean Theorem:

In a triangle with sides a, b, and longest side c, the equation $a^2 + b^2 = c^2$ holds if and only if the triangle is a right triangle.

Distance between two points (x_1, y_1) and (x_2, y_2): $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Slope of a line containing two points (x_1, y_1) and (x_2, y_2): $\frac{y_2 - y_1}{x_2 - x_1}$

Right triangles

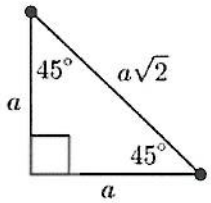


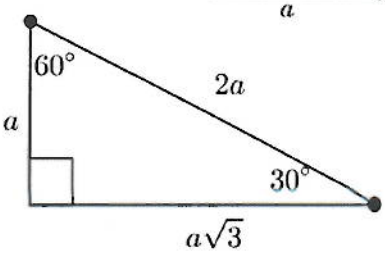
$$c^2 = a^2 + b^2$$

$$\sin A = \frac{a}{c} = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{b}{c} = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{a}{b} = \frac{\text{opposite}}{\text{adjacent}}$$





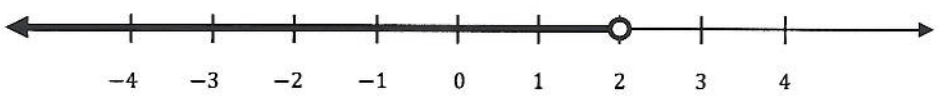
1. Gino knows that the formula for converting degrees Celsius (C) to degrees Fahrenheit (F) is $F = \frac{9}{5}C + 32$. He also knows how to transform an equation into an equivalent equation. Which of the following is correctly solved for C?

A. $C = \frac{5F-160}{9}$ B. $C = 5F - \frac{160}{9}$ C. $C = \frac{5F+160}{9}$ D. $C = \frac{5}{9}F + 160$

2. Let a and b represent two numbers such that $a > b$. State whether each statement below is true or false. Justify your answer.

Statement	True or False?	Justification
$a + 8 > b + 8$	True	Addition prop of inequality
$a - 7 > b - 7$	True	Subtraction prop of inequality
$-7a > -7b$	False	mult prop of inequality (must flip symbol)
$\frac{a}{-10} < \frac{b}{-10}$	True	div prop of inequality

3. Below is the solution to an inequality, represented graphically.



Which of the following inequalities has the solution graphed above?

A. $-3x > 6$ B. $-4x - 9 > -17$ C. $2x + 10 \leq 14$

4. Solve the following exponential equations.

(a) $3^{x+2} = 3^7$ (b) $25^{x+1} = 5^{x-3}$ (c) $9^{x+2} = 27^x$

$x = 5$ $x = -5$ $x = 4$

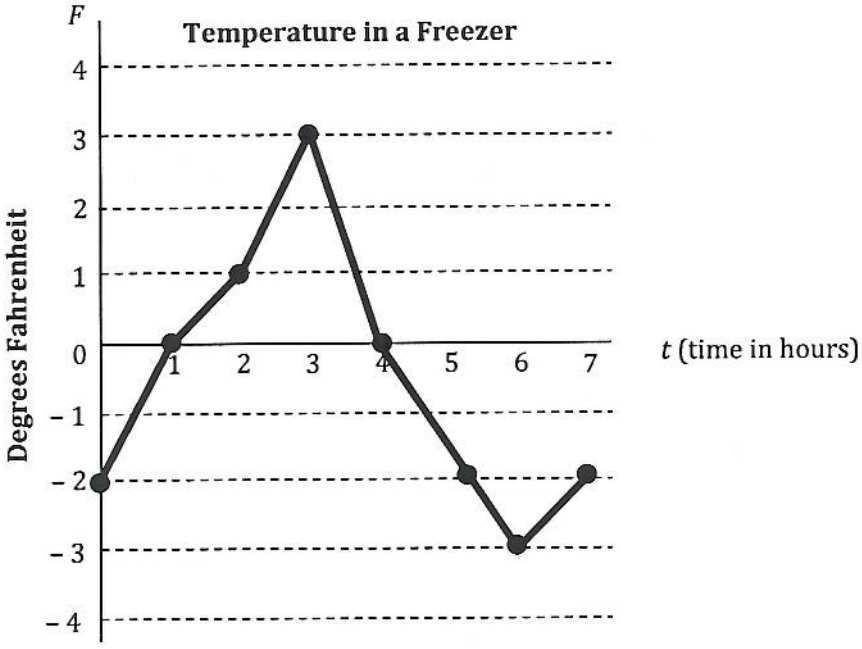
5. Vlad wished to solve the equation $64^x = 16^{x+7}$. There are many correct ways to solve this equation. Which of the following is ***not*** a correct first step in solving this equation?

A. $2^{6x} = 2^{4(x+7)}$ B. $4^{3x} = 4^{2(x+7)}$ C. $16^{4x} = 16^{x+7}$

6. Which of the following expressions is equal to 5^{2x}?

A. 25^x B. 10^x C. 2^{5x}

7. The graph below represents the temperature (F) in degrees Fahrenheit inside of a freezer as a function of time. The variable t represents the time, in hours, since midnight.



(a) What is the domain of the function? $0 \leq t \leq 7$

(b) What is the range of the function? $-3 \leq F \leq 3$

(c) What is the meaning of the F-intercept?
At midnight the temperature of the freezer is -2°F

(d) At what time t is the minimum temperature reached?
6 AM

(e) On what interval of time is the temperature decreasing? $3 \leq t \leq 6$

(f) What does the statement $F(5) = -2$ represent in the context of the situation?

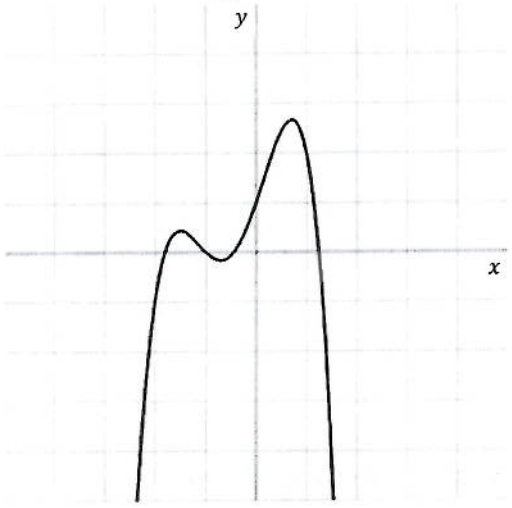
At 5AM the temperature of the freezer is -2°F.

Justification for a function: - passes vertical line test
- every element of Domain has a unique element of Range

Justification for not a function; - Does not pass vertical line test

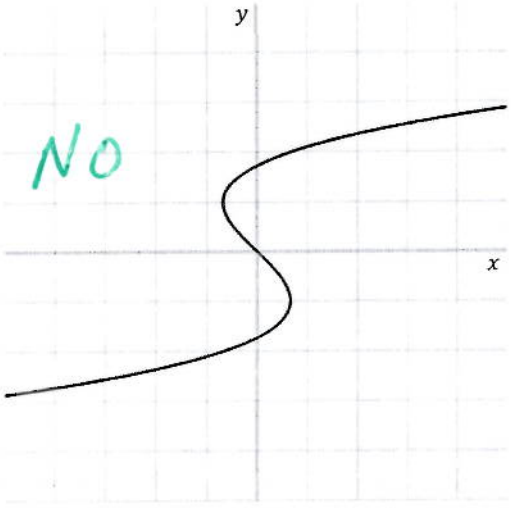
8. For each relation below, determine whether or not the relation represents a function. Justify your answer. - every element of range does not have a unique element of range

(a)



Yes

(b)



NO

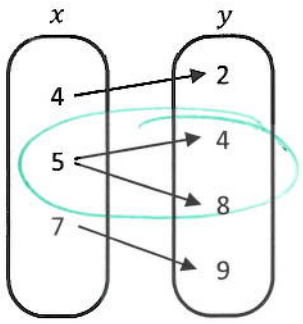
(c) $\{(2,7),\ (4,-7),\ (2,12),(6,11)\}$

NO $2 \to 7, 12$

(d) $\{(4,9),(6,11),(11,15),(10,9)\}$

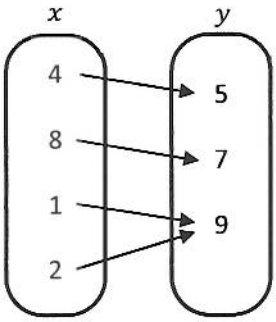
Yes

(e)



NO

(f)



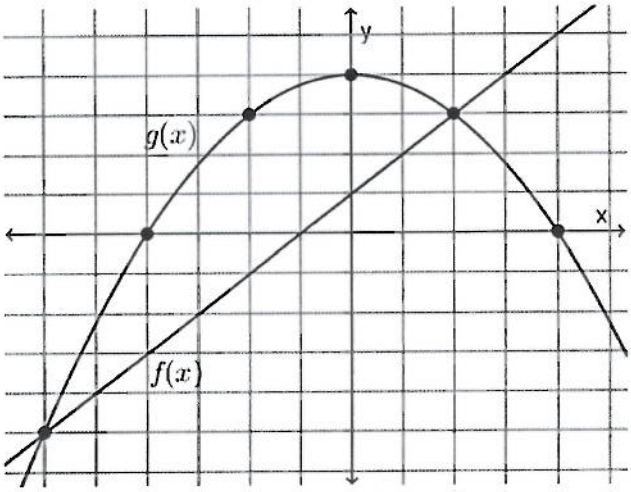
Yes

9. What is the number of solutions for this system of equations below?

$$\begin{cases} y = \frac{4}{5}x + 7 \\ y = \frac{3}{4}x + 7 \end{cases}$$

A. 0 solutions
B. exactly 1 solution
C. exactly 2 solutions
D. an infinite number of solutions

10. The graph of two functions, $f(x)$ and $g(x)$, are shown below.



For each problem, write the correct symbol, $<$, $=$, or $>$ in the box between the two statements.

(a) $f(2)$ [=] $g(-2)$

(b) The x-intercept of $f(x)$ [<] The y-intercept of $g(x)$

(c) $f(1) \cdot f(3)$ [>] $g(-2) + g(2)$

11. A rectangle has a length that is 6 inches longer than its width. If w represents, the width, write an expression, in terms of w, for the area of the rectangle.

$w(w+6)$ or w^2+6w

12. Fill in the number that completes the square.

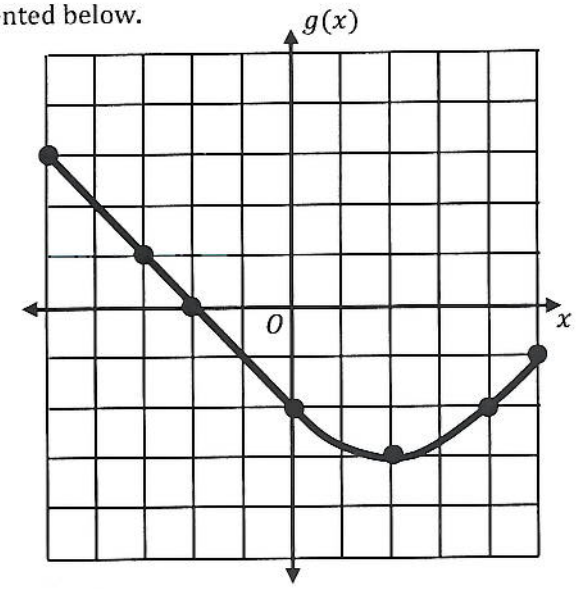
(a) $x^2 + 6x +$ 9

(b) $x^2 - 12x +$ 36

(c) $x^2 + 7x +$ 49/4

13. Two functions, $f(x)$ and $g(x)$ are represented below.

x	$f(x)$
−8	5
−6	6
−3	9
0	8
1	2
4	0
7	−10



Compare the statements below in columns A and B. In the empty space at the end of each row in the table, write the column letter (A or B) of the expression that has the ***greater*** value. If both expression are equal, write =.

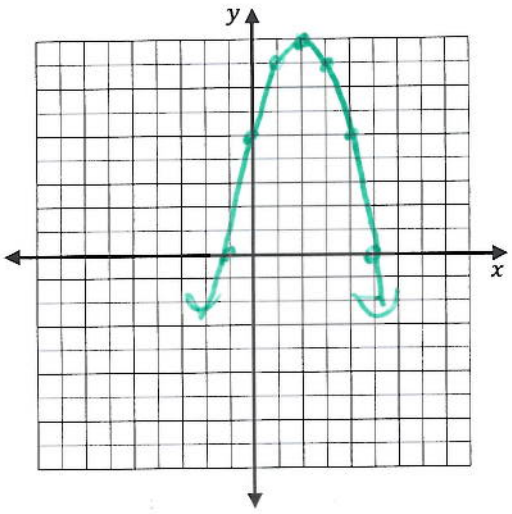
	Column A	Column B	Which is greater (or are they equal)?
(a)	$f(1)$	$g(-3)$	A
(b)	The maximum value of $f(x)$	The x-intercept of $g(x)$	A
(c)	$\frac{f(0)-f(4)}{4}$	$g(2)\cdot g(4)$	B
(d)	The value of x that makes $f(x)=0$	$g(-5)+g(-3)$	=
(e)	$a+b, f(a)=5$ and $f(b)=-10$	$g(4)$	A

14. Find the slope of the line that passes through $(-5,1)$ and $(7,-3)$.

$-\frac{1}{3}$

Sketch the graph of the function, then give the information requested.

15. $f(x) = -x^2 + 4x + 5$



Vertex: (2, 9)

Line of Symmetry: $x = 2$

x-intercepts: $-1, 5$

y-intercept: 5

Domain: $\mathbb{R}$

Range: $y \leq 9$

Interval on which $f(x)$ is increasing: $x \leq 2$

Interval on which $f(x)$ is decreasing: $x \geq 2$

16. Use the answer bank below to complete the following statements.

ANSWER BANK	
difference	ratio
linear	
arithmetic	exponential
geometric	

(a) An explicit rule for an arithmetic sequence would be a(n) linear function.

(b) The recursive formula $f(0) = 20,\ f(n) = 30 \cdot f(n-1)$ represents a(n) geometric sequence; its explicit rule would be a(n) exponential function.

(c) The sequence 10, 12, 14, 16, 18, 20 has a constant difference of 2.

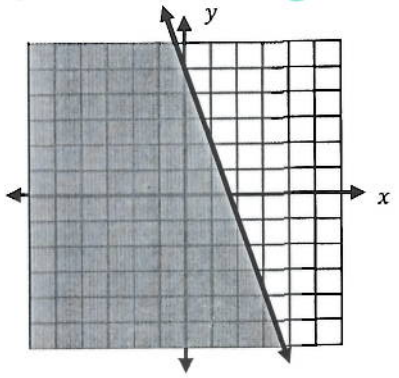
(d) The sequence 10, 20, 40, 80, 160 has a constant ratio of 2

17. Match the following graphs to its corresponding equation.

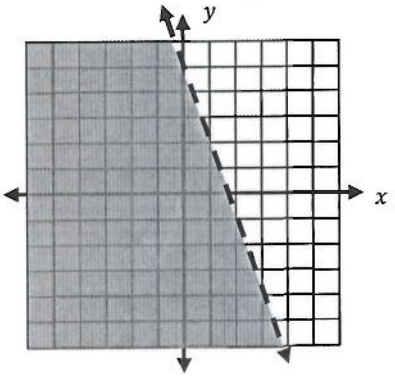
1) $y > -3x + 5$ 2) $y < -3x + 5$ 3) $y \geq -3x + 5$ 4) $y \leq -3x + 5$

D B C A

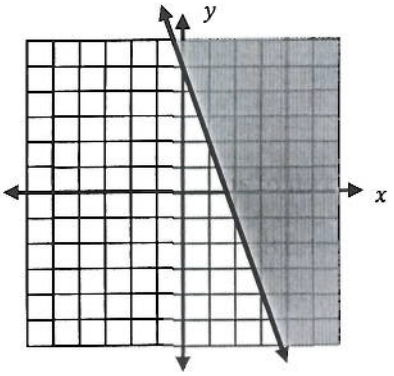
A.



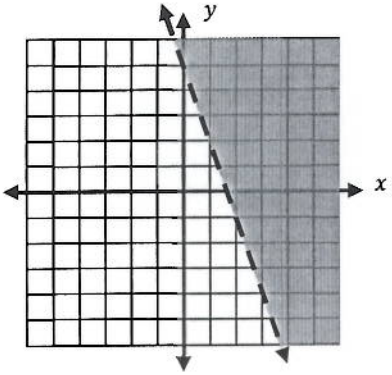
B.



C.

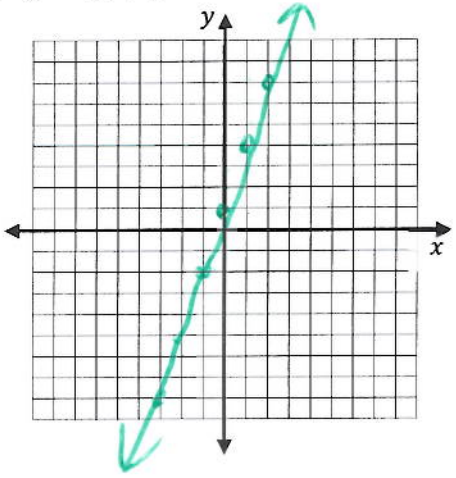


D.

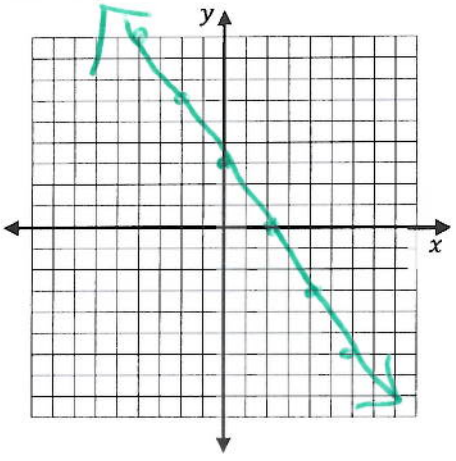


18. Graph the lines. Accurately plot and label at least 3 points on each graph.

(a) $y = 3x + 1$



(b) $3x + 2y = 6$



For items **19 and 20**, a function of time is given. In each item, determine the average rate of change on the given interval. *Give the units for your answer.*

19.

Time (seconds)	Distance (feet)
0	0
1	5
2	20
3	45
4	80
5	125

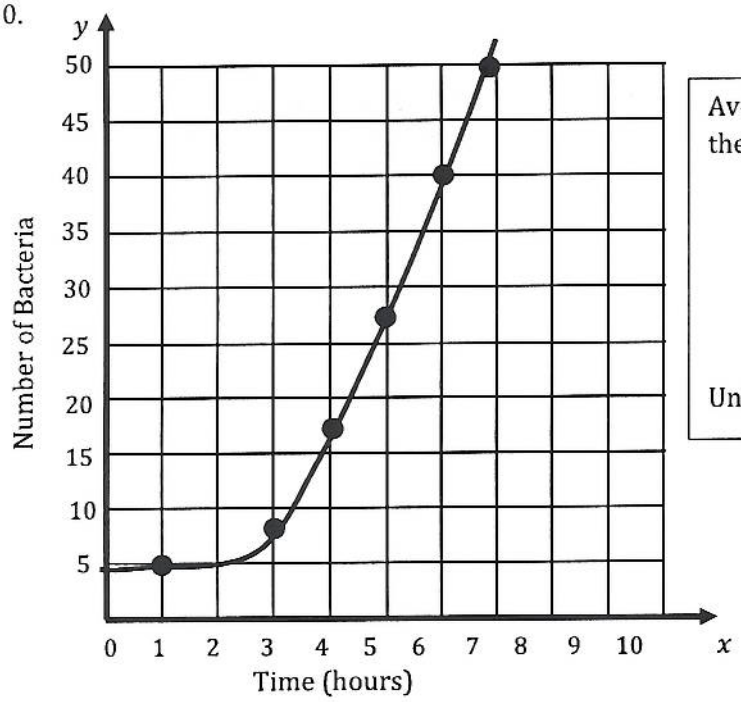
Average speed on the interval

$2 \leq t \leq 5$:

37 ft per sec

Units:

20.



Average rate of bacteria growth on the interval $1 \leq t \leq 6$.

7 bacteria per hour

Units:

21. Solve the literal equations.

(a) Solve for r: $A = P + Prt$

$r = \frac{A-P}{Pt}$

or $r = \frac{A}{Pt} - \frac{1}{t}$

(b) Solve for z: $2x - 3z + 12 = 0$

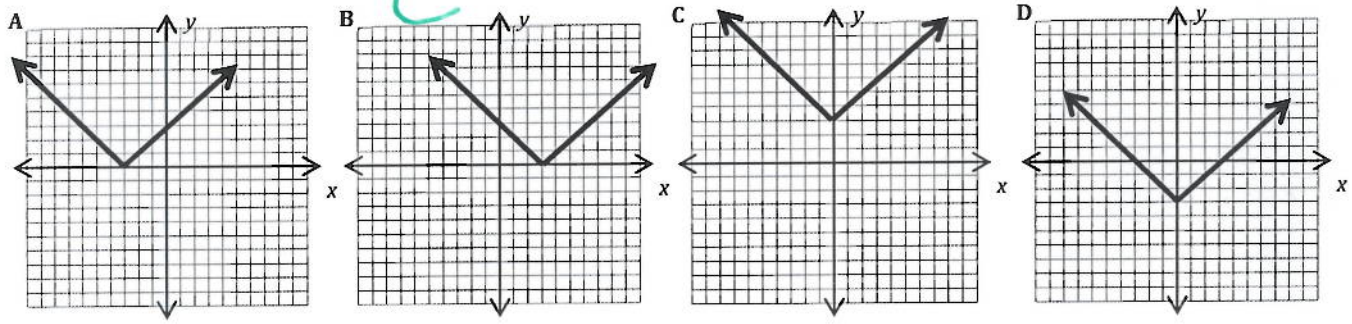
$z = \frac{2}{3}x + 4$

22. The following questions explore the relationship between $y = f(x)$ and $y = af(x-h)+k$, and the effect of a, h, and k in transforming the function $f(x)$

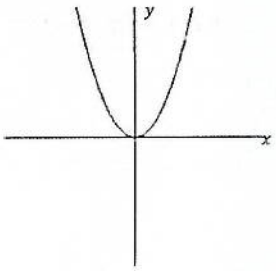
A

(a) Which of the following graphs represents the function $f(x) = |x+3|$? Which one represents $f(x) = |x| + 3$?

C



(b) The graph to the right represents $y = x^2$. Match the equations listed below with the graphs I, II, II, and IV.

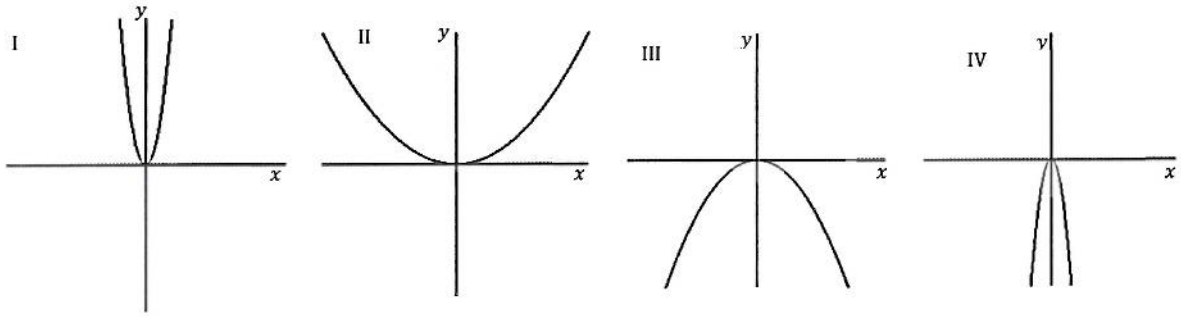


III $y = -\frac{1}{3}x^2$

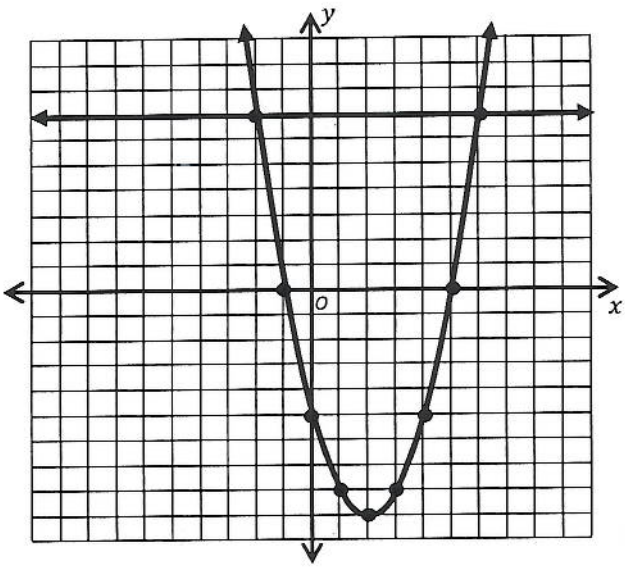
I $y = 4x^2$

IV $y = -5x^2$

II $y = \frac{1}{2}x^2$



23. The equations $y = x^2 - 4x - 6$ and $y = 7$ are graphed on the coordinate plane below.



(a) What are the solutions to the equation $x^2 - 4x - 5 = 7$? $x = -2, 6$

(b) What are the solutions to the inequality $x^2 - 4x - 5 \leq 7$? $-2 \leq x \leq 6$

24. Solve the following linear equations.

(a) $-4(3 - x) = 2(x - 6)$ $x = 0$

(b) $2(4x + 6) + 8 = 6x$ $x = -10$

(c) $3x - 2(x + 1) = 0$ $x = 2$

(d) $6(x + 2) + 1 = 2(x + 4)$ $x = -5/4$

(e) $7x = 4x - 2$ $x = -2/3$

(f) $7x + 19 = 55 - 2x$ $x = 4$

(g) $2x + 7 + x = 4(x + 2) - 5$ $x = 4$

(h) $4(1 - x) + 3x = -2(x + 1)$ $x = -6$

25. Find the slope of the line containing the points (6,5) and (3,9).

$-4/3$

26. Find the x-intercept and the y-intercept of the line $3x - 4y = -48$.

x-int: -16 y-int: 12

27. Find an equation of the line with slope 3/5 and y-intercept of -4.

$y = \frac{3}{5}x - 4$

28. Find an equation of the line that passes through the points (1,2) and $(3, -4)$.

$y = -3x + 5$

29. Find an equation of the line that passes through the point $(-1,4)$ and is parallel to the line with equation $y = 3x - 1$.

$y = 3x + 7$

30. Find an equation of the line that passes through the point $(-2, -5)$ and is perpendicular to the line with equation $= x + 2$.

$y = -x - 7$

31. Compute the value of each of the following.

(a) Evaluate $y = 3x^2 - 5$ if $x = 4$. 43

(b) Evaluate $y = 4x^3 + 1$ if $x = -3$. -11

(c) Evaluate $f(x) = -x^2 - 14x$ when $x = 2$. -32

32. Completely simplify each of the following. Simplify any radical expression (do not write as a decimal).

(a) $(-3a^2 + 4a - 7) + (2a^2 - 7a + 8)$

$-a^2 - 3a + 1$

(b) $(39x^4 - 4x^3 + 2x^2 - x - 7) - (13x^4 + 3x^3 - 2x^2 - x + 8)$

$26x^4 - 7x^3 + 4x^2 - 15$

(c) $(y + 7)(y - 3)$

$y^2 + 4y - 21$

(d) $(x + 12)(x - 12)$

$x^2 - 144$

(e) $(p - 2)(3p + 2)$

$3p^2 - 4p - 4$

(f) $(6m - 5)^2$

$36m^2 - 60m + 25$

(g) $(3t - 5)(3t + 5)$

$9t^2 - 25$

(h) $(2x - 3)(3x^2 + x - 1)$

$6x^3 - 7x^2 - 5x + 3$

(i) $z^2 \cdot z^4$

z^6

(j) x^{15}/x^5

x^{10}

(k) $(11x)^2$

$121x^2$

(l) $(s^3)^2$

s^6

(m) $\left(\frac{2y^3}{3x^2}\right)^3$

$\frac{8y^9}{27x^6}$

(n) $(5x^2y^4)(3x^4y^3)$

$15x^6y^7$

(o) $\sqrt{50}$

$5\sqrt{2}$

(p) $\sqrt{100}$

10

(q) $\sqrt{32}$

$4\sqrt{2}$

(r) $3\sqrt{20}$

$6\sqrt{5}$

(s) $\sqrt{14}\sqrt{7}$

$7\sqrt{2}$

(t) $\sqrt{\frac{32}{25}}$

$\frac{4\sqrt{2}}{5}$

33. Completely factor each of the following. (HINT: When factoring, first take out any common factors, then factor using the difference of squares method or some other method of factoring.)

(a) $5x^2 - 20x$

$5x(x-4)$

(b) $7x^3 - 21x^2$

$7x^2(x-3)$

(c) $x^2 + 16x + 64$

$(x+8)^2$

(d) $x^2 - 49$

$(x+7)(x-7)$

(e) $x^2 - x - 72$

$(x+8)(x-9)$

(f) $3x^2 - 5x - 2$

$(3x+1)(x-2)$

(g) $x^2 + 7x + 12$

$(x+4)(x+3)$

(h) $2x^2 - x - 15$

$(2x+5)(x-3)$

(i) $x^2 - 8x + 16$

$(x-4)^2$

(j) $-6x^2 + 3x + 3$

$-3(2x+1)(x-1)$

(k) $x^2 + 10x - 24$

$(x+12)(x-2)$

(l) $-2x^2 + 6x$

$-2x(x+3)$

(m) $4x^2 - 49$

$(2x+7)(2x-7)$

(n) $3x^2 - 11x + 6$

$(3x-2)(x-3)$

(o) $81x^2 - 1$

$(9x+1)(9x-1)$

(p) $3x^2 + 8x + 5$

$(3x+5)(x+1)$

(q) $3x^2 + 11x + 10$

$(3x+5)(x+2)$

(r) $6x^3 - 3x^2 - 18x$

$3x(2x+3)(x-2)$

(s) $6x^2 + 13x + 5$

$(3x+5)(2x+1)$

(t) $10x^2 - 7x - 12$

$(5x+4)(2x-3)$

34. Solve each of the following by factoring.

(a) $(2x + 1)(x + 3) = 0$

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

(b) $x^2 - 16 = 0$

$x = \pm 4$

(c) $x^2 - 3x - 10 = 0$

$x = 5, -2$

(d) $x^2 - 6x = 0$

$x = 0, 6$

(e) $2x^2 - 13x + 15 = 0$

$x = 3/2, 5$

(f) $x^2 + 7x - 8 = 0$

$x = -8, 1$

(g) $4x^2 - 24x = 0$

$x = 0, 6$

35. Solve each of the following using the quadratic formula.

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

$x = -\frac{1}{2}, 2$

(b) $x^2 + 5x + 6 = 0$

$x = -2, -3$

(c) $x^2 - 4x - 1 = 0$

$x = 2 \pm \sqrt{5}$

(d) $2x^2 - 8x + 5 = 0$

$x = \frac{4 \pm \sqrt{6}}{2}$

36. Solve the quadratic equation by taking a square root.

(a) $(x-7)^2 = 81$

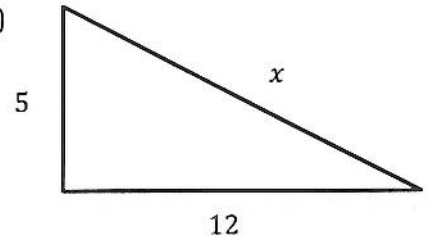
$X = -2, 16$

(b) $(x+5)^2 = 64$

$X = -13, 3$

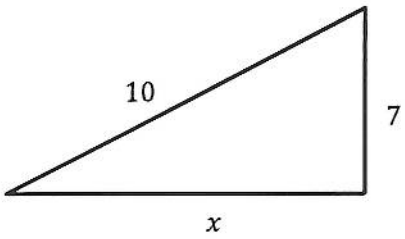
37. For the items below, determine the side of the right triangle marked x.

(a)



$X = 13$

(b)



$X = \sqrt{51}$

38. The lengths of the three sides of a triangle are given. Determine whether the triangle is a right triangle.

(a) Lengths are 12, 16, and 30.

No

(b) Lengths are 2, 3, and 4.

No

39. Find the distance between the pair of points.

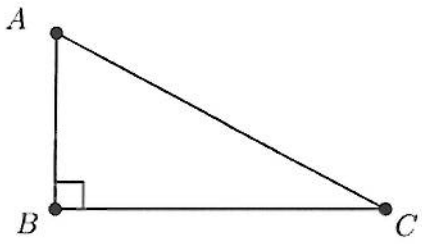
(a) $(7, -2)$ and $(-6, 3)$.

$\sqrt{194} \approx 13.928$

(b) $(-6, 3)$ and $(2, 9)$

10

40. Given right ΔABC, use the item bank to identify the following. Items may be used more than once.



Item Bank

$\angle A$	$\angle B$	$\angle C$	$\overline{AB}$	$\overline{BC}$	$\overline{AC}$
$\frac{BC}{AC}$	$\frac{BC}{AB}$	$\frac{AB}{BC}$	$\frac{AB}{AC}$	$\frac{AC}{BC}$	$\frac{AC}{AB}$

(a) Leg opposite $\angle A$

$\overline{BC}$

(b) Leg opposite $\angle C$

$\overline{AB}$

(c) Sine Ratio of $\angle A$

$\frac{BC}{AC}$

(d) Cosine of ratio $\angle A$

$\frac{AB}{AC}$

(e) Tangent ratio of $\angle A$

$\frac{BC}{AB}$

(f) Sine ratio of $\angle C$

$\frac{AB}{AC}$

(g) Cosine ratio of $\angle C$

$\frac{BC}{AC}$

(h) Tangent ratio of $\angle C$

$\frac{AB}{BC}$

(i) The angle whose Sine ratio is $\frac{BC}{AC}$.

$\angle A$

(j) The angle whose Tangent ratio is $\frac{AB}{BC}$

$\angle C$

(k) Hypotenuse

$\overline{AC}$