Key

ALGEBRA
3rd TRIMESTER
EXAM REVIEW

Inequalities

1. Your class hopes to collect at least 400 cans of food for the annual food drive. There were 132 cans donated the first week and 163 more the second week. How many more cans of food must be collected by the end of the third week for your class to meet or surpass your goal? Write and solve an inequality. Show your work.

$132 + 163 + x \geq 400$

$295 + x \geq 400$

$-295 \quad -295$

$x \geq 105$

1. inequality $132 + 163 + x \geq 400$

Define: Let x = cans collected in the 3rd week

Solution: $x \geq 105$ cans

Systems of Linear Equations

1. Solve each system using substitution or elimination.

$\begin{cases} y = 2x \\ y = -4x + 9 \end{cases}$	$3\left(2x - 3y = -8\right)$ $2\left(3x + 4y = 5\right)$	$\begin{cases} 3x + 2y = -19 \\ x = 12y + 19 \end{cases}$
$2x = -4x + 9$ $+4x \quad +4x$ $\frac{6x}{6} = \frac{9}{6}$ $x = 1.5$ $y = 2(1.5)$ $y = 3$ $\boxed{(1.5, 3)}$	$6x - 9y = -24$ $-\ 6x + 8y = 10$ $\frac{-17y}{-17} = \frac{-34}{-17}$ $y = 2$ $2x - 3(2) = -8$ $2x - 6 = -8$ $2x = -2$ $x = -1$ $\boxed{(-1, 2)}$	$3(12y + 19) + 2y = -19$ $36y + 57 + 2y = -19$ $38y + 57 = -19$ $38y = -76$ $y = -2$ $x = 12(-2) + 19$ $x = -24 + 19$ $x = -5$ $\boxed{(-5, -2)}$

2. Two groups of students order burritos and tacos at a local restaurant. One group orders 3 burritos and 4 tacos for a total of \$11.33. The other group orders 9 burritos and 5 tacos for a total of \$23.56.

A burrito costs \$1.79
A taco cost \$1.49

a. Define variables for the situation.

Let x = # of burritos

Let y = # of tacos

b. Write a system of equations to represent this scenario.

$3x + 4y = 11.33$

$9x + 5y = 23.56$

c. How much does a burrito cost? How much does a taco cost?

$3\left(3x + 4y = 11.33\right) \rightarrow 9x + 12y = 33.99$

$-\ 9x + 5y = 23.56$

$7y = 10.43$

$y = 1.49$

$3x + 4(1.49) = 11.33$

$3x + 5.96 = 11.33$

$3x = 5.37$

$x = 1.79$

Exponents

Simplify each expression. Use positive exponents.

1. $a^4b^{-7}c^0$ $= \frac{a^4}{b^7}$

1. $\frac{a^4}{b^7}$

2. $(0.93^6)(0.93^{-8})$ $= (0.93)^{-2}$

$= \frac{1}{(0.93)^2} = \frac{1}{0.8649}$

2. $\frac{1}{0.8649}$

3. $\frac{p^3q^{-1}}{q^2r^{-6}}$ $\frac{p^3 \cdot q^{-3}}{r^{-6}} = \frac{p^3r^6}{q^3}$

3. $\frac{p^3r^6}{q^3}$

4. $(m^3n^{-5}m^{-1})^{-3}$ $= m^{-9}n^{15}m^3$

$= m^{-6}n^{15} = \frac{n^{15}}{m^6}$

4. $\frac{n^{15}}{m^6}$

5. $\left(\frac{x^4y^{-2}}{x^{-3}y^5}\right)^{-1}$ $\frac{x^{-4}y^2}{x^3y^{-5}} = x^{-7}y^7 = \frac{y^7}{x^7}$

5. $\frac{y^7}{x^7}$

6. $u^{-5}v^4(-u^3v^{-2})^3$

$u^{-5}v^4 \cdot -1 \cdot u^9 \cdot v^{-6}$

$-1 \cdot u^4v^{-2}$

$= -\frac{u^4}{v^2}$

6. $-\frac{u^4}{v^2}$

Polynomials

Simplify. Write each answer in standard form.

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

$2x^2-x+2$

1. $2x^2-x+2$

2. $(2x^2+6x+7)+(3x^2+3x-5)$

$5x^2+9x+2$

2. $5x^2+9x+2$

3. $(3x^2+4x-10)-(2x+7-4x^2)$

$(3x^2+4x-10)+(-2x-7+4x^2)$

$7x^2+2x-17$

3. $7x^2+2x-17$

4. $(8x-4x^2+x^3)-(8x^2+4x^3-7x)$

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

$-3x^3-12x^2+15x$

4. $-3x^3-12x^2+15x$

5. $-y(8y^2+y)$

$-8y^3-y^2$

5. $-8y^3-y^2$

6. $7x(3-x+6x^3)$

$21x-7x^2+42x^4$

6. $42x^4-7x^2+21x$

7. $5y(y^5+8y^3)$

$5y^6+40y^4$

7. $5y^6+40y^4$

8. $(a+3)(a-1)$

	a	3
a	a^2	$3a$
-1	$-a$	-3

a^2+2a-3

8. a^2+2a-3

9. $(2y-8)(y-4)$

	y	-4
$2y$	$2y^2$	$-8y$
-8	$-8y$	$+32$

$2y^2-16y+32$

9. $2y^2-16y+32$

10. $(3x+4)(5x-9)$

	$5x$	-9
$3x$	$15x^2$	$-27x$
4	$20x$	-36

$15x^2-7x-36$

10. $15x^2-7x-36$

11. $(x-1)(x^2+6x-4)$

	x^2	$+6x$	-4
x	x^3	$6x^2$	$-4x$
-1	$-x^2$	$-6x$	$+4$

11. $x^3+5x^2-10x+4$

Factor each expression.

12. x^2-6x+5

	x	5
x	x^2	$-5x$
1	$-x$	5

$\cdot 5$	$+-6$
$-5\cdot-1$	$-5+-1$

12. $(x-5)(x-1)$

13. $y^2+18y+81$

	y	9
y	y^2	$9y$
9	$9y$	81

$\cdot 81$	$+18$
$9\cdot 9$	$9+9$

13. $(y+9)(y+9)$

14. $16x^2+48x+36$

$4(4x^2+12x+9)$

	$2x$	3
$2x$	$4x^2$	$6x$
3	$6x$	$+9$

$\cdot 36$	$+12$
$6\cdot 6$	$6+6$

14. $4(2x+3)(2x+3)$

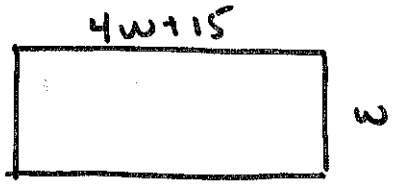
15. $3x^2-27x$

$3x(x-9)$

15. $3x(x-9)$

16. A settling pond at a sewage treatment facility is rectangular. The length of the pond is 15 feet more than 4 times its width w. What is the area of the pond?

16. $4w^2+15w$

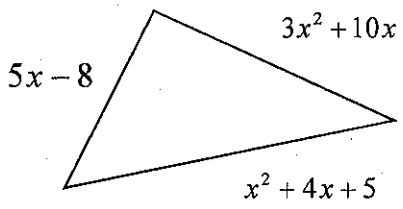


$w(4w+15)$

$4w^2+15w$

17. Find the **PERIMETER** of this triangle. Leave answer in standard form.

17. Perimeter = $4x^2+19x-3$



Quadratics

1. Give the equation of the axis of symmetry for the function $y=2x^2+8x-5$.

1. $x=-2$

$\frac{-b}{2a} = \frac{-8}{2(2)} = \frac{-8}{4} = -2$

2. What are the coordinates of the vertex for the function $f(x)=x^2+12x-9$?

2. $(-6,-45)$

$(-6)^2+12(-6)-9$

$36-72-9$

-45

$\frac{-b}{2a} = \frac{-12}{2(1)} = \frac{-12}{2} = -6$

For #'s 6 – 8, identify the vertex of each graph. Tell whether it is a minimum or maximum.

3. $y=\frac{3}{8}x^2$

3. minimum $(0,0)$

$\frac{-b}{2a} = \frac{-0}{2(\frac{3}{8})} = 0,0$

4. $y=-4x^2+24x+6$

4. $(3, 42)$

$\frac{-b}{2a} = \frac{-24}{2(-4)} = \frac{-24}{-8} = 3$

$-4(3)^2+24(3)+6$

$-36+72+6$

42

5. Give the needed information. If necessary, round answers to the nearest tenth.

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

A. **Choose one.** Opens up or opens down — Opens down

B. The value for a, b, and c

$a =$ -1

$b =$ 2

$c =$ 1

C. The equation for the axis of symmetry — Axis of symmetry is: X = 1

$\frac{-b}{2a} = \frac{-2}{2(-1)} = 1$

D. The y-intercept — y-intercept is: (0, 1)

E. The coordinates of the vertex — Coordinates of the vertex are: (1, 2)

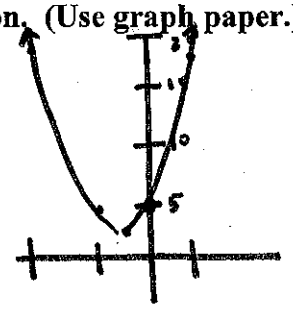
F. **Choose one.** Vertex is a minimum or maximum. — Vertex is a maximum

Graph each function. (Use graph paper.)

$\frac{-6}{2(6)} = \frac{-1}{2}$

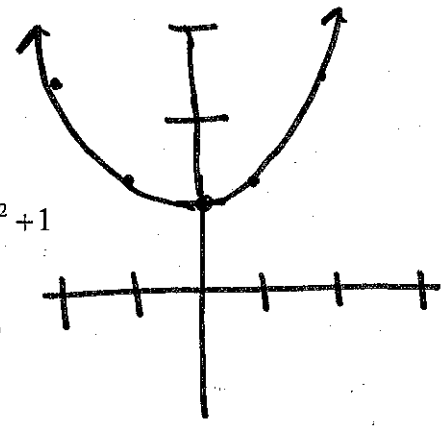
6. $y = 6x^2 + 6x + 5$

x	y
1	17
0	5
-0.5	3.5
-1	5
-2	15



7. $y = \frac{1}{3}x^2 + 1$

x	y
-2	2 1/3
-1	1 1/3
0	1
1	1 1/3
2	2 1/3



Solve by finding square roots.

8. $-16q^2 + 64 = 0$

$-64 \quad -64$

$-16q^2 = -64$

$\sqrt{q^2} = \sqrt{4}$

8. $q = \pm 2$

9. $x^2 - 10 = 100$

$+10 \quad +10$

$\sqrt{x^2} = \sqrt{110}$

~~x = ±9.5~~

$x = \pm 10.5$

9. $x = \pm 10.5$

Solve using the Zero-Product property. (Factor)

10. $3x^2 = 12x$

$3x^2 - 12x = 0$

$3x(x-4) = 0$

$3x = 0$, $x = 0$

$x - 4 = 0$, $x = 4$

10. $x = 0$ or $x = 4$

11. $x^2 - x - 6 = 0$

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

$x - 3 = 0$ or $x + 2 = 0$

$x = 3$ $\quad$ $x = -2$

11. $x = 3$ or $x = -2$

Solve using the quadratic formula. If the equation has no real solutions, write *no solution*. If necessary, round to the nearest tenth.

12. $x^2 - 35x = -70$

$x^2 - 35x + 70 = 0$

$= \dfrac{35 \pm \sqrt{(-35)^2 - 4(1)(70}}{2(1)}$

$= \dfrac{35 \pm \sqrt{1225 - 280}}{2}$

$\dfrac{35 \pm \sqrt{945}}{2}$

$= \dfrac{35 \pm 30.74}{2}$

$+$: $\dfrac{35 + 30.74}{2} =$

$-$: $\dfrac{35 - 30.74}{2} =$

12. 32.87 or 2.13

13. $4x^2 + 33x = 27$

$4x^2 + 33x - 27$

$\dfrac{-33 \pm \sqrt{(33)^2 - 4(4)(-27)}}{2(4)}$

$\dfrac{-33 \pm \sqrt{1089 + 432}}{8}$

$\dfrac{-33 \pm \sqrt{1521}}{8}$

$= \dfrac{-33 \pm 39}{8}$

$+$: $\dfrac{-33 + 39}{8} = \dfrac{6}{8} = 0.75$

$-$: $\dfrac{-33 - 39}{8} = \dfrac{-72}{8} = -9$

13. 0.75 or -9

14. $2x^2 - 59x + 29 = 12$

$2x^2 - 59x + 17$

$\dfrac{59 \pm \sqrt{(-59)^2 - 4(2)(17)}}{2(2)}$

$\dfrac{59 \pm \sqrt{3481 - 136}}{4}$

$\dfrac{59 \pm \sqrt{3345}}{4}$

$\dfrac{59 \pm 57.84}{4}$

$+$: $\dfrac{59 + 57.84}{4} = \dfrac{116.84}{4} = 29.2$

$-$: $\dfrac{59 - 57.84}{4} = \dfrac{1.16}{4} = 0.3$

14. 29.2 or 0.3

15. A football is punted upward at a velocity of 45 ft/s from a starting height of 3 ft. Use the equation $h = -18t^2 + 52t + 3$ to answer the following questions.

A. At what time will the ball reach its maximum height? 15A. 1.44 sec.

* Find the vertex!

$\frac{-b}{2a} = \frac{-52}{2(-18)} = 1.44\overline{}$

this is the x-coordinate, I need the y-coordinate (or h coord.) for part B

$h = -18(1.44)^2 + 52(1.44) + 3$

$h = -37.32 + 74.88 + 3$

B. What will the maximum height be? 15B. 40.56 ft

$h = 40.56$

C. When will the ball reach the ground? 15C. 2.95 sec.

I need to find the time when $h = 0$

$0 = -18t^2 + 52t + 3$

$\frac{-52 \pm \sqrt{(52)^2 - 4(-18)(3)}}{2(-18)}$

$\frac{-52 \pm \sqrt{2704 + 216}}{-36}$

$\frac{-52 \pm \sqrt{2920}}{-36}$

$\frac{-52 \pm 54.03}{-36}$

$+ \quad \frac{-52 + 54.03}{-36} = -.06$

$- \quad \frac{-52 - 54.03}{-36} = 2.95$

16. Describe as many characteristics of the following functions.

Linear Equations	Exponential Equations	Quadratic Equations
* ~~equation~~ graph is a straight line * equation = $y = mx + b$ * m = slope * b = y-intercept $(0, b)$		* graph is a parabola * equation is $y = ax^2 + bx + c$ * y-intercept $(0, c)$