

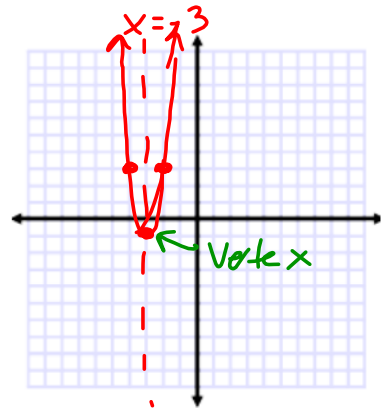
Unit 6 and 7 Review Algebra 2 NAME: _____ Date: _____

Form Options: Vertex, Standard, & Intercept form

1. $y = 4(x+3)^2 - 1$ *one set of ()*
 $4(x - (-3))^2 + -1$ *Vertex*

Graph the functions (4 points)

What form is this equation written in? Vertex (1 pt)
 What is the form/equation using a, b, c, h, k, q or p: $a(x-h)^2 + k$ (1 pt)
 What is the Axis of symmetry of this equation: $x = -3$ (1 point)



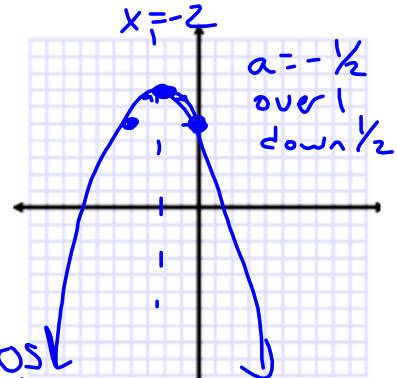
What is the VERTEX of this equation: $(-3, -1)$ (1 point)
 (h, k) $h = -3$ $k = -1$
 What other points does this equation go through: $(-2, 3)$ $(-4, 3)$ (2 points)

a = 4 over 1 up 4

2. $F(x) = -1/2 x^2 - 2x + 5$ *no sets of ()*
 $a = -1/2$ $b = -2$ $c = 5$ *Standard*

Graph the functions (4 points)

What is the form/equation using a, b, c, h, k, q or p: $ax^2 + bx + c$ (1 pt)
 What is the Axis of symmetry of this equation: $x = -2$ (1 point)



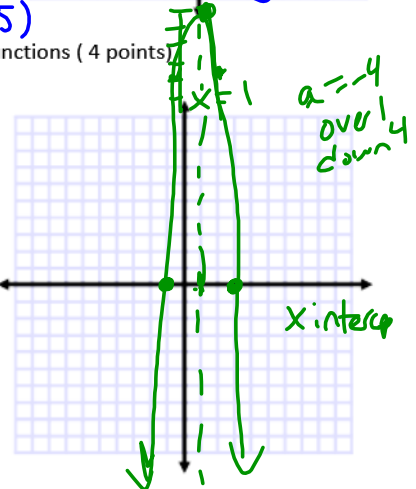
What is the VERTEX of this equation: $(-2, 7)$ (1 point)
 $y = -1/2(-2)^2 - 2(-2) + 5$
 $y = 7$
 What other points does this equation go through: $(0, 5)$ $(-4, 5)$ (2 points)

Plug in axis of symmetry to find y

y intercept (0, c)
 $(0, 5)$ - reflected over AOS $(-4, 5)$

3. $g(x) = -4(x-3)(x+1)$ *2 sets of ()* Graph the functions (4 points)

What form is this equation written in? Intercept (1 pt)
 What is the form/equation using a, b, c, h, k, q or p: $a(x-p)(x-q)$ (1 pt)



What is the Axis of symmetry of this equation: $x = 1$ (1 point)
AOS is halfway between x intercepts
 $x = \frac{p+q}{2} = \frac{3+(-1)}{2} = \frac{2}{2} = 1$
 What is the VERTEX of this equation: $(1, 16)$ (1 point)

a = -4 over 1 down 4

Plug in AOS
 $y = -4(1-3)(1+1)$
 $y = -4(-2)(2) = 16$
 What other points does this equation go through: _____ (2 points)

X intercepts
 Set each factor or () = 0

$x - 3 = 0$ $x + 1 = 0$
 $+3 +3$ $-1 -1$
 $x = 3 = p$ $x = -1 = q$
 $(3, 0)$ $(-1, 0)$

Standard Form Vertex form
 $y = -4(x-3)(x+1)$
 $y = -4(x^2 + 1x - 3x - 3)$
 $= -4(x^2 - 2x - 3)$
 $y = -4x^2 + 8x - 12$
 Since $a = -4$ and $V: (1, 16)$
 $y = -4(x-1)^2 + 16$

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4. $y = 1/3x(x-8)(x+6)$

Lead Coefficient: $\frac{1}{3}$ is positive
 # in front of highest degree term
 What is the right side of the function doing?

Right Side
 if lead coeff is positive - R.S. up
 if lead coeff is negative - R.S. down

$F(x) \rightarrow \infty$ As $x \rightarrow \infty$

Degree: 3 x^3 - odd
 highest exponent in standard form
 What is the left side of the function doing?

Left Side
 if degree is odd - L.S. opposite
 if degree is even - L.S. matches R.S.

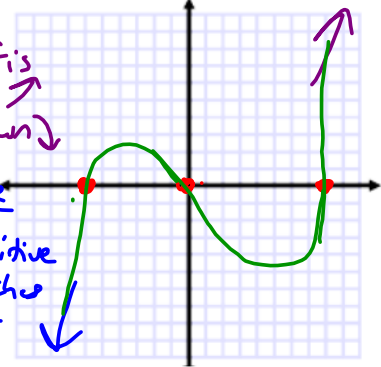
$F(x) \rightarrow -\infty$ As $x \rightarrow -\infty$

What are the zeros, their multiplicity and what is happening there?

Set each X factor = 0 and solve

$x=0$ $m=1$ Pass	$x-8=0$ $+8 +8$ $x=8$ $m=1$ Pass	$x+6=0$ $-6 -6$ $x=-6$ $m=1$ Pass
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Graph the functions (4 points)



5. For the graph above state or estimate the:

x-intercepts:

$x=-1$ $x=1$ $x=3$
 $+1 +1$ $-1 -1$ $-3 -3$ $m=1$

$x+1=0$ $x-1=0$ $x-3=0$
 bounce $m=2$ $m=1$ $m=1$

Local Extremes:

function bends
 local max $(0.1, 3.4)$
 local min $(-1, 0) \cup (2.2, -10)$

Absolute Extreme: No absolute max function goes higher
 Absolute min $(-1, 0)$

The 2 Points of Inflection: $(-0.5, 1.9) \cup (1.5, -4)$

Where function changes concavity

Domain: $\{x | -\infty < x < \infty\}$ $D: (-\infty, \infty)$

Range: $\{y | -10 \leq y < \infty\}$ $R: [-10, \infty)$

Interval positive: $\{x | -\infty < x < -1 \cup -1 < x < 1 \cup 3 < x < \infty\}$
 y's are $(-\infty, -1) \cup (-1, 1) \cup (3, \infty)$

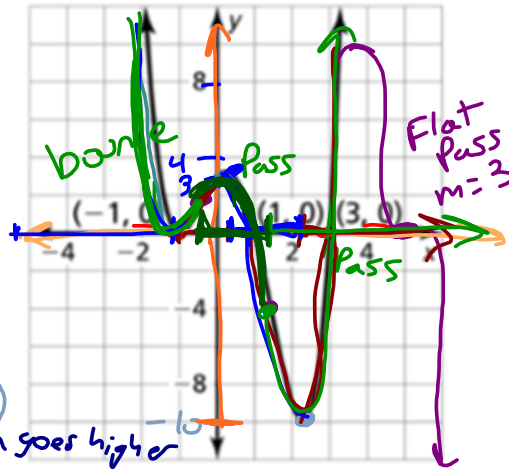
Interval negative: $\{x | 1 < x < 3\}$ $(1, 3)$
 y's are

Interval increasing: $\{x | -1 < x < 0.1 \cup 2.2 < x < \infty\}$ $(-1, 0.1) \cup (2.2, \infty)$
 y's are getting bigger

Interval decreasing: $\{x | -\infty < x < -1 \cup 0.1 < x < 2.2\}$ $(-\infty, -1) \cup (0.1, 2.2)$
 y's are getting smaller

Concave Up: $\{x | -\infty < x < -0.5 \cup 1.5 < x < \infty\}$ $(-\infty, -0.5) \cup (1.5, \infty)$

Concave Down: $\{x | -0.5 < x < 1.5\}$ $(-0.5, 1.5)$



[bracket when value is included
 (parentheses when value is not included or reached

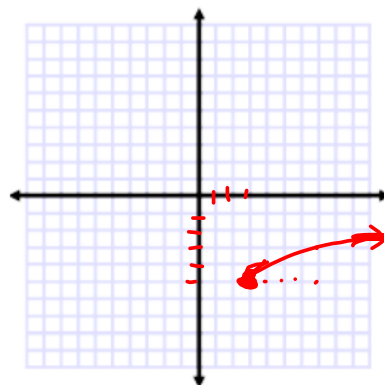
x values where

mins to max
 max to mins
 look at points of inflection

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6. Use the function $f(x) = \sqrt{x-3} - 5$ and identify the key features that are listed in the table for the graph. Label the graph with the key features.

Key Feature	Answer
Domain	$[3, \infty)$
Range	$[-5, \infty)$
Minimum Value	$y = -5$ at $(3, -5)$
x-intercept	$(28, 0)$
y-intercept	None
Function is Positive	$(28, \infty)$
Function is Negative	$[3, 28)$
Interval Increasing	$[3, \infty)$
Interval Decreasing	None

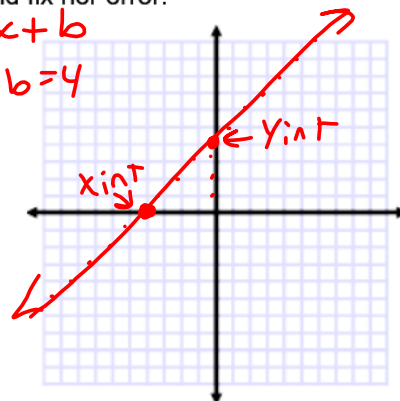


$0 = \sqrt{x-3} - 5$
 $5 = \sqrt{x-3}$
 $25 = x-3$
 $28 = x$
 $y = \sqrt{x-3} - 5$
 $y = \sqrt{x-3} - 5$
 im + y

7. Cheyenne identified the key features of the function $f(x) = x + 4$ before graphing it. She wrote her answers in the table. Find and fix her error.

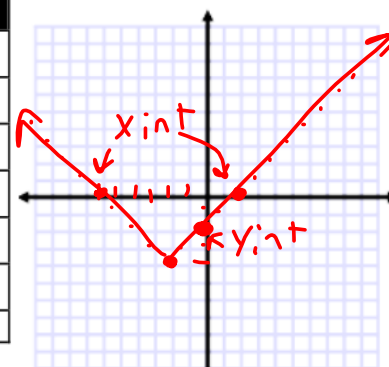
Key Feature	Answer
Domain	$(-\infty, \infty)$ ✓
Range	$(-\infty, \infty)$ ✓
x-intercept	$x = -4$ ✓
y-intercept	4 ✓
Function is Positive	$(-4, \infty)$ ✓
Function is Negative	$(-\infty, -4)$ ✓

$y = mx + b$
 $m = 1$ $b = 4$



8. Identify the key features of the function $f(x) = |x + 2| - 4$.

Key Feature	Clues	Answer
Domain	Values of the x-axis	$(-\infty, \infty)$
Range	Values of the y-axis	$[-4, \infty)$
Minimum Value	Lowest point on the graph	$(-2, -4)$
x-intercept	When $y = 0$	$(-6, 0) \cup (2, 0)$
y-intercept	When $x = 0$	$(-2, 0)$
Function is Positive	Function is above the x axis	$(-\infty, -6) \cup (2, \infty)$
Function is Negative	Function is below the x axis	$(-6, 2)$



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Factor Review 2 LET'S GET GOOD AT THIS!

Name: _____

You will be factoring or solving all the expressions or equations by factoring. The skills are all mixed, you will need to decide which skills are being applied and which to use.

9. $30a^4b^3c - 18a^3b^2c^2$ *Factor out GCF*
 $6a^3b^2c(5ab - 3c)$

10. $p^2 - 14p - 32 = 0$
 $(p-16)(p+2) = 0$
 $p-16=0$ $p+2=0$
 $p=16$ $p=-2$

11. $7t^2 + 17t - 12 = 0$
 $(7t-4)(t+3) = 0$
 $7t-4=0$ $t+3=0$
 $t = 4/7$ $t = -3$

12. $12x^2 + 9x = 0$
 $3x(4x+3) = 0$
 $3x=0$ $4x+3=0$
 $x=0$ $x = -3/4$

13. $y^2 + y = 56$
 $y^2 + y - 56 = 0$
 $(y-7)(y+8) = 0$
 $y-7=0$ $y+8=0$
 $y=7$ $y=-8$

14. $49x^2 - 1 = 0$
 $(7x-1)(7x+1) = 0$
 $7x-1=0$ $7x+1=0$
 $x = 1/7$ $x = -1/7$

15. $27x^2 - 18x = -3$
 $27x^2 - 18x + 3 = 0$
 $3(9x^2 - 6x + 1) = 0$
 $3(3x-1)(3x-1) = 0$
 $3x-1=0$ $3x-1=0$

$x = 1/3$
 with multiplicity of 2

16. $5m^2 = 16p - 15$
 $5m^2 - 16p + 15 = 0$
 $m = \frac{-(-16) \pm \sqrt{(-16)^2 - 4(5)(15)}}{2(10)}$
 $m = \frac{16 \pm \sqrt{-44}}{20}$ $m = \frac{16 \pm 2i\sqrt{11}}{20}$

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

18. $-27x^3 - 64$
 $-(27x^3 + 64)$
 $-(3x+4)(9x^2 - 12x + 16)$
 $m = \frac{8 \pm i\sqrt{11}}{10}$

19. $12x^4yz^2 - 24x^2y^3z^3 + 18x^2yz^3$
 $6x^2yz^2(2x^2 - 4y^2z + 3z)$

20. $63g^3 + 252g = 0$
 $63g(g^2 + 4) = 0$
 $63g(g+2i)(g-2i) = 0$
 $g=0$ $g=-2i$ $g=2i$

21. $49x^2 + 42x + 16 = 11$
 $49x^2 + 42x + 5 = 0$
 $(7x+5)(7x+1) = 0$
 $7x+5=0$ $7x+1=0$
 $x = -5/7$ $x = -1/7$

22. $8p^2 - 10p - 18 = 0$
 $2(4p^2 - 5p - 9) = 0$
 $2(4p-9)(p+1) = 0$
 $4p-9=0$ $p+1=0$
 $p = 9/4$ $p = -1$

Factoring Polynomials

Greatest Common Factor
Factor out GCF 1st

2 Terms

Difference of Squares
 $9x^2 - 4 = (3x - 2)(3x + 2)$
 $\sqrt{9x^2} = 3x \quad \sqrt{4} = 2$

Sum of Squares
 $9x^2 + 4 = (3x - 2i)(3x + 2i)$
 $\pm i$

Difference of Cubes
 $x^3 - 8 = \sqrt[3]{x^3} = x \quad \sqrt[3]{8} = 2$
 SOAP $(x - 2)(x^2 + 2x + 4)$
 $a \quad b \quad a^2 \quad ab \quad b^2$

Sum of Cubes
 $x^3 + 8 = (x + 2)(x^2 - 2x + 4)$
 $a \quad b \quad a^2 \quad ab \quad b^2$

Polynomials
 Sum/Difference of Squares or Cubes

$x^8 - 81 = \sqrt{x^8} = x^4 \quad \sqrt{81} = 9$
 $= (x^4 - 9)(x^4 + 9)$
 $= (x^2 - 3)(x^2 + 3)(x^2 - 3i)(x^2 + 3i)$

$x^6 + 27 = \sqrt[3]{x^6} = x^2 \quad \sqrt[3]{27} = 3$
 $= (x^2 + 3)(x^4 - 3x^2 + 9)$

3 Terms

$a = 1 \quad 1x^2 + bx + c$
 $(x \quad)(x \quad)$
 $\begin{matrix} c \\ \times \\ b \end{matrix}$

a is not 1 $ax^2 + bx + c$
 Split middle term and factor by grouping
 $\begin{matrix} a \cdot c \\ \times \\ b \end{matrix}$

Quadratic Form Polynomials
 $ax^2 + bx + c$
 Lead exponent is double middle exponent
 $\begin{matrix} a \cdot c \\ \times \\ b \end{matrix}$

Quadratic Formula (Also Solves)
 $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

4 or more Terms

Even number of terms
 Factor by Grouping
 • Group terms by 2s
 • Factor out GCF
 • Factor out common binomial factor
 $2x^2 - 4x - 1x + 2$
 $(2x)(x - 2) - 1(x - 2)$
 $(x - 2)(2x - 1)$

Any Polynomial
 Rational Root Theorem & Synthetic Division

Solving: Set each factor = 0
 solve for x

$\sqrt{\quad}$ undoes x^2
 $\sqrt[3]{\quad}$ undoes x^3
 $\sqrt[4]{\quad}$ undoes x^4
 $\sqrt[5]{\quad}$ undoes x^5

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Form Options: Vertex, Standard, & Intercept form

1. $y = 4(x+3)^2 - 1$ *has one ()* Graph the functions (4 points)

What form is this equation written in? Vertex (1 pt)

What is the form/equation using a,b,c,h,k,q or p: $a(x-h)^2+k$ (1 pt)

What is the Axis of symmetry of this equation: $x = -3$ (1 point)

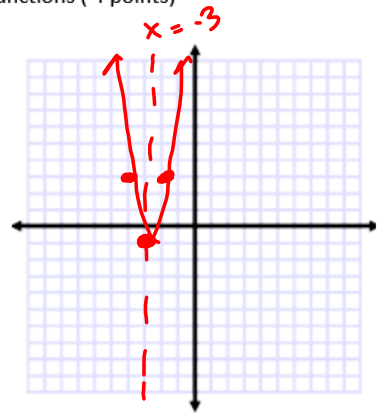
$x = h = -3$

What is the VERTEX of this equation: $(-3, -1)$ (1 point)

'a' is positive
↑

What other points does this equation go through: $(-4, 3)$ $(-2, 3)$ (2 points)

$a = 4$ so we go over 1 up 4



2. $F(x) = -1/2x^2 - 2x + 5$ *no ()*

'a' is negative
↓

What form is this equation written in? Standard (1 pt)

What is the form/equation using a,b,c,h,k,q or p: ax^2+bx+c (1 pt)

What is the Axis of symmetry of this equation: $x = -2$ (1 point)

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

What is the VERTEX of this equation: $(-2, 7)$ (1 point)

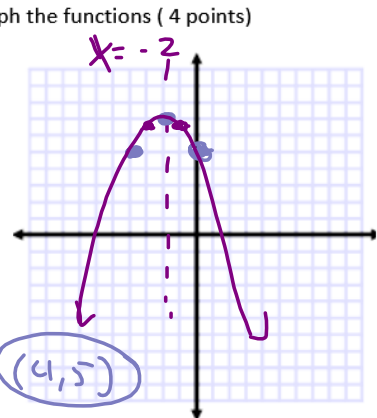
plug in axis of symmetry together

$y = -1/2(-2)^2 - 2(-2) + 5$

What other points does this equation go through: $(0, 5)$ $(4, 5)$ (2 points)

y intercept (0, 5) a = -1/2 over 1 down 1/2

(0, 5) reflected we get (4, 5)



3. $g(x) = -4(x-3)(x+1)$ *2 sets of ()* Graph the functions (4 points)

What form is this equation written in? Intercept (1 pt)

What is the form/equation using a,b,c,h,k,q or p: $a(x-p)(x-q)$ (1 pt)

What is the Axis of symmetry of this equation: $x = 1$ (1 point)

exactly between x intercepts
 $x = \frac{p+q}{2} = \frac{3+(-1)}{2} = \frac{2}{2} = 1$

What is the VERTEX of this equation: $(1, 16)$ (1 point)

plug in axis of symmetry

$y = -4(1-3)(1+1)$
 $y = -4(-2)(2) = 16$

What other points does this equation go through: _____ (2 points)

set each () = 0

$(3, 0)$ $(-1, 0)$

$x-3=0$
 $+3 +3$

$x+1=0$
 $-1 -1$

$(0, 12)$ $(2, 12)$ $a = -4$

over 1 down 4

$p = 3 \leftarrow x = 3$
 $(3, 0)$

$x = -1 \rightarrow q = -1$
 $(-1, 0)$

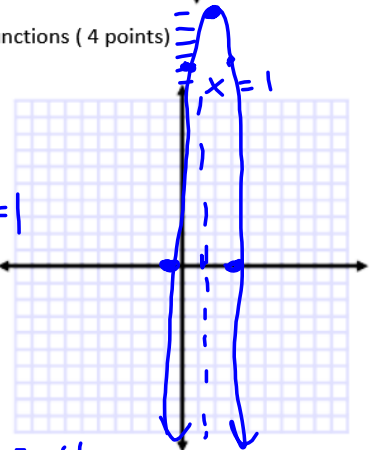
Standard Form Vertex

$y = -4(x-3)(x+1)$ we $(1, 16)$
 $a = -4$

$y = -4(x^2+x-3x-3)$ $y = -4(x-1)+16$

$y = -4(x^2-2x-3)$

$y = -4x^2+8x+12$



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Date: _____
 $x^0(x-2)^4(x+7)^3$ Degree x^8
 Graph the functions (4 points)

4. $y = \frac{1}{3}x(x-8)(x+6)^1$

Lead Coefficient: $\frac{1}{3}$ positive

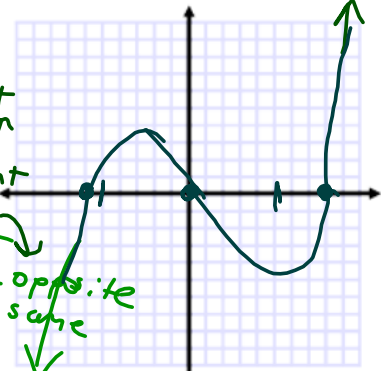
What is the right side of the function doing?
 F(x) $\uparrow \infty$ As x $\rightarrow \infty$

Degree: 3 x^3 odd opposite

What is the left side of the function doing?
 F(x) $\downarrow -\infty$ As x $\rightarrow -\infty$

highest exponent in standard form

if lead coeff - is positive right side is up
 - is negative right side is down
 if degree is - odd left side opposite - even left side same



What are the zeros, their multiplicity and what is happening there?

$\frac{1}{3}x^3 - 8x^2 - 6x = 0$
 $x^3 - 8x^2 - 6x = 0$
 $x^2(x - 8 - \frac{6}{x}) = 0$
 $x^2(x - 8) = 0$
 $x^2 = 0 \Rightarrow x = 0$ (m=2, pass)
 $x - 8 = 0 \Rightarrow x = 8$ (m=1, pass)
 $x + 6 = 0 \Rightarrow x = -6$ (m=1, pass)

5. For the graph above state or estimate the:

x-intercepts: $(-1, 0)$ $(1, 0)$ $(3, 0)$

y-intercepts: $(0, 3)$

Multiplicity $m=2$ bounce

Local Extremes:
 local mins: $(-1, 0)$ $(2.1, -9)$
 local max: $(0, 3.5)$

Absolute Extremes:
 no absolute min at $(2.1, -9)$
 no absolute max because function goes higher than local max

The 2 Points of Inflection:
 point in between max/min where function changes concavity
 $(-0.5, 1.5)$ $(1.5, -4)$

Domain: $\{x | -\infty < x < \infty\}$ $D: (-\infty, \infty)$

Range: $\{y | -9 \leq y < \infty\}$ $R: [-9, \infty)$

[bracket means value is included
 (parentheses means value not included or reached

Interval positive: $\{x | -\infty < x < -1 \cup -1 < x < 1 \cup 3 < x < \infty\}$ $(-\infty, -1) \cup (-1, 1) \cup (3, \infty)$

Interval negative: $\{x | 1 < x < 3\}$ $(1, 3)$

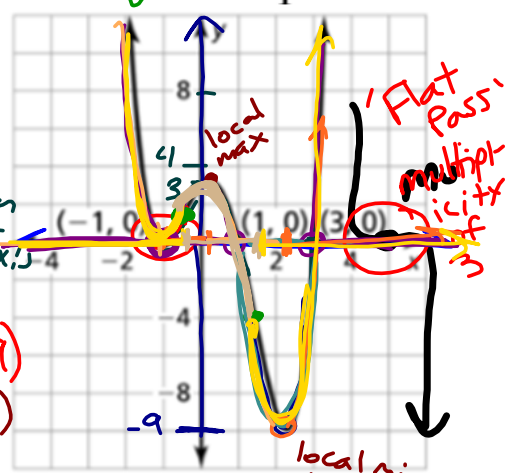
Interval increasing: $\{x | -1 < x < 0.1 \cup 2.1 < x < \infty\}$ $(-1, 0.1) \cup (2.1, \infty)$

Interval decreasing: $\{x | -\infty < x < -1 \cup 0.1 < x < 2.1\}$ $(-\infty, -1) \cup (0.1, 2.1)$

Concave Up: $\{x | -\infty < x < -0.5 \cup 1.5 < x < \infty\}$ $(-\infty, -0.5) \cup (1.5, \infty)$

Concave Down: $\{x | -0.5 < x < 1.5\}$ $(-0.5, 1.5)$

begin point of inflection



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Factor Review 2 LET'S GET GOOD AT THIS!

Name: _____

You will be factoring or solving all the expressions or equations by factoring. The skills are all mixed, you will need to decide which skills are being applied and which to use.

Factor out GCF
part + smallest exponent

9. $30a^4b^3c - 18a^3b^2c^2$
 $6a^3b^2c(5ab - 3c)$

11. $7t^2 + 17t - 12 = 0$
 a.c = 7 · (-12) = -84
 $7t^2 + 21t - 4t - 12 = 0$
 $7t(t+3) - 4(t+3) = 0$
 $(t+3)(7t-4) = 0$
 $t+3=0$ or $7t-4=0$
 $t=-3$ or $t=\frac{4}{7}$

13. $y^2 + y = 56$
 $y^2 + y - 56 = 0$
 $(y+8)(y-7) = 0$
 $y+8=0$ or $y-7=0$
 $y=-8$ or $y=7$

15. $27x^2 - 18x + 3 = 0$
 $3(9x^2 - 6x + 1) = 0$
 $3(3x-1)(3x-1) = 0$
 $3x-1=0$
 $3x=1$
 $x=\frac{1}{3}$
 a.c = 9 · 1 = 9
 $9x^2 - 3x - 3x + 1 = 0$
 $3x(3x-1) - 1(3x-1) = 0$
 $(3x-1)(3x-1) = 0$
 SOAP
 $\sqrt[3]{x^3} = x$
 $\sqrt[3]{8} = 2$

19. $12x^4yz^2 - 24x^2y^3z^3 + 18x^2yz^3$

21. $49x^2 + 42x + 16 = 11$

10. $p^2 - 14p - 32 = 0$
 a=1 trinomial
 $(p+2)(p-16) = 0$
 $p+2=0$ or $p-16=0$
 $p=-2$ or $p=16$

12. $12x^2 + 9x = 0$
 $3x(4x+3) = 0$
 $3x=0$ or $4x+3=0$
 $x=0$ or $x=-\frac{3}{4}$
 2 terms factor out variable

14. $49x^2 - 1 = 0$
 Difference of squares
 $(7x+1)(7x-1) = 0$
 $7x+1=0$ or $7x-1=0$
 $7x=-1$ or $7x=1$
 $x=-\frac{1}{7}$ or $x=\frac{1}{7}$
 real answers
 $\sqrt{49x^2} = 7x$
 $\sqrt{1} = 1$

16. $5m^2 = 16p - 15$
 Use quad formula not factorable

18. $-27x^3 - 64$
 want to be positive
 $-(27x^3 + 64)$
 $-(3x+4)(9x^2 - 12x + 16)$
 $\sqrt[3]{27x^3} = 3x$
 $\sqrt[3]{64} = 4$
 Sum of squares
 two imaginary answers
 $63g(g^2+4) = 0$
 $63g(g+2i)(g-2i) = 0$
 $63g=0$ or $g+2i=0$ or $g-2i=0$
 $g=0$ or $g=-2i$ or $g=2i$

20. $63g^3 + 252g = 0$

22. $8p^2 - 10p - 18 = 0$

if no = just factor dont solve

Unit 6 and 7 Review Algebra 2 NAME: _____ Date: _____

Factor Review 2 LET'S GET GOOD AT THIS!

Name: _____

You will be factoring or solving all the expressions or equations by factoring. The skills are all mixed, you will need to decide which skills are being applied and which to use.

look at GCF for numbers + variables smallest exponent

9. $30a^4b^3c - 18a^3b^2c^2$

$6a^3b^2c(5ab - 3c)$

if no = factor just + factor don't solve

set each factor = 0

10. $p^2 - 14p - 32 = 0$

$(p+2)(p-16) = 0$
 $p+2=0 \rightarrow p=-2$
 $p-16=0 \rightarrow p=16$

11. $7t^2 + 17t - 12 = 0$

$7t^2 - 4t + 21t - 12 = 0$
 $t(7t-4) + 3(7t-4) = 0$
 $(7t-4)(t+3) = 0$
 $7t-4=0 \rightarrow t=4/7$
 $t+3=0 \rightarrow t=-3$

ac method: $a=7, c=-12, b=17$
 $7 \cdot -12 = -84$
 $-4 + 21 = 17$

12. $12x^2 + 9x = 0$

$3x(4x+3) = 0$
 $3x=0 \rightarrow x=0$
 $4x+3=0 \rightarrow 4x=-3 \rightarrow x=-3/4$

must = 0 to factor + solve

13. $y^2 + y = 56$

$y^2 + y - 56 = 0$
 $(y-7)(y+8) = 0$
 $y-7=0 \rightarrow y=7$
 $y+8=0 \rightarrow y=-8$

a=1 3 Terms

14. $49x^2 - 1 = 0$

Use Quad Formula not factorable

15. $27x^2 - 18x + 3 = -3$

$27x^2 - 18x + 3 = 0$
 $3(9x^2 - 6x + 1) = 0$
 $3(3x-1)(3x-1) = 0$
 $3x-1=0 \rightarrow 3x=1 \rightarrow x=1/3$ twice

16. $5m^2 = 16p - 15$

17. $x^3 - 8$

18. $-27x^3 - 64$

19. $12x^4yz^2 - 24x^2y^3z^3 + 18x^2yz^3$

20. $63g^3 + 252g = 0$

21. $49x^2 + 42x + 16 = 11$

22. $8p^2 - 10p - 18 = 0$

