

Name: _____ Date: _____ Period: _____

Algebra AB Final Review

Finish the following Exponential Properties

Product
 $x^a \cdot x^b = X^{a+b}$

Power
 $(x^a)^b = X^{ab}$

Product to a Power
 $(x^a y^b)^c = X^{ac} y^{bc}$

Quotient
 $\frac{x^a}{x^b} = X^{a-b}$

Quotient to Power
 $\left(\frac{x^a}{y^b}\right)^c = \frac{X^{ac}}{Y^{bc}}$

Negative Exponent
 $x^{-a} = \frac{1}{X^a}$

Zero Exponent
 $x^0 = 1$

Rational Exponent
 $x^{\frac{n}{m}} = \sqrt[m]{X^n}$

$$\frac{1}{x^{-a}} = X^a$$

(WILL NOT BE ON FINAL)

Simplify

1. $x^4 * x^5$
 X^{4+5}
 X^9

2. $4x^2 * -3x$
 $-12 X^{2+1}$
 $-12 X^3$

3. $2x^{-3} y^5$
 $\frac{2y^5}{X^3}$

4. $\frac{y^{-5}}{6x^{-3}}$
 $\frac{X^3}{6y^5}$

5. $(4x^3 y^5)^3$
 $4^3 x^9 y^{15}$
 $64 x^9 y^{15}$

6. $x^2 * (3xy^2)^0$
 $X^2 * 1$
 X^2

7. x^{-2}
 $\frac{1}{X^2}$

8. $\frac{1}{y^{-2}}$
 Y^2

9. $\frac{x^3 y^{-5} x^0}{x^{-4}}$
 $\frac{X^3 X^4 X^0}{Y^5}$
 $\frac{X^7}{Y^5}$

10. $\frac{x^5}{x^2}$
 X^{5-3}
 ~~X^2~~
 X^2

11. $\frac{3z^3}{z^5}$
 $3z^{3-5}$
 $3z^{-2}$
 $\frac{3}{Z^2}$

12. $\frac{6x^3 y^0}{3x^2 z^5}$
 $\frac{2x^{3-2} y^0}{Z^5}$ ← $(y^0 = 1)$
 $\frac{2x}{Z^5}$

Simplify

$$13. \left(\frac{x^5}{y^2}\right)^3$$

$$\frac{x^{15}}{y^6}$$

$$14. \frac{x^3 y^3}{5xy^2}$$

$$\frac{x^2 y}{5}$$

$$15. \frac{9x^2}{9x^3}$$

$$\frac{1}{x}$$

$$16. \frac{10y^3 x^0}{5y^2 x^3}$$

$$\frac{2y}{x^3}$$

$$17. \left(\frac{8z^7}{5x^3}\right)^2$$

$$\frac{8^2 z^{14}}{5^2 x^6}$$

$$\frac{64 z^{14}}{25 x^6}$$

$$18. \left(\frac{ab}{4a^4 b^5}\right)^3$$

$$\frac{a^3 b^3}{4a^{12} b^{15}}$$

$$\frac{1}{4a^9 b^{12}}$$

$$19. \left(\frac{x^2}{y^{-2}}\right)^3$$

$$\frac{x^6}{y^{-6}}$$

$$x^6 y^6$$

$$20. 2^0$$

$$1$$

Solve the following exponential equations (MUST HAVE SAME BASE)

$$20. 3^{a-3} = 3^2$$

$$a-3=2$$

$$\frac{+3 \quad +3}{a=5}$$

$$21. 5^{2-2n} = 5^{-3n}$$

$$2-2n = -3n$$

$$\frac{+2n \quad +2n}{2 = -n}$$

$$-2 = n$$

$$22. 6^x = 1$$

$$x = 0$$

$$23. 10^x = 10^{15}$$

$$x = 15$$

$$24. 7^{1-x} = 7^4$$

$$1-x = 4$$

$$\frac{-1 \quad -1}{-x = 3}$$

$$x = -3$$

$$25. 9 = 3^x$$

$$3^2 = 3^x$$

$$2 = x$$

Simplify each expression with addition or subtraction (combine like terms)

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

$$x + 3 + x - 2$$

$$2x + 1$$

2. $(2x^2 - 1x - 5) + (x^2 + 7x - 1)$

$$2x^2 - 1x - 5 + x^2 + 7x - 1$$

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

3. $(-2p - p^2 + 4p^3) - (2p^2 + 7p)$

$$-2p - p^2 + 4p^3 - 2p^2 - 7p$$

$$4p^3 - 3p^2 - 9p$$

4. $(r^2 - 6r + 2) - (2r^2 + 5r - 9)$

$$r^2 - 6r + 2 - 2r^2 + 5r + 9$$

$$-r^2 - 11r + 11$$

5. $(2x + 7x) + (x + 4x^2) - (15x^2 + 4x - 6)$

$$2x + 7x + x + 4x^2 - 15x^2 - 4x + 6$$

$$-11x^2 + 6x + 6$$

6. $(3x^4 + x - 14) + (3y^2 + 13 - 5x + 8 - 7x^4)$

$$3x^4 + x - 14 + 3y^2 + 13 - 5x + 8 - 7x^4$$

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

Find each product by using the distributive property

11. $x(3x + 3)$

$$3x^2 + 3x$$

12. $2v(5v^2 + v - 12)$

$$10v^3 + 2v^2 - 24v$$

13. $6b(-2b + 1)$

$$-12b^2 + 6b$$

14. $5x(2x^2 + x - 3)$

$$10x^3 + 5x^2 - 15x$$

15. $(x + 3)(x + 2)$

$$x^2 + 2x + 3x + 6$$

$$x^2 + 5x + 6$$

16. $(3r + 2)(2r - 1)$

$$6r^2 - 3r + 4r - 2$$

$$6r^2 + r - 2$$

Find each product by using the distributive property.

17. $(q-3)(q-7)$

$$q^2 - 7q - 3q + 21$$

$$q^2 - 10q + 21$$

18. $(9z-1)(4z+8)$

$$36z^2 + 72z - 4z - 8$$

$$36z^2 + 68z - 8$$

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

$$2x^3 - 2x^2 + 3x + 10x^2 - 10x + 15$$

$$2x^3 + 8x^2 - 7x + 15$$

20. $(x+3)^2$

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

$$x^2 + 3x + 3x + 9$$

$$x^2 + 6x + 9$$

Simplify each expression by applying the distributive property and combining like terms.

21. $2x(x+6) + (x+3)$

$$2x^2 + 12x + x + 3$$

$$2x^2 + 13x + 3$$

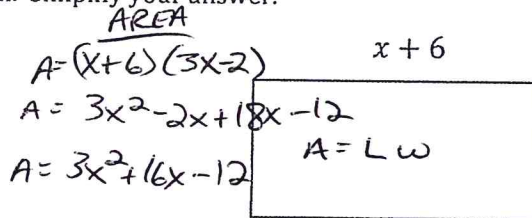
22. $-u(v^2+2v-3) - (v^2+6)$

$$-uv^2 - 2uv + 3u - v^2 - 6$$
~~$$-uv^2$$~~

Find the area and perimeter of each. Simplify your answer.

23. $A = \underline{3x^2 + 16x - 12}$

$P = \underline{8x + 8}$



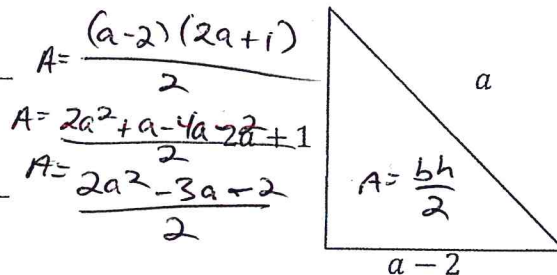
PERIMETER

$$x+6+x+6+3x-2+3x-2$$

$$3x-2 \quad 8x+8$$

24. $A = \underline{\frac{2a^2 - 3a - 2}{2}}$

$P = \underline{3a - 1}$



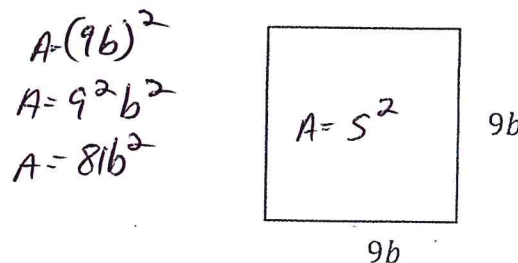
PERIMETER

$$a+1+a+a-2$$

$$3a-1$$

25. $A = \underline{81b^2}$

$P = \underline{36b}$



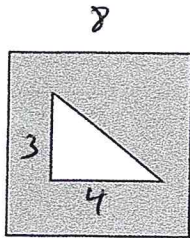
PERIMETER

$$9b+9b+9b+9b$$

Application problems: Find the area of the shaded region in the simplest form.

$$(BIG\ SHAPE) - (LITTLE\ SHAPE) = SHADED\ REGION$$

26. A Square has a side length of 8 has a triangle of base 4 and height 3 cut out of it.



SQUARE

$$A = s^2$$

$$A = 8^2$$

$$A = 64$$

TRIANGLE

$$A = \frac{bh}{2}$$

$$A = \frac{4(3)}{2}$$

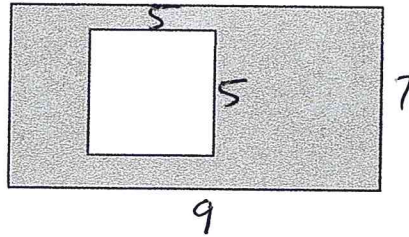
$$A = \frac{12}{2}$$

$$A = 6$$

$$64 - 6 = \boxed{58}$$

What is the area of the shaded region?

27. A rectangle with width of 7 and length of 9 has a square of side length 5 cut out of it.



SQUARE

$$A = s^2$$

$$A = 5^2$$

$$A = 25$$

RECTANGLE

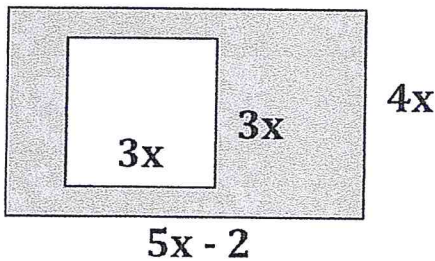
$$A = LW$$

$$A = 9(7)$$

$$A = 63$$

$$63 - 25 = \boxed{38}$$

28.



SQUARE

$$A = s^2$$

$$A = (3x)^2$$

$$A = 9x^2$$

RECTANGLE

$$A = LW$$

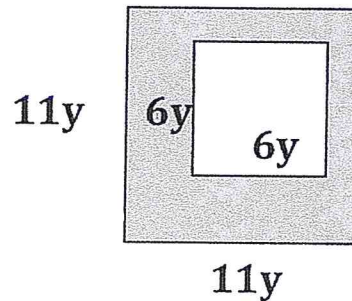
$$A = (5x-2)(4x)$$

$$A = 20x^2 - 8x$$

$$\frac{20x^2 - 8x}{\text{RECTANGLE}} - \frac{9x^2}{\text{SQUARE}} = \boxed{11x^2 - 8x}$$

SHADED

29.



$$A = (6y)^2$$

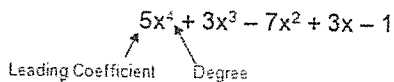
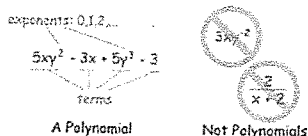
$$A = 36y^2$$

$$A = (11y)^2$$

$$A = 121y^2$$

$$121y^2 - 36y^2 = \boxed{85y^2}$$

Identifying Polynomials



Identification by number of terms

$2x$	Monomial	Monomials consist of 1 term
$2x + 3y$ ↑ ↑ 1 2	Binomial	Binomials consist of 2 terms
$2x^2 + 3x + 5$ ↑ ↑ ↑ 1 2 3	Trinomial	Trinomials consist of 3 terms.
$3x^3 + 2x^2 - 6x + 2$ ↑ ↑ ↑ ↑ 1 2 3 4	Polynomial	If there are more than 3 terms, use the term polynomial.

Identification by degree

5	Constant	A number on it's own is considered a constant monomial.
$2x + 1$	Linear 1 st Degree	Highest degree is 1 making this a Linear Binomial. OR 1 st Degree Binomial
$3x^2 + 2x + 1$	Quadratic 2 nd Degree	Highest degree is 2 making this a Quadratic Trinomial. OR 2 nd Degree Trinomial
$x^3 + 3$	Cubic 3 rd degree	Highest degree is 3 making this a Cubic Binomial. OR 3 rd Degree Binomial
$x^5 + 2x^3 + 3x^2 + 2x$	5 th degree	5 th Degree 4 Termed Polynomial.

Name each polynomial by degree and number of terms.

30. $3x^2 + 2x$

QUADRATIC BINOMIAL

31. 7

CONSTANT

32. $3x + 4$

1ST DEGREE BINOMIAL

33. $-5p^3 + 2p^2 - 5$

CUBIC TRINOMIAL

34. $-8n^4 + 5n^3 - 2n^2 - 8n$

4TH DEGREE 4 TERMED POLYNOMIAL

35. $\frac{5}{x^2 + 3x}$

QUADRATIC BINOMIAL

36. $9v^7 + 7v^6 + 4v^3 - 1$

7TH DEGREE 4 TERM POLYNOMIAL

Identify the GCF of each Polynomial.

31. $6x^2, x$

x

32. $-12x^2y, 3xy^2, 9x^3y^3$

3xy

33. x^{10}, x^{11}, x^{100}

x^{10}

34. $xyz, x^2y^2z^2, x^3y^3$

xyz

35. abc, ab, bc, cd

1

36. $12x^2, 4x, 4$

4

Factor out the GCF

37. $32x^2y^8 + 8x^3y^5$

$8x^2y^5$

38. $-8x^3 + 4x^2$

$4x^2$

39. $50x - 45$

5

40. $60m^2n^5 + 12m^2n^6 + 18m^4n^6$

$6m^2n^5$

41. $3x^2 - x$

x

Identify and factor the following special polynomials as Perfect Square Trinomials or Difference of Squares. Look for the GCF first.

42. $16p^2 - 25$

$(4p + 5)(4p - 5)$

43. $4x^2 + 10x + 25$

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

$(2x + 5)^2$

44. $4x^2 - 1$

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

45. $16x^2 - 12x + 36$

~~$(4x - 6)(4x - 6)$~~

$4(4x^2 - 3x + 9)$

~~$4(2x - 3)(2x - 3)$~~

Factor completely. Make sure to look for the GCF first!

46. $x^2 - 12x + 35$

	x	-7	
x	x^2	$-7x$	
-5	$-5x$	35	

$\begin{array}{r} m \quad s \\ 35 - 12 \\ \hline -(5) \quad -7 - 5 \end{array}$

$(x - 7)(x - 5)$

47. $n^2 + 9n - 10$

	n	$+10$	
n	n^2	$10n$	
-1	$-1n$	-10	

$\begin{array}{r} m \quad s \\ -10 \quad 9 \\ \hline 10(-1) \quad 10 - 1 \end{array}$

$(n + 10)(n - 1)$

Factor Completely. Make sure to look for the GCF first!

48. $3m^2 + 6m + 3$

$$3(m^2 + 2m + 1)$$

$$3(m+1)(m+1)$$

$$3(m+1)^2$$

49. $2p^2 + 18p + 16$

$$2(p^2 + 9p + 8)$$

$$2(p+8)(p+1)$$

	$p+8$	
p	p^2	$8p$
$+1$	$1p$	8

50. $2n^2 + 3n - 9$
-18

$$(2n-3)(n+3)$$

	$n+3$	
$2n$	$2n^2$	$6n$
-3	$-3n$	-9

m	s
-18	3
$6(-3)$	$6+3$

51. $5n^2 + 19n + 12$
60

$$(5n+4)(n+3)$$

	$n+3$	
$5n$	$5n^2$	$15n$
$+4$	$4n$	12

m	s
60	12
$15(4)$	15

52. $2n^2 + 5n + 2$
4

$$(2n+1)(n+2)$$

	$n+2$	
$2n$	$2n^2$	$4n$
$+1$	$1n$	2

m	s
4	5
$4(1)$	$4+1$

53. $3k^2 + 34k + 63$
189

$$(3k+7)(k+9)$$

	$3k+7$	
$3k^2$	$3k^2$	$7k$
$+9$	$27k$	63

189	34
$7(27)$	$7+27$

54. ~~$4n^2 - 45n + 50$
200~~

$4n^2$	
	50

200	45
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55. ~~$42x^2 + 204x + 144$~~

Factor Completely by Grouping

56. $20x^3 + 16x^2 - 5x - 4$

$$4x^2(5x+4)$$

	$5x+4$	
$4x^2$	$20x^3$	$16x^2$
-1	$-5x$	-4

$$(4x^2-1)(5x+4)$$

57. $10x^2 + 35x^2 - 12x - 42$

$$45x^2 - 12x - 42$$

$$3(15x^2 - 4x - 14)$$

Factored

	210	
$15x^2$		
		-14

210	-14
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Quadratics

Determine the transformation that occurs from the parent function $f(x) = x^2$ to the new function

58. $g(x) = -5x^2 + 1$

- NARROWER
- VERTEX MOVED UP 1
- FLIPPED

59. $g(x) = (x - 7)^2$

- MOVED RT 7 ON X-AXIS

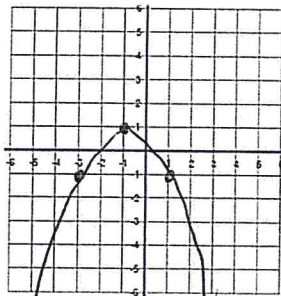
60. $g(x) = -1/3(x + 1)^2 + 8$

- VERTEX MOVED UP 9 AND LT 1
- WIDER
- FLIPPED

62. Given the equation, identify the missing information.

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

X	Y
-5	-7
-3	-1
-1	1
1	-1
3	-7



Axis of Symmetry $X = -1$

Vertex $(-1, 1)$

Max/Min Value: -1

Min/Max

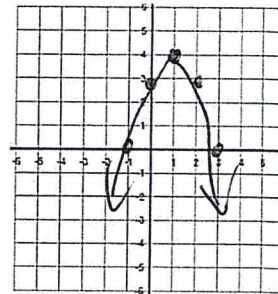
Domain: $\{ \text{ALL REAL} \}$

Range: $y \leq 1$

61. Given the equation, identify the missing information.

$$Y = -x^2 + 2x + 3$$

X	Y
-1	0
0	3
1	4
2	3
3	0



Axis of Symmetry: $x = 1$

Vertex $(1, 4)$

Max/Min Value: 4

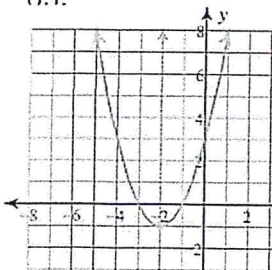
Min/Max

Domain: $\{ \text{ALL REAL} \}$

Range: $y \leq 4$

Given the graphs below, State how many solutions there are, what the solutions are, the vertex, and the axis of symmetry.

63.

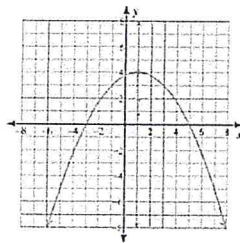


Number of Solutions 2

Solutions: $-3, -1$

Vertex: $(-2, -1)$ AOS: $x = -2$

64.

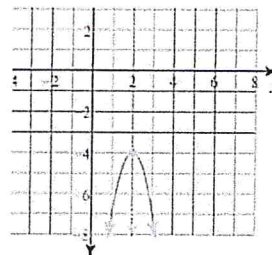


Number of Solutions 2

Solutions: $-3, 5$

Vertex: $(1, 4)$ AOS: $x = 1$

65.

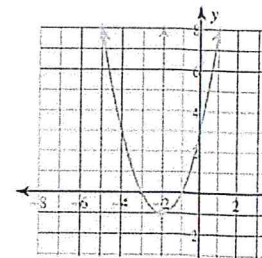


Number of Solutions 0

Solutions: NONE

Vertex: $(2, -4)$ AOS: $x = 2$

66.

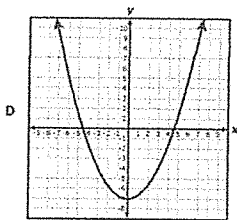
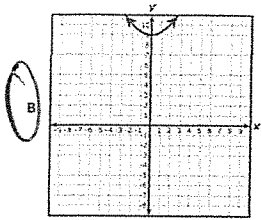
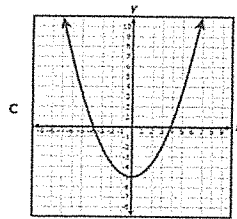
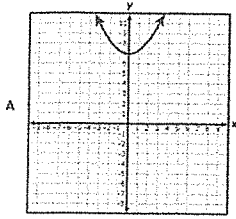


Number of Solutions 2

Solutions: $-3, -1$

Vertex: $(-2, -1)$ AOS: $x = -2$

67. Which graph can be obtained by translating the graph of $h(x)=0.33x^2+2$ up 7 units?



68. $f(x) = \frac{3}{4}x^2 + 4$ $h(x) = -\frac{3}{4}x^2 + 7$
 $g(x) = -\frac{2}{3}x^2 + 5$ $j(x) = \frac{2}{3}x^2 + 4$

Which 2 equations have same y-int? $f(x)$ $j(x)$

Which 2 equations have a maximum? $g(x)$ $h(x)$

Which 2 equations DON'T cross the x axis? $f(x)$ $j(x)$

69. Which function's graph has a vertex at (3, 5) and contains the point (5, 13)?

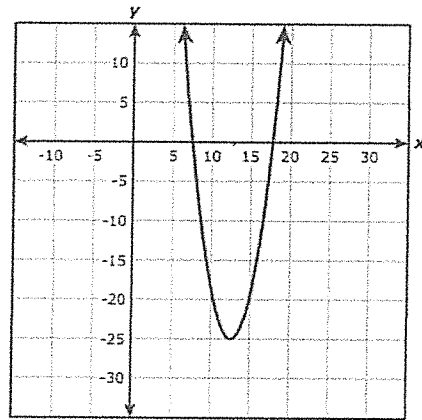
F $y = \frac{1}{10}(x+3)^2 - 5$

G $y = \frac{1}{10}(x-3)^2 - 5$

H $y = 2(x-3)^2 + 5$

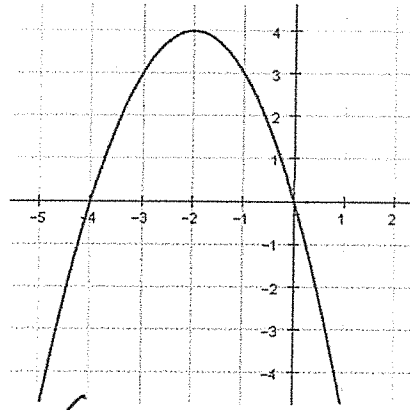
J $y = 2(x+3)^2 +$

70. Estimate the vertex of the following parabola.



(12, -25)

71.



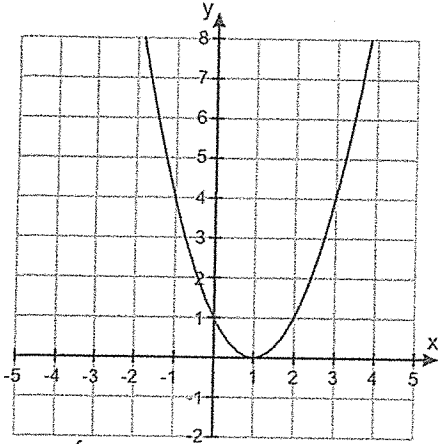
Vertex: (-2, 4) Max/Min: MAX

Axis of symmetry: $x = -2$

Zero(s): -4, 0

Y-intercept: 0

72.



Vertex: (1, 0) Max/Min: Min

Axis of symmetry: X=1

Zero(s): 1

Y-intercept: 1

73.

X	-8	-9	-10	-11	-12
Y	0	2	4	2	0

Vertex: (-10, 4) Max/Min: MAX

Axis of symmetry: X=-10

Root(s): -8, -12

Y-intercept: -14

74.

x	Y
-4	8
-3	4
-2	1
-1	0
0	1

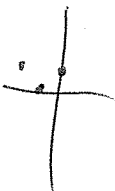
Vertex: (-1, 0)

Max/Min: min

Axis of symmetry: X=-1

Root(s): -1

Y-intercept: 1



75. Use the calculator to find a quadratic function $f(x) = ax^2 + bx + c$ that provides a reasonable fit to the data.

X	0	.5	1	1.5	2	2.5
Y	4	37.5	63	80.5	90	91.5

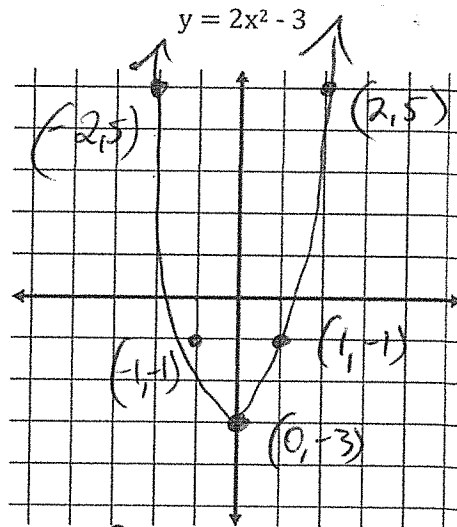
Equation: _____

76. Use the calculator to find a quadratic function $f(x) = ax^2 + bx + c$ that provides a reasonable fit to the data.

X	-3	-1	2	5	8
Y	5	0	9	24	81

Equation: _____

77. Graph the following equation, then list the vertex, axis of symmetry, and min/max value. You must have points on your graph.

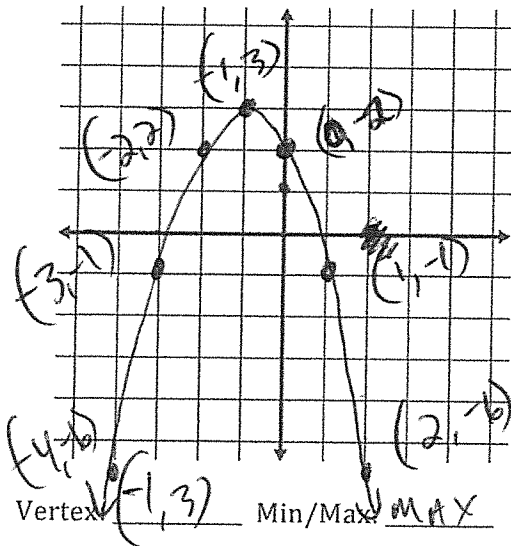


Vertex: (0, -3) Min/Max: min

Axis of Symmetry: X=0

78. Graph the following equation. You must have points on your graph.

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



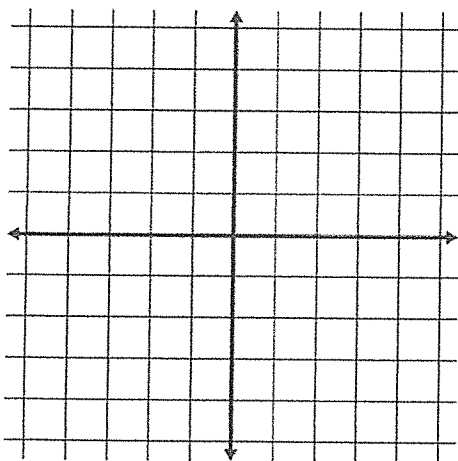
Axis of Symmetry: $x = -1$

79. Graph the three equations below on the graph provided. Then put the equations in order from the widest graph to the narrowest graph. You must have points on your graph or no credit will be given.

$$y = x^2$$

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

$$y = 3x^2$$



Widest to Narrowest:

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

80. Determine the transformation that occurs from the parent function

$$f(x) = x^2$$

$$g(x) = -3x^2 + 4$$

- a. Reflection, stretch, shift up 4 units
- b. Reflection, compression, shift up 4 units
- c. Reflection, shift up 4 units
- d. Compression, shift up 4 units.

81. Determine the transformation that occurs from the parent function

$$f(x) = x^2$$

$$g(x) = (x + 8)^2$$

- e. Shift up 8 units
- f. Shift down 8 units
- g. Shift left 8 units
- h. Shift right 8 units.

82. Given the equation, identify the missing information.

$$Y = -2(x + 1)^2 - 4$$

Vertex: $(-1, -4)$

Axis of Symmetry: $x = -1$

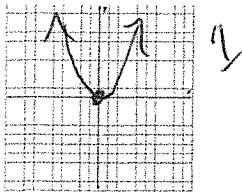
Max/Min value: -4

Is this a max/min? MAX

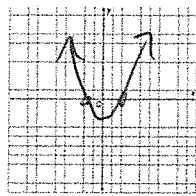
Domain: $\{ALL REALS\}$

Range: $y \leq -4$

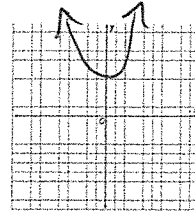
83. Label and sketch the possible solutions for quadratic equations as one solution, two solutions, or zero real solutions.



1



2



0

Solve the following quadratic equations with the square root.

$$84. \begin{aligned} x^2 - 16 &= 0 \\ +16 &+16 \\ x^2 &= 16 \\ \sqrt{x^2} &= \sqrt{16} \\ x &= \pm 4 \end{aligned}$$

$$85. \begin{aligned} 2x^2 - 18 &= 0 \\ 2(x^2 - 9) &= 0 \\ \frac{2}{2}(x^2 - 9) &= \frac{0}{2} \\ x^2 - 9 &= 0 \\ x^2 &= 9 \\ x &= \pm 3 \end{aligned}$$

$$86. \begin{aligned} 7x^2 &= 0 \\ \frac{7x^2}{7} &= \frac{0}{7} \\ x^2 &= 0 \\ x &= 0 \end{aligned}$$

Use the Zero-Product Property to solve each equation.

$$87. (x+6)(x-4) = 0$$

$$\begin{aligned} x+6 &= 0 & x-4 &= 0 \\ \boxed{x = -6} & & \boxed{x = 4} & \end{aligned}$$

$$88. d(d-8) = 0$$

$$\begin{aligned} \boxed{d=0} & & d-8 &= 0 \\ & & \boxed{d=8} & \end{aligned}$$

$$89. (3f+2)(2f-5) = 0$$

$$\begin{aligned} 3f+2 &= 0 & 2f-5 &= 0 \\ 3f &= -2 & 2f &= 5 \\ \frac{3f}{3} &= \frac{-2}{3} & \frac{2f}{2} &= \frac{5}{2} \\ \boxed{f = -\frac{2}{3}} & & \boxed{f = \frac{5}{2}} & \end{aligned}$$

Use Factoring and the Zero-Product Property to solve the following quadratics.

$$90. x^2 + 2x - 15 = 0$$

$$\begin{aligned} (x+5)(x-3) &= 0 \\ x+5 &= 0 & x-3 &= 0 \\ \boxed{x = -5} & & \boxed{x = 3} & \end{aligned}$$

$$91. x^2 - 15x + 56 = 0$$

$$\begin{aligned} (x-8)(x-7) &= 0 \\ x-8 &= 0 & x-7 &= 0 \\ \boxed{x = 8} & & \boxed{x = 7} & \end{aligned}$$

$$92. z^2 - 10z = -24$$

$$\begin{aligned} z^2 - 10z + 24 &= 0 \\ (z-6)(z-4) &= 0 \\ z-6 &= 0 & z-4 &= 0 \\ \boxed{z = 6} & & \boxed{z = 4} & \end{aligned}$$

$$93. 3b^2 + 7b - 6 = 0$$

$$\begin{aligned} (3b-2)(b+3) &= 0 \\ 3b-2 &= 0 & b+3 &= 0 \\ 3b &= 2 & \boxed{b = -3} & \\ \boxed{b = \frac{2}{3}} & & & \end{aligned}$$

Change the following expressions from exponential to radical form.

94. ~~$2^{\frac{3}{4}}$~~

95. ~~$3x^{\frac{4}{5}}$~~

Evaluate the following radicals

96. $\sqrt{81}$
 ± 9

97. $\sqrt{36x^2}$
 $6x$

98. $\sqrt{20x^3yz^4}$
 $2xz^2\sqrt{5xy}$

99. $2\sqrt{80p^4}$
 $2\sqrt{16 \cdot 5} p^2$
 $2 \cdot 4 p^2 \sqrt{5}$
 $8p^2\sqrt{5}$

Simplify the following radical expressions using addition or subtraction. You may have to simplify a radical before you can combine.

100. $-11\sqrt{21} + 12\sqrt{21}$
 $\sqrt{21}$

101. $-5\sqrt{11} - 10\sqrt{11}$
 $-15\sqrt{11}$

102. $2\sqrt{6} + 3\sqrt{54}$
 $2\sqrt{6} + 9\sqrt{6}$
 $11\sqrt{6}$

$3\sqrt{54}$
 $3\sqrt{9 \cdot 6}$
 $3 \cdot 3\sqrt{6}$
 $9\sqrt{6}$

103. $-3\sqrt{18} + 3\sqrt{8} - \sqrt{24}$
 $-3\sqrt{9 \cdot 2} + 3\sqrt{4 \cdot 2} - \sqrt{6 \cdot 4}$
 $-3 \cdot 3\sqrt{2} + 3 \cdot 2\sqrt{2} - 2\sqrt{6}$
 $-9\sqrt{2} + 6\sqrt{2} - 2\sqrt{6}$

Simplify the following radical expression using multiplication. Your final answer must be completely simplified.

104. $3\sqrt{12} \cdot \sqrt{6}$
 $3\sqrt{72}$
 $3\sqrt{9 \cdot 36}$
 $3 \cdot 6\sqrt{2}$
 $18\sqrt{2}$

105. $-4\sqrt{15} \cdot -\sqrt{3}$
 $4\sqrt{45}$
 $4\sqrt{9 \cdot 5}$
 $4 \cdot 3\sqrt{5}$
 $12\sqrt{5}$

Simplify the following radical expression using multiplication. Your final answer must be completely simplified.

$$106. \sqrt{20x^2} * \sqrt{20x}$$

$$\sqrt{400x^3}$$

$$20x\sqrt{x}$$

$$107. \sqrt{3v}(\sqrt{6} + 2)$$

$$\sqrt{18v} + 2\sqrt{3v}$$

$$108. (\sqrt{x} + 4)(\sqrt{x} - 4)$$

$$\sqrt{x^2} - 4\sqrt{x} + 4\sqrt{x} - 16$$

$$\boxed{x - 16}$$

Evaluate each function for $x = -1, 1, 2$.

$$107. f(x) = 4 \cdot 7^x$$

x	f(x)
-1	0.57143
1	28
2	196

$$108. y = \frac{2}{3} \cdot 6^x$$

x	f(x)
-1	0.11111
1	4
2	24

109. A population of 2000 fish increases at an annual rate of 9.3%.

- Write an expression to represent the equivalent monthly increase in population.
- How many fish will there be in 5 years?
- How many fish will there be in 10 years?

Without graphing, tell whether the function represents *exponential growth* or *exponential decay*. Then identify the first term and the amount your function is increasing by.

$$110. y = 6.6 \cdot 2^x$$

GROWTH, 13.2, MULTIPLY BY 2

$$111. g(x) = 7.6 \left(\frac{1}{8}\right)^x$$

DECAY, 0.95, MULTIPLY BY $\frac{1}{8}$

The following topics may also appear on your final exam!

- Solving Equations
- Slope!!!
- Graphing and Writing Linear Equations
 - Slope Intercept
 - Point Slope
- Systems of Equations
 - Substitution
 - Elimination
 - Graphing
- Domain/Range of anything
- Pythagorean Theorem