Brushing up on Essential Algebra Skills to get you ready for Algebra-2 Summer Packet

(For students entering Algebra 31/32)

This packet should be completed before returning to school. The first full day of school questions will be answered on the packet. The second class period an assessment on the packet will be administered. For each section a link to a "youtube" instructional video has been provided. If you prefer not to type in the links AND/OR you need extra practice sheets with answers then you need to join the "summer packet algebra 2" class on schoology. You will find one file with all the links and practice sheets titled by topic and problem number from this packet.

NEW TO SCHOOLOGY

www.schoology.com – sign-up – BE SURE TO USE A USER NAME AND PASSWORD YOU WILL REMEMBER – Join Class with the code **8K7M9-5NC7P (All CAPS no spaces)**

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It is suggested you complete this packet closer to the end of the summer to keep it fresh for the start of school. This packet is not laid out for work to be done on packet, all work should be done on separate sheets of paper, there is a page of graphs at the end of the packet for any problems requiring graphs.

Section I: Quadratics

Pre-Requisite Expectations

- Graph quadratic functions and show intercepts, maxima, and minima (F-IF.7a)
- Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph (F-IF.8)
- Solve quadratic equations in one variable using factoring, completing the square, and quadratic formula (A-REI.4)

UNLESS OTHERWISE NOTED ALL PROBLEMS SHOULD BE DONE WITHOUT THE AID OF A CALCULATOR.

Factoring: With leading coefficient of 1: https://www.youtube.com/watch?v=nOZTe8jU2g4
With leading coefficient not equal to 1: https://www.youtube.com/watch?v=ISPxJ6JXT8o
With common factors: https://www.youtube.com/watch?v=GMoqg_s4Dl4
Perfect Square Trinomials: https://www.youtube.com/watch?v=liRNTieIU_k
Difference of Perfect Squares:: https://www.youtube.com/watch?v=VgOABFwNhVg

Factor each of the following completely

1. $f(x) = x^2 + 5x + 6$
2. $g(x) = x^2 - 5x + 6$
3. $h(x) = x^2 - 5x - 6$
4. $r(v) = 2v^2 + 5v + 2$
5. $f(x) = 4x^2 + 24x - 64$
6. $f(a) = 3a^2 - 27$
7. $f(y) = y^2 - 8y + 16$

Solving Quadratics: Solving by Quadratic Formula: http://www.youtube.com/watch?v=i7idZfS8t8w
Solving by taking square roots: https://www.youtube.com/watch?v=RMwoe8sRYvg
Solving using the zero product property (factoring):
https://www.youtube.com/watch?v=jgHPXoh5MPs

8. Find the solution(s) by taking the square root: $2x^2 = 18$
9. Find the roots using the quadratic formula:
Leave answer in exact form fully simplified
$3x^2 - 2x - 4 = 0$

10. Find the zeroes using the zero product property (factoring):
$2x^2+5x-12=0$

11. Solve the quadratic by taking square root:
$2(x-3)^2-32=0$

Graphing Quadratics: In Vertex/Graphing Form: https://www.youtube.com/watch?v=7QMoNY6FzvM
In Standard Form: https://www.youtube.com/watch?v=ty4Ohya4hdE
In Intercept/Factored Form: https://www.youtube.com/watch?v=IR56CnowYuA

Graph each and list: x and y intercepts (estimate any that are not integers) and vertex

12. $f(x)=\frac{1}{2}(x-3)^2+2$

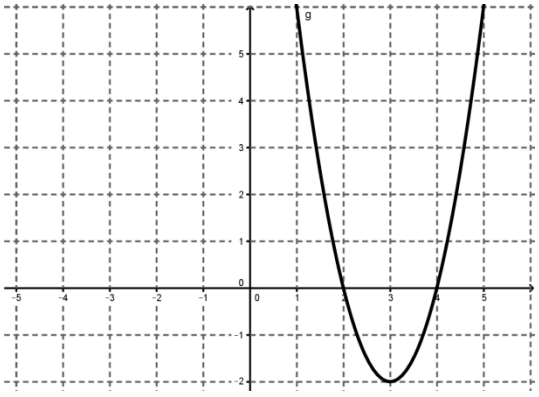
13. $f(x)=2(x+3)(x-1)$

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

Writing the quadratic given a graph: Vertex Form: https://www.youtube.com/watch?v=R77QHCTJpbg
Intercept Form:
https://www.youtube.com/watch?v=jmHQcTU4riI

15. Write the equation in vertex/graphing form

16. Write the equation in intercept/factored

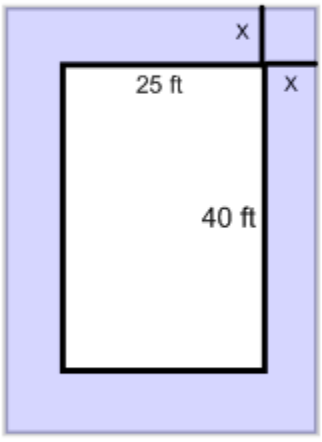


Solving Modeling Problems: You may use calculators. But will also need to be able to solve without graphing calculator.

17. A football is kicked into the air with an initial upward velocity of 29.4 meters per seconds. Using $h(t) = -4.9t^2 + 29.4t$:
    a. Calculate the height after 1) 2 seconds and 2) 3 seconds
    b. When will the ball be at its maximum height and what is the maximum height?
    c. When will the ball hit the ground?
    d. What is the domain and range for this function?

18. You free fall from a bridge to bungee jump, find how long until you hit the ground should your bungee cord fail to spring up. The ground is 720 feet below and the free fall is modeled by $h(t) = -16t^2 + 720$ to?

19. Julie Stone designed a rectangular patio that is 25 ft by 40 ft. This patio is surrounded by a terraced strip of uniform width planted with small trees and shrubs. If the area A of this terraced strip is 504 ft^2, find the width, x, of the strip.



Section 2: Functions

Pre-Requisite Expectations

- Evaluate functions for inputs in their domains (F-IF.2)
- Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range (F-IF.1)
- Understand that if *f* is a function and *x* is an element of its domain, then *f*(*x*) denotes the output of *f* corresponding to the input of *x* (F-IF.1)
- Understand that the graph of *f* is the graph of the equation *y* = *f*(*x*) (F.IF.1)
- Use function notation (F-IF.2)

Determining whether a function exists, stating domain and range:

Domain and Range Given Graph: https://www.youtube.com/watch?v=RK2EM7lKmbw
Is it a function?: https://www.youtube.com/watch?v=ryQJa8ybxVY

Are the following relations function? State why or why not! Then state the domain and range!

20. $\{(5,1),(-3,5),(8,1),(2,-7),\}$

Function: _____

Domain: _____

Range: _____

21. $\{(3,1),(-2,4),(3,3),(1,0),\}$

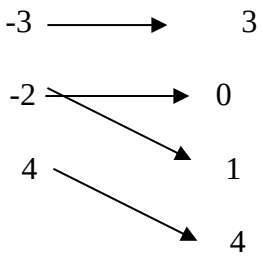
Function: _____

Domain: _____

Range: _____

Mapping Diagram: Identify the domain and range. Then tell whether the relation is a function.

22. Input Output



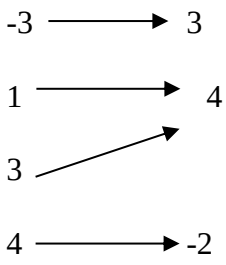
Function: _____

Domain: _____

Range: _____

.

23. Input Output



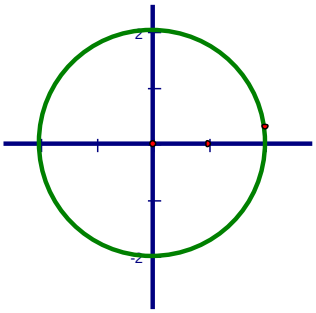
Function: _____

Domain: _____

Range: _____

Graphs: Identify the domain and range as well as x-intercept(s) and y-intercept(s). Then tell whether the graph represents a function.

24.



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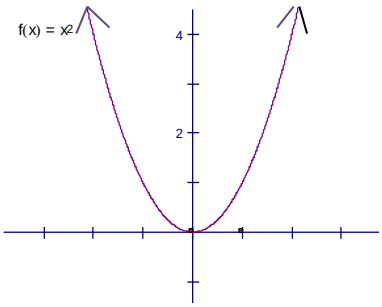

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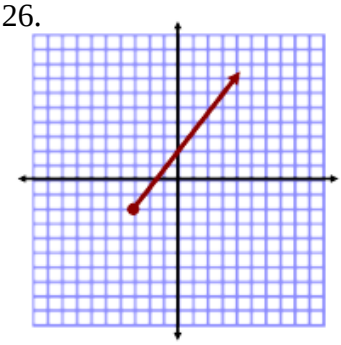


Function: _____

Domain: _____

Range: _____

x-intercept_____

y-intercept _____

Function: _____

Domain: _____

Range: _____

x-intercept_____

y-intercept _____

Function: _____

Domain: _____

Range: _____

x-intercept_____

y-intercept _____

Function Notation:

Function Notation and Composite Functions: https://www.youtube.com/watch?v=RSlZTgHSKSg

Evaluate the following expressions given the functions below:

$g(x) = -3x + 1$ $f(x) = x^2 + 7$ $h(x) = \frac{12}{x}$ $j(x) = 2x + 9$

27. $g(10)$ =

28. $f(3)$ =

29. $h(-2)$ =

30. $j(7)$ =

31. $h(a)$

32. $g(b+c)$

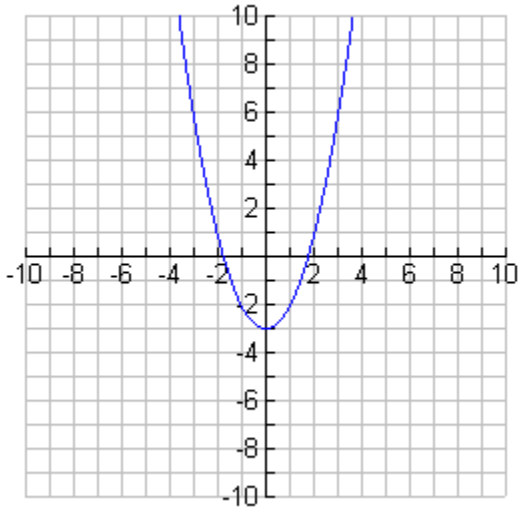
33. Find x if $g(x) = 16$

34. Find x if $h(x) = -2$

35. Find x if $f(x) = 23$

36. Evaluate each using the given graph:

Find $f(1),\ f(-2),\ f(0)$
$f(x)=6$.



KEY TO ALGEBRA 32
SUMMER WORK PACKET

1) $f(x) = x^2+5x+6$
$(x+2)(x+3) = f(x)$

6 / 2 × 3 / 5

use actual factors b/c leading coeff = 1

2) $g(x) = x^2-5x+6$
$(x-2)(x-3) = g(x)$

6 / -2 × -3 / -5

use actual factors b/c leading coeff = 1

3) $h(x) = x^2-5x-6$
$(x-6)(x+1) = h(x)$

-6 / -6 × 1 / -5

use actual factors b/c leading coeff = 1

4) $r(v) = 2v^2+5v+2$

4 / 4 × 1 / 5

OPTION 1

	$2v$	1
$2v$	$2v^2$	$1v$
2	$4v$	2

$(2v+1)(2v+2) = r(v)$

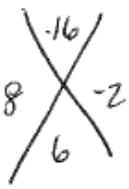
OPTION 2:
$2v^2+4v+v+2$
$2v(v+2)+1(v+2)$
$(2v+1)(v+2) = r(v)$

OPTION 3
( )( )
mult. to $2v^2$
$(2v\ \ )(v\ \ )$
both positive
$(2v+\ \ )(v+\ \ )$
doesn't work
$(2v+2)(v+1)$
$2v+2v \neq 5v$
mult to 2
$(2v+1)(v+2) = r(v)$

5) $f(x) = \frac{4x^2}{4} + \frac{24x}{4} - \frac{64}{4}$ first factor out gcf that is common factor. (GCF)

$f(x) = 4(x^2 + 6x - 16)$

$4(x+8)(x-2) = f(x)$



use actual factors b/c now leading coefficient = 1

6) $f(a) = 3a^2 - 27$ first factor out GCF

$3(a^2 - 9)$

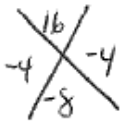
now it's difference of two perfect squares

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

7) $f(y) = y^2 - 8y + 16$

$(y-4)(y-4)$

$= (y-4)^2 = f(y)$



use actual factors b/c leading coefficient = 1

8) $\frac{2x^2}{2} = \frac{18}{2} \Rightarrow x^2 = 9 \Rightarrow x = 3, \; x = -3$

9) $3x^2 - 2x - 4 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $a = 3$ $b = -2$ $c = -4$

$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-4)}}{2(3)} \Rightarrow \frac{2 \pm \sqrt{4 + 48}}{6} \Rightarrow \frac{2 \pm \sqrt{52}}{6}$

$x = \frac{2 + \sqrt{52}}{6} \quad x = \frac{2 - \sqrt{52}}{6}$

10) $2x^2+5x-12=0$

OPTION 1

$(2x\quad)(x\quad)$

$(2x+\quad)(x-\quad)$ or $(2x-\quad)(x+\quad)$ (mult to -12)

$(2x+\quad)(x-\quad)$ or $(2x-3)(x+4)$

Factors now solve

OPTION 2

	$2x^2$	$-3x$
$8x$		
4	$8x$	-12

$2x \quad -3$

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

OPTION 3

$2x^2+8x-3x-12$

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

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

$2x-3=0$

$+3=+3$

$\frac{2x}{2}=\frac{3}{2}$

$x=3/2$

$x+4=0$

$-4\ -4$

$x=-4$

$x=3/2$ or $x=-4$

11) $2(x-3)^2-32=0$

$+32\ +32$

$\frac{2(x-3)^2}{2}=\frac{32}{2}$

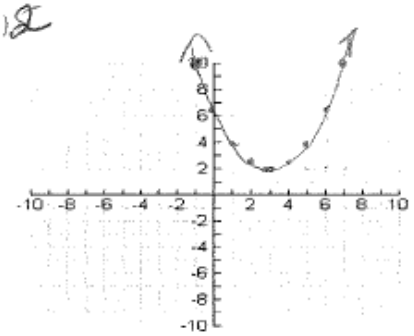
$(x-3)^2=16$

$(x-3)=\pm 4$

$x-3=4 \qquad x-3=-4$

$x=7$ or $x=-1$

#12



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

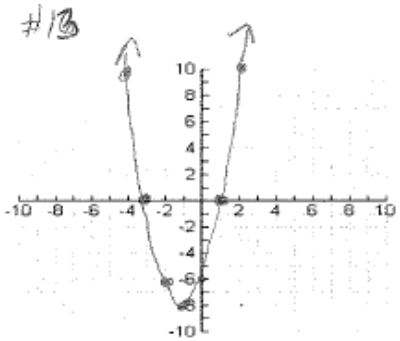
$V = (3, 2)$

$a = 1/2$

y-int: tussen 6 en 7 (6.5)

x-int: none

#13



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

int $(-3, 0)$ $(1, 0)$ $a = 2$

$\frac{-3+1}{2} = \frac{-2}{2} = -1 \rightarrow$ x-coord of vertex

$f(-1) = 2(-1+3)(-1-1)$

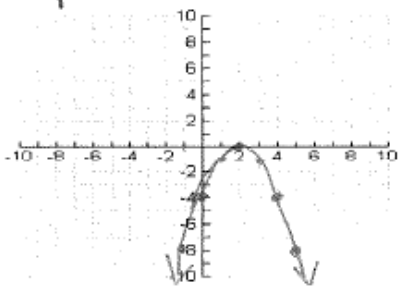
$2(2)(-2) = -8$

$V(-1, -8)$

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

y-int: $(0, -6)$

#14



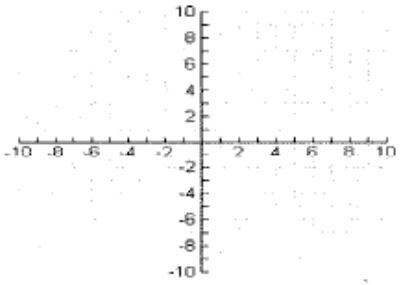
$f(x) = -x^2 + 4x - 4$ $a = -1$

$-\frac{b}{2a} = \frac{-4}{2(-1)} = \frac{-4}{-2} = 2 \rightarrow$ x-coord

$f(2) = -(2)^2 + 4(2) - 4$

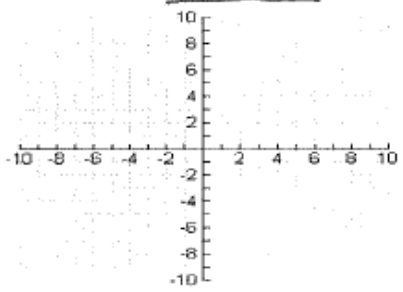
$-4 + 8 - 4 = 0$

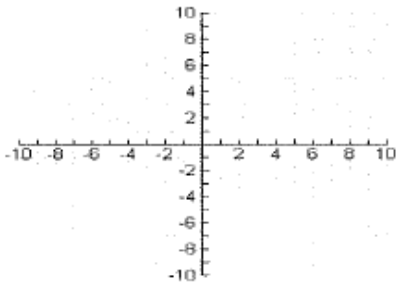
$V = (2, 0)$



x-int: $(2, 0)$

y-int: $(0, -4)$





15) $V=(1,4)$ $y=a(x-h)^2+k$

$V=(h,k)$

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

pt $(0,3)$ pt (x,y)

$3=a(0-1)^2+4$

$3=1a+4$

$-4 \quad -4$

$-1=1a$

$a=-1$

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

16) x-int: $(2,0)(4,0)$ $y=a(x-p)(x-q)$

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

pt: $(3,-2)$ pt (x,y)

$-2=a(3-2)(3-4)$

$-2=a(1)(-1)$

$\frac{-2}{-1}=\frac{-1a}{-1}$

$2=a$

$\boxed{y=2(x-2)(x-4)}$

Area of whole − area of interior = area of edge

19) $(25+2x)(40+2x) \quad (25)(40) = 504$

$1000+50x+80x+4x^2-1000=504$

$4x^2+130x=504$

$4x^2+130x-504=0$

$2(2x^2+65x-252)=0 \qquad a=2 \quad b=65 \quad c=-252$

$\frac{-b\pm\sqrt{b^2-4ac}}{2a} \Rightarrow \frac{-65\pm\sqrt{65^2-4(2)(-252)}}{2(2)} = \frac{-65\pm\sqrt{6241}}{4}$

$\Rightarrow \frac{-65\pm 79}{4} \Rightarrow \frac{-65-79}{4} = \frac{-144}{4} = \frac{-36}{4} = -9$ ✗

$\frac{-65+79}{4} = \frac{14}{4} = \frac{7}{2}$ ✓

border is $7/2$ $(3\frac{1}{2})$ ft wide