

Booker T. Washington Summer Math Packet 2017

Completed by Thursday, August 24, 2017

Go to the BTW website (<http://btw.tulsaschools.org/>) then click the summer assignments (beach ball) and choose the course that you are enrolled in for the 2016-17 school year.

Helpful websites:

<http://patrickjmt.com/>

Free site with video lectures

<http://www.khanacademy.org/>

Free site with video lectures

<http://tutorial.math.lamar.edu/Classes/Alg/Alg.aspx>

Free site with notes and problems

www.pearsonsuccessnet.com

Site from textbook publisher Pearson (Only available to students who have access from prior years)

Simplify the Expression, Combine Like terms, Substitute a Value for a Variable

1.) Simplify:
 $12(x - 1) - 3(x - 1)$

2.) Evaluate $6t - 4u$
for $t = 4$ and $u = -1$

3.) Simplify:
 $5(r^2 + n) - 3(r^2 - 2n)$

1.3 Solve Linear Equations

Solve for x using basic algebra operations.

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

5.) $\frac{3}{4}\left(\frac{4}{5}x - 2\right) = \frac{11}{2}$

1.4 Literal Equations

Solve for a specific variable.

6.) Solve for r : $C = 2\pi r$

7.) Solve for C : $F = \frac{9}{5}C + 32$

1.6 Solving Inequalities

Less Than, Greater Than, solve for x , Compound Inequalities, "And" or "Or"

8.) Solve $-2x - 10 < 15 + 3x$

9.) Solve $-6 \leq 3x - 15 \leq 12$

1.7 Solve Absolute Value

$|ax + b| = c$ $ax + b = c$ and $ax + b = -c$

$|ax + b| < c$ $-c < ax + b < c$ (less than - and)

$|ax + b| > c$ $ax + b > c$ or $ax + b < -c$ (greater than - or)

10.) Solve $|x + 7| \geq 9$

11.) Solve $|4x + 2| = 6$

12.) Solve $|2x - 3| < 3$

2.1 Functions and Their Graphs

Every input has exactly one output, Vertical line test.

13.) Determine if the relation is a function.

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

14.) Determine if the relation is a function.

$$(0,4) (1,4) (2, 5) (3,6) (4,6)$$

2.2 Slope and Rate of Change

Determine the slope given two points; use the slope to find the rate of change. (Know the 4 types of slope)

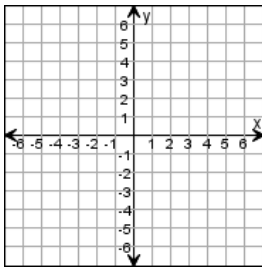
15.) Find the slope of the line passing through (3, -1) and (6, 4). Does it rise, fall, horizontal, or vertical?

16.) Tell whether the lines are parallel, perpendicular, or neither. Line 1: (0, 3) , (0, -7) Line 2: (-6, -4) , (12, -4)

2.3 Graphing Linear Equations

Slope-Intercept Form, Standard Form, Horizontal Lines $y = \#$, Vertical Lines $x = \#$

17.) Graph the line $y = -\frac{2}{3}x - 2$



18.) Find the slope and y-intercepts of the line $5x - 4y = 20$.

19.) Find the x- and y- intercepts of $y = 3x - 4$

- a.) x-intercept: 3, y-intercept: -4
- b.) x-intercept: -4, y-intercept: 3
- c.) x-intercept: -4, y-intercept: 4/3
- d.) x-intercept: 4/3, y-intercept: -4

2.4 Writing Equations of Lines

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

$$\text{Slope } m = \frac{y_2 - y_1}{x_2 - x_1}$$

20.) Write the slope-intercept form of the line that passes through the point (-5, 2) and has a slope of 4.

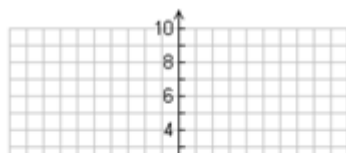
21.) Write the standard form of the line that passes through the point (2, -4) and is parallel to the line $y = -2x - 5$.

2.7-2.8 Graphing Absolute Value Functions and Piecewise Functions

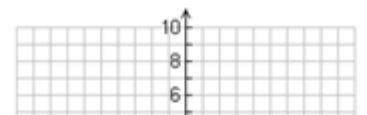
Always looks like a "v", $y = a|x - h| + k$ (a - think of as slope, h - left/right (switch sign), k - up/down)

22.) Graph the absolute value function:

$$y = |x - 1| + 3$$



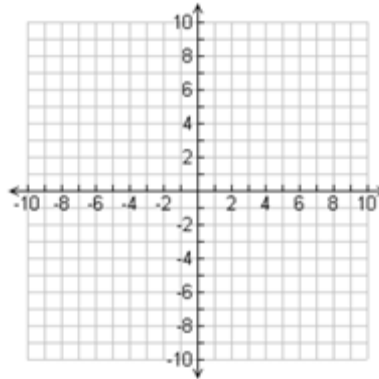
23.) Graph the absolute value function:



$$y = -3|x| - 2$$

- 24.) Graph the piecewise function $f(x) = \begin{cases} -x & \rightarrow x > 2 \\ x - 4 & \rightarrow x \leq 2 \end{cases}$

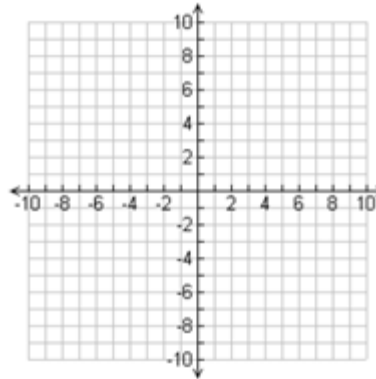
***Review Step-Functions**
***Review Domain/Range**



3.1 System of Equations, Solve by Graphing:

Graph each line individually, where they intersect is the solution to the system.

- 25.) Find the solution to the system by graphing.
 $x + y = -7$
 $2x - y = -2$



3.2 System of Equations

Solve the system using the substitution or linear combination (elimination) method.

- 26.) Solve the linear system:

$$\begin{aligned} x - 2y &= 9 \\ -3x + y &= -7 \end{aligned}$$

- 27.) Solve the linear system:

$$\begin{aligned} 3x - 4y &= -1 \\ -3x + 2y &= 0 \end{aligned}$$

- 28.) Ace Rent a Car charges a flat fee of \$15 and \$0.20 a mile for their cars. Acme Rent a Car charges a flat fee of \$28 and \$0.12 a mile for their cars. Use the following model to find out after how many miles Ace Rent a Car becomes more expensive than Acme rent a Car.

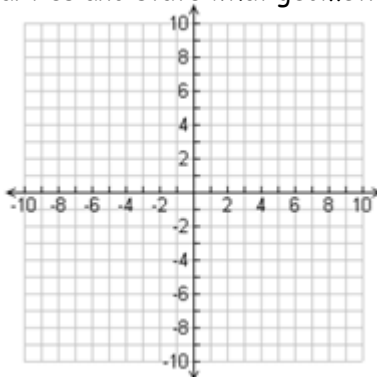
$$\begin{aligned} c &= 15 + 0.2m \text{ (Ace)} \\ c &= 28 + 0.12m \text{ (Acme)} \end{aligned}$$

3.3 System of Linear Inequalities

Graph the lines separately. Draw a Solid or Dotted Line, then Shade. Where the two shadings overlap is your solutions.

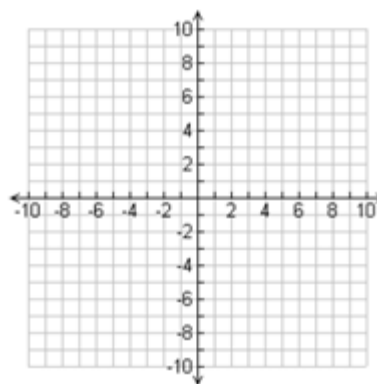
29.) Graph the system of linear inequalities and state what geometric shape it makes.

$$\begin{aligned}y &\geq x - 1 \\y &< -2x + 1 \\x &> -3\end{aligned}$$



3.5 Graphing Linear Equations in 3D(x, y, and z axis)

30.) Sketch the graph of the equation. $12x + 3y + 8z = 24$



3.6 Systems with Three Variables

Use the linear combination method twice to eliminate one variable. Then use the linear combination method again to use the two new equations to solve for the variables.

31.) Decide if the given ordered triple is a solution of the following system of equations: (1, -2, 4).

$$\begin{aligned}3x + 2y + 3z &= 11 \\2x - 4y + z &= 14 \\x + y - 5z &= -21\end{aligned}$$

32.) Solve the system of equations.

$$\begin{aligned}x + y + z &= 5 \\-2x - y + z &= -15 \\x - 2y - z &= 6\end{aligned}$$

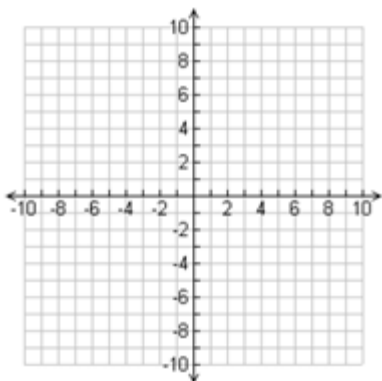
5.1 Graphing Quadratics

Standard Form $y = ax^2 + bx + c$, Vertex Form, $y = (x - h)^2 + k$

33.) What is the vertex of this parabola: $y = (x + 2)^2 + 4$

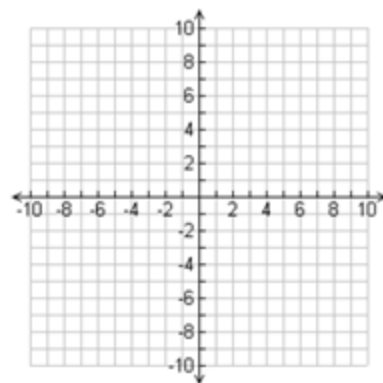
34.) What is the y-intercept and vertex of this parabola: $y = 4x^2 - 8x + 12$

35.) Graph the quadratic equation: $y = (x + 2)^2 + 3$.



36.) Graph: $y = -2x^2 - 4x + 4$

- How many roots does it have?
- What is the y-intercept?
- What is the maximum point?



5.2 Solve Quadratic Equations by Factoring

Basic Factoring, Bottoms Up, Difference of Squares, Greatest Common Factor

37.) Solve by factoring: $x^2 - 18x + 81 = 0$.

38.) Solve by factoring: $5x^2 - 13x + 6 = 0$

5.3 Solve Quadratic Equations by Using Square Roots

Isolate the squared term then take the square root of both sides to solve for x .

39.) Solve for x : $\frac{1}{3}(x + 5)^2 = 7$

40.) Solve for m : $2(m - 6)^2 - 45 = 53$

5.4 Complex Numbers

The square root of a negative number turns to i . $\sqrt{-1} = i \Leftrightarrow -1 = i^2$

Never have an "i" in the denominator of a fraction.

41.) Write the expression as a complex number in standard form. $\frac{5}{1+i}$

42.) What is $(3i)^4$?

43.) What is the difference of $(4 + 2i)$ and $(-7 - 3i)$?

5.5-5.6 Complete the Square and the Quadratic Formula

Solve quadratic equations by using the quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

44.) Solve: $x^2 + 2x + 5 = 0$

45.) Use the quadratic formula to solve the equation: $3x^2 + x - 1 = 0$

46.) Solve using complete the square: $x^2 + 6x - 7 = 0$

6.1 Properties of Exponents

1.) $a^m \cdot a^n = a^{m+n}$

2.) $(a^m)^n = a^{m \cdot n}$

3.) $(a \cdot b)^m = a^m \cdot b^m$

4.) $a^{-m} = 1/a^m$

5.) $a^m/a^n = a^{m-n}$

6.) $a^0 = 1$

47.) Simplify: $\frac{4x^3}{y^2} \cdot \frac{y^3x^2}{8x^1}$

48.) Simplify: $(4x^2y^5)^{-2}$

6.2 Evaluate and Graph Polynomial Functions

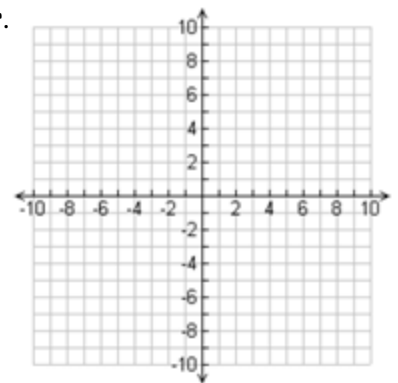
Degree - biggest exponent, *Type* - constant, linear, quadratic, cubic, quartic,

Leading Coefficient - coefficient on term with largest degree

49.) Evaluate the polynomial when $d = 5$: $7d^3 - 6d^2 - 5d - 12$

50.) State the left and right end behaviors of the graph of $f(x) = -x^3 + x^2 - 7$

51.) Sketch the graph of the function $f(x) = x^4 - 4$ then state the end behavior.



6.3 Add/Subtract/Multiply Polynomials

Combine Like Terms when adding and subtracting. Multiply as normal.

52.) What is the sum of: $(6b^5 + 8b^3 - 8) + (5b^5 - 3b + 8)$

53.) What is the difference of: $(2x + 5) - (3x^2 + 7x - 5)$

54.) What is the product of: $(x - 3) \cdot (x^2 + 2x - 1)$

6.4 Factor and Solve Polynomials (Sum/Difference of Cubes, Grouping, GCF)

55.) Factor. $10x^4 - 160$

56.) Factor $x^3 - 2x^2 - 9x + 18$

57.) Factor $x^3 - 64$

6.5 Synthetic Division and Long Division

Hint: synthetic division is the upside down division bar.

58.) Use synthetic division: $(2x^3 + 9x^2 + 3x - 6) \div (x + 4)$

59.) Use long division: $(5x^4 - 3x^2 + 4) \div (x^2 + 2)$

6.6-6.7 Finding Rational Zeroes

60.) How many zeros of $f(x) = x^5 + 4x^4 - 6x + 1$?

61.) What are the roots of $f(x) = x^3 + 4x^2 + 3x$?

62.) What are the roots of $f(x) = x^3 + 3x^2 + 4x + 12$?

6.8 Analyzing Graphs of Polynomial Functions

Know how to identify:

- # of zeroes
- # of turning points
- end behavior
- local max/min
- increasing/decreasing intervals

7.1 n^{th} Roots and Rational Exponents

63.) Rewrite the expression: $\sqrt[3]{5^2}$

64.) Rewrite the expression: $8^{7/4}$

65.) Evaluate: $(\sqrt[3]{-27})^4$

66.) Evaluate: $32^{4/5}$

7.2 Properties of Rational Exponents

67.) $(2^{1/4} \cdot 2^{1/3})^6$

68.) $\sqrt[3]{375} + \sqrt[3]{81}$

69.) $\sqrt[5]{9xy^7} \cdot \sqrt[5]{6x^6}$

70.) $\frac{4}{\sqrt[3]{x}}$

7.3 Function Operations

71.) Given $f(x) = x^2 - 3$, $g(x) = x + 1$, $h(x) = 6x^{-1}$

a.) $f(x) + g(x)$

b.) $(f \cdot g)(x)$

c.) $h(g(x))$

7.4 Inverse Functions

Switch x and y and then solve for y .

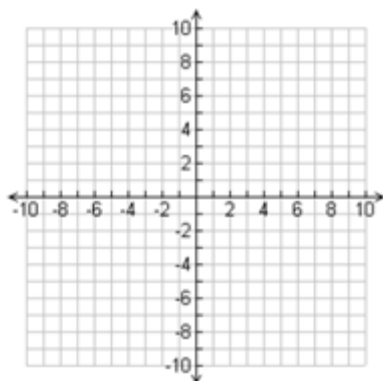
72.) Find an equation for the inverse of the relation: $f(x) = x^3 + 2$

7.5 Graphing Square Roots and Cube Roots

(h is horizontal shift, k is vertical, a is orientation)

73.) Graph and state Domain/Range.

$$Y = (x - 1)^{1/2} + 7$$



7.6 Solving Radical Equations (check answers)

74.) $x^{2/3} + 15 = 24$

75.) $x - 4 = \sqrt{2x}$