

EOC Review Topics

EOC Review: Solving Equations with Technology

Standards

A2.F.BF.A.1 Write a function that describes a relationship between two quantities.

A2.A.REI.D.6 Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the approximate solutions using technology.

A2.A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, radical and exponential functions.

Objective

SWBAT use technology **IOT** solve problems involving linear, quadratic, polynomial, radical and exponential functions

Key Concepts

Fundamental Theorem of Algebra- every non-zero, single variable, degree n polynomial with complex coefficients has counted with multiplicity, exactly n complex roots.

Essential Questions

What will it look like if there is no solution? In what ways can we solve functions?

Examples

Solve each equation by graphing and using technology

1. (I do) $3(2x - 1) = 11x$

2. (I do) $3|x + 2| - 1 = 8$

3. (We do) At a bookstore, used hardcover books sell for \$8 each and used softcover books sell for \$2 each. You purchase 36 used books and spend \$144.

4. (We do) $2x^2 - 5x - 3 = 0$

5. (They do) When an object is dropped from a height of 5 feet and falls to the ground under the force of gravity its' height y , in feet, x seconds after being dropped is given by $y = -2x^2 + 5$

6. (They do) $2x^3 + 2x^2 - 4x = 0$

7. $\sqrt{x+2} - 3 = 2x$

8. $2^{x+1} = 25$

Independent practice

Solve each equation by graphing and using technology.

1. $5x + 4 = 2x + 10$

$$x = 2$$

2. $|5 - 2x| + 3 = 8$

$$x = \{0, 5\}$$

3. $\begin{cases} 2x + 4y = 12 \\ x + y = 2 \end{cases}$

$$(-2, 4)$$

4. $x^2 - 7x = -12$

$$x = \{3, 4\}$$

5. $4x^3 = 4x^2 + 3x$

$$x = \left\{-\frac{1}{2}, 0, \frac{3}{2}\right\}$$

6. $2 + \sqrt{3x - 2} = 6$

$$x = 6$$

7. $7 - 5^{2x-1} = 4$

$$x = 0.84$$

8. Three times the square of a number is 5.

$$3x^2 = 5$$

$$x = \{-1.29, 1.29\}$$

EOC REVIEW: QUADRATICS

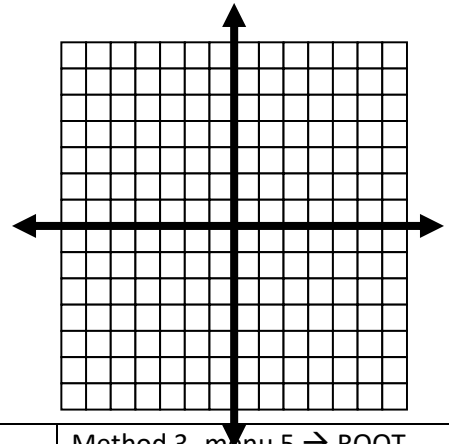
A2.A.REI.D.6 (formerly A-REI.D.11) Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the approximate solutions using technology.

A2.F.BF.A.1 Write a function that describes a relationship between two quantities.

A2.F.BF.A.1a Determine an explicit expression, a recursive process, or steps for calculation from a context.

A2.F.BF.A.1b Combine standard function types using arithmetic operations.

- (I do) The graph of the function $y = x^2 - 3x - 4$ is a parabola. Plot the points for the x -intercept(s), y -intercept(s) and maximum or minimum point on the coordinate plane. Then draw the parabola.



- What are the zeros of $y = -x^2 + 2x + 8$

Method 1 - factoring	Method 2- quadratic formula	Method 3- menu 5 → ROOT

- (I do) Consider the function $f(x) = x^2 - 8x + 19$. Write an equivalent form of the equation to reveal the maximum or minimum height.

4. (We do) Write a quadratic equation for $a = 3$, $b = 4$ and $c = 8$. Find the solution(s) of the equation in quadratic form.
5. (They do) The length of a garden is 6 more than the width. The area is 40 square feet.
- Create an algebraic equation to determine the length and width of the garden.
 - What is the length, in feet, of the garden?
6. (They do) A diver dives from a 10 m springboard. The equation $f(t) = -4.9t^2 + 4t + 10$ models her height above the pool at time t . At what time does she enter the water?

Independent Practice (You do). Complete your assignment on a separate sheet. Show all work.

1. A rectangular pool has an area of $5x^2 + 23x + 12$ and the length of one side is $5x + 3$. What is the length of the other side? **factor** $5x^2 + 23x + 12 = (5x + 3)(x + 4) \rightarrow \boxed{x + 4}$
2. How many solutions are there for the following system? Give an ordered pair that best approximates each solution.
- $$\begin{cases} f(x) = 2x^2 - 15x + 20 & (1.43, 2.68) \\ g(x) = -4x^2 + 16x - 12 & (3.74, -8.12) \end{cases}$$
3. A projectile is launched from ground level and models the equation $h(t) = vt - 16t^2$, where v is an initial velocity in ft/sec, t is the time in seconds and h represents the height.
- If the initial velocity is 128 ft/sec, find the time between launch and landing. $h(t) = 128t - 16t^2$
 - Find the maximum height of the projectile. **256 ft** **8 seconds**

EOC REVIEW – A variety of Calculator Functions

<p>CUBE ROOT, 4th ROOT, etc <i>In the calculator,</i> shift $\sqrt{\square}$</p> <p>Rewrite $625^{1/4}$ in radical notation and simplify it</p> <p>Changing calculator from real to imaginary mode, and vice versa <i>In the calculator,</i> Shift $\boxed{\text{MENU}}$, scroll to complex mode $a+bi$</p> <p>Simplify in the calculator $(2i - 4)^2$</p>	<p>GRAPHING ABSOLUTE VALUE, LOGARITHMS, etc <i>In the calculator,</i> Shift $\boxed{4}$, scroll down to abs</p> <p>Graph $y = x + 2$</p> <p>Graph $\log_4 x$ $\boxed{\text{MENU}} \boxed{5}$, $\boxed{\text{SHIFT}} \boxed{4}$ $\boxed{\rightarrow}$ scroll down to $\log a b c$</p> <p>RADIANS AND DEGREES <i>In the calculator,</i> $\boxed{\text{SHIFT}} \boxed{\text{MENU}}$ scroll to Angle</p> <p>Find $\sec 45^\circ$ and $\cos \frac{\pi}{4}$</p>	<p>SIMPLIFYING LOGS WITH BASES OTHER THAN 10 <i>In the calculator,</i> $F4, F2$ from main screen menu 1</p> <p>Simplify $\log_3 27$</p> <p>PERMUTATIONS, COMBINATIONS, AND FACTORIALS <i>In the calculator,</i> $\boxed{\text{OPTN}} \boxed{F6} \boxed{F3}$</p> <p>Simplify $5!$ ${}_{10}C_3$ ${}_{10}P_3$</p>	<p>SIMPLIFYING SYSTEMS OF MATRICES <i>In the calculator,</i> Shift $\boxed{4}$, $\boxed{6}$ scroll to Redf $F4, F1, F3, 2, \text{ent}, 3, \text{ent}$ type in values</p> <p>Write a matrix to represent the equations and solve the system $x - 2y = -10$ $-2x - 3y = -1$</p> <p>MEAN, MEDIAN, MODE, RANGE, INTERQUARTILE RANGE, STANDARD DEVIATION <i>In the calculator,</i> $\boxed{\text{Menu}} \boxed{2}$ enter in th 1 $\boxed{F2}, \boxed{F1}$</p> <p>Find the mean, median, etc for 98, 87, 79, 82, 101, 99, 97, 97, 102, 91, 93</p>
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Independent Practice CALCULATOR FUNCTIONS assignment. Complete your assignment on a separate sheet. Show all work.

Simplify in the calculator!

1. $(7 + 3i)^2$
 $40 + 42i$

2. $(2i - 3)(4i + 3)$
 $-17 - 6i$

3. $\sqrt{-68}$
 $2i\sqrt{17}$

4. $\log_4 64$
 3

5. $\sqrt[4]{81}$ 3

6. $7!$
 5040

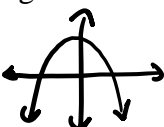
7. ${}_{12}C_4$
 495

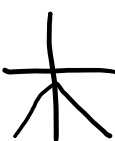

8. ${}_{17}P_5$
 742560

9. $\cos 60^\circ$
 $\frac{1}{2}$

10. $\csc \frac{\pi}{2}$
 1

Graph each of the following in the calculator

11. $y = -x^2 - 2x + 5$ 

12. $y = -|x| - 2$  13. $\log_3 x$ 

Write a matrix to represent the system of equations and then solve the system in the calculator.

14. $-x + 5y - 4z = 0$

$3x + 4y + z = -1$

$-3x + 6y - 7z = 2$

rref $\begin{bmatrix} -1 & 5 & -4 & 0 \\ 3 & 4 & 1 & -1 \\ -3 & 6 & -7 & 2 \end{bmatrix} = \left(\frac{31}{4}, \frac{-17}{4}, \frac{-29}{4} \right)$

15. $x - 3y + z = 6$

$x + 3z = 12$

$y = -5x + 1$

rref $\begin{bmatrix} 1 & -3 & 1 & 6 \\ 1 & 0 & 3 & 12 \\ 5 & 1 & 0 & 1 \end{bmatrix} = \left(\frac{15}{47}, \frac{-28}{47}, \frac{183}{47} \right)$

16. Use the calculator to find the mean, median, mode, range, interquartile range, standard deviation and variance for 75 73 77 79 79 74 81 74 70 68 70 72

$\bar{x} = 74.3$ (mean)

med = 74

mode = 70, 74, 79

range = 13

$\sigma_x = 3.88$ (standard deviation)

IQ range = 7

EOC REVIEW – Exponential and Logarithmic Functions

Standards: A2.A.CED.A – Create equations that describe number relationships. A2.A.REI.A – Understand solving equations as a process of reasoning and explain the reasoning. A2.F.BF.A – Build a function that models a relationship between two quantities. A2.F.LE.B – Interpret expressions for functions in terms of the situations they model. A2. A. REI.B – Solve equations and inequalities in one variable

Objectives: Students will be able to create and solve problems involving exponential and logarithmic functions, predict measurements, as well as use the functions interchangeably as inverses of each other

<p>Exponential growth and decay</p> <p>For the function $y = ab^x$,</p>	<p>To model exponential growth and decay:</p> $A(t) = a(1 + r)^t$ <p>You invested \$1000 in a savings account at the end of 6th grade. The account pays 5% annual interest. How much money will be in the account after six years?</p>	<p>Continuously Compounded Interest</p> $A(t) = P \cdot e^{rt}$ <p>Suppose you won a contest at the start of 5th grade that deposited \$3000 in an account that pays 5% compounded continuously. How much will you have in the account when you enter high school 4 years later? Express your answer to the nearest dollar.</p>	<p>Rewrite the given logs using log properties:</p> <p>*$\log(xy)$:</p> <p>*$\log \frac{x}{y}$:</p> <p>*$\log x^y$:</p> <p>Write $2^3 = 8$ in logarithmic form</p>	<p>Evaluate each log or ln in the calculator.</p> <p>*How do you enter logs with bases other than 10?</p> <p>$\log_2 16$</p> <p>ln 1</p>
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*Reminder: Compounding n times $A = P(1 + \frac{r}{n})^{nt}$

annually = 1
 quarterly = 4
 monthly = 12
 weekly = 52

Independent Practice EXPONENTIAL AND LOGARITHMIC FUNCTION assignment

1. Sarah currently has \$62,410 in her retirement account, and her goal is to have at least \$100,000 in the account. The account earns 6.9% interest on the balance, compounded annually. Sarah does not make any additional withdrawals or deposits.

What is the fewest number of years it would take Sarah to reach her goal?

Choose an answer and show work or Explain how you got your answer.

a. 6

b. 7

c. 8

d. 9

2. Two bird populations were studied, and formulas were developed for each population's growth. The population $P_1 = 30e^{kt}$ and $P_2 = 60e^{0.2t}$, where k is a constant and t is the time in years since the start of the study. The two populations were equal 10 years after the start of the study. What is the approximate value of k ?

Choose an answer and show work or Explain how you got your answer

a. 0.13

b. 0.27

c. 7.13

d. 8.93

3. Using the formula $A = P \left(1 + \frac{r}{n}\right)^{nt}$, Jamie deposits \$627 into a savings account. The account has an interest rate of 3.5%, compounded quarterly. Write the function that gives the amount of money in dollars, $J(t)$, in Jamie's account t years after the initial deposit.

$$J(t) = 627 \left(1 + \frac{0.035}{4}\right)^{4t} \quad \text{or} \quad J(t) = 627 (1.00875)^{4t}$$

4. Ahmad opens a savings account with an initial deposit of \$1500. The account has an interest rate of 2.5% compounded continuously. How much money will be in Ahmad's account at the end of 10 years?

$$A = 1500e^{0.025(10)} = 1926.04$$

5. Expand $\log x^3 y^4 x^5$ completely using the logarithmic properties.

$$3 \log x + 4 \log y + 5 \log x = \boxed{8 \log x + 4 \log y}$$

6. In 2009 there was an endangered population of 270 cranes in a western state. Due to wildlife efforts, the population is increasing at a rate of 5% per year.

*What exponential function would be a good model for this population of cranes?

$$A = 270 (1+0.05)^t$$

*If this trend continues, how many cranes will there be in this population in 2020?

$$A = 270 (1+0.05)^{11}$$

53

7. The equation $y = 281(1.01)^x$ is a model for the population of the United States y , in millions of people, x years after the year 2000. Estimate when the United States population will reach 400 million people.

$$281(1.01)^x = 400$$

$$x = 35.2$$

$$2000 + 35 \rightarrow \boxed{2035}$$

EOC REVIEW: Models & Regression

Standard

A2.S.ID.B.2 Represent data on two quantitative variables on a scatter plot and describe how the variables are related. a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data.

1. The average cost of whole milk for several recent years is listed in the table. What is the equation for the line of best fit. Based on the model, what would you expect to pay in the year 2020 for a gallon of milk? Let 1998 represent year 1.

Year	1998	2000	2002	2004	2006	2008
Cost of gallon	2.65	2.89	3.00	3.01	3.20	3.77

2. Find an equation in standard form of the parabola passing through the points.
 - a. (1, -3), (2, 0), (3, 9)

Independent Practice Models & Regression Assignment. Complete your assignment on a separate page. Show all work

1. Find an equation in standard form of the parabola passing through the points (3, -1), (2, -5) and (4, -5).

$$y = -4x^2 + 24x - 37$$

2. A player hits a tennis ball across the court and records the height of the ball at different times, as shown in the table below.
 - a. Find a quadratic model for the data.

$$y = -\frac{1}{2}x^2 + x + 5.5$$

Time (s)	Height (ft)
0	5.5
1	6.0
2	5.5
3	4.0

- b. Use the model to estimate the height of the ball at 4 seconds. 1.5 ft

- c. What is the ball's maximum height?

$$6 \text{ ft}$$

3. What polynomial function has a graph that passes through the four points (0, -3), (1, -1), (2, 5) and (-1, -7)?

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

4. For the data below that examines U.S. Federal Spending, compare two models and determine which one best fits the data. Which model seems more likely to represent the data set over time? Let x represent the number of years after 1900.

Cubic

$$y = 0.028x^3 - 6.71x^2 + 578.2x + 226.7$$

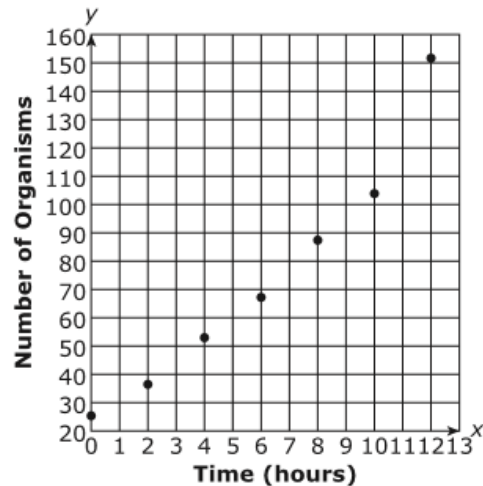
Linear

$$y = 49.238x - 2614.29$$

Year	Total (billions)
1965	630
1980	1300
1995	1950
2005	2650

6. The graph shows the exponential growth of the number of organisms in a Petri dish over a 12-hour period.

Time (hours)	Number of Organisms
0	25
2	36
4	52
6	68
8	88
10	104
12	151



- a. Write an exponential function $N(t)$ to model the data.

$$N(t) = 27.035(1.15)^x$$

- b. To the nearest whole organism, how many organisms are expected to be in the Petri dish at 24 hours?

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EOC REVIEW – Average Rate of Change, Solve equations graphically

Standards: A2.F.LE.A – Construct and compare linear, quadratic, and exponential models and solve problems. A2.F.LE.B – Interpret expressions for functions in terms of the situation they model A2.A.CED.A – Create equations that describe numbers or relationships. A2.A.REI.B – Solve equations and inequalities in one variable. A2. REI. D – Represent and solve problems graphically. A2.A.REI.C – Solve systems of equations. A2.N.CN.A – Perform arithmetic operations with complex numbers. A2.A.REI.B – Solve equations and inequalities in one variable

Objectives : Students will be able to determine the average rate of change of functions between two points. Students will be able to solve equations by cross-multiplying and determine the solutions of any equations graphically.

<p>How do I find the average rate of change between two points for any function? (use the points (x_1, y_1) and (x_2, y_2))</p>	<p>How do I determine the solution(s) for a system of equations graphically? Sketch an example.</p> <p>Find the solution(s) of $y = 2x + 5$ and $y = x + 2$</p> <p>TO PUT IN CALCULATOR: MENU 5 , F6 , F5</p>	<p>SOLVE: $\frac{x}{2} = \frac{3x+1}{4}$</p>
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Independent Practice AVERAGE RATE OF CHANGE/SOLVE EQUATIONS GRAPHICALLY assignment. Complete on a separate sheet. Show all work.

- Which value of x satisfies the equation $\frac{x+23}{x+3} = 5$? $x = 2$

2. What are the solutions of the given system?

$$y = x^2 + 2$$

$$x + y = 2$$

SHOW THE WORK OR EXPLAIN HOW YOU GOT YOUR ANSWER, DON'T JUST CHOOSE ONE AN ANSWER!

- a. (3, 5) and (2, 0) b. (1, 1) and (-2, 4) c. (-3, 5) and (2, 0) d. (0, 2) and (-1, 3)

3. A system of equations is given: $f(x) = x^2 + 2x - 8$ and $g(x) = -x^2 - 3x + 5$

What are the solutions (values of x) for which $f(x) = g(x)$? $x = -4.1$

$$x = 1.59$$

4. Choose which answer best matches your answer choice. **SHOW YOUR WORK OR EXPLAIN HOW YOU GOT YOUR ANSWER!**

Which ordered pair is a solution to the system of equations

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

$$y = -3x + 9$$

- a. (1, 6) b. (4, 0) c. (2, 3) d. (1, 0)

5. Choose which answer best matches your answer choice. **SHOW YOUR WORK OR EXPLAIN HOW YOU GOT YOUR ANSWER!**

The set $\{-5, 2, 4\}$ contains the solution(s) to the following rational equation. $\frac{x+5}{9x-18} = \frac{1}{x-2}$

Which values of the solution set are valid?

- a. -5 only b. 4 only c. 2 and 4 d. -5 and 2

6. A function $f(x) = x + 2$ represents the growth in attendance at an exercise class. A function $g(x)$ is five times $f(x)$. Select ALL functions that represent $g(x)$.

- a. $g(x) = x + 7$ b. $g(x) = 5(x + 2)$ c. $g(x) = 5x + 2$
d. $g(x) = 5x + 10$ e. $g(x) = x - 3$