

Item 21
Multi-Part Technology-Enhanced
The graph of the exponential function $f(x) = 4(0.5)^x + 2$ is shown.

Part A
Which function has the same end behavior as $f(x)$ for large, positive values of x ? $x \rightarrow \infty, f(x) \rightarrow 2$

$f(x) = 4(1.3)^x + 3$
 $g(x) = 0.5(1.3)^x + 2$
 $h(x) = 4(0.8)^x + 3$
 $k(x) = 0.5(0.8)^x + 2$

Part B
Which function's graph has a y-intercept of 17?

A. $N(x) = 5(2)^x$
 B. $N(x) = 5(0.5)^x + 0.5$
 C. $N(x) = (0.5)^x + 1$
 D. $N(x) = 0.5(2)^x + 0.5$

March 19, 2019, Tuesday

Factor each completely. March 20, 2019, Wednesday

3) $25p^2 - 4$ $a = 5p$ $b = 2$
 $(5p + 2)(5p - 2)$

5) $n^2 - 3n - 4$ 1×-4
 $(n+1)(n-4)$ < 4

6) $r^2 - 1$ $a = r$ $b = 1$
 $(r+1)(r-1)$

7) $n^2 + 19n - 40$ 1×-40
 $(n-5)(n+24)$ < -40

Algebra 1 - Unit 3B Day 1
Solving Quadratic Equations by Factoring

Zero Product Property
If $a \cdot b = 0$, then either $a = 0$, or $b = 0$. In other words, when two expressions are being multiplied and the result is zero, one of the two expressions must be equal to zero.

Ex: If $3 \cdot b = 0$, then " b " must be equal to 0. Or if $a \cdot 5 = 0$, then " a " must be equal to 0.

$x^2 - 2x - 15 < 0$
 new $(x+3)(x-5) = 0$, then either $x+3 = 0$, OR $x-5 = 0$.
 If $(x+3)(x-5) = 0$, then either $x+3 = 0$, OR $x-5 = 0$.
 If $(x-1)(x-4) = 0$, then either $x-1 = 0$, OR $x-4 = 0$.
 If $(2x+7)(x-4) = 0$, then either $2x+7 = 0$, OR $x-4 = 0$.

How to solve these equations:

Original Problem	$(x+3)(x-5) = 0$
Step 1 - Set each expression equal to zero	$(x+3) = 0$ $x-5 = 0$
Step 2 - Solve each equation	$x+3 = 0$ $x-5 = 0$ $-3 \quad -3$ $+5 \quad +5$
Answer - There should be 2	$x = -3$ $x = 5$

Try another: $(2x+3)(x-4) = 0$

MOST OF THE TIME, the problem will not be set up as above. In other words, those problems were already factored like $(2x+3)(x-4) = 0$.

So, here is an example of having to factor before solving:

Original Problem	$x^2 + 7x + 12 = 0$
Step 1 - Factor	$(x+3)(x+4) = 0$
Step 2 - Set each expression equal to zero	$x+3 = 0$ $x+4 = 0$
Step 3 - Solve each equation	$-3 \quad -3$ $-4 \quad -4$
Answer - There should be 2	$x = -3$ $x = -4$

Out the answer might repeat $x = 3, x = 3$

Algebra 1 - Unit 3B Day 1
Solving Quadratics by Factoring

Notes continued: Solve each equation by factoring.

1) $(v+5)(v-7) = 0$
 $v+5 = 0$ $v-7 = 0$
 $-5 \quad -5$ $+7 \quad +7$
 $v = -5$ $v = 7$

2) $(5n+2)(n-2) = 0$
 $5n+2 = 0$ $n-2 = 0$
 $-2 \quad -2$ $+2 \quad +2$
 $5n = -2$ $n = 2$

3) $(v-1)(v+7) = 0$
 $v-1 = 0$ $v+7 = 0$
 $+1 \quad +1$ $-7 \quad -7$
 $v = 1$ $v = -7$

4) $(m-2)(m+5) = 0$
 $m-2 = 0$ $m+5 = 0$
 $+2 \quad +2$ $-5 \quad -5$
 $m = 2$ $m = -5$

5) $(v+4)(v-3) = 0$
 $v+4 = 0$ $v-3 = 0$
 $-4 \quad -4$ $+3 \quad +3$
 $v = -4$ $v = 3$

6) $n(n+7) = 0$
 $n = 0$ $n+7 = 0$
 $-7 \quad -7$
 $n = -7$

Solve each equation by factoring:

8) $(2x-7)(x-7) = 0$ 9) $(v+7)(v-1) = 0$

10) $\sqrt{v+7} = 0$ 11) $(n+3)(n+7) = 0$

12) $k^2 - k - 42 = 0$ 13) $p^2 - 9p + 20 = 0$

14) $p^2 + 4p + 4 = 0$ 15) $p^2 - 4p - 32 = 0$

16) $7k^2 - 8k = 0$ 17) $7k^2 + 10k - 8 = 0$

18) $7k^2 - 12k - 4 = 0$ 19) $2k^2 + 15k + 25 = 0$

Algebra 1
Solve each equation by factoring.

1) $(r-8)(r-1) = 0$ 2) $a^2 + 6a = 0$

3) $x^2 + 10x + 16 = 0$ 4) $8k^2 + 11k + 6 = 0$

5) $a^2 - 16 = 0$

Algebra 1
 Solve each equation by factoring.

1) $(7x+1)(x+7)=0$ 2) $p^2-6p+5=0$

3) $r^2-49=0$ 4) $2p^2-13p-7=0$

5) $x^2+x=0$

March 19, 2019, Tuesday

Item 18
 Constructed-Response

Shaun recycles bottles and cans. He earns 10 cents for each bottle he recycles and 5 cents for each can he recycles. After recycling a bag of bottles and cans, he gets a receipt that states he earned \$12.75 and recycled a total of 210 bottles and cans. Determine the number of bottles and the number of cans he recycled. Shaun writes the system of equations below:

$$\begin{cases} x + y = 210 \\ 10x + 5y = 1275 \end{cases}$$

1) Graphing?
 2) Substitution
 3) Elimination *

Part A What does the x represent in terms of the situation? Write your answer in the space provided.
 Part A **Bottles**

Part B Shaun graphs lines to represent the equations in his system. What are the coordinates of the point where the two lines intersect? Write your answer in the space provided.
 Part B $X=45, Y=165$

Handwritten work for Part B:

$$\begin{array}{r} x + y = 210 \\ 10x + 5y = 1275 \\ \hline -10x - 10y = -2100 \\ \hline -5y = -925 \\ \hline y = 185 \end{array}$$

$$\begin{array}{r} x + y = 210 \\ x + 165 = 210 \\ \hline x - 165 = -45 \\ \hline x = 45 \end{array}$$
 Note: The handwritten solution for Part B shows a discrepancy between the typed answer $Y=165$ and the final handwritten result $Y=185$.

Algebra 1 - Unit 3B Day 2 Solving Quadratic Equations by Square Roots
 MOSEP 2.A.12.1 I can solve a quadratic equation with one variable.

- A square root is written with the radical symbol.
- The opposite of being **gaming** being squared is to take the **square root**.
- The goal is to get the variable squared by itself.

What do you think we should do? ONE step: $\sqrt{\#^2} = \#$ $\sqrt{\#^2} = \pm \#$

Solve the following TWO Step equations:

- $x^2 = 25$
 $x = \pm \sqrt{25}$
 $x = \pm 5$
- $x^2 + 9 = 0$
 $x^2 = -9$
 $x = \pm \sqrt{-9}$
 $x = \pm 3i$
- $x^2 - 16 = 0$
 $x^2 = 16$
 $x = \pm 4$
- $x^2 = -8$
 $x = \pm \sqrt{-8}$
 $x = \pm 2\sqrt{2}i$
- $x^2 = 100$
 $x = \pm 10$
- $x^2 = 16$
 $x = \pm 4$

Solve the following THREE step equations:

- $5v^2 + 4 = 0$
 $5v^2 = -4$
 $v^2 = -\frac{4}{5}$
 $v = \pm \sqrt{-\frac{4}{5}}$
 $v = \pm \frac{2}{\sqrt{5}}i$
- $(x+3)^2 = 1$
 $x+3 = \pm 1$
 $x = -3 \pm 1$
 $x = -2, -4$
- $(x+3)^2 = 9$
 $x+3 = \pm 3$
 $x = -3 \pm 3$
 $x = 0, -6$

Solve the following MULTI step equations:

- $(x+3)^2 = 1$
 $x+3 = \pm 1$
 $x = -3 \pm 1$
 $x = -2, -4$
- $(x+3)^2 = 9$
 $x+3 = \pm 3$
 $x = -3 \pm 3$
 $x = 0, -6$
- $3(x+3)^2 = 12$
 $(x+3)^2 = 4$
 $x+3 = \pm 2$
 $x = -3 \pm 2$
 $x = -1, -5$

Algebra 1 - Unit 3B Day 3 Solving Square Roots Practice

- $x^2 - 25 = 0$
 $x = \pm 5$
- $3x^2 - 7 = 47$
 $3x^2 = 54$
 $x^2 = 18$
 $x = \pm \sqrt{18}$
 $x = \pm 3\sqrt{2}$
- $x^2 - 11 = 16$
 $x^2 = 27$
 $x = \pm \sqrt{27}$
 $x = \pm 3\sqrt{3}$
- $(x+4)^2 = 25$
 $x+4 = \pm 5$
 $x = -4 \pm 5$
 $x = 1, -9$
- $(2x-3)^2 = 4$
 $2x-3 = \pm 2$
 $2x = 5 \pm 2$
 $x = \frac{7}{2}, \frac{1}{2}$
- $(x-7)^2 = 9$
 $x-7 = \pm 3$
 $x = 10, 4$
- $(x+3)^2 = 16$
 $x+3 = \pm 4$
 $x = 1, -7$
- $(2x+6)^2 = 81$
 $2x+6 = \pm 9$
 $2x = 3 \pm 9$
 $x = 3, -3$
- $(x+6)^2 = 16$
 $x+6 = \pm 4$
 $x = -2, -10$
- $x^2 + 21 = 5$
 $x^2 = -16$
 $x = \pm 4i$
- $3(x+4)^2 = 12$
 $(x+4)^2 = 4$
 $x+4 = \pm 2$
 $x = -2, -6$
- $2x^2 - 12 = 2x^2 - 1$
 $-12 = -1$
 $-11 = 0$
 Undefined
- $5(x^2) = (10)^2$
 $5x^2 = 100$
 $x^2 = 20$
 $x = \pm \sqrt{20}$
 $x = \pm 2\sqrt{5}$

Algebra 2
 Solve each equation by factoring or taking square roots.

- $b^2 + 4b = 0$
- $b^2 - 5b - 6 = 0$
- $p^2 - 1 = 0$
- $10p^2 - 17p + 3 = 0$
- $x^2 = 4$
- $x^2 + 8 = 12$
- $36x^2 + 7 = 71$
- $(x-4)^2 = 25$

Algebra 2
 Solve each equation by factoring or taking square roots.

- $m^2 - 3m + 2 = 0$
- $m^2 + 5m = 0$
- $p^2 - 16 = 0$
- $3p^2 + 23p + 6 = 0$
- $x^2 = 16$
- $36x^2 = 16$
- $8x^2 - 2 = 390$
- $(x+4)^2 = 25$

March 20, 2019, Wednesday

Item 15
Selected-Response
The table defines a quadratic function.

x	y
-1	5
0	1
1	-1
2	1

Item 14
Selected-Response
Which value is an irrational number?

A. $4 + \sqrt{7}$
B. $\sqrt{2} \sqrt{8}$
C. $\frac{\sqrt{3} \sqrt{12}}{5}$
D. $\sqrt{3} - \sqrt{3}$

What is the average rate of change between $x = -1$ and $x = 1$?

A. undefined
B. $-\frac{1}{3}$
C. -3
D. -4

Algebra 1 ~ Unit 3B Day 3
MCC9-12.A.REI.4b: I can solve by completing the square.

Solving Quadratic Equations by Completing the Square

◆ Certain quadratic equations can be factored into **Perfect Squares**. Factor the following quadratic expressions to see why these are called **Perfect Square Trinomials**:

$x^2 + 6x + 9$ $x^2 - 10x + 25$ $x^2 + 12x + 36$

◆ **Creating a Perfect Square Trinomial**

- In the following perfect square trinomial, the _____ term is missing.
- Find the constant (c) term by taking half the middle term then squaring it. Put this number in the blank- we say that this number "completes the square".

$x^2 + 14x + \underline{\hspace{2cm}}$

◆ **Create perfect square trinomials by finding the number that completes the square. Then factor the perfect square trinomial:**

$x^2 + 20x + \underline{\hspace{2cm}}$ $x^2 - 4x + \underline{\hspace{2cm}}$ $x^2 + 5x + \underline{\hspace{2cm}}$

Solving Quadratic Equations by Completing the Square Example #1

Solve the following equation by completing the square.

$x^2 + 8x - 20 = 0$

Step 1: Get all variables on one side and all numbers without variables on the other side.

Step 2: Find the number that completes the square on the left side of the equation, add that term to both sides.

$x^2 + 8x + \underline{\hspace{2cm}} = 20 + \underline{\hspace{2cm}}$

Step 3: Factor the perfect square trinomial on the left side of the equation. Simplify the right side of the equation.

Step 4: Take the square root of both sides.

Step 5: Set up the two solution possibilities and solve.

Step 6: CHECK YOUR ANSWERS!!!

Let's try!

Solve each equation by completing the square.

1) $x^2 + 14x - 45 = 6$ 2) $m^2 - 16m + 24 = 2$

Algebra 1 ~ Unit 3B Day 3
MCC9-12.A.REI.4b: I can solve by completing the square.

Solving Quadratic Equations by Completing the Square

1. Rewrite so all terms containing x are on one side.
2. Find the number that completes the square on the left side of the equation. Add that number to both sides.
3. Factor the perfect square trinomial on the left side of the equation. Simplify the right side of the equation.
4. Take the square root of each side.
5. Solve for x.
6. Check your answers!!!

Solve each equation.

1. $x^2 - 10x - 54 = 0$	2. $x^2 - 18x + 77 = 0$
3. $x^2 + 20x - 73 = 0$	4. $x^2 + 6x - 72 = -8$
5. $x^2 - 10x - 56 = 6$	6. $x^2 - 14x - 75 = 8$

Algebra 2
TOTD Solving Quadratics (Factoring/Sq. Root/Completing the Square)

Solve each equation by factoring.

1) $k^2 - 8k = 0$ 2) $m^2 - 16 = 0$

3) $x^2 + 9x + 14 = 0$ 4) $5m^2 - 22m - 10 = 0$

Solve each equation by taking square roots.

5) $9t^2 - 9 = 0$ 6) $4x^2 + 3 = 403$

Solve each equation by completing the square.

7) $x^2 - 4x + 3 = 0$ 8) $k^2 + 12k + 35 = 0$

Algebra 2
TOTD Solving Quadratics (Factoring/Sq. Root/Completing the Square)

Solve each equation by factoring.

1) $m^2 - 4m - 21 = 0$ 2) $x^2 - 9 = 0$

3) $m^2 - 6m = 0$ 4) $2x^2 + 15x - 8 = 0$

Solve each equation by taking square roots.

5) $-6x^2 = -216$ 6) $8x^2 - 5 = 387$

Solve each equation by completing the square.

7) $x^2 + 16x - 36 = 0$ 8) $m^2 - 16m + 60 = 0$

Algebra 1 - Day 4 **Solving by the Quadratic Formula Notes**
 The solutions of any quadratic equation ($ax^2 + bx + c = 0$) can be found by evaluating the quadratic formula:

$$x = \frac{-b \pm \sqrt{(b)^2 - 4(a)(c)}}{2(a)}$$

Examples: Use the quadratic formula to solve for x

- $2x^2 - 10x - 5 = 0$
- $9x^2 + 2 = 3x$
- $-x^2 - 6x = 9$

March 21, 2019, Thursday

- What is the y-intercept of the graph of $h(x) = 2^x - 4$?
- What is the range of the graph of $f(x) = -3(x - 4)^2$?

Algebra 1 - Day 4 **Solving by the Quadratic Formula Notes**
 The solutions of any quadratic equation ($ax^2 + bx + c = 0$) can be found by evaluating the quadratic formula:

$$x = \frac{-b \pm \sqrt{(b)^2 - 4(a)(c)}}{2(a)}$$

Examples: Use the quadratic formula to solve for x

- $2x^2 - 10x - 5 = 0$
- $9x^2 + 2 = 3x$
- $-x^2 - 6x = 9$

Name _____

Algebra 1 - Unit 8 Day 4
Solving by the Quadratic Formula

Solve each equation with the quadratic formula.

- $4x^2 - 9 = 0$
- $6p^2 + 8p - 30 = 0$
- $6t^2 + 7t - 68 = 0$
- $5x^2 + 11 = 0$
- $x^2 + 4x - 69 = -9$
- $2t^2 - 58 = -8$
- $4t^2 - 8t = 21$
- $4t^2 = 144$

- $2a^2 - 5 + 3a = -10 - 8a^2 + 3a$
- $m^2 + 8m = 91 + 2m$
- $m^2 - 3m - 45 = 9m$
- $12p^2 - 9p - 44 = -4p + 8p^2$
- $2t^2 + 11t - 138 = 0$
- $6n^2 + 7n - 20 = -7$
- $\{6, -11.5\}$
 - No solution
 - $\{2.231, -7.731\}$
 - $\{18.471, -7.471\}$
- $\{7, -7\}$
 - $\{6, -1.5\}$
 - $\{9.899, -9.899\}$
 - $\{1, -2.167\}$
- $4t^2 = 25$
- $6x^2 + 7x - 64 = 4$
- $\{1, -1\}$
 - $\{2.5, -2.5\}$
 - $\{0.667, 0.5\}$
 - $\{1.25, -1.25\}$
- $\{2.833, -4\}$
 - $\{2.458, -5.458\}$
 - $\{1.198, -2.365\}$
 - $\{2, -6.5\}$

Name _____

Algebra 1
TOTD Solving Quadratic Equations (any method)

Solve each equation your way (by factoring, square root, completing the square, or quadratic formula). **SHOW ALL OF YOUR WORK!!**

- $p^2 + 2p - 143 = 0$
- $4x^2 - 9 = 0$
- $4x^2 - 7x - 15 = 0$
- $4x^2 + 3x - 27 = 0$

Algebra I
 © 2014 Kuta Software LLC. All rights reserved. Name _____
TOTD Solving Quadratic Equations (any method)
 Solve each equation your way (by factoring, square root, completing the square, or quadratic formula). **SHOW ALL OF YOUR WORK!**

1) $p^2 + 2p - 143 = 0$ 2) $4x^2 - 9 = 0$

3) $4t^2 - 7t - 15 = 0$ 4) $4x^2 + 3x - 27 = 0$

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March 22, 2019, Friday

Item 13
 Constructed-Response

Maria and Jeff collect data on the number of cars that pass through an intersection every Monday morning for 2 months. They record the findings as 78, 158, 63, 71, 96, 67, 75, and 84. They each use different methods to summarize the typical number of cars that pass through the intersection at the specified time and compare their findings. Jeff says that, on average, 79 cars pass through the intersection each Monday morning. Maria disagrees and says that the mean should not be used and uses the median instead to describe the typical number of cars that pass through the intersection on any given Monday morning.

Part A What is the median value of the data? Write your answer in the space provided.

Part B Explain why the median should be used instead of the mean. Write your answer in the space provided.

EOC released...close reading...so many details!
 G.O. then quiz...

Part A _____

Part B _____

