Algebra II

knoxschools.org/kcsathome

KCS at Home Learning Packet
April 2020
Algebra II

This packet is aligned to the following Tennessee Mathematics Standards and KCS Curriculum modules.
Module One
F.BF.A.1 Write a function that describes a relationship between two quantities. ★ a. Determine an explicit expression, a recursive process, or steps for calculation from a context. **F.BF.A.2.** Know and write arithmetic and geometric sequences with an explicit formula and use them to model situations. ★
Module Two
F.BF.A.1 Write a function that describes a relationship between two quantities. ★ b. Combine standard function types using arithmetic operations. **F-BF.A.1.a** Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. ★ **N.Q.A.1** Identify, interpret, and justify appropriate quantities for the purpose of descriptive modeling.
Module Three
A.REI.B.3 Solve quadratic equations and inequalities in one variable. a. Solve quadratic equations by inspection (e.g.,x_2=49), taking square roots, completing the square, knowing and applying the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b. **N.CN.A.1** Know there is a complex number i such that $i_2 = -1$, and every complex number has the form a+bi with a and b real. **N.CN.B.3** Solve quadratic equations with real coefficients that have complex solutions.

KCS @ home

1.1 Something to Talk About

A Develop Understanding Task

Cell phones often indicate the strength of the phone's signal with a series of bars. The logo below shows how this might look for various levels of service.

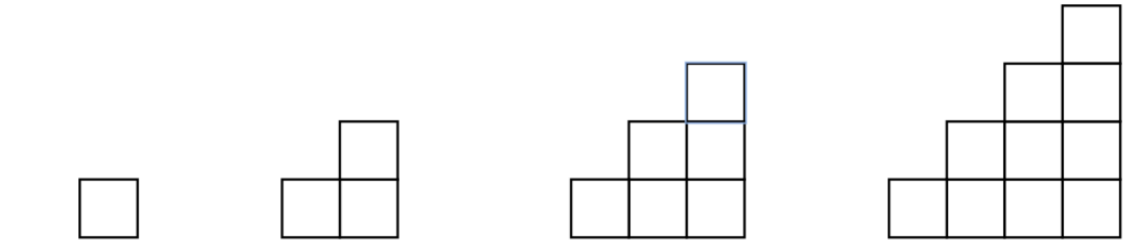


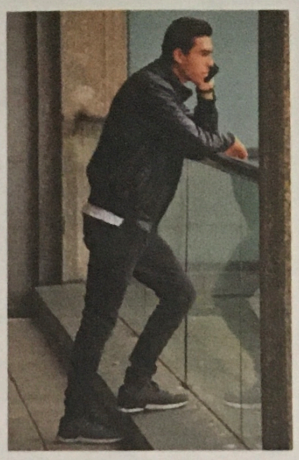
Figure 1 Figure 2 Figure 3 Figure 4

1. Assuming the pattern continues, draw the next figure in the sequence.

2. How many blocks will be in the figure 10?

3. Examine the sequence of figures and find a rule or formula for the number of tiles in any figure number.

ANSWER KEY



1.1 Something to Talk About

A Develop Understanding Task

Cell phones often indicate the strength of the phone's signal with a series of bars. The logo below shows how this might look for various levels of service.

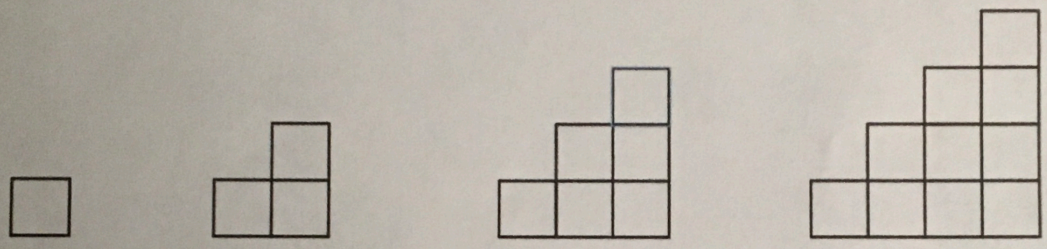


Figure 1 **Figure 2** **Figure 3** **Figure 4**

1. Assuming the pattern continues, draw the next figure in the sequence.

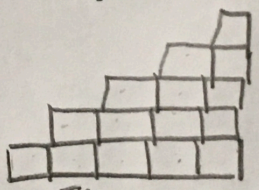


FIGURE 5

2. How many blocks will be in the figure 10?

55 Blocks

3. Examine the sequence of figures and find a rule or formula for the number of tiles in any figure number.

Y = # OF BLOCKS

X = FIGURE

RULE: $y = \frac{x(x+1)}{2}$

mathematics vision project

READY, SET, GO! Name Period Date

READY

Topic: Standard form or Quadratic form

In each of the quadratic equations, $ax^2 + bx + c = 0$ **identify the values of a, b and c .**

1. $x^2 + 3x + 2 = 0$

   a =
   b =
   c =

2. $2x^2 + 3x + 1 = 0$

   a =
   b =
   c =

3. $x^2 - 4x - 12 = 0$

   a =
   b =
   c =

Write each of the quadratic expressions in factored form.

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

5. $2x^2 + 3x + 1$

6. $x^2 - 4x - 12$

7. $x^2 - 3x + 2$

8. $x^2 - 5x - 6$

9. $x^2 - 4x + 4$

10. $x^2 + 8x - 20$

11. $x^2 + x - 12$

12. $x^2 - 7x + 12$

Answer Key

SOLVING QUADRATICS & OTHER EQUATIONS **3.4**

READY, SET, GO! Name Period Date

READY

Topic: Standard form or Quadratic form

In each of the quadratic equations, $ax^2 + bx + c = 0$ identify the values of a, b and c.

1. $x^2 + 3x + 2 = 0$

   a = 1
   b = 3
   c = 2

2. $2x^2 + 3x + 1 = 0$

   a = 2
   b = 3
   c = 1

3. $x^2 - 4x - 12 = 0$

   a = 1
   b = -4
   c = -12

Write each of the quadratic expressions in factored form.

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

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

5. $2x^2 + 3x + 1$

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

6. $x^2 - 4x - 12$

   $(x+2)(x-6)$

7. $x^2 - 3x + 2$

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

8. $x^2 - 5x - 6$

   $(x+1)(x-6)$

9. $x^2 - 4x + 4$

   $(x-2)(x-2)$

10. $x^2 + 8x - 20$

    $(x-2)(x+10)$

11. $x^2 + x - 12$

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

12. $x^2 - 7x + 12$

    $(x-3)(x-4)$

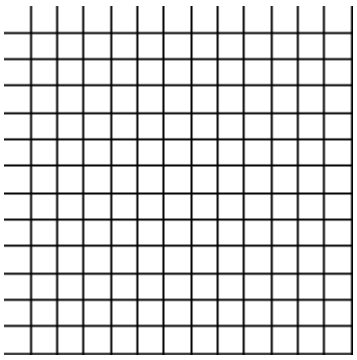
3.5 Throwing an Interception

A Develop Understanding Task

The *x*-intercept(s) of the graph of a function $f(x)$ are often very important because they are the solution to the equation $f(x)=0$. In past tasks, we learned how to find the *x*-intercepts of the function by factoring, which works great for some functions, but not for others. In this task we are going to work on a process to find the *x*-intercepts of any quadratic function that has them. We'll start by thinking about what we already know about a few specific quadratic functions and then use what we know to generalize to all quadratic functions with *x*-intercepts.

1. What can you say about the graph of the function $f(x)=x^2-2x-3$?

   a. Graph the function

   b. What is the equation of the line of symmetry?

   c. What is the vertex of the function?

2. Now let's think specifically about the *x*-intercepts.

   a. What are the *x*-intercepts of $f(x)=x^2-2x-3$?

   b. How far are the *x*-intercepts from the line of symmetry?

   c. If you knew the line of symmetry was the line $x = h$, and you know how far the *x*-intercepts are from the line of symmetry, how would you find the actual *x*-intercepts?

   d. How far above the vertex are the *x*-intercepts?

   e. What is the value of $f(x)$ at the *x*-intercepts?

ANSWER KEY

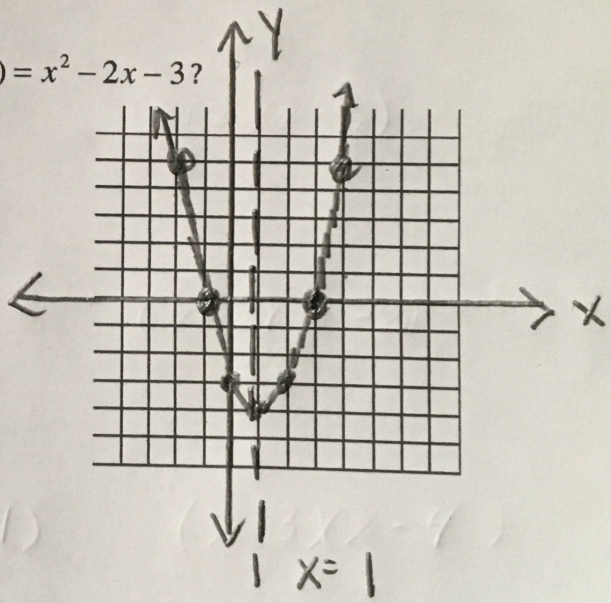
3.5 Throwing an Interception

A Develop Understanding Task

The x-intercept(s) of the graph of a function $f(x)$ are often very important because they are the solution to the equation $f(x)=0$. In past tasks, we learned how to find the x-intercepts of the function by factoring, which works great for some functions, but not for others. In this task we are going to work on a process to find the x-intercepts of any quadratic function that has them. We'll start by thinking about what we already know about a few specific quadratic functions and then use what we know to generalize to all quadratic functions with x-intercepts.

1. What can you say about the graph of the function $f(x)=x^2-2x-3$?

   a. Graph the function



   b. What is the equation of the line of symmetry?

   X = 1

   c. What is the vertex of the function?

   V(1, -4)

2. Now let's think specifically about the x-intercepts.

   a. What are the x-intercepts of $f(x)=x^2-2x-3$?

   (-1, 0) (3, 0)

   b. How far are the x-intercepts from the line of symmetry?

   2 units

   c. If you knew the line of symmetry was the line $x = h$, and you know how far the x-intercepts are from the line of symmetry, how would you find the actual x-intercepts?

   h ± x , where x = the distance the x-intercept is from the axis of symmetry.

   d. How far above the vertex are the x-intercepts?

   4 units

   e. What is the value of $f(x)$ at the x-intercepts?

   f(x) = 0

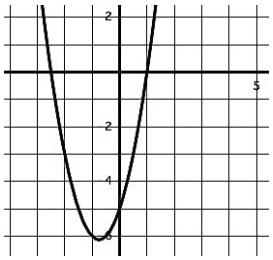
10. Determine the nature of the x-intercepts.

$f(x) = x^2 + 4x - 24$

11. Determine the nature of the x-intercepts.

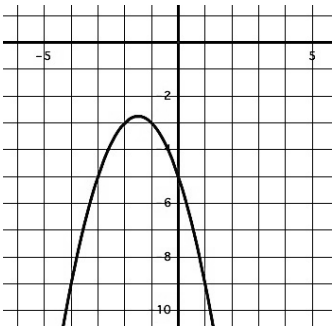
$g(x) = (2x - 1)(5x + 2)$

12. Determine the nature of the x-intercepts.



$f(x) = 2x^2 + 3x - 5$

13. Determine the nature of the x-intercepts.



14. Determine the nature of the x-intercepts.

$r(t) = t^2 - 8t + 16$

15. Determine the nature of the x-intercepts.

$h(x) = 3x^2 - 5x + 9$

Quadratic formula

$ax^2 + bx + c = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

GO

Topic: Finding x-intercepts for quadratics using factoring and quadratic formula.

If the given quadratic function can be factored then factor and provide the x-intercepts. If you cannot factor the function then use the quadratic formula to find the x-intercepts.

19. $A(x) = x^2 + 4x - 21$

20. $B(x) = 5x^2 + 16x + 3$

21. $C(x) = x^2 - 4x + 1$

22. $D(x) = x^2 - 16x + 4$

23. $E(x) = x^2 + 3x - 40$

24. $F(x) = 2x^2 - 3x - 9$

25. $G(x) = x^2 - 3x$

26. $H(x) = x^2 + 6x + 8$

27. $K(x) = 3x^2 - 11$

ANSWER KEY

10. Determine the nature of the x-intercepts.

$f(x) = x^2 + 4x - 24$

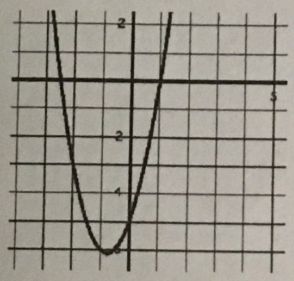
two real, irrational

11. Determine the nature of the x-intercepts.

$g(x) = (2x - 1)(5x + 2)$

two real, rational

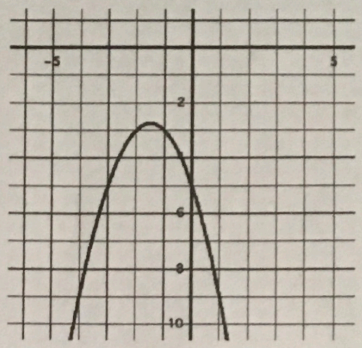
12. Determine the nature of the x-intercepts.



$f(x) = 2x^2 + 3x - 5$

two real, rational

13. Determine the nature of the x-intercepts.



two imaginary

14. Determine the nature of the x-intercepts.

$r(t) = t^2 - 8t + 16$

real, rational

15. Determine the nature of the x-intercepts.

$h(x) = 3x^2 - 5x + 9$

imaginary

Determine the number of roots that each polynomial will have.

16. ~~$x^5 + 7x^3 - x^2 + 4x - 21$~~ 17. ~~$4x^3 + 2x^2 - 3x - 9$~~ 18. ~~$2x^7 + 4x^5 - 5x^2 + 16x + 3$~~

GO

Topic: Finding x-intercepts for quadratics using factoring and quadratic formula.

If the given quadratic function can be factored then factor and provide the x-intercepts. If you cannot factor the function then use the quadratic formula to find the x-intercepts.

19. $A(x) = x^2 + 4x - 21$

$A(x) = (x - 3)(x + 7)$

$x = 3$, $x = -7$

20. $B(x) = 5x^2 + 16x + 3$

$B(x) = (5x + 1)(x + 3)$

$x = -\frac{1}{5}$, $x = -3$

21. $C(x) = x^2 - 4x + 1$

$x = 2 \pm \sqrt{3}$

22. $D(x) = x^2 - 16x + 4$

$x = 8 \pm 2\sqrt{15}$

23. $E(x) = x^2 + 3x - 40$

$E(x) = (x - 5)(x + 8)$

$x = 5$, $x = -8$

24. $F(x) = 2x^2 - 3x - 9$

$F(x) = (2x + 3)(x - 3)$

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

25. $G(x) = x^2 - 3x$

$G(x) = x(x - 3)$

$x = 0$, $x = 3$

26. $H(x) = x^2 + 6x + 8$

$H(x) = (x + 2)(x + 4)$

$x = -2$, $x = -4$

27. $K(x) = 3x^2 - 11$

$x = \pm \frac{\sqrt{33}}{3}$