Essential Question

How do you represent a Quadratic Function on a graph?

Unit 3 Vocabulary

Standard Form
Vertex Form
Discriminant

Common Core GPS

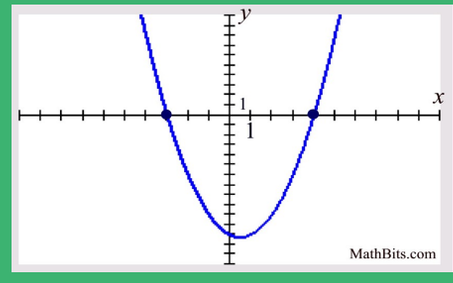
Unit 3 Modeling & Analyzing Quadratic Functions

10/30

Warm Up - Check HW and Video link link

Practice with Application

CW/HW Pg. 29 & 30 #1- 9



http://mathbitsnotebook.com/Algebra1/Quadratics/QDGraphInfo.html

Solve the following **QUADRATIC EQUATIONS** by **FACTORING & ZERO PRODUCT PROPERTY**:

1. $w^2 - 2w = 24$

$-24 \quad -24$

$w^2 - 2w - 24 = 0$

$(w+4)(w-6) = 0$

$w+4=0 \quad w-6=0$

$-4 \quad -4 \quad +6 \quad +6$

$w = -4$ OR $w = 6$

CHECK ANSWER

$x=-4$: $(-4)^2 - 2(-4) = 24$, $16 + 8 = 24$ ✓

$x=6$: $(6)^2 - 2(6) = 24$, $36 - 12 = 24$ ✓

-24: $1,-24$; $-1,24$; $2,-12$; $-2,12$; $3,-8$; $-3,8$; $4,-6$; $-4,6$

2. $t^2 = 8t + 20$

$-8t \quad -8t \quad -20$

$t^2 - 8t - 20 = 0$

$(t+2)(t-10) = 0$

$t+2=0 \quad t-10=0$

$-2 \quad -2 \quad +10 \quad +10$

$t = -2$ OR $t = 10$

CHECK ANS

$t=-2$: $(-2)^2 = 8(-2) + 20$, $4 = -16 + 20$ ✓

$t=10$: $(10)^2 = 8(10) + 20$, $100 = 80 + 20$ ✓

-20: $1,-20$; $-1,20$; $2,-10$; $-2,10$; $4,-5$; $-4,5$

3. $r^2 - 6r = 0$ $+5 = 6r$ $r^2 = 6r + 5 = 0$ $(r-1)(r-5)$ $r=1 \; r=5$

$r(r-6) = 0$

$r = 0 \quad r-6=0$

$+6 \quad +6$

$r = 0$ OR $r = 6$

CHECK ANSWER

$r=0$: $(0)^2 - 6(0) = 0$, $0 - 0 = 0$ ✓

$r=6$: $(6)^2 - 6(6) = 0$, $36 - 36 = 0$ ✓

4. $x^2 + 2x - 20 = 7x + 4$

$-7x \quad -4 \quad -7x \quad -4$

$x^2 - 5x - 24 = 0$

$(x+3)(x-8) = 0$

$x+3=0 \quad x-8=0$

$-3 \quad -3 \quad +8 \quad +8$

$x = -3$ OR $x = 8$

-24: $1,-24$; $-1,24$; $2,-12$; $-2,12$; $3,-8$; $-3,8$; $4,-6$; $-4,6$

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

$x^2 - 4x + 2x - 8 = 4 + 2x$

$-2x \quad -4 \quad -4 \quad -2x$

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

$(x+2)(x-6) = 0$

$x+2=0 \quad x-6=0$

$-2 \quad -2 \quad +6 \quad +6$

$x = -2$ OR $x = 6$

-12: $1,-12$; $-1,12$; $2,-6$; $-2,6$; $3,-4$; $-3,4$

6. $2x^2 - 5 = 3x^2 + 11 - 10x$

$-2x^2 \quad +5 \quad -2x^2 \quad +5$

$0 = x^2 + 16 - 10x$

$0 = x^2 - 10x + 16$

$0 = (x-2)(x-8)$

$x-2=0 \quad x-8=0$

$+2 \quad +2 \quad +8 \quad +8$

$x = 2$ OR $x = 8$

16: $1,16$; $-1,-16$; $2,8$; $-2,-8$; $4,4$; $-4,-4$

7. $2x^2 + 7x - 15 = 0$

-30: $1,-30$; $-1,30$; $2,-15$; $-2,15$; $3,-10$; $-3,10$; $5,-6$; $-5,6$

$2x-3$ / 1 and $2x+10$ / 2

$(2x-3)(x+5)=0$

$2x-3=0$ $+3\ +3$; $\frac{2x}{2}=\frac{3}{2}$ and $x+5=0$ $-5\ -5$

$x = 3/2$ OR $x = -5$

8. $4p^2 - 10 = 3p$

$-3p\ \ -3p$

$4p^2 - 3p - 10 = 0$

-40: $1,-40$; $-1,40$; $2,-20$; $-2,20$; $4,-10$; $-4,10$; $5,-8$; $-5,8$

$4p+5$ / 1 and $4p-8$ / 4

$(4p+5)(p-2)=0$

$4p+5=0$ $-5\ -5$; $\frac{4p}{4}=\frac{-5}{4}$ and $p-2=0$ $+2\ +2$

$p = 2$ OR $p = -5/4$

9. $3x^2 + 2x - 12 = 3x^2 + 6x$

$-3x^2\ \ -3x^2$

$2x - 12 = 6x$

$-2x\ \ -2x$

$\frac{-12}{4} = \frac{4x}{4}$

$-3 = x$

10. $x^3 - 12x^2 + 32x = 0$

$x(x^2 - 12x + 32) = 0$

$x \cdot (x-4) \cdot (x-8) = 0$

$x = 0$; $x-4=0$ $+4\ +4$; $x-8=0$ $+8\ +8$

$x = 0$ OR $x = 4$ OR $x = 8$

32: $1,32$; $-1,-32$; $2,16$; $-2,-16$; $4,8$; $-4,-8$

11. $x^2 - 4 = 0$

$x\ x$; $2\ 2$

$(x+2)(x-2)=0$

$x+2=0$ $-2\ -2$ and $x-2=0$ $+2\ +2$

$x = -2$ OR $x = 2$

12. $2a^2 + 17a + 8 = 0$

16: $1,16$; $-1,-16$; $2,8$; $-2,-8$; $4,4$; $-4,-4$

$2a+1$ / 1 and $2a+16$ / 2

$(2a+1)(a+8)=0$

$2a+1=0$ $-1\ -1$; $\frac{2a}{2}=\frac{-1}{2}$ and $a+8=0$ $-8\ -8$; $a = -8$

$a = -1/2$ OR $a = -8$

Solve the applications that of **QUADRATIC EQUATIONS**:

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Solve the applications that of **QUADRATIC EQUATIONS**:

1. The length of a rectangle is 1 cm more than twice its width. If the area of the rectangle is $21cm^2$ then what are the dimensions? 3cm, 7cm

$2w+1$

$2(3)+1$

7

$w=3$

$w(2w+1)=21$

$2w^2+w=21$

$2w^2+w-21=0$

42, -6, 7, 1

$(2w^2-6w)+(7w-21)=0$

$2w(w-3)+7(w-3)=0$

$(w-3)(2w+7)=0$

$w-3=0$

$w=3$

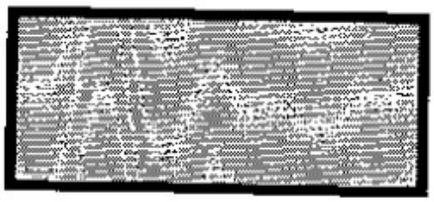
$2w+7=0$

$-7 \quad -7$

$2w=-7$

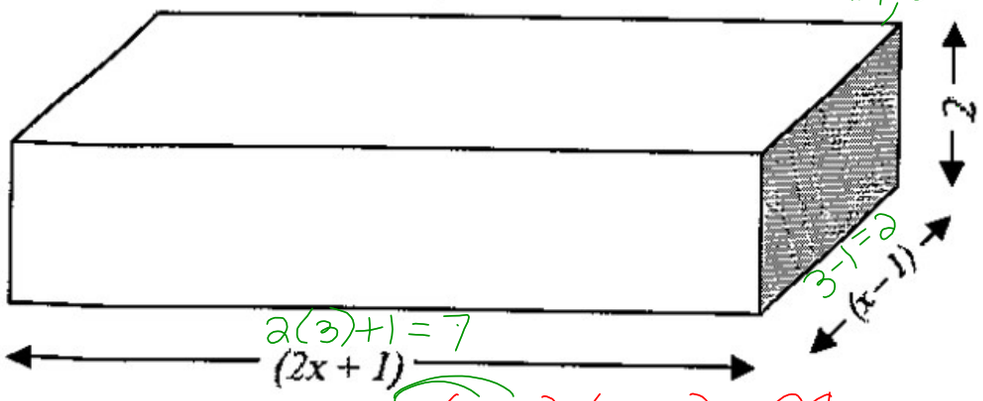
$w=-\frac{7}{2}$ or $-3\frac{1}{2}$

2. The length of a rectangle is 3 cm less than twice its width. If the area of the rectangle is $20cm^2$ then what are the dimensions? 4 cm, 5cm



$V = l \cdot w \cdot h$

3. The volume of the prism is 28 cubic inches. What is the length of each side? 2in, 2in, 7in



$2(x-1)(2x+1)=28$

$(2x-2)(2x+1)=28$

$4x^2+2x-4x-2=28$

$4x^2-2x-2=28$

$-28 \quad -28$

$\frac{4x^2-2x-30}{2} = \frac{0}{2}$

$2x^2-x-15=0$

-30, -6, 5, -1

$(2x^2-6x)+(5x-15)=0$

$2x(x-3)+5(x-3)=0$

$(x-3)(2x+5)=0$

$x-3=0$ $\quad 2x+5=0$

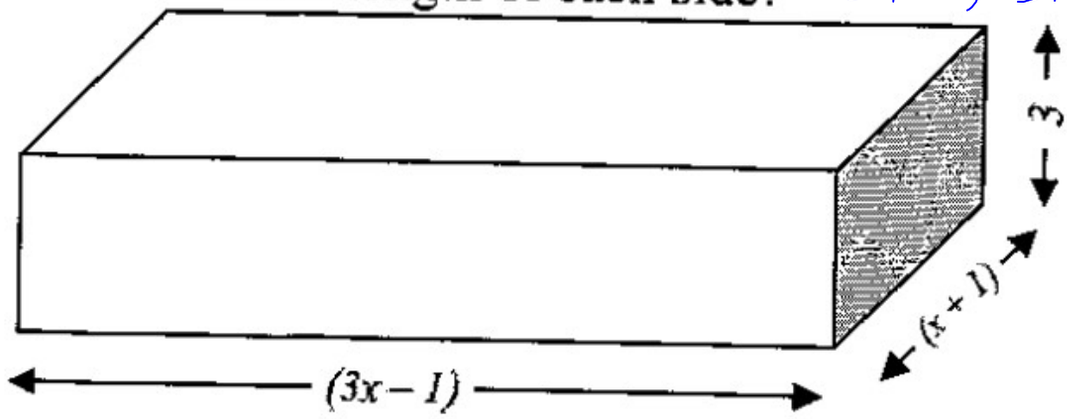
$-5 \quad -5$

$x=3$

$2x=-5$

$x=\frac{-5}{2}$ or $-2\frac{1}{2}$

4. The volume of the prism is 45 cubic inches. What is the length of each side? 3in, 3in, 5in



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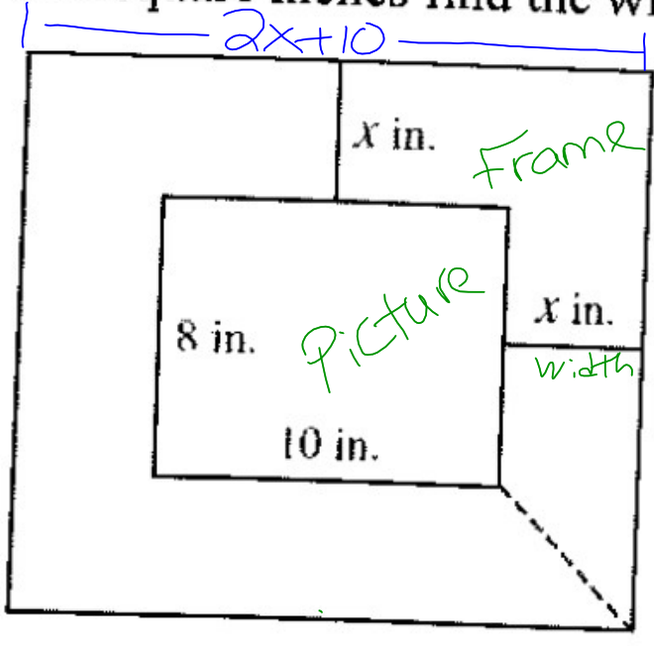
5. A picture frame is shown at the right. If the entire area of the frame and the picture totals 120 square inches find the width of the frame.



1 in

$(2x+10)(2x+8)=120$

$4x^2+16x+20x+80=120$

$4x^2+36x+80=120$

$-120 \quad -120$

$\frac{4x^2+36x-40}{4}=\frac{0}{4}$

$x^2+9x-10=0$

$(x^2-1x)+(10x-10)=0$

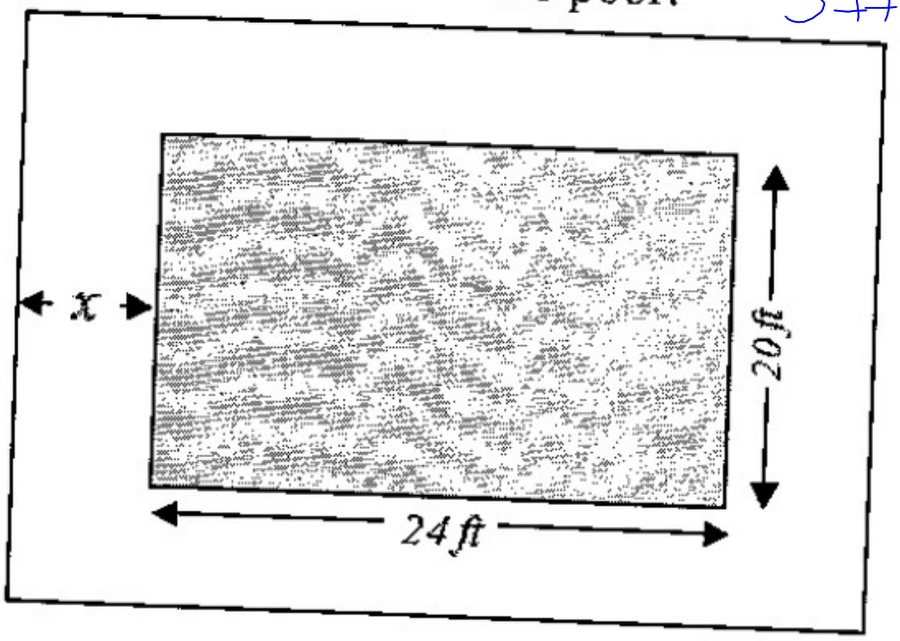
$x(x-1)+10(x-1)=0$

$(x-1)(x+10)=0$

$x-1=0 \quad x+10=0$

$x=1 \quad x=-10$

6. A below ground swimming pool is to be constructed in the park. The pool is in the shape of a rectangle with the dimensions of 20' by 24'. A uniform width sidewalk is to be made around the pool. If the contractor says that he has enough concrete to create 300 ft^2 of sidewalk. What is the maximum width of the sidewalk around the pool? 3 ft



7. The product of two consecutive positive integers is 132. Write an equation to model the situation and find the two integers. 11, 12

1st integer = x

2nd integer = $x+1$

$x(x+1) = 132$

$x^2 + x = 132$

$x^2 + x - 132 = 0$

-132, -11, 12, 1

$(x-11)(x+12) = 0$

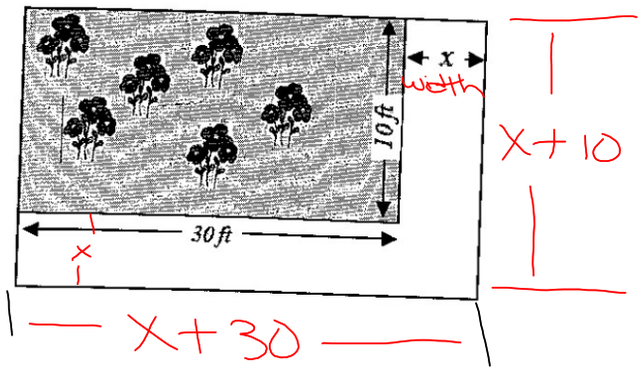
$x - 11 = 0$ $\quad x + 12 = 0$

$x = 11$ $\quad x = -12$

8. The perimeter of a rectangle is 42 cm and the area is 80 cm^2. Write an equation to model the situation and find the dimensions of the rectangle.

5 cm, 16 cm

9. A park is putting in a sidewalk of uniform width to go around two sides of a rectangular garden that is 10 feet by 30 feet. The contractor has enough concrete for 176 ft^2. What is the maximum width of such a sidewalk?



$(x+10)(x+30)-300=176$