

**Before we begin, are there any questions from last day's work?**

## Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) graph a quadratic relation using "factored form".
- b) determine the equation of a quadratic given conditions.

p. 279

2e)  $x^2 - 2x = 0$

$x(x-2) = 0$

$\downarrow$   
 $x = 0$

$\downarrow$   
 $x - 2 = 0$   
 $x = 2$

f)  $c^2 - 17c + 30 = 0$

$(c-15)(c-2) = 0$

$\downarrow$   
 $c = 15$  or  $c = 2$

3a)  $3x^2 + 28x + 9 = 0$

$(3x+1)(x+9) = 0$

$\downarrow$   
 $3x+1=0$

$3x = -1$

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

$\downarrow$   
 $x+9=0$

$x = -9$

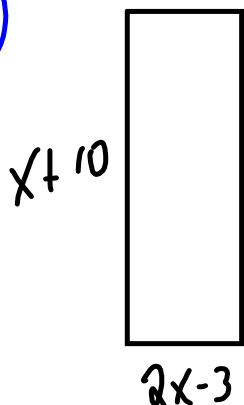
4b)  $8c + 15 = -c^2$

$c^2 + 8c + 15 = 0$

$(c+5)(c+3) = 0$

$\therefore c = -5$  or  $c = -3$

8)

Find  $x$  if  $A = 54 \text{ cm}^2$ 

$A = (x+10)(2x-3)$

$= 2x^2 - 3x + 20x - 30$

$54 = 2x^2 + 17x - 30$

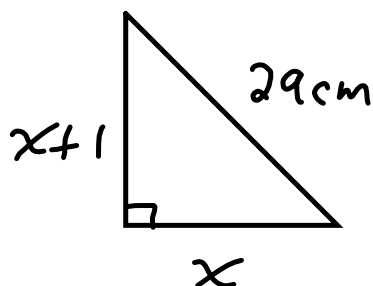
$0 = 2x^2 + 17x - 30 - 54$

$0 = 2x^2 + 17x - 84$

$= (2x \quad x \quad )$

14

p. 280 #14



$$x^2 + (x+1)^2 = 29^2$$

$$x^2 + x^2 + 2x + 1 = 841$$

$$2x^2 + 2x + 1 - 841 = 0$$

$$2x^2 + 2x - 840 = 0$$

$$2(x^2 + x - 420) = 0$$

$$2(x - 20)(x + 21) = 0$$

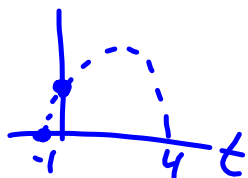
$$\therefore x = 20 \text{ cm or } x = -21 \text{ cm}$$

inadmissible.

p. 241 #14  $s, m$ 

$$h = -5t^2 + 15t + 20$$

a) factor  $h = -5(t^2 - 3t - 4)$   
 $= -5(t - 4)(t + 1)$



b) hits ground?

$$h = 0$$

$$0 = -5(t - 4)(t + 1)$$

$$\therefore t = 4 \text{ or } t = -1$$

secs

inadmissible

$\therefore$  ball hits the ground at 4 sec.

4.5 Quadratic Relations of the Form  $y=a(x-r)(x-s)$  (Fall 2016)-f16.notebook November 23, 2016

MPM 2D1 4.5 Quadratic Relations of the Form  $y=a(x-r)(x-s)$

Date: Nov. 23/16

Ex. 1 Given the equation  $y=(x-1)^2-4$  (in vertex form),

a) convert the equation to standard form  $y=ax^2+bx+c$ .

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

b) convert the equation to factored form:  $y=a(x-r)(x-s)$ , then state the x-intercepts, axis of symmetry, and the vertex.

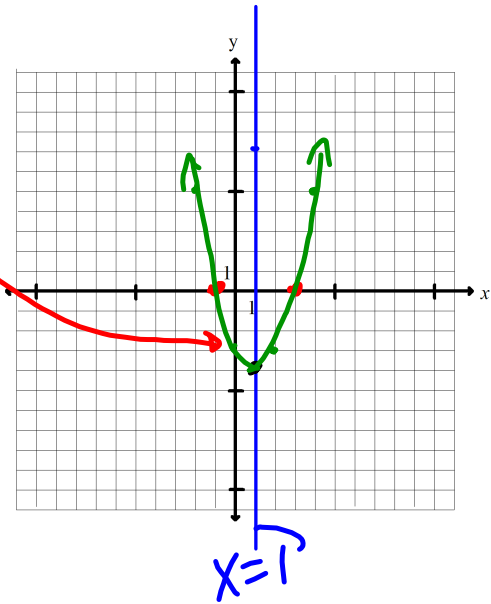
$$\begin{aligned} y &= x^2 - 2x - 3 \\ &= (x-3)(x+1) \end{aligned}$$

let  $y=0$

$$0 = (x-3)(x+1)$$

$$x=3 \text{ or } x=-1$$

Axis of Symmetry (A of S):  $x = \frac{3+(-1)}{2} = -\frac{2}{2} = -1$



Sub  $x=1$

$$\begin{aligned} y &= (1-3)(1+1) \\ &= (-2)(2) \\ &= -4 \therefore v(1, -4) \end{aligned}$$

$$y = a(x-h)^2 + k$$

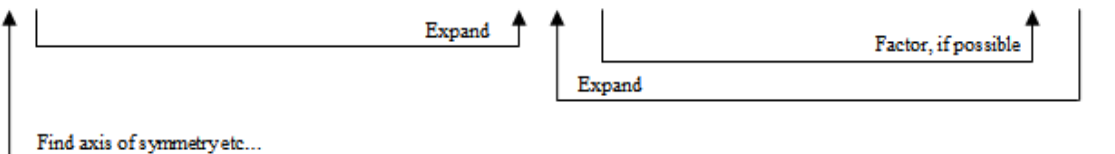
Vertex Form

$$y = ax^2 + bx + c$$

Standard Form

$$y = a(x-r)(x-s)$$

Factored Form



Summary

Given a quadratic relation in vertex form  $y=a(x-h)^2+k$ , the coordinates of the vertex are  $(h, k)$ .

Given a quadratic relation in standard form  $y=ax^2+bx+c$ , the y-intercept is 'c'.

Given a quadratic relation in intercept form  $y=a(x-r)(x-s)$ , the 'r' and 's' represent the x-intercepts.

Note that the value of 'a' is the same in all 3 forms.

4.5 Quadratic Relations of the Form  $y=a(x-r)(x-s)$  (Fall 2016)-f16.notebook November 23, 2016

Ex. 2 Given the equation  $y = 2(x+3)^2 - 8$  (in vertex form),

a) convert the equation to standard form  $y = ax^2 + bx + c$ .

$$\begin{aligned}
 y &= 2(x+3)^2 - 8 \\
 &= 2(x^2 + 6x + 9) - 8 \\
 &= 2x^2 + 12x + 18 - 8 \\
 &= 2x^2 + 12x + 10
 \end{aligned}$$

$$(x+3)(x+3)$$

b) convert the equation to factored form:  $y = a(x-r)(x-s)$ , then state the x-intercepts, axis of symmetry, and the vertex

$$\begin{aligned}
 y &= 2x^2 + 12x + 10 \\
 &= 2(x^2 + 6x + 5) \\
 &= 2(x+5)(x+1)
 \end{aligned}$$

at  $y=0$

$$0 = 2(x+5)(x+1)$$

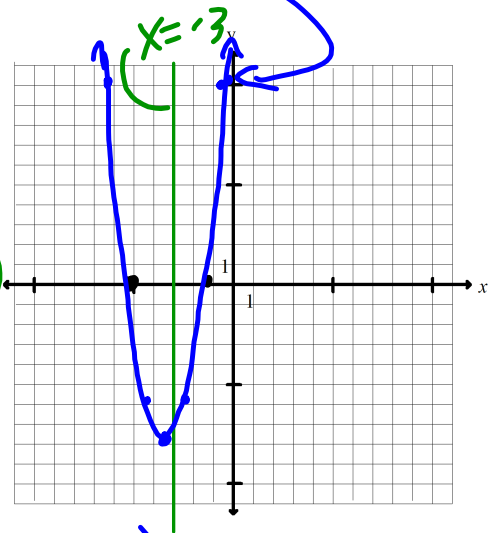
$\downarrow$                        $\downarrow$   
 $x = -5$     or     $x = -1$

Abs:

$$x = \frac{-5+(-1)}{2}$$

$$= \frac{-6}{2}$$

$$x = -3$$



$$\begin{aligned}
 y &= 2(x+5)(x+1) \\
 &= 2(-3+5)(-3+1) \\
 &= 2(2)(-2) \\
 &= -8
 \end{aligned}$$

$\therefore v(-3, -8)$

Ex. 3 Determine an equation in the form  $y=a(x-r)(x-s)$ , for the quadratic relation with  $x$ -intercepts  $-2$  and  $10$ , and through the point  $(7, 9)$ .

$$y = a(x-10)(x+2)$$

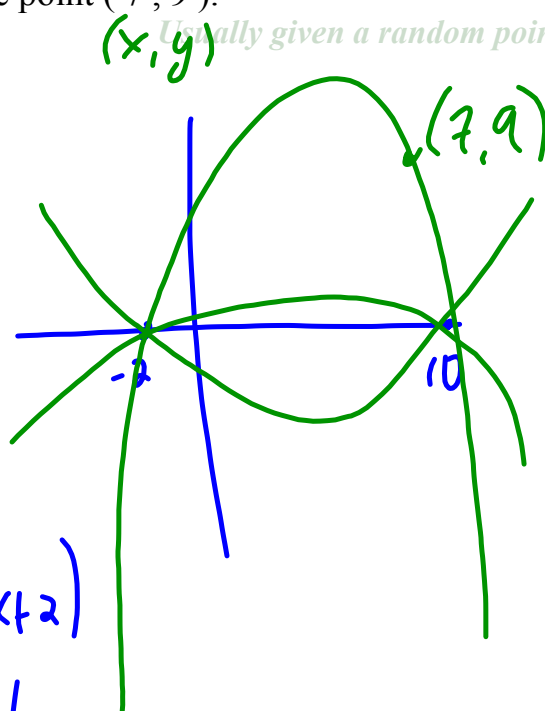
$$9 = a(7-10)(7+2)$$

$$9 = a(-3)(9)$$

$$\frac{9}{-27} = \frac{-27a}{-27}$$

$$-\frac{1}{3} = a \quad \therefore y = -\frac{1}{3}(x-10)(x+2)$$

is the equation.



Today's practice: **Read "Key Concepts" on p. 191**  
pp. 192-193 #3, 4abc, 5, 6, 8, 10, 11  
*Enrichment:* p. 193 #12, 13, 15

Video example link on next slide.

## 4.5 Quadratic Relations of the Form $y=a(x-r)(x-s)$ (Fall 2016)-f16.notebook November 23, 2016

Ex. 1 Length=4:36

Ex. 2 (*p.190 from our textbook*) Length=3:06 (start at 4:36)

<http://www.youtube.com/watch?v=C8YcqPLAz3A>



6.3 Tomorrow Ex. 1 Length=6 min

<http://www.youtube.com/watch?v=cSGObgLOu3U>

