

Are there any questions from yesterday's homework practice?

p. 257 #15



pp. 258-259 #2b, 3df, 5, 7cd, 8abc, 10a, 12, 13ab, 15a, 16a  
(HINT In 16a, the question is expressed as a difference of squares!)

*Optional Worksheet: Mixed Factoring #4*

p. 203 #7a (MAKE A GRAPH ON GRID PAPER), 8 (JUST SKETCH IN PART a) – NO GRID REQUIRED)

p. 205 #7 (JUST SKETCH IN PART a) – NO GRID)

p. 316 #4c (NO “CHECK”), 5cd,

7cde (GRAPH ON GRID PAPER)



P.258

8a)

$$\begin{aligned} & 3k^2 + 12km - 36m^2 \\ &= 3(k^2 + 4km - 12m^2) \\ &= 3(k - 2m)(k + 6m) \end{aligned}$$

b)  $8y^2 + 19y + 6$

$$\begin{aligned} & = (y+2)(8y+3) \\ &= (3w-1)(3w-7) \end{aligned}$$

$$\begin{array}{c} 3w-1 \\ \cancel{3w-1} \end{array}$$

p.258

$$(a) A = x^2 + 13x - 30$$

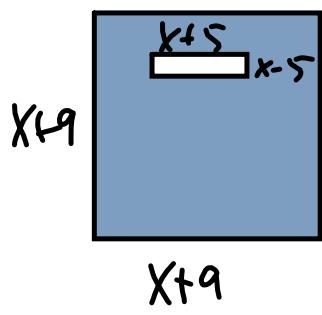
q)  $l \perp w?$   $l$   $w$   
 $A = (x+15)(x-2)$

$x=3$  is the smallest

↑  
 5) smallest  $x$  (integer)

$$\begin{aligned} & \text{if } x \geq 2 \\ & (17)(0) \\ & = 0 \end{aligned}$$

p.259 #12

 $A_{\text{Shade}}$ 

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

$$= x^2 + 18x + 81 - (x^2 - 25)$$

$$= \underline{x^2} + 18x + 81 - \underline{x^2} + 25$$

$$= 18x + 106$$

$$\begin{aligned} b) A &= 18x + 106 \\ &= 2(9x + 53) \end{aligned}$$

$$\begin{aligned} & \text{if } x = 7 \\ b) A &= 2(9(7) + 53) \\ & = 2(63 + 53) \\ & = 2(116) \\ & = 232 \end{aligned}$$

P.25 Q #13

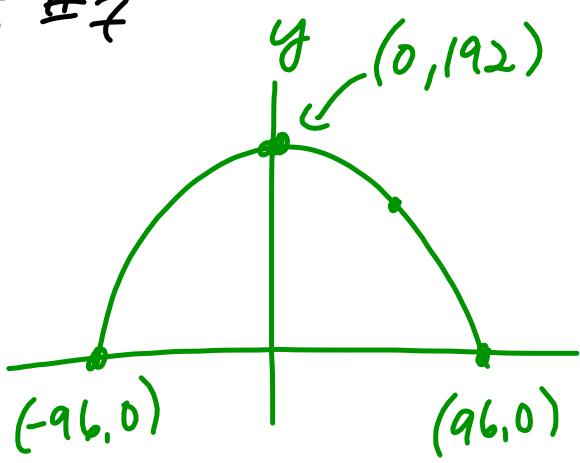
$$y = 2(x+6)^2 - 2$$

$$\begin{aligned} \text{a) } y &= 2(x^2 + 12x + 36) - 2 \\ &= 2x^2 + 24x + 72 - 2 \\ &= 2x^2 + 24x + 70 \end{aligned}$$

$$\begin{aligned} \text{b) } y &= 2x^2 + 24x + 70 \\ &= 2(x^2 + 12x + 35) \\ &= 2(x+5)(x+7) \\ \text{c) } y &\leq 0 \end{aligned}$$

P.205 #7

a)



$$y = ax^2 + 192$$

$$0 = a(96)^2 + 192$$

$$-192 = 9216a$$

$$\frac{-192}{9216} = a$$

$$-\frac{1}{48} = a$$

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

$$= a(x-0)^2 + 192$$

$$= ax^2 + 192$$

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

$$= a(x-96)(x-(-96))$$

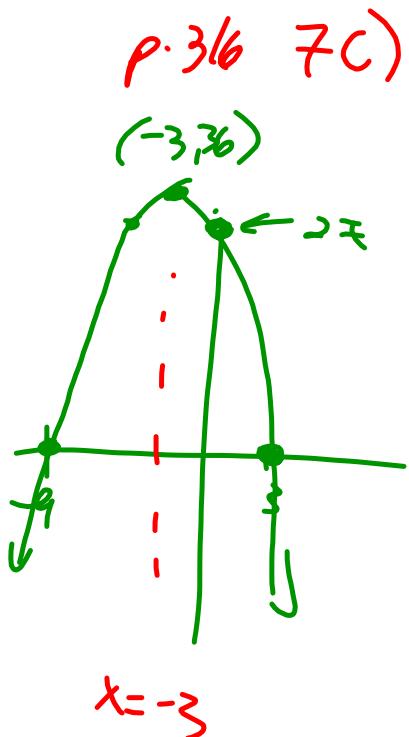
$$= a(x-96)(x+96)$$

$$192 = a(0-96)(0+96)$$

$$192 = a(-9216)$$

$$-\frac{192}{9216} = a$$

$$\therefore y = -\frac{1}{48}(x-96)(x+96)$$



$$\begin{aligned}
 y &= -x^2 - 6x + 27 \\
 &= -(x^2 + 6x - 27) \\
 0 &= -(x+9)(x-3) \\
 \downarrow & \\
 x+9 &= 0 \quad \text{or} \quad x-3 = 0 \\
 x &= -9 \qquad \qquad x = 3
 \end{aligned}$$

$$\begin{aligned}
 \text{Ans: } x &= -\frac{9}{2} \\
 &= -\frac{6}{2} \\
 &= -3
 \end{aligned}$$

$$\begin{aligned}
 &\because x = -3 \\
 y &= -1(x+9)(x-3) \\
 &= -1(-3+9)(-3-3) \\
 &= -1(6)(-6) \\
 &= 36 \\
 &\therefore V(-3, 36)
 \end{aligned}$$

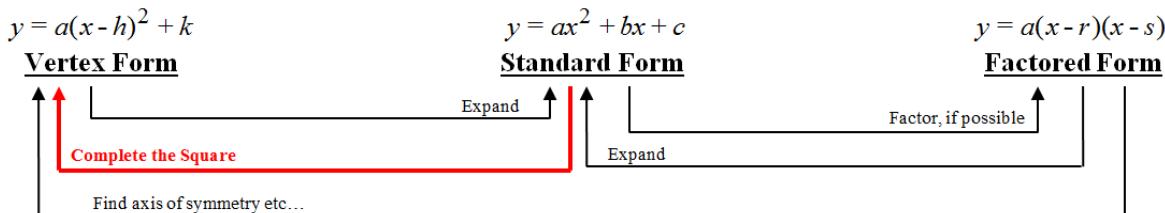
## Today's Learning Goal(s):

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

- a) convert a quadratic relation from standard form to vertex form by "completing the square".

MPM 2DI

## 6.1 Maxima and Minima-Completing the Square

Date: Nov. 29/16

What is the vertex of the quadratic relation  $y = x^2 - 10x + 25$ ?

Notice that the relation is a “**perfect square trinomial**” equivalent to,  $y = (x-5)^2$  with vertex  $(5, 0)$ .

Given:  $y = ax^2 + bx + c$ , the relation is a perfect square when  $c = \left(\frac{1}{2}b\right)^2$ .

i.e.  $y = x^2 - 10x + 25$  or  $y = x^2 + 14x + 49$  but not  $y = x^2 - 20x + 36$

$$\begin{array}{lll} \left(\frac{1}{2}(-10)\right)^2 & \left(\frac{1}{2}(14)\right)^2 & \left(\frac{1}{2}(-20)\right)^2 \\ = (-5)^2 & = (7)^2 & = (-10)^2 \\ = 25 & = 49 & = 100 \\ & & \neq 36 \end{array}$$

Ex. 1 What constant term must be added to the following expressions to make them perfect squares?

a)  $y = x^2 + 12x$

if  $c = 36$

$\left(\frac{12}{2}\right)^2$   
then  $y = x^2 + 12x + 36$   
 $= (x+6)^2$

b)  $y = x^2 - 16x$

if  $c = 64$

then  $y = x^2 - 16x + 64$   
 $= (x-8)^2$

c)  $y = x^2 - 30x$

if  $c = 225$

then  $y = x^2 - 30x + 225$   
 $= (x-15)^2$

$$\begin{aligned} & \left(\frac{12}{2}\right)^2 \\ & = 6^2 \\ & \therefore 36 \end{aligned}$$

Recall: When we add “zero” to an equation, we do not change its value.

This idea of adding an equivalent of zero is the principle behind completing the square.

Ex. 2 Find the vertex by completing the square.

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

$$\begin{aligned} &= \underbrace{x^2 - 6x + 9}_\text{Complete the square} - 9 + 11 \\ &= (x-3)^2 + 2 \\ \therefore V(3, 2) \end{aligned}$$

b)  $y = x^2 + 18x + 20$

$$\begin{aligned} &= \underbrace{x^2 + 18x + 81}_\text{Complete the square} - 81 + 20 \\ &= (x+9)^2 - 61 \\ \therefore V(-9, -61) \end{aligned}$$

c)  $y = -3x^2 + 30x + 41$

$$\begin{aligned} &= -3(x^2 - 10x) + 41 \\ &= -3(\underbrace{x^2 - 10x + 25}_\text{Complete the square} - 25) + 41 \\ &= -3(x-5)^2 + 75 + 41 \\ &= -3(x-5)^2 + 116 \\ \therefore V(5, 116) \end{aligned}$$

Be ready for the unit summative on Tomorrow!

Today's practice: **Read p.267 Example 2, Method 1: Complete the Square**

pp. 270-272 #4c, 5, 6a, 8abce, 17ab, 19

**Enrichment:** pp. 272-273 #17d, 27