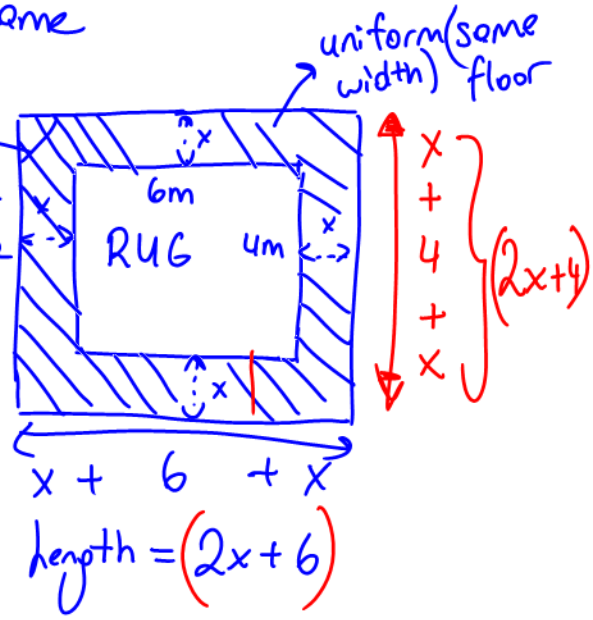
Area of the room = 2 x Area$_{rug}$

**Day 3. page 1, ~~A~~ H.**

**4 m by 6 m rug covers half of the floor area of a room and leaves a uniform strip of bare floor around the edges. What are the dimensions of the room ?**

same

Let "x" represent the width of the uniform strip




If the area of the rug $6 \times 4 = 24\ m^2$
then the area of the room is $24 \times 2 = 48 m^2$

Area of the room = $48\ m^2$

$(2x+6)(2x+4) = 48$ FOIL to expand

$4x^2 + 8x + 12x + 24 = 48$ collect like terms (simplify)

$-48$

$4x^2 + 20x + 24 = 48$

$4x^2 + 20x - 24 = 0$ GCF = 4

$4(x^2 + 5x - 6) = 0$

| M | A | N |
|---|---|---|
| -6 | 5 | -1, 6 |

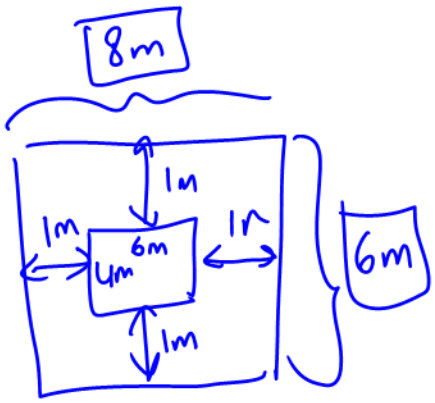
$\Rightarrow 4(x-1)(x+6) = 0$

$x - 1 = 0$

$x = 1$

$x + 6 = 0$

~~$x = -6$~~ b/c dimension cannot be negative



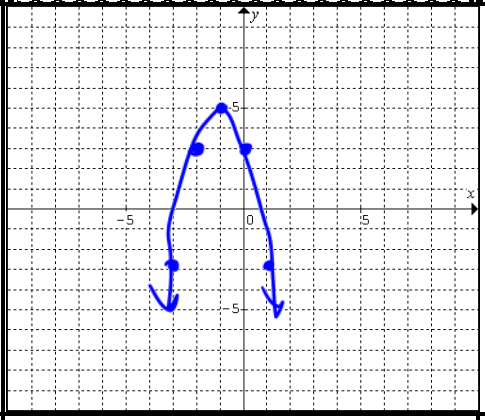
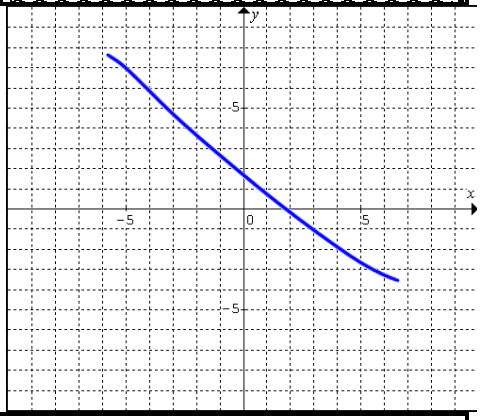

$\therefore$ length $(2x+6)$ is $2(1)+6 = 8m$

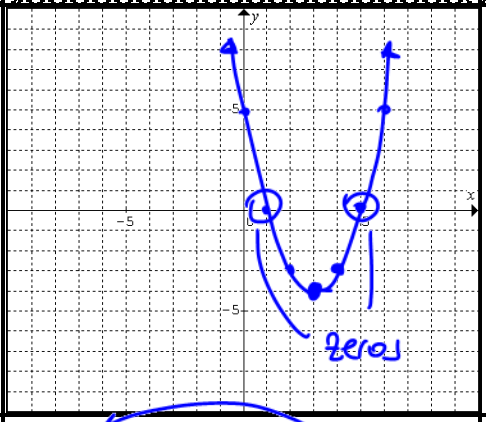
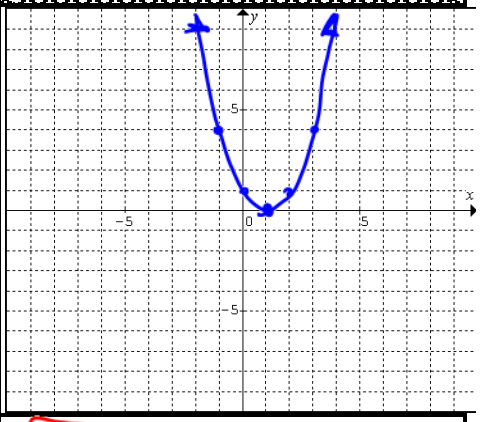
width $(2x+4)$ is $2(1)+4 = 6m$

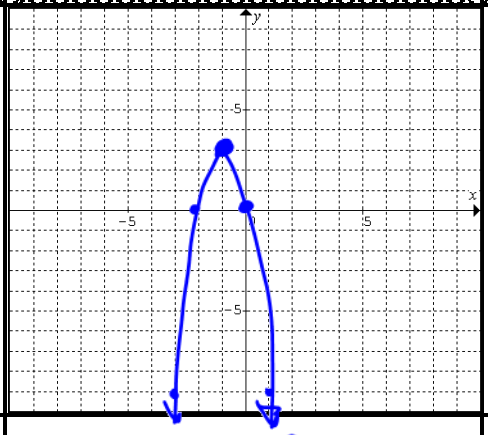
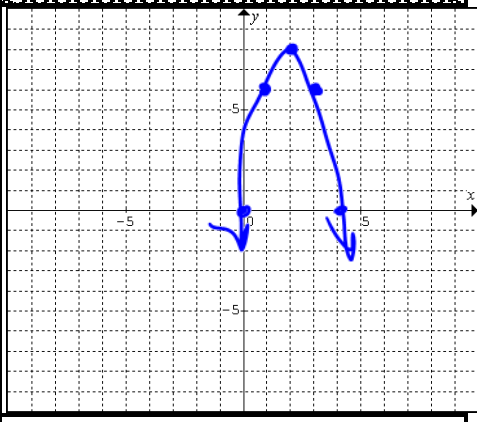
**MPM2D1** STD form → Vertex **Date:** _____

**Day 4: Completing the Square – Vertex & Zeros** **Chapter 6: Quadratic Equations**

# Completing the Square - Vertex & Zeros

| Steps $y=a(x-h)^2+k$ | **Example #1** $y = -2x^2 - 4x + 3$ | **Example #2** $y = -5x^2 + 20x + 1$ |
|---|---|---|
| **Common factor** the coefficient of the $x^2$ term from the first two terms. **Do not** factor out the x. | $=-2\left(\frac{-2x^2}{-2} - \frac{4x}{-2}\right) + 3$<br>$=-2(x^2+2x) + 3$ | $y=-5(x^2-4x)+1$ |
| **Divide** the coefficient of x by 2, and then **square** it. | $\frac{+2}{2}=1 \rightarrow (1)^2=1$ | $\frac{-4}{2}=-2 \quad (-2)^2=4$ |
| **Add** and **subtract** that value inside the bracket of the equation two steps above. | $=-2(x^2+2x+1-1)+3$<br>$(-2)(-1)$ | $y=-5(x^2-4x+4-4)+1$<br>P.S.T |
| Move the last term in the bracket to the outside of the bracket and **multiply** it with the number in front of the bracket. Add the two constants together. | $=-2(x^2+2x+1)+2+3$<br>$=-2(x^2+2x+1)+5$<br>Perfect square trinomial | $=-5(x^2-4x+4)+20+1$<br>why? $(-5)(-4)$ $=-5(x^2-4x+4)+21$<br>PST |
| Factor the perfect square trinomial inside the bracket. | $=-2(x+1)^2+5$<br>Vertex $(-1,5)$ | $y=-5(x-2)^2+21$ |
| Steps $=-2(1,3,5)$<br>$=-2,-6,-10$ |  |  |
| **Now, determine the zeros:** Set $y = 0$ | $0=-2(x+1)^2+5$ | $0=-5(x-2)^2+21$ |
| Remove the ***k*** | $-5=-2(x+1)^2$ | $-21=-5(x-2)^2$ |
| Remove the ***a*** | $\frac{-5}{-2}=\frac{-2(x+1)^2}{-2}$ | $\frac{-21}{-5}=\frac{-5(x-2)^2}{-5}$ |
| Square root – Don't forget the ± | $\sqrt{2.5}=\sqrt{(x+1)^2}$ | $\sqrt{4.2}=\sqrt{(x-2)^2}$ |
| Remove the ***h*** | $1.6 = x+1$ and $-1.6=x+1$ | $2.05=x-2$ and $-2.05=x-2$ |
| | $x=0.6$ or $x=-2.6$ | $x=4.05$ $x=-0.05$ |

| Steps | Example #3<br>$y = x^2 - 6x + 5$ | Example #4<br>$y = x^2 - 2x + 1$ |
|---|---|---|
| Common factor the coefficient of the $x^2$ term from the first two terms. Do not factor out the x. | $y = (x^2 - 6x) + 5$ | $y = (x^2 - 2x) + 1$ |
| Divide the coefficient of x by 2, then square it. | $\frac{-6}{2} = -3 \rightarrow (-3)^2 = 9$ | $\frac{-2}{2} = -1 \rightarrow (-1)^2 = 1$ |
| Add and subtract that value inside the bracket of the equation two steps above. | $y = (x^2 - 6x + 9 - 9) + 5$ | $y = (x^2 - 2x + 1 - 1) + 1$ |
| Move the last term in the bracket to the outside of the bracket and multiply it with the number in front of the bracket. Add the two constants together. | $y = (x^2 - 6x + 9) - 9 + 5$<br>$y = (x^2 - 6x + 9) - 4$ | $y = (x^2 - 2x + 1) - 1 + 1$<br>PST<br>$y = (x^2 - 2x + 1)$ |
| Factor the perfect square trinomial inside the bracket. | PST<br>$y = (x - 3)^2 - 4$ | $y = (x - 1)^2$ |
| $y = (x-3)^2 - 4$<br>Vertex $(3, -4)$<br>Steps 1, 3, 5<br>Steps a • (1, 3, 5) |  |  |
| **Now, determine the zeros:**<br>Set $y = 0$ | $0 = (x-3)^2 - 4$ | $\sqrt{0} = \sqrt{(x-1)^2}$ |
| ISOLATION<br>Remove the ***k*** | $4 = 1(x-3)^2$ | $0 = x - 1$ |
| Remove the ***a*** | $\sqrt{4} = \sqrt{(x-3)^2}$ | $x = 1$ |
| Square root – Don't forget the ± | $2 = x - 3$ and $-2 = x - 3$ | |
| Remove the ***h*** | $x = 5$ $\quad$ $x = 1$ | |

| Steps | Example #5<br>$y = -3x^2 - 6x$ | Example #6<br>$y = -2x^2 + 8x$ |
|---|---|---|
| Common factor the coefficient of the $x^2$ term from the first two terms. Do not factor out the x. | $y=-3(x^2+2x)$ | $y=-2(x^2-4x)$ |
| Divide the coefficient of x by 2, then square it. | $\frac{2}{2}=1$ $(1)^2=1$ | $\frac{-4}{2}=-2$ $(-2)^2=4$ |
| Add and subtract that value inside the bracket of the equation two steps above. | $y=-3(x^2+2x+1-1)$ | $y=-2(x^2-4x+4-4)$ |
| Move the last term in the bracket to the outside of the bracket and multiply it with the number in front of the bracket. Add the two constants together. | $y=-3(x+1)^2+3$ | $y=-2(x-2)^2+8$ |
| Factor the perfect square trinomial inside the bracket. | Vertex $(-1,3)$<br>steps $=-3,-9$ | Vertex $(2,8)$<br>steps $=-2,-6$ |
| . |  |  |
| **Now, determine the zeros:** Set $y = 0$ | $0=-3(x+1)^2+3$ | $0=-2(x-2)^2+8$ |
| Remove the ***k*** | $-3=-3(x+1)^2$ | $-8=-2(x-2)^2$ |
| Remove the ***a*** | $\frac{-3}{-3}=\frac{-3(x+1)^2}{-3}$ | $\frac{-8}{-2}=\frac{-2(x-2)^2}{-2}$ |
| Square root – Don't forget the ± | $\sqrt{1}=\sqrt{(x+1)^2}$ | $\sqrt{4}=\sqrt{(x-2)^2}$ |
| Remove the ***h*** | $1=x+1$ and $-1=x+1$<br>$x=0$ $x=-2$ | $2=x-2$ and $-2=x-2$<br>$x=4$ $x=0$ |