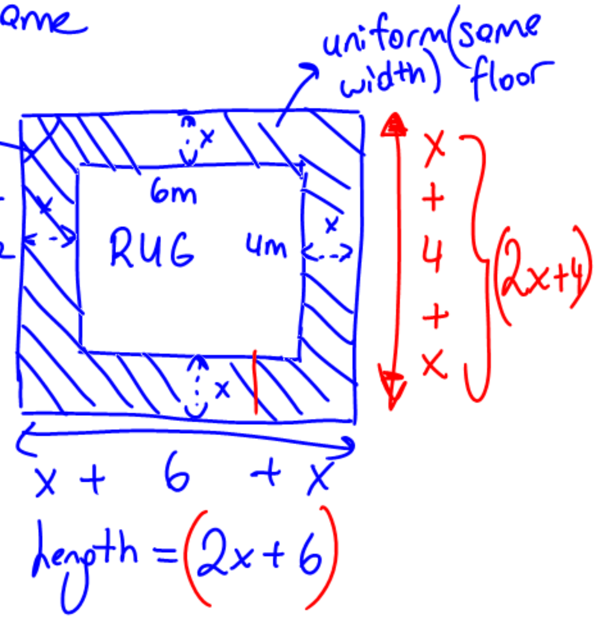
Area of the room = $2 \times \text{Area}_{rug}$

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)

$4x^2 + 20x + 24 = 48$ $\quad -48$

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

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

M	A	N
-6	5	-1, 6

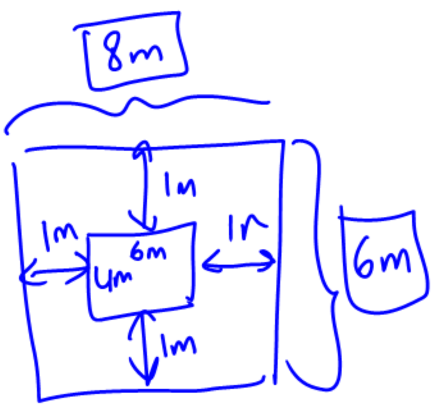
$\Rightarrow 4(x-1)(x+6) = 0$

$x - 1 = 0$

$\boxed{x = 1}$

$x + 6 = 0$

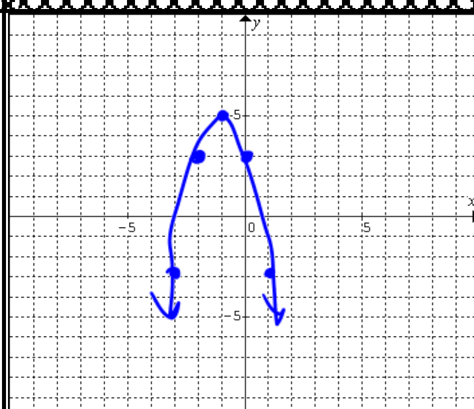
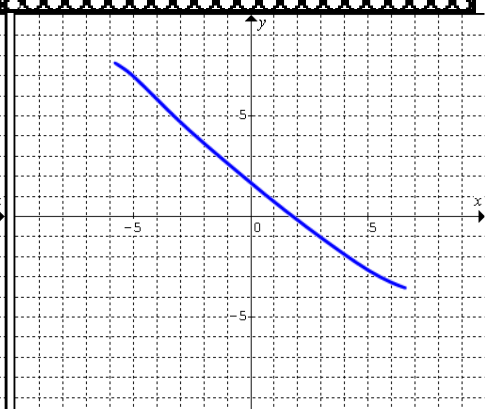
$\cancel{\boxed{x = -6}}$ b/c dimension cannot be negative



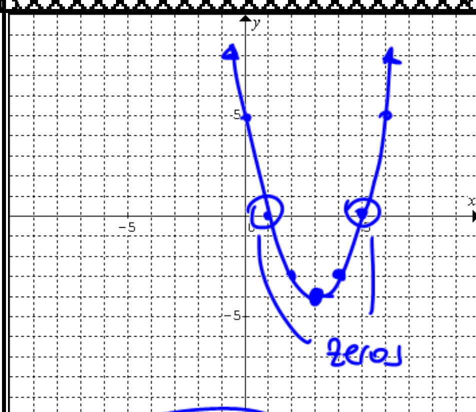
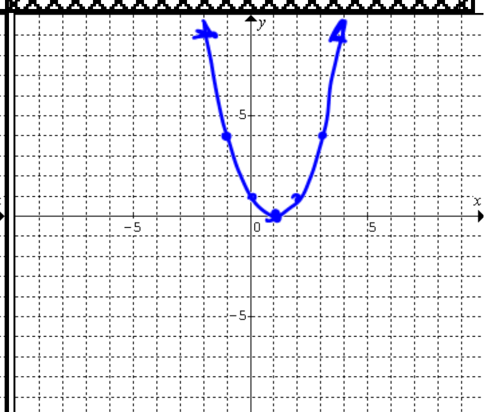
$\therefore$ length $(2x+6)$ is $2(1)+6 = 8m$

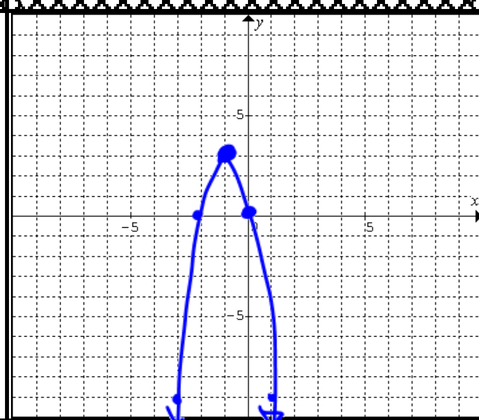
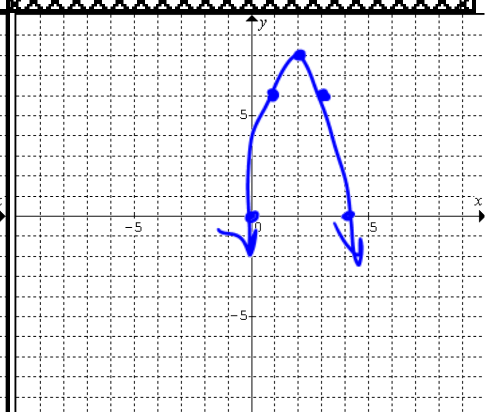
width $(2x+4)$ is $2(1)+4 = 6m$

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.	$=-2\left(\frac{-2x^2}{-2}-\frac{4x}{-2}\right)+3$ $=-2(x^2+2x)+3$	$y=-5(x^2-4x)+1$
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.	$=-2(x^2+2x+1-1)+3$ $(-2)(-1)$	$y=-5(x^2-4x+4-4)+1$ 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.	$=-2(x^2+2x+1)+2+3$ $=-2(x^2+2x+1)+5$ Perfect square trinomial	$y=-5(x^2-4x+4)+20+1$ why? $(-5)(-4)$ $=-5(x^2-4x+4)+21$ PST
Factor the perfect square trinomial inside the bracket.	$=-2(x+1)^2+5$ Vertex $(-1,5)$	$y=-5(x-2)^2+21$
Steps $=-2(1,3,5)$ $=-2,-6,-10$		
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 $-2.05=x-2$

$\boxed{x=0.6}$ or $\boxed{x=-2.6}$ $\boxed{x=4.05}$ $\boxed{x=-0.05}$

Steps	**Example #3** $y = x^2 - 6x + 5$	**Example #4** $y = x^2 - 2x + 1$
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.	$y=(x^2-6x+9)-9+5$ $y=(\underbrace{x^2-6x+9}_{PST})-4$	$y=(\underbrace{x^2-2x+1}_{PST})-1+1$ $y=(x^2-2x+1)$
Factor the perfect square trinomial inside the bracket.	$y=(x-3)^2-4$	$y=(x-1)^2$
$y=(x-3)^2-4$ Vertex $(3,-4)$ $\boxed{\text{Steps } 1,3,5}$ Steps $a\cdot(1,3,5)$		
Now, determine the zeros: Set $y = 0$	$0=(x-3)^2-4$	$\sqrt{0}=\sqrt{(x-1)^2}$
ISOLATION Remove the k	$4=1(x-3)^2$	$0=x-1$
Remove the a	$\sqrt{4}=\sqrt{(x-3)^2}$	$\boxed{x=1}$
Square root – Don't forget the ±	$2=x-3$ and $-2=x-3$	
Remove the h	$\boxed{x=5}$ $\boxed{x=1}$	

Steps	Example #5 $y = -3x^2 - 6x$	Example #6 $y = -2x^2 + 8x$
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.	$\frac{2}{2} = 1 \quad (1)^2 = 1$	$\frac{-4}{2} = -2 \quad (-2)^2 = 4$
Add and subtract that value inside the bracket of the equation two steps above.	$y = -3(x^2 + 2x + 1 - 1)$	$y = -2(x^2 - 4x + 4 - 4)$
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 $(-1,3)$ steps $= -3, -9$	Vertex $(2,8)$ 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 $-1 = x+1$	$2 = x-2$ $\boxed{x=4}$ and $-2 = x-2$ $\boxed{x=0}$

$\boxed{x=0}$ $\boxed{x=-2}$