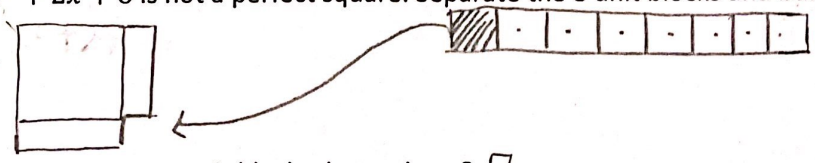
Unit 4 Day 6 Notes

Not every quadratic expression is a perfect square. We can model the area of a non-perfect square by making a square then adjusting the expression to ensure the new expression is equivalent to the original standard form expression.

$x^2 + 2x + 8$ is not a perfect square. Separate the 8 unit blocks and build a square using $x^2 + 2x$

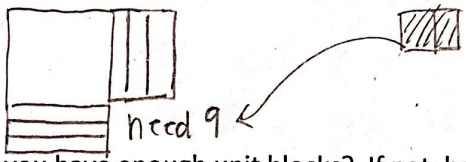


How many extra unit blocks do you have? 7

Write an expression to model the area using $(side\ length)^2$. Be sure to include the extra units in your model!

$A(x) = (x+1)^2 + 7$

$x^2 + 6x + 2$ is not a perfect square. Separate the 2 unit blocks and build a square using $x^2 + 6x$.

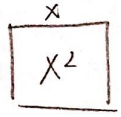


Did you have enough unit blocks? If not, how many are you missing? No! Missing 7

Write an expression to model the area using $(side\ length)^2$. Be sure to include the missing blocks in your model!

$A(x) = (x+3)^2 - 7$

Summarize the steps to complete the square using a physical model when you are given a quadratic expression in standard form.

① Start w/ x^2 

② Divide the B blocks into 2 equal parts (add/subtract from each side)

③ How many blocks are needed to "Complete the square?"
- are there extra blocks? $(\ \ )^2 +$ Extra
- are you short blocks? $(\ \ )^2 -$ # short

Since physically modeling large quantities of blocks or parts of blocks can be challenging, we need to model the physical process algebraically. ex) $x^2 + 20x + 30$

1. Keep x^2 and bx, but leave space for a new "c" value that would make a perfect square. (Move the original unit blocks away). $x^2 + 20x + \_\_\_\_ + 30$

2. Find the number of unit blocks needed to create a perfect square. $(b/2)^2 = (20/2)^2 = (10)^2 = 100$

3. We cannot just add a value to an expression and keep the expression equivalent to the original. We have to subtract the value to maintain an equivalent expression.

$x^2 + 20x + 100 + 30 - 100$

4. The first three terms are the perfect square. Rewrite this as $(side\ length)^2$.

$(x+10)^2 + 30 - 100$

5. Combine the last two terms. $(x+10)^2 - 70$

6. Vertex form!

Vertex $(-10, -70)$
Left 10 and down 70.

$x^2 + 50x + 30$
$x^2 + 50x + \_\_\_ + 30 - \_\_\_$
$x^2 + 50x + 625 + 30 - 625$
$(x+25)^2 - 595$

Vertex form
Vertex: $(-25, -595)$
Left 25, down 595

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