

10.5 Completing the Square Using Algebra Tiles

MATERIALS • algebra tiles

TEKS a.5, A.4.A;
2A.2.A

QUESTION How can you use algebra tiles to complete the square?

For an expression of the form $x^2 + bx$, you can add a constant c to the expression so that the expression $x^2 + bx + c$ is a perfect square trinomial. This process is called *completing the square*.

EXPLORE Complete the square

Find the value of c that makes $x^2 + 4x + c$ a perfect square trinomial.

STEP 1 Model expression

Use algebra tiles to model the expression $x^2 + 4x$. You will need one x^2 -tile and four x -tiles for this expression.



STEP 2 Rearrange tiles

Arrange the tiles to form a square. The arrangement will be incomplete in one of the corners.



STEP 3 Complete the square

Determine the number of 1-tiles needed to complete the square. The number of 1-tiles is the value of c . So, the perfect square trinomial is $x^2 + 4x + 4$ or $(x + 2)^2$.



DRAW CONCLUSIONS Use your observations to complete these exercises

- Copy and complete the table using algebra tiles.

Expression	Number of 1-tiles needed to complete the square	Expression written as a square
$x^2 + 4x$	4	$x^2 + 4x + 4 = (x + 2)^2$
$x^2 + 6x$?	?
$x^2 + 8x$?	?
$x^2 + 10x$?	?

- In the statement $x^2 + bx + c = (x + d)^2$, how are b and d related? How are c and d related?
- Use your answer to Exercise 2 to predict the number of 1-tiles you would need to add to complete the square for the expression $x^2 + 18x$.