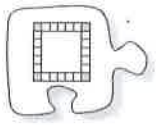
4.1.3 How can I describe *any* figure?

Using Variables to Generalize



4-24. Refer to your resource page on 91.

a) Choose a *different* method (not Tina's) from Lesson 4.1.2 for counting the number of tiles in a 10 x 10 square frame. Work with your team to shorten this method into an **algebraic expression** (a combination of numbers, variables, and operation symbols). Vocabulary

b) Work with your team to write an algebraic expression for each method on page 91

4-25. Compare the expression that you created in problem 4-24 (part a) to the one you created for Tina yesterday, $x + x + (x - 2) + (x - 2)$. The expressions both represent the number of tiles in a square frame of any side length, so they are called **equivalent expressions**. For example, there are 36 tiles in a 10-by-10 frame, no matter how you count them. For both expressions to "work," you should get the right number of tiles for any particular frame.

a) How can we check that your two expressions are equivalent?

b) Jerrold was playing around and created the following expressions for fun. Are they equivalent? How can you tell?

$2x + 2$ $\quad$ $x + 1 + x + 1$ $\quad$ $2(x + 1)$

c) Are the two expressions below equivalent?

$5 + x \cdot x \cdot x$ $\quad$ $3x + 5$

4-26. Bonnie is the owner of the "I've Been Framed!" picture-framing shop. Use your algebraic expressions to help Bonnie with each of the following orders. Show how you found each answer

a) A customer wants a frame that has 8 tiles along each side. How many tiles will Bonnie need for the whole frame?

Bonnie needs 28 tiles.

b) Bonnie's neighbor wants a frame that is 16 tiles along each side. How many tiles will she need?

a) Using Jonas' method:

$4 \cdot (8) - 4$

$32 - 4$

28

b) Using Jonas' method:

$4 \cdot (16) - 4$

$64 - 4$

60

she will need 60 tiles.

c) $5 + x \cdot x \cdot x$

$5 + 2 \cdot 2 \cdot 2$

$5 + 4 \cdot 2$

$5 + 8$

13

$3x + 5$

$3(2) + 5$

$6 + 5$

11

NO, these are not equivalent.

4-24

a) Our team chose _____'s method.

b) Jonas : $4 \cdot x - 4$

Curran : $x + (x-1) + (x-1) + (x-2)$

TJ : $4 \cdot (x-2) + 4$

Alyssa : $(x-1) \cdot 4$

Raymond : $x \cdot x - (x-2) \cdot (x-2)$

4-25 a) You can see if two expressions are equivalent by checking if you get the same value of tiles.

b)

$2x+2$	$x+1+x+1$	$2(x+1)$
$2(10)+2$	$10+1+10+1$	$2(10+1)$
$20+2$	$11+11$	$2(11)$
22	22	22

yes, they are all equivalent because they all equall 22 when using 10 for x.

c)

$5+x \cdot x \cdot x$	$3x+5$	NO, these are not equivalent.
$5+2 \cdot 2 \cdot 2$	$3(2)+5$	
$5+4 \cdot 2$	$6+5$	
$5+8$	11	
13		