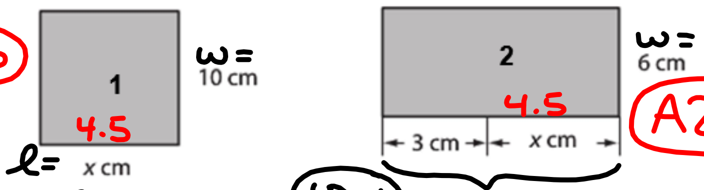
Lesson 2-6: Solving Equations with the Variable on Each Side

WRITING AND SOLVING EQUATIONS
EXAMPLE 1

Find the value of *x* so that the figures have the same area.

$A = l \cdot w$ $A1 = 45$



$A2 = 45$

What is the area of the rectangle 1? $A1 = x \cdot 10 = 10x$

$l = 3 + x = 3 + 4.5$
$= 7.5$

What is the area of the rectangle 2? $A2 = (3 + x) \cdot 6 = 6x + 18$

$A1 = A2$

Now, if the rectangles are supposed to have the SAME areas, write an equation to represent this fact.

$$10x = 6x + 18$$

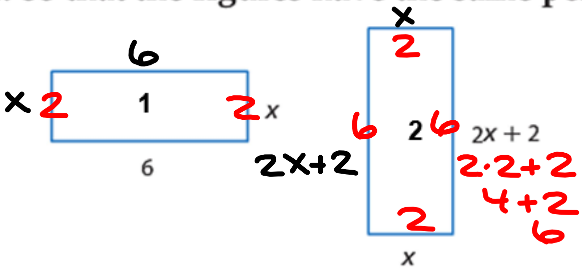
Solve the equation:

$$10x = \cancel{6x} + 18$$
$$-6x \quad -\cancel{6x}$$
$$\frac{\cancel{4}x}{\cancel{4}} = \frac{18}{4}$$
$$\boxed{x = 4.5\text{cm.}}$$

EXERCISE 1

Find the value of x so that the figures have the same perimeter.

$P1 = 16$



$P2 = 16$

P1
Perimeter of rectangle 1 = $6+x+6+x = 12+2x$

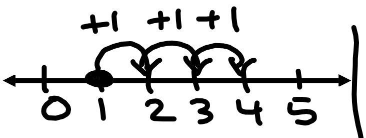
P2
Perimeter of rectangle 2 = $x+2x+2+x+2x+2 = 6x+4$

$P1 = P2$

Equation: $12+2x = 6x+4$

Solve it:

$$12+\cancel{2x} = 6x+4$$
$$-\cancel{2x} \quad -2x$$
$$12 = 4x+\cancel{4}$$
$$-4 \quad -\cancel{4}$$
$$\frac{8}{4} = \frac{\cancel{4}x}{\cancel{4}}$$
$$2 = x$$



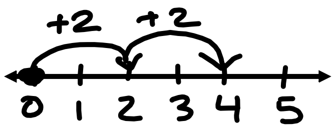
consecutive integers

n = 1st integer

$n+1$ = 2nd integer

$n+1+1 = n+2$ = 3rd integer

go up by <u>one</u>.



consecutive evens

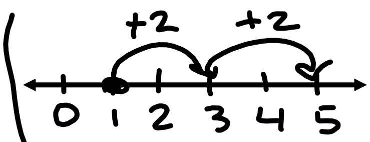
n = 1st even

$n+2$ = 2nd even

$n+2+2$ = 3rd even

$n+4$

go up by <u>two</u>.



consecutive odds

n = 1st odd

$n+2$ = 2nd odd

$n+2+2 = n+4$

3rd odd

EXAMPLE 2

Two times the least of three consecutive odd integers exceeds three times the greatest by 15. What are the integers? answers

How do we set up the variables for CONSECUTIVE ODD INTEGERS? Go by two

First odd = n

Second odd = $n+2$

Third odd = $n+4$

Equation: 2 • (1st) = 3 • (3rd) + 15

Solve:

$$2\cdot n = 3(n+4)+15$$
$$2n = 3n+12+15$$
$$2n = 3n+27$$
$$-2n \quad -2n$$
$$0 = n+27$$
$$-27 \quad -27$$
$$-27 = n$$

Answer: The three consecutive odd integers are -27, -25, -23.

$-27+2$, $-27+4$

Check:

$$2(-27) = 3(-23)+15$$
$$-54 = -69+15$$
$$-54 = -54 \checkmark$$

Exercise 2: Four times the lesser of two consecutive even integers is 12 less than twice the greater number. Find the integers.

evens go by twos.

1st even $= n = -4$

2nd even $= n+2$

$-4+2 = -2$

$$4(\text{1st}) = 2(\text{2nd})-12$$
$$4\cdot n = 2(n+2)-12$$
$$4n = 2n+4-12$$
$$4n = 2n-8$$
$$-2n \quad -2n$$
$$\frac{2n}{2} = \frac{-8}{2}$$
$$n = -4$$

$$4(-4) = 2(-2)-12$$
$$-16 = -4-12$$
$$-16 = -16 \checkmark$$

The even integers are -4 and -2.

CRITIQUE Determine whether each solution is correct. If the solution is not correct, describe the error and give the correct solution.

a.
$$2(g + 5) = 22$$
$$* \quad 2g + 5 = 22 \quad *$$
$$2g + 5 - 5 = 22$$
$$2g = 17$$
$$g = 8.5$$

wrong

$$2g + \cancel{10} = 22$$
$$\cancel{-10} \mid -10$$
$$\frac{\cancel{2}g}{\cancel{2}} = \frac{12}{2}$$
$$g = 6$$

right

b.
$$5d = 2d - 18$$
$$5d - 2d = \cancel{2d} - 18 \cancel{- 2d}$$
$$3d = -18$$
$$d = -6$$

right

c.
$$-6z + 13 = 7z$$
$$* \; -6z + 13 - 6z = 7z - 6z \; *$$
$$13 = z$$

wrong

$$-\cancel{6z} + 13 = 7z$$
$$+\cancel{6z} \mid +6z$$
$$\frac{13}{13} = \frac{13z}{13}$$
$$1 = z$$

right