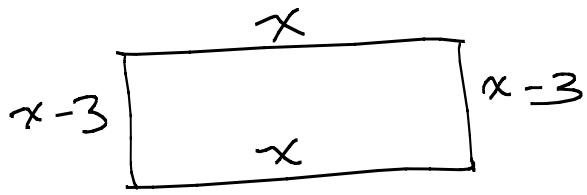
Note Title 2/6/2017

Review Problem: (from 2.6)

A rectangle has perimeter 66 ft. The width is 3 ft less than the length. Find the dimensions.

length: x
width: $x-3$



$2(\text{length}) + 2(\text{width}) = \text{perimeter}$

width $\xrightarrow{\text{compare to}}$ length
x

$$2x + 2(x-3) = 66$$
$$2x + 2x - 6 = 66$$
$$4x - 6 = 66$$
$$+6 \quad +6$$
$$4x = 72$$
$$\frac{4x}{4} = \frac{72}{4}$$
$$x = 18$$

$$4\overline{)72} \quad 18$$
$$\frac{4}{32}$$

From above:
length: x
width: $x-3$
$x = 18 \Rightarrow 18 - 3 = 15$

The width is 15 ft and the length is 18 ft.

Homework Qs

2.4 #29 Eight times the sum of three consecutive odd integers is 210 more than 10 times the middle integer. Find the integers

1st integer: x

2nd integer: $x+2$

3rd integer: $x+4$

$$8(\text{sum}) = 10(\text{middle integer}) + 210$$

$$8(x+x+2+x+4) = 10(x+2) + 210$$

$$8(3x+6) = 10x + 20 + 210$$

$$24x + 48 = 10x + 230$$

$$-10x \qquad -10x$$

$$14x + 48 = 230$$

$$-48 \qquad -48$$

$$14x = 182$$

$$\frac{14x}{14} = \frac{182}{14}$$

$$x = 13$$

$$14\overline{)182}\quad 13,\ 14,\ 42,\ 42,\ 0$$

1st integer: $x = 13$

2nd: $x+2 \Rightarrow 13+2 = 15$

3rd: $x+4 \Rightarrow 13+4 = 17$

The integers are 13, 15, 17.

2.6 continued

Example: One side of a triangle is 6 meters longer than twice the shortest side. The third side is 9 meters more than the shortest side. The perimeter is 75 meters. Find all the side lengths.

"one side": $2x+6$

shortest side: x

3rd side: $x+9$

one side → compare to → shortest side x

3rd side → compare to → shortest side x

$x = 15$

The sides are 15 m, 36m, and 24m long.

2.8 Linear Inequalities:

$<$ means "is less than"

$>$ means "is greater than"

$\leq$ means "is less than or equal to"

$\geqslant$ means "is greater than or equal to"

Note: $\geqslant$ and $\geq$ are equivalent

$\leqslant$ and $\leq$ are equivalent

True/false:

$2 < 5$ True

$-5 > -2$ False

$2 < 2$ False

$2 \leq 2$ True

$-1 < -4$ False

$6 > -12$ True

$2 \leq 7$ True

Definition: A linear inequality (in 1 variable) is any relationship that can be written in the form $\begin{cases} ax+b < c, & ax+b > c \\ ax+b \leq c, & ax+b \geqslant c \end{cases}$

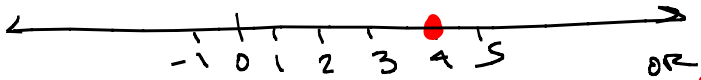
where a, b, c are numbers and x is the variable.

Examples: $2x - 3 < 5$, or $2(6-x) \geqslant x + 1$

We can use a number line to graph the solution set of an equation or inequality.

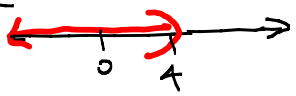
Examples:

$x = 4$



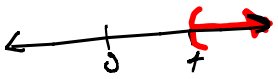
$x < 4$

OR



$x \leq 4$

$x > 4$



$x \geq 4$

$1 < x \leq 4$

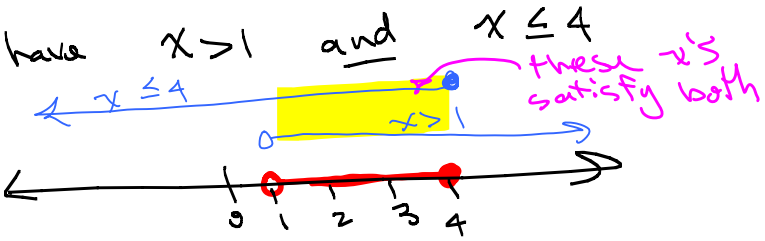
$1 < x \leq 4$ is a <u>combined inequality</u> (a statement that contains 2 inequalities)

$1 < x \leq 4$ means $1 < x$ and $x \leq 4$

$1 < x$ is equivalent to $x > 1$.

Rewrite $1 < x$ as $x > 1$.

Now we have $x > 1$ and $x \leq 4$



<u>Set-builder notation</u> (set roster notation)

Inequality: $x \leq 4$

set-builder notation: $\{x \mid x \leq 4\}$

"such that"

The set of all numbers x such that $x \leq 4$

<u>Interval notation</u>: we use a comma to separate the left boundary and right boundary of the shaded area.

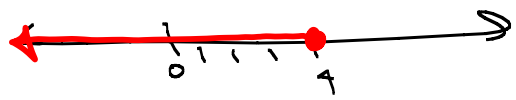
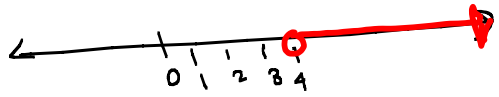
We use ∞ (infinity) for the far right "end" of the number line

We use $-\infty$ for the left "end" of the number line.

Example: $1 < x \leq 4$

set-builder: $\{x \mid 1 < x \leq 4\}$

Interval notation $(1, 4]$

Set-builder	Graph	Interval Notation
$\{x \mid 1 < x < 4\}$		$(1, 4)$
	or 	
$\{x \mid x < 4\}$		$(-\infty, 4)$
$\{x \mid x \geq 4\}$		$[4, \infty)$
$\{x \mid x \leq 4\}$		$(-\infty, 4]$
$\{x \mid x > 4\}$		$(4, \infty)$