

Math 115

Spring 2018

Lecture 2

$$\begin{array}{c} ? a^2 + b^2 = c^2 ? \\ y = mx + b \quad ? \quad d = rt \end{array}$$

Review:

Simplify:

$$\textcircled{1} \quad \underline{12 \div 4} \cdot 3 - 6 \cdot 2$$

$$= 3 \cdot 3 - 6 \cdot 2 = 9 - 12 = 9 + (-12) = \boxed{-3}$$

$$\textcircled{2} \quad 12 \div (4 \cdot 3) - 6 \cdot 2$$

$$= 12 \div 12 - 6 \cdot 2 = 1 - 12 = 1 + (-12) = \boxed{-11}$$

$$\textcircled{3} \quad \frac{|-16|}{-4^2} = \frac{16}{-16} = \boxed{-1}$$

$$\begin{aligned}
 \textcircled{4} \quad \frac{-|-6|-2}{(-2)^3} &= \frac{-6-2}{(-2)^3} \\
 &= \frac{-6+(-2)}{-8} \\
 &= \frac{-8}{-8} = \boxed{1} \\
 \textcircled{5} \quad \frac{1}{2} - \frac{5}{6} &= \frac{1 \cdot 3}{2 \cdot 3} - \frac{5}{6} \\
 &\quad \text{LCD}=6 \\
 &= \frac{3}{6} - \frac{5}{6} = \frac{3-5}{6} = \frac{-2}{6} = \boxed{-\frac{1}{3}} \\
 \textcircled{6} \quad -1\frac{1}{8} + 5\frac{3}{4} &= \frac{-9}{8} + \frac{23 \cdot 2}{4 \cdot 2} \\
 &\quad \text{LCD}=8 \\
 &= \frac{-9}{8} + \frac{46}{8} \\
 &= \frac{-9+46}{8} \\
 &= \boxed{\frac{37}{8}} \\
 &= \boxed{4\frac{5}{8}}
 \end{aligned}$$

Evaluate: $x^2 - y^2$ for $x=6$ & $y=-2$

$$= (6)^2 - (-2)^2 = 36 - 4 = \boxed{32}$$

Evaluate: $\frac{x + yz}{xy}$ for $x=6$, $y=-2$, and $z=-3$.

$$\begin{aligned}
 &= \frac{6 + (-2)(-3)}{(6)(-2)} = \frac{6 + 6}{-12} \\
 &= \frac{12}{-12} = \boxed{-1}
 \end{aligned}$$

① Find the opposite of $-3\frac{1}{3}$.

$$3\frac{1}{3}$$

② Find the reciprocal of $-3\frac{1}{3}$.

$$-3\frac{1}{3} = \frac{-10}{3} \rightarrow \boxed{\frac{-3}{10}}$$

③ Distribute & Simplify: $4(x-3) + 6(x+2)$

$$= 4x - \cancel{12} + 6x + \cancel{12}$$

$$= 4x + 6x = \boxed{10x}$$

Use x for unknown, Translate only

① 4 times Some number increased by -10.

$$\underbrace{\quad\quad\quad}_x \quad + (-10)$$

$$4 \cdot x$$

$$\text{Final Ans: } 4x + (-10) = 4x - 10$$

② -8 Subtracted from half Some number.

$$\frac{1}{2}x - (-8)$$

Diagram showing the expression $\frac{1}{2}x - (-8)$ with annotations: a red bracket above x labeled x , and purple arrows pointing from the -8 in the original text to the $-(-8)$ in the expression.

Final Ans $\boxed{\frac{1}{2}x - (-8)} = \boxed{\frac{1}{2}x + 8}$

Also $\boxed{\frac{x}{2} + 8}$

③ 10 times the sum of two numbers reduced by the product of the two numbers.

$\boxed{10(x+y) - xy}$ Final Ans.

Square root of 1 more than Some number
is equal to

the number less 1.

$$\sqrt{x+1} = x-1$$

The product of Some number and
3 more than the number
is equal to
10.

$$x \cdot (x+3) = 10$$

Evaluate $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

for $a=1$, $b=-4$, and $c=-12$

$$b^2 - 4ac = (-4)^2 - 4(1)(-12)$$

$$= 16 - 4(-12) = 16 + 48 = 64$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-4) \pm \sqrt{64}}{2(1)} = \frac{4 \pm 8}{2}$$

one time $\frac{4+8}{2} =$

$$\frac{12}{2} =$$

$$\boxed{6}$$

and another time $\frac{4-8}{2} =$

$$\frac{-4}{2} =$$

$$\boxed{-2}$$

The length of a rectangle is 3m longer than twice its width.

Draw & label such rectangle.

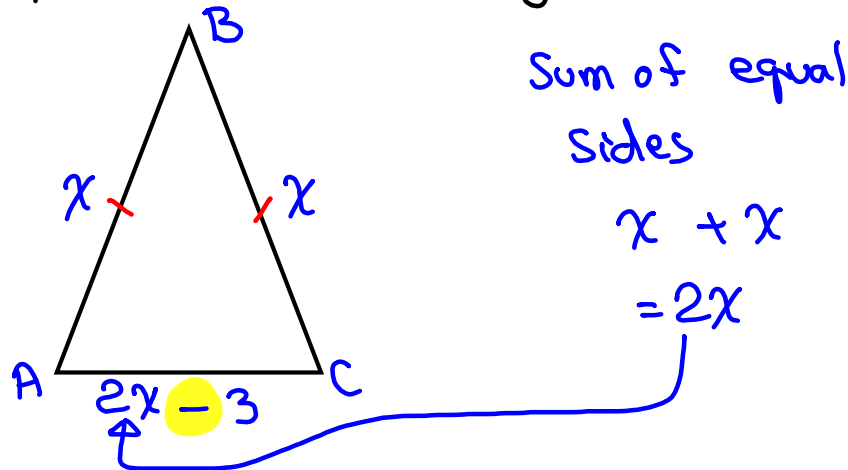


$$W = x$$

$$L = 2x + 3$$

In triangle ABC, Two Sides are equal. The third Side is 3m shorter than the sum of equal Sides.

Draw & label such triangle.



Properties of Real numbers:

① Commutative Prop.

$$a + b = b + a$$

$$7 + 3 = 3 + 7$$

$$a \cdot b = b \cdot a$$

$$6 \cdot (-2) = -2 \cdot 6$$

$$x + (-4) = -4 + x$$

$$10x = x \cdot 10$$

② Associative Prop.

$$(a + b) + c = a + (b + c)$$

$$(6 + 2) + 10 = 6 + (2 + 10)$$

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

$$(7 \cdot 3) \cdot 4 = 7 \cdot (3 \cdot 4)$$

$$(x + 6) + 4 = x + (6 + 4)$$

$$(-2 \cdot x) \cdot 5 = -2 \cdot (x \cdot 5)$$

③ Distributive Prop.

$$a(b+c) = a \cdot b + a \cdot c \quad 4(x+3) = 4 \cdot x + 4 \cdot 3$$

$$a(b-c) = a \cdot b - a \cdot c \quad -2(x-7) = -2 \cdot x - (-2 \cdot 7)$$

$$3(x^2 - 5x + 8) =$$

$$3x^2 - 3 \cdot 5x + 3 \cdot 8$$

④ Identity Prop.

- Additive $x + 0 = x$

$$7 + 0 = 7$$

$$-4 \cdot 1 = -4$$

- Multiplicative $x \cdot 1 = x$

⑤ Inverse Prop

- Additive $x + (-x) = 0$

- Multiplicative $x \cdot \frac{1}{x} = 1, x \neq 0$

$$25 + (-25) = 0$$

$$4 \cdot \frac{1}{4} = 1$$

$$-100 + 100 = 0$$

$$-\frac{3}{5} \cdot -\frac{5}{3} = 1$$

Simplify

$$4(2x - 5) + 20 =$$

Distribute

$$4(2x) - 4 \cdot 5 + 20 =$$

Associative

$$(4 \cdot 2)x - 20 + 20 =$$

Inverse

$$8x + 0 =$$

Identity

$$\boxed{8x}$$

Simplify

$$\frac{2}{3} \left(\frac{3}{2}x + 1 \right) - \frac{2}{3} =$$

Distribution

$$\frac{2}{3} \left(\frac{3}{2}x \right) + \frac{2}{3} \cdot 1 - \frac{2}{3} =$$

Identity,
Associative

$$\left(\frac{2}{3} \cdot \frac{3}{2} \right) x + \frac{2}{3} - \frac{2}{3} =$$

Inverse

$$1x + 0 =$$

Identity

$$x + 0 =$$

Identity

$$\boxed{x}$$

Name the properties:

$$3 + x \cdot 2 = 3 + 2x \quad \text{Commutative}$$

$$= 2x + 3 \quad \text{Commutative}$$

$$5(2x) + \frac{4}{3} \cdot 1 - \frac{4}{3} = \quad \text{Identity}$$

$$5(2x) + \frac{4}{3} - \frac{4}{3} = \quad \text{Inverse}$$

$$5(2x) + 0 = \quad \text{Identity}$$

$$5(2x) = \quad \text{Associative}$$

$$(5 \cdot 2)x =$$

$$\boxed{10x}$$

Simplify & Name the properties:

$$\frac{3}{5} \left(\frac{5}{3}x - \frac{5}{3} \right) + \frac{7}{2} \cdot \frac{2}{7} = \quad \text{Distributive}$$

$$\frac{3}{5} \cdot \left(\frac{5}{3}x \right) - \frac{3}{5} \cdot \frac{5}{3} + \frac{7}{2} \cdot \frac{2}{7} = \quad \text{Inverse, Associative}$$

$$\left(\frac{3}{5} \cdot \frac{5}{3} \right) x - 1 + 1 = \quad \text{Inverse}$$

$$1 \cdot x + 0 = \quad \text{Identity}$$

$$x + 0 = \quad \text{Identity}$$

$$\boxed{x}$$

Simplify & Name Properties:

$$4(x + 6) + 6(-4 + x)$$

Distributive

$$= 4x + 4 \cdot 6 + 6(-4) + 6x$$

$$= 4x + 24 - 24 + 6x$$

Inverse

$$= 4x + 0 + 6x$$

Identity

$$= 4x + 6x$$

$$= \boxed{10x}$$

Translate, then Simplify, give the name of properties used.

-3 times the difference of
twice some number and 1, increased
by 6 times the number.

$$-3(2x - 1) + 6x$$

Distribution

$$= -3(2x) - (-3 \cdot 1) + 6x$$

Associative,
Identity

$$= (-3 \cdot 2)x - (-3) + 6x$$

$$= -6x + 3 + 6x$$

Commutative

$$= -6x + 6x + 3$$

Inverse

$$= 0 + 3$$

$$= 3$$

Identity

Simplify

$$\begin{aligned}
 & 3(2x^2 - 5x + 1) - 2(3x^2 - 8x - 1) - x - 5 \\
 &= 3(2x^2) - 3(5x) + 3 \cdot 1 - 2(3x^2) - (-2 \cdot 8x) - (-2 \cdot 1) \\
 & \qquad \qquad \qquad - x - 5 \\
 &= \cancel{6x^2} - 15x + 3 - \cancel{6x^2} + 16x + 2 - x - 5 \\
 &= \cancel{-15x} + \cancel{16x} - \cancel{x} + 3 + 2 - 5 \\
 &= 0 + 0 = \boxed{0} \quad \text{Do not use } \emptyset \text{ for Zero.}
 \end{aligned}$$