

## 1.3 Properties of real numbers

①

→ knowing and understanding the properties will help us be able to solve algebra problems.

### Commutative Property

↳ addition and multiplication

↳  $2+3 = 3+2$  → commutative property of addition

↳  $3 \cdot 4 = 4 \cdot 3$  → commutative property of multiplication

→ we can move the numbers around in addition & multiplication

→ Be careful!

↳  $2-3 \neq 3-2$   
↳  $3 \div 4 \neq 4 \div 3$  } doesn't work for subtraction and division

### Distributive Property

EX → a)  $2(x+y) = 2x + 2y$  → "distribute" the 2

b)  $(a+b)3 = a \cdot 3 + b \cdot 3 = 3a + 3b$  → distributive property & commutative property

c)  $3(2x-4y) = 3 \cdot 2x - 3 \cdot 4y = 6x - 12y$

~~.....~~

d)  $-2(x-2y) = (-2)(x) - (-2)(+2y) = -2x + 4y$

e)  $-(x-y) = -1(x-y) = (-1)(x) - (-1)(y) = -x + y$

★ Please read 1010 online section about distributive law!

# Other properties

1) if  $a=b$  then  $a+c=b+c$

→ can add (or subtract) same things on both sides of = sign

2) if  $a=b$  then  $ac=bc$

→ can multiply (or divide) same thing on both sides of = sign

3)  $0 \cdot a = 0$  ;  $\frac{0}{a} = 0$

4)  $-\frac{a}{b} = \frac{-a}{b} = \frac{a}{-b}$

→ negative can move

Ex Solve

a)  $x+2=5 \Rightarrow x+2-2=5-2 \rightarrow$  property 1  
 $\Rightarrow x+0=3$   
 $\Rightarrow x=3$

"implies that" → don't put an equals sign here!

b)  $3x=6 \Rightarrow \frac{1}{3} \cdot 3x = \frac{1}{3} \cdot 6 \rightarrow$  property 2  
 $\Rightarrow \frac{1}{3} \cdot \frac{3}{1} \cdot x = \frac{1}{3} \cdot \frac{6}{1}$   
 $\Rightarrow \frac{3}{3} \cdot x = \frac{6}{3}$   
 $\Rightarrow 1 \cdot x = 2$   
 $\Rightarrow x=2$