

Integers

• Natural numbers = 1, 2, ...

∞ infinity

• Whole numbers = 0, 1, 2, ... ∞

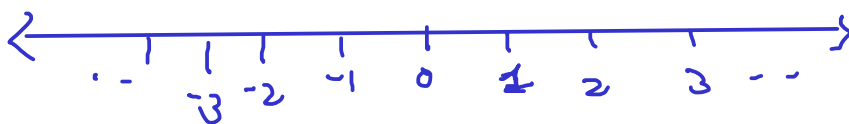
Is every natural number a whole number? Yes

• 0 is neither positive or negative

• $0 < 1 < 2 < 3 < \dots$

• Smaller number from larger = $20 - 5 = 15$
↳ positive

• Larger number from smaller number $\Rightarrow 5 - 20 = -15$



• $-5 > -6$

• Notes :-

- Every number on the number line is greater than every number on its left.
- a. and b, $a > b$ then $-a < -b$

• $2 < 5 \rightarrow -2 > -5$
 signs flip

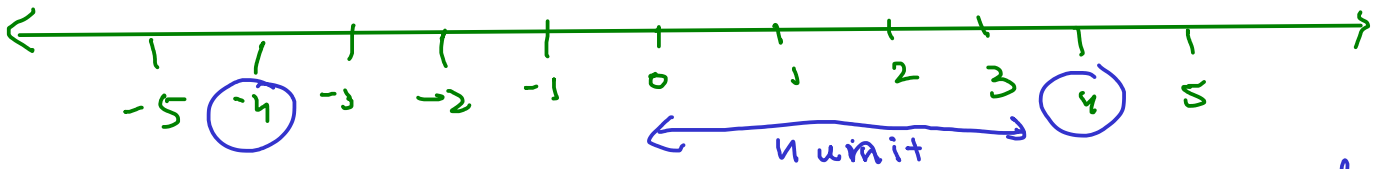
• $50 > 20 \rightarrow -50 < -20$

• $-20 > -32 \rightarrow 20 < 32$

$-(-ve) = +ve$

• $10 > -1 \rightarrow -10 < 1$

Absolute value



• Absolute value of an integer is the distance of that point from 0 irrespective of the sign.

• The absolute value of $-a$ is a . (a is positive)

• The absolute value of a is a . (a is positive)

• $|x|$

Examples:-

$$|-4| = 4$$

$$|2| = 2$$

$$|-7| = 7$$

$$|-10| = 10$$

$$|(-2 \times 3 + 5 - 6)| =$$

$$|(-6 + 5 - 6)| = |-1 - 6| = |-7| = 7$$

Q.

$$|x + 10| = 2$$

Find x.

$$\rightarrow x = -8, -12$$

$$\rightarrow x = -8,$$

$$|-8 + 10| = \underline{|2| = 2}$$

$$x = -12,$$

$$|-12 + 10| = |-2| = 2$$

$$\rightarrow \quad | \text{something} | = a$$

$$\text{something} = a \quad \text{or} \quad -a.$$

$$| x + 10 | = 2$$

$$x + 10 = 2 \quad \text{or}$$

$$x + 10 = -2$$

↓

$$x = 2 - 10 \\ = -8$$

$$x = -2 - 10 \\ = -12$$

Competition :-

$$1) \quad | x + 12 | = 5$$

$$2) \quad | x | = 0$$

$$3) \quad | x + 3 | = 0$$

→ -3

$$4) \quad | x + 5 | = 8$$

$$5) \quad | x + 6 | = 9$$

$$|x + 12| = 5$$



$$x + 12 = 5$$

$$\begin{aligned} x &= 5 - 12 \\ &= -7 \end{aligned}$$

or

$$x + 12 = -5$$

or

$$\begin{aligned} x &= -5 - 12 \\ &= -17 \end{aligned}$$

check: $|-7 + 12| = |5| = 5$

$$|-17 + 12| = |-5| = 5$$

$$2) |x| = 0$$

$$x = +0$$



$$x = 0$$

or

$$x = -0$$



$$x = 0$$

$$|x + 5| = 8$$

$$x + 5 = +8$$

$$x = 8 - 5$$

$$x = 3$$

or

$$x + 5 = -8$$

$$x = -8 - 5$$

$$= -(13)$$

$$= -13$$

$$x = 3 \text{ or } -13$$

$$|x + 6| = 9$$

$$x + 6 = 9$$

or

$$x + 6 = -9$$

$$x = 9 - 6$$

$$= 3$$

or

$$x = -9 - 6$$

$$= -15$$

Properties: -
→ of addition

- Closure → a, b , $a + b$ is an integer
- Commutative → $a + b = b + a$
- Associative → $(a + b) + c = a + (b + c)$
- Additive identity → 0
- Additive inverse → additive inverse of a is $-a$.

$$a + (-a) = \text{additive identity} = 0$$

• multiplicative identity → 1

• multiplicative inverse → a is $\frac{1}{a}$

$$a \times \frac{1}{a} = \text{multiplicative identity} = 1$$

$$\cdot \quad \begin{array}{c} 5-2 \neq 2-5 \\ \parallel \\ 3 \end{array} \quad \begin{array}{c} -3 \\ \parallel \\ 2-5 \end{array}$$

• Rules of multiplication

$$(-ve) \times (-ve) = +ve$$

$$(+ve) \times (+ve) = +ve$$

$$(+ve) \times (-ve) = -ve$$

$$(-ve) \times (+ve) = -ve$$

$$Q. \quad (-7) \times 9 = -63$$

$$-2002 \times 1 \times 0 = 0$$

Distributive property =

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

$$Q. \quad \begin{aligned} (-10) \times (2 + 4) &= (-10) \times 2 + (-10) \times 4 \\ &= -20 + -40 \\ &= -60 \end{aligned}$$

$$\begin{aligned}(-10) \times (2+4) &= (-10) \times 6 \\ &= -60\end{aligned}$$

Q.

$$a \div a = 1 \quad ; \text{ if } a \neq 0$$

$$a \div 1 = a$$

$$0 \div a = 0$$

$$a \div 0 = \text{not defined,}$$

Competition :-

$$1) \quad -8 \times (5+3) = ? \quad -64$$

$$2) \quad -20 \times (1+ -6) = ? \quad 100$$

$$3) \quad -4 \times (0+1) = ? \quad -4 \times 1 = -4$$

$$4) \quad 5 \times (-5+5) = ? \quad 5 \times 0 = 0$$

$$5) \quad -7 \times -6 = ? \quad 42$$

$$6) \quad -8 \times 8 = ? \quad -64$$

$$\begin{aligned}
 1) \quad -8 \times (5+3) &= (-8) \times 5 + (-8) \times 3 \\
 &= (-40) + (-24) \\
 &= -64
 \end{aligned}$$

$$2) \quad -20 \times (1-6) = (-20) \times (-5) = 100$$

Q. (i)

$$\begin{aligned}
 12 \times 13 &= (10+2) \times 13 = 130 + 26 \\
 &= 156
 \end{aligned}$$

$$\begin{aligned}
 (ii) \quad 140 - (-56) \\
 &= 196
 \end{aligned}$$

$$\begin{aligned}
 (iii) \quad -20 - 4 \\
 &= -24
 \end{aligned}$$

Simplify

$$\begin{aligned}
 -4 + 15 - 5 + 20 \\
 &= 26
 \end{aligned}$$

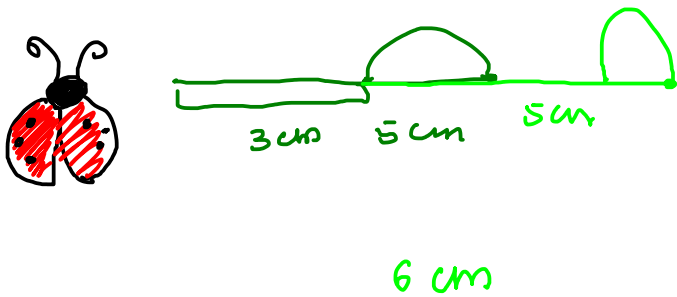
1. If $15 \times (a + 5) = 15 \times (-4) + 15 \times 5$
 then a is ?

distributive.

2. The greatest negative integer is $\boxed{-1}$
 small +ve integer is $\boxed{1}$

3. $(-27) \times (-16) + (-27) \times (-14)$
 distributive law
 $= (-27) (-16 + (-14)) = (-27) (-30)$
 $= 810$

Example:-



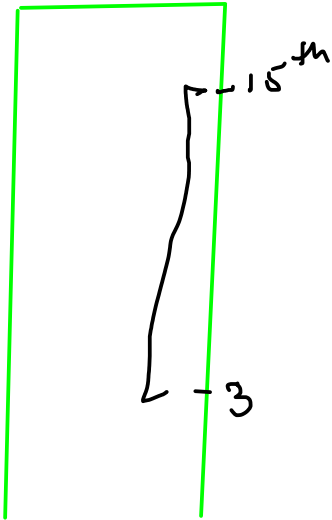
After 2 second, it is moving 3cm

\therefore 38 second, it is moving 57cm

\therefore 39 second, it is moving $57 + 10$ cm
 $= 67$

\therefore 40 second, it is moving $= 67 - 7 = 60$ cm

Example:-



no of floors = 12

distance to cover = $12 \times 5 = 60 \text{ m}$

lift cover 2 metre in every second

\therefore No of seconds = $\frac{60}{2} = 30 \text{ seconds}$