GRADE 8 MATHEMATICS NOTES

JUNIOR SCHOOL

NUMBERS

Integers

The Number Line

- Integers are whole numbers, negative whole numbers and zero.
- Integers are always represented on the number line at equal intervals which are equal to one unit.

Activity in the sub strand

Carry out activities involving positive and negative numbers and zero.

- ✓ For example climbing upstairs (positive),
- ✓ Climbing down (negative).
- ✓ Others may include standing at a point, the zero point, and count the number of steps moved either forward or backward.

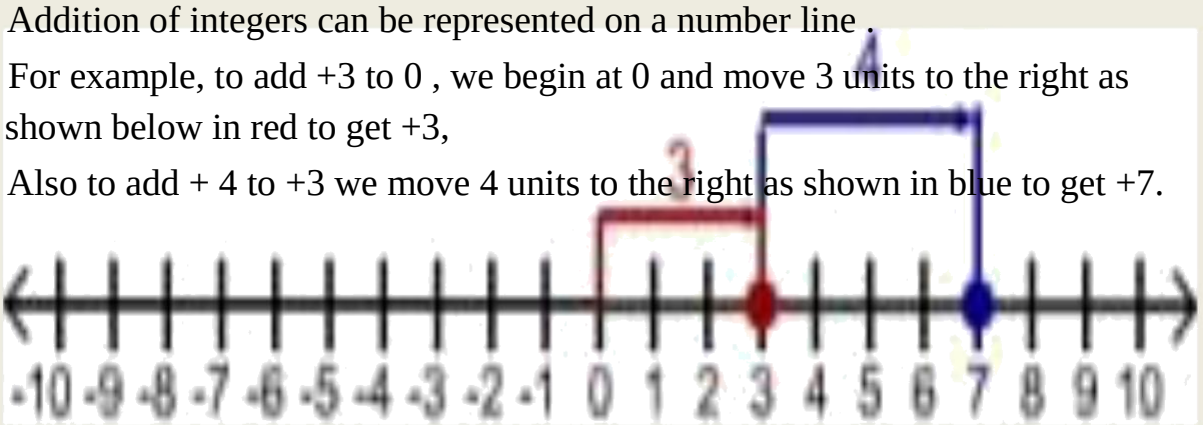
Operations on Integers

Addition of Integers

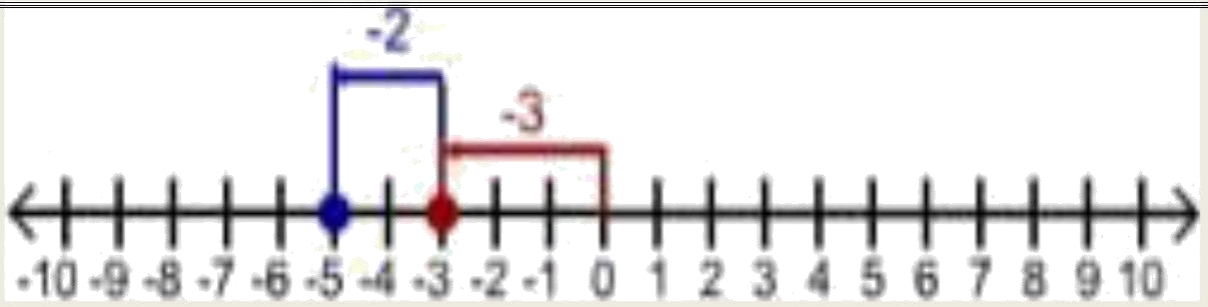
- Addition of integers can be represented on a number line .

For example, to add +3 to 0 , we begin at 0 and move 3 units to the right as shown below in red to get +3,

Also to add + 4 to +3 we move 4 units to the right as shown in blue to get +7.



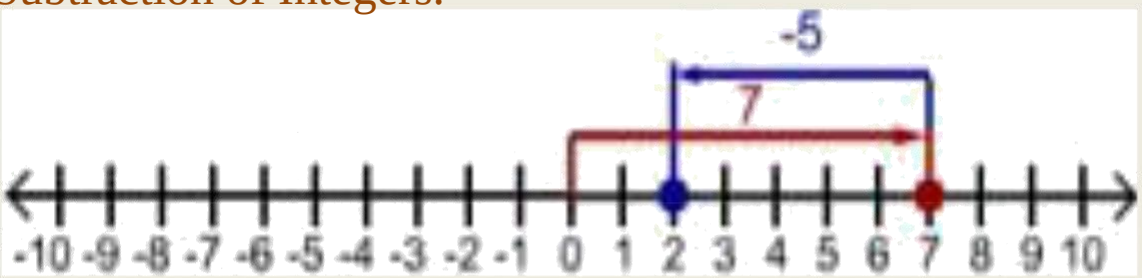
To add -3 to zero we move 3 units to the left as shown in red below to get -3 while to add -2 to -3 we move 2 steps to the left as shown in blue to get -5.



Note;

- When adding positive numbers we move to the right.
- When dealing with negative we move to the left.

Subtraction of Integers.



Example

(+7) – (0) = (+7)

To subtract +7 from 0 ,we find a number n which when added to get 0 we get +7 and in this case n = +7 as shown above in red.

Example

(+2) – (+7) = (-5)

Start at +7 and move to +2. 5 steps will be made towards the left. The answer is therefore -5.

Example

-3 – (+6) = -9

We start at +6 and moves to -3. 9 steps to the left, the answer is -9.

Note:

- In general positives signs can be ignored when writing positive numbers i.e. +2 can be written as 2 but negative signs cannot be ignored when writing negative numbers -4 can only be written s -4.

  4–(+3)=4-3
  = 1
  -3- (+6) =3 – 6
  = -3

- Positive integers are also referred to as natural numbers. The result of subtracting the negative of a number is the same as adding that number.

  2–(-4)=2+4
  = 6
  (-5)–(-1)=-5+2
  = -3

- In mathematics it is assumed that that the number with no sign before it has appositive sign.

Multiplication of integers

- In general

  - (a negative number) x (appositive number) = (a negative number)
  - (a positive number) x (a negative number) = (a negative number)
  - (a negative number) x (a negative number) = (a positive number)

Examples

-6 x 5 = -30
7 x -4 = - 28
-3 x -3 = 9
-2 x -9 = 18

Division of integers

- Division is the inverse of multiplication. In general

1. (a positive number) ÷ (a positive number) = (a positive number)
2. (a positive number) ÷ (a negative number) = (a negative number)
3. (a negative number) ÷ (a negative number) = (a positive number)

4. (a negative number) ÷ (appositive number) = (a negative number)

- For multiplication and division of integer:

- Two like signs gives positive sign. Two
- unlike signs gives negative sign
- Multiplication by zero is always zero and division by zero is always zero.

Order of Operations of integers

- BODMAS is always used to show as

the order of operations.

B – Bracket first.

O – Of is second.

D – Division is third.

M – Multiplication is fourth.

A – Addition is

fifth.

S – Subtraction is considered last.

Example

6 x 3 – 4 ÷ 2 + 5 + (2-1) =

Solution

➢ Use BODMAS

(2 – 1) = 1 we solve
brackets first (4÷ 2) = 2 we
then solve division
(6 x 3) = 1 8 next is
multiplication Bring them
together
18 – 2 +5 +1 = 22 we solve addition first and lastly subtraction

18+6–2=22

Questions on integers

1. 3x – 1 > -4
   2x + 1 ≤ 7
2. Evaluate
   -12 ÷ (-3) x 4 – (-15) -5
   x 6 ÷ 2 + (-5)
3. Evaluate $\frac{-8 \div 2 + 12 \times 9 - 4 \times 6}{56 \div 7 \times 2}$
4. Evaluate without using mathematical tables or the calculator $\frac{1.9 \times 0.032}{20 \times 0.0038}$

Fractions

Introduction

- A fraction is written in the form $^{a}/_{b}$ where a and b are numbers and b is not equal to 0. The upper number is called the numerator and the lower number is the denominator.
- a→numerator
- b→denominator

Proper Fraction

In a proper fraction the numerator is smaller than the denominator. E.g. ,

Improper Fraction

- The numerator is bigger than or equal to denominator. E.g. , ,

Mixed Fraction

- An improper fraction written as the sum of an integer and a proper fraction.
  For example = 2 +

  = 2

Changing a Mixed Number to an Improper Fraction

Mixed number – 4 (contains a whole number and a fraction)

Improper fraction – (numerator is larger than denominator)

Step 1 – Multiply the denominator and the whole number
Step 2 – Add this answer to the numerator; this becomes the new numerator ***Step 3*** – Carry the original denominator over

Example

$3\frac{1}{8} = 3 \times 8 + 1 = 25$

$= \frac{25}{8}$

Example

$4\frac{4}{9} = 4 \times 9 + 4 = 40$

$= \frac{40}{9}$

Changing an Improper Fraction to a Mixed Number

Step 1 – Divide the numerator by the denominator
Step 2– The answer from step 1 becomes the whole number
Step 3– The remainder becomes the new numerator
Step 4– The original denominator carries over

Example*1*

$\frac{47}{5} = 47 \div 5$ or

$5\overline{)47} = 5\overline{)47}^{9} = 9\frac{2}{5}$

$\underline{45}$

2

Example*2*

$\frac{9}{2} = 2\overline{)9} = 2\overline{)9}^{4} = 4\frac{1}{2}$

$\underline{8}$

1

Comparing Fractions

When comparing fractions, they are first converted into their equivalent forms using the same denominator.

Equivalent Fractions

To get the equivalent fractions, we multiply or divide the numerator and denominator of a given fraction by the same number. When the fraction has no factor in common other than 1, the fraction is said to be in its **simplest form**.

Example

Arrange the following fractions in ascending order (from the smallest to the biggest):

$1/2, \ 1/4, \ 5/6, \ 2/3$

Step 1: Change all the fractions to the same denominator.
Step 2: In this case we will use 12 because 2, 4, 6, and3 all go into i.e. We get 12 by finding the L.C.M of the denominators.
To get the equivalent fractions divide the denominator by the L.C.M and then multiply both the numerator and denominator by the answer,
For ½ we divide 12 ÷ 2 = 6, then multiply both the numerator and denominator by 6 as shown below.

$\underline{1}_{x6} \ \underline{1}_{x3} \ \underline{5}_{x2}$
$\underline{2}_{x4} \ 2_{x6} \ 4_{x3}$
$6_{x2} \ 3_{x4}$

Step 3: The fractions will now be:
$6/12, \ 3/12, \ 10/12, \ 8/12$
Step 4: Now put your fractions in order (smallest to biggest.)
$3/12, \ 6/12, \ 8/12, \ 10/12$
Step 5: Change back, keeping them in order.
$1/4, \ 1/2, \ 2/3, \ 5/6$
You can also use percentages to compare fractions as shown below.

Example

Arrange the following in descending order (from the biggest)

$5/12,\ 7/3,\ 11/5,\ 9/4$

Solution

$\frac{5}{12} \times 100 = 41.67\%$

$\frac{7}{3} \times 100 = 233.3\%$

$\frac{11}{5} \times 100 = 220\%$

$\frac{9}{4} \times 100 = 225\%$

$7/3,\ 9/4,\ 11/5,\ 5/12$

Operation on Fractions

Addition and Subtraction