

CORNERSTONE JUNIOR SCHOOL - MUKONO

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P.6 MATHEMATICS SELF-STUDY LESSONS SET 2 12.6.20

LESSON 1

TOPIC: NUMBER PATTERNS AND SEQUENCES

SUB TOPIC : REPRESENTING PRIME FACTORS ON A

VENN DIAGRAM

COMPETENCES

By the end of this lesson you should be able to:

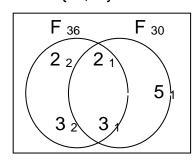
- Prime factorize numbers correctly.
- Represent the prime factors on a Venn diagram

Example 1

Represent the prime factors, F₃₆ and F₃₀ on a Venn diagram

$$F_{30}=\{2_1, 3_1, 5_1\}$$
 $F_{36}=\{2_1,$

 $C.P.F=\{2_1,3_1\}$



- Prime factorize 36 and 30 as shown.
- List the prime factors in set notation.
- Drawn a Venn diagram.
- First identify common factors to be put in the intersection.
- Write the remaining prime factors in their respective regions

Activity

Draw Venn diagrams to represent the prime factors for the following

- 1. 24 and 30
- 2. 30 and 48
- 3. 18 and 40
- 4. 48 and 60
- 5. 15 and 20
- 6. 36 and 54

TOPIC : NUMBER PATTERNS AND SEQUENCES

SUB TOPIC : FINDING THE GCF AND LCM USING A

VENN DIAGRAM

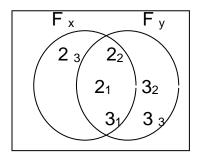
COMPETENCES

By the end of the lesson, you should be able to:

- Find the greatest common factors (GCF) using a Venn diagram.
- Find the lowest common factors (LCM) using a Venn diagram.
- Calculate the values of the unknowns used.

CONTENT: FINDING THE GCF AND LCM USING A VENN DIAGRAM

Study the Venn diagram and use it to answer questions that follow



a) Find the value of x $F_x = \{2_1, 2_2, 2_3, 3_1\}$

$$F_x = 2 \times 2 \times 2 \times 3$$

$$F_x = 8 \times 3$$

$$F_x = 24$$

b) Find the value of y:

$$Fy = 2x2x3x3x3$$

= 12x9

- To get the value of x, multiply all the prime factors of x.
- To get the value of y, multiply all the factors of y.
- To get the GCF, multiply all the common factors. (the factors in the intersection)
- To get the LCM, multiply all the factors in the union.

c) Find the GCF of x and y
G.C.F of x and
$$y = F_x \cap F_y$$

$$= 2_1 \times 2_2 \times 3_1$$

$$= 2 \times 2 \times 3$$

$$= 4 \times 3$$

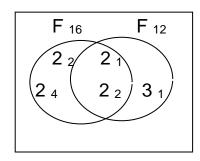
$$= 12$$

d) Find the LCM of x and y
LCM of x and y
L C M =
$$F_x \cup F_y$$

= $2_1x2_2x2_3x3_1x3_2x3_3$
= $2 \times 2 \times 2 \times 3 \times 3 \times 3$
= 8×27
= 216

Activity

1. Study the Venn diagram below and use it to answer the questions that follow.

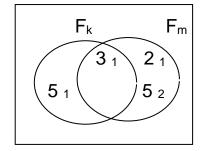


Find;

- i) F1₆ ∩F₁₂
- ii) The GCF of 16 and 12
- iii) $F_{16} \cup F_{12}$

iv) The LCM of 16 and 12

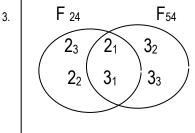
2.



Find:

- a) $F_k \cap F_m$
- b) GCF of Fk and Fm
- $c)^{^{\prime}} \; \mathsf{F}_{k} \; \cup \; \mathsf{F}_{m}$
- d) LCM of F_k and F_m

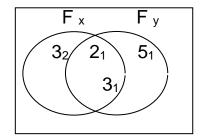
3.



Find;

- $\mathsf{F}_{24} \! \cap \! \mathsf{F}_{54}$ i)
- The GCF of 24 and 54 ii)
- $F_{24} \cup F_{54}$ iii)
- The LCM of 24 and 54 iv)

4.



- i) Find the value of x
- ii) Find the value of y
- iii) Find the GCF of x and y
- iv) Find the LCM of x and y

TOPIC: NUMBER PATTERNS AND SEQUENCES

SUB TOPIC : SQUARES AND SQUARE ROOTS

CONTENT : SQUARES AND SQUARE ROOTS

COMPETENCES

By the end of the lesson, you should be able to:-

- Identify square numbers
- Prime factorize correctly
- Find the square root of a given number

SQUARES AND SQUARE ROOTS

- A square number is a number obtained after multiplying any counting number by itself.
- A square root is a number which is multiplied by itself to give a square number.

Example 1

Find the square of 25

$$(25)^2 = 25 \times 25$$

Example II

Find the square root of 81

$$\sqrt{81} = \sqrt{(3 \times 3) \times (3 \times 3)}$$

$$= 3 \times 3$$

- $\sqrt{81} = 9$
- prime factorize the given number.
- pair the prime factors and pick one from each pair.
- multiply the factors picked to get the square root.

Activity

A. Find the square of each of the following numbers:-

- 1. 8
- 2. 16
- 3. 27
- 4. 11
- 5. 20
- 6. 100

B. Find the square root of the following

- 1. 36
- 2. 144
- 3. 484
- 4. 625
- 5. 324
- 6. 576

TOPIC : NUMBER PATTERNS AND SEQUENCES

SUB TOPIC : SQUARES AND SQUARE ROOTS OF

FRACTIONS

Content : Finding squares and square roots of fractions

COMPETENCES

By the end of the lesson, you should be able to:

- Identify the type of the fraction correctly.
- Find the square of a given fraction
- Find the square root of a given fraction

Finding Squares and square roots of fractions

- When given a common fraction, the result must remain a common fraction.
- when given a mixed number, the answer must be presented as a mixed number.

Example 1

a) Find the square of $\frac{1}{2}$ ($\frac{1}{2}$)²

$$\frac{1x1}{2x2}$$

 $\frac{1}{4}$

b) 1
$$\frac{1}{5}$$

$$(1\frac{1}{5})^2$$

$$(\frac{5x1+1}{5})^2$$

$$(\frac{5+1}{5})^2$$

$$(\frac{6}{5})^2$$

$$\frac{6}{5} \times \frac{6}{5}$$

$$\frac{6x6}{5x5}$$

$$1\frac{11}{25}$$

Example IIFind the square root of;

a)
$$\sqrt{\frac{36}{81}}$$

Prime factorize 36 and 81

36

_2	36
2	18
3	9
3	3
	1

3	81
3	27
3	9
3	3

$$1$$

$$= \sqrt{\frac{2x2x3x3}{3x3x3x3}}$$

$$= \frac{2x3}{3x3} = \frac{6}{9}$$

since the given question was not in its simplest form, you should not reduce the answer to the its simplest form.

b)
$$\boxed{6\frac{1}{4}}$$

$$\boxed{\frac{25}{4}}$$

$$\boxed{\frac{5x5}{2x2}}$$

$$=\frac{5}{2}$$

$$\boxed{\frac{1}{2}}$$

*A question in mixed fraction requires an answer in mixed fraction.

Activity

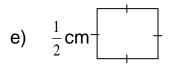
Find the squares of each of the following

a)
$$\frac{1}{3}$$

b)
$$\frac{4}{5}$$

c)
$$\frac{3}{8}$$

d)
$$1\frac{2}{3}$$



Find the area of the square.

f) Work out
$$7\frac{1}{2} \times 7\frac{1}{2}$$

Find the square root of;

g)
$$\frac{1}{4}$$

h)
$$\frac{9}{16}$$

i)
$$3\frac{6}{25}$$

j)
$$2\frac{46}{49}$$



Find the value of x if the area is 256cm²

TOPIC : NUMBER PATTERNS AND SEQUENCES

SUB TOPIC : SQUARE AND SQUARE ROOTS OF

DECIMALS

CONTENT: FINDING SQUARES AND SQUARE ROOTS OF

DECIMALS

COMPETENCES

By the end of this lesson, you should be able to:

- Identify the fraction

- Find squares of decimals

- Find square roots of decimals

Finding squares and square roots of decimals

- Multiply the given number by itself to get the square number.
- Prime factorize the numerator and denominator to get the square roots.

Note

When given a decimal, the answer must be presented as a decimal

Example

Find the square of 0.4

$$(0.4)^{2} = 0.4 \times 0.4$$

$$= \frac{4x4}{10x10}$$

$$= \frac{16}{100}$$
Or: 0.4
$$\times 0.4$$

$$1 = 6$$

$$+ 0.0$$

$$0.1 = 6$$

$$= 0.16$$

Example II

Workout the square root of 0.36

$$\sqrt{0.36} \qquad = \sqrt{\frac{36}{100}}$$

$$\sqrt{\frac{36}{100}} = \sqrt{\frac{2 \times 2 \times 3 \times 3}{2 \times 2 \times 5 \times 5}}$$

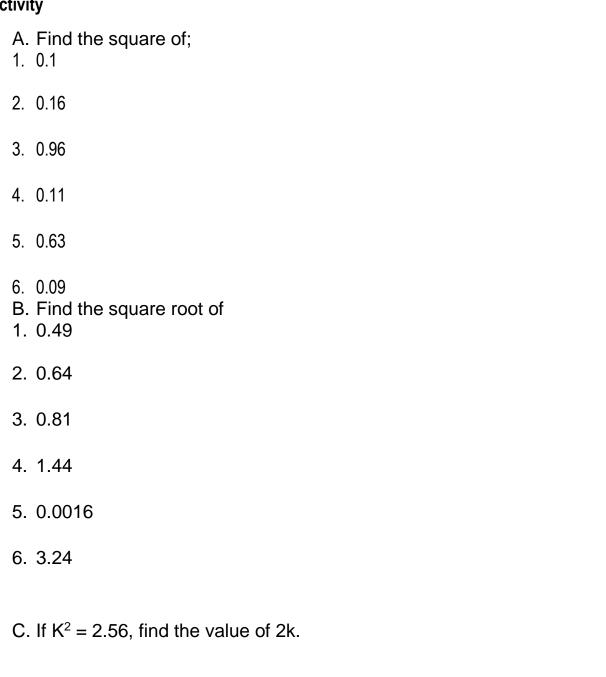
$$= \frac{2x3}{2x5}$$

$$= \frac{6}{10}$$

$$= 0.6$$

^{*}Remember a question in decimal requires an answer in decimal.

Activity



D. The area of a square garden is 2.89m². Calculate the length of one

side of the garden.

TOPIC : INTEGERS

SUB TOPIC : ADDITION OF INTEGERS WITHOUT A

NUMBERLINE

CONTENT : ADDING INTEGERS WITHOUT A

NUMBERLINE

COMPETENCES

By the end of this lesson, you should be able to:

- Determine the direction of given integers

- Make clear positive movements. (moving forward)

- Make clear negative movements. (moving backwards)

- Use a mind map to add integers.

NOTE

- When the same (similar) signs 7 + in the same position are multiplied, they give us a positive.
- When different signs in the middle/same position are multiplied they give us a negative.

- X - = +

+ X + = +

- X + = -

+ X - = -

Adding integers without a number line

Example

1. Add: $^{+}2 + ^{+}5 = ^{+}2 + (^{+}5)$

Activity

Workout without a number line.

- 1. +2++4
- 2. +3++5
- 3. +2++1
- 4. +4+3
- 5. +5++2
- 6. -2+-3
- 7. -6+-2
- 8. -4+-3
- 9. -1+-4
- 10. -7+-2

TOPIC: INTEGERS

SUB TOPIC: ADDITION OF INTEGERS USING A NUMBER LINE

COMPETENCES: By the end of this lesson, you should be able to:-

- Determine the direction of given integers
- Make clear positive movements. (moving forward)
- Make clear negative movements. (moving backwards)
- Use a number line to add integers.

CONTENT

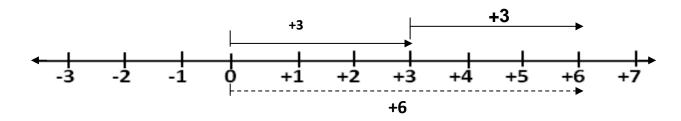
Adding integers using a number line

REVIEW P.5 WORK

- 1. Identify integers on the number line
- 2. Ordering integers
- 3. Comparing integers

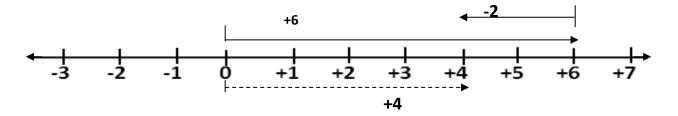
Examples

- Evaluate: +3 + +3 using a number line Note
 - → +3 means move 3 steps forward and continue moving 3 steps forward, your final destination is the answer.



Therefore: $3 + {}^{+}3 = {}^{+}6$

2. Evaluate $^{+}6 + ^{-}2$



Therefore; +6 + -2 = +4

ACTIVITY

A. Workout the following using a number line.

TOPIC: INTEGERS

SUB TOPIC: SUBTRACTION OF INTEGERS WITHOUT A NUMBER LINE

CONTENT: SUBTRACTION OF INTEGERS WITHOUT A NUMBER LINE

COMPETENCES

By the end of this lesson, you should be able to:

- Determine the direction of given integers

- Make clear positive movements. (moving forward)

- Make clear negative movements. (moving backwards)

- Use a mind map to subtract integers.

Note:-

- Before subtracting integers without a number line, you need to multiply the signs.
- Similar signs multiplied together give gives a positive eg,

$$\triangleright$$
 - \times - = +

Different signs multiplied together give a negative. eg

$$> - x + = -$$

Example

1. Subtract: +3 - +6 without using a number line +3 - +6 = +3 - (+6)

Pos	Neg
+	-
+	-
+	-
	-
	-
	-
0	-3

Activity

Workout the following without using a number line

- 1. +3 -+4
- 2. -4 -4
- 3. -6-+6
- 4. +5 -+4
- 5. +3 +2
- 6. -4 +2
- 7. -6 -4
- 8. +10 --6

TOPIC: INTEGERS

SUB TOPIC: SUBTRACTION OF INTEGERS USING A NUMBER LINE

CONTENT: SUBTRACTION OF INTEGERS USING A NUMBER LINE

COMPETENCES

By the end of this lesson, you should be able to:

- Determine the direction of given integers

- Make clear positive movements. (moving forward)

- Make clear negative movements. (moving backwards)

- Use a number line to subtract integers.

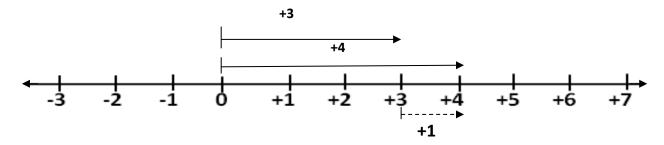
Introduction

- When subtracting integers using a number line, all integers must start from zero.
- It appears as if two people are going to race.
- To get the answer, draw an arrow from the second integer to the first integer.
- Remember, the first integer must be nearer to the number line.

Example

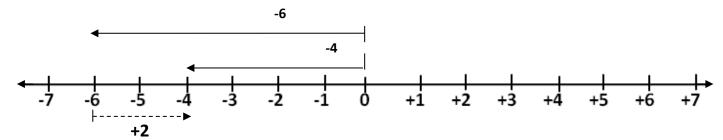
1. Simplify the following using a number line.

+4 - +3



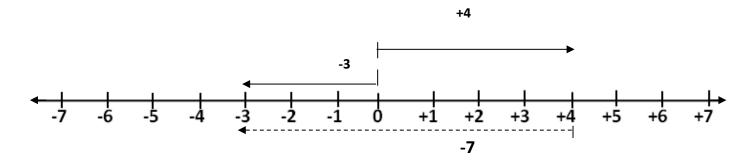
Therefore; $^{+}4 - ^{+}3 = ^{+}1$

2. simplify:- -4 - -6



Therefore; $^{-}4 - ^{-}6 = ^{+}2$

3. simplify:- -3 - +4



Therefore; $^{-}$ 3 - $^{+}$ 4 = $^{-}$ 7

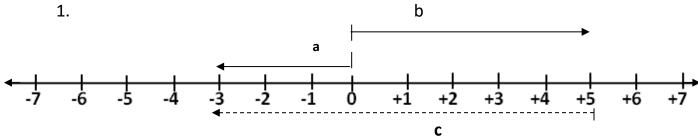
ACTIVITY

- A. Subtract using a number line.
 - 1. 7 –2
 - 2. -6-2
 - 3. ⁻6 −4
 - 4. 3 –8
- B. Write the subtraction sentence for each of the following number line.

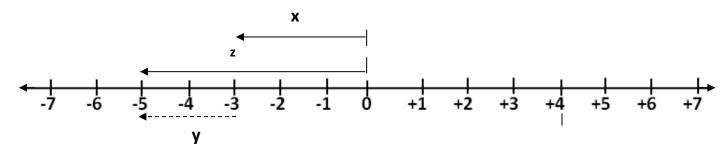
Note;

- A mathematical statement has no answer eg. +3+ -4
- A mathematical sentence has an answer eg. +3 + -8 = -5

1.



2.



TOPIC: INTEGERS

SUBTOPIC: MULTIPLICATION OF INTEGERS

CONTENT: Multiplication of integers

COMPETENCES

By the end of this lesson you should be able to:

- Recognize the number of groups correctly
- Multiply correctly with or without a number line
- Recognize the direction of movement correctly

$$+ x + = +$$

$$- x - = +$$

$$+ x - = -$$

Introduction;

- When multiplying integers,
 - -Integers with similar signs multiplied together give a positive result. e.g.

$$\rightarrow$$
 - x - = + \rightarrow + x + = +

-Integers with different signs multiplied together give a negative result. e.g.

Multiplication of integers

Examples

Multiply: 2 x +2
 x +2 means two groups of +2
 +2 + +2

Note:

$$+ x + = +$$

$$- X - = +$$

$$- x + = -$$

Example. 2

2. Workout 3×-4 $3 \times -4 = -12$

Exercise

Multiply the following

- 1. 2 x ⁻5
- 2. 3 x ⁺4
- 3. 3 x ⁻2
- 4. 4 x ⁻2
- 5. 2 x -1
- 6. 3 x ⁻2
- 7. 2 x ⁻6
- 8. 2x + 5
- 9. 3 x ⁻4
- $10.4 \times ^{-2}$
- 11.4 x ⁻2

TOPIC: INTEGERS

SUB TOPIC: MULTIPLICATION OF INTEGERS USING A NUMBER LINE.

COMPETENCES

By the end of this lesson, you should be able to:

- Identify the given operation.
- Draw the number line correctly.
- Make the laps on the number line.
- Interpret multiplication on the number line.

CONTENT

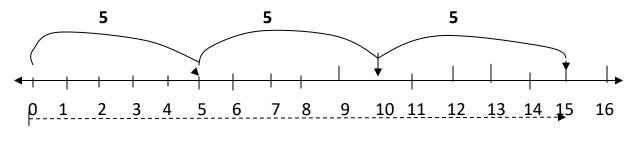
Multiplication

Note;

- The first integer represents number of groups/ laps to make.
- The second one represents steps in each lap and the direction.

Examples

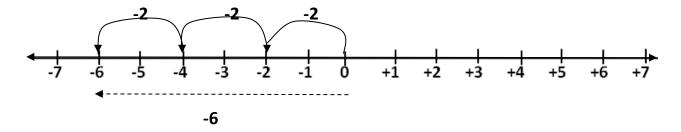
1. Multiply: ⁺3 x ⁺5 (this means make **3 groups of five steps to the positive side.**)



15

:.
$$^{+}3$$
 x $^{+}5$ = $^{+}15$

+3 x -2 (This means three groups of 2 steps to the negative side.)



:.
$$^{+}3 \times ^{-}2 = ^{-}6$$

ACTIVITY

Multiply the following using a number line

- 1. +5 x +2
- 2. +8 x +4
- 3. +9 x +6
- 4. +5 x +7
- 5. +12 x +7
- 6. +3 x +5
- 7. +4 x +3

TOPIC: INTEGERS

SUB TOPIC: APPLICATION OF INTEGERS

COMPETENCE: by the end of this lesson, you should be able to:-

- Interpret the word statements
- Apply integers in daily life

APPLICATION OF INTEGERS

Key words

- 1. **Debt** means negative (-ve)
- 2. **Loss** means negative (-ve)
- 3. **profit** means positive (+ve)
- 4. **Gain** means positive (+ve)
- 5. Pay = positive (+ve)
- 6. **Starting time** of an event = 0
- 7. **Time before** the start = negative (-ve)
- 8. **Time later** / after the start = positive(+ve)

Examples 1

1. Kayemba had a debt of shs. 150,000 with each of his three friends. He received shs. 400,000 as salary. Find Kayemba's financial position after paying off his debts.

Total debt = shs.
$$^{-1}50,000$$

shs. $^{-4}50,000$

Examples 2

1. Kato borrowed sh. 500, but paid back sh. 300. How much money does Kato have?

2. The temperature was $20^{\circ}F$ but dropped by $23^{\circ}F$. Find the new temperature. $^{+}20F - 23^{\circ}F = -3^{\circ}F$

The new temperature is ⁻3⁰F

ACTIVITY

Workout the following using integers

- 1. A motorist moved 100m forward and reversed 150m. How far is she from the starting point?
- 2. A frog jumped 3 steps four times before diving into the swimming pool. Calculate the distance covered by the frog.
- 3. Ali's weight dropped by 10kg from 60kg. Find Ali's weight.

4.	Move 4metres backwards and another 4metres backwards.	Write your last
	position using integers.	

5. Omanya cycled 60km to town and another 2km to his office. How far is Omanya now?

TOPIC FRACTIONS :

SUB TOPIC MULTIPLICATION OF SIMPLE FRACTIONS.

COMPETENCES

By the end of the lesson you should be able to:

- Find the product of the given fractions.
- Multiply numerators and denominators correctly.
- Reduce/simplify products to their Lowest terms

CONTENT

Note

- In multiplication of fraction, we get the product of numerators alone and that of denominators alone.
- Simplify the product to the simplest form.

Simplify $\frac{1}{3}$ x 12

Multiply: $\frac{2}{3}$ x $\frac{1}{5}$

 $\frac{1}{2}$ x 12^{4}

 $\frac{2}{3}$ x $\frac{1}{5}$ = $\frac{2x1}{3x5}$

1 x 4

= 4

Activity

1.
$$\frac{1}{2}$$
 x12

2.
$$\frac{3}{6}$$
 x 48

3.
$$\frac{2}{3}$$
 of 12

1.
$$\frac{1}{2}$$
 x12 2. $\frac{3}{6}$ x 48 3. $\frac{2}{3}$ of 12 4. $\frac{1}{2}$ x $\frac{1}{3}$

5.
$$\frac{2}{9}$$
 $\times \frac{4}{10}$

5.
$$\frac{2}{9}$$
 $\frac{x}{10}$ 6. $\frac{6}{2}$ $\frac{2}{3}$ $\frac{x}{1}$ $\frac{1}{8}$ 7. $\frac{12}{8}$ $\frac{2}{3}$ 8. $\frac{2}{2}$ $\frac{1}{2}$ $\frac{x}{4}$

7.
$$12 \times \frac{2}{3}$$

$$8.2\frac{1}{2} \times \frac{1}{4}$$

More about multiplication of fractions.

- 1. Calculate the product of $2\frac{1}{2}$ and $\frac{1}{4}$. 2. What is the product of $\frac{3}{4}$ and $\frac{1}{3}$?
- 3. What is a quarter of 60kgs?
- 4. What is $\frac{3}{5}$ of 1200 birds
- 5. Calculate $\frac{1}{4}$ of $\frac{4}{7}$

FRACTIONS TOPIC :

SUB TOPIC FINDIND THE RECIPROCAL

COMPETENCES: By the end of the lesson you should be able to:-

- Understand the reciprocal of a number
- > Calculate to get the reciprocal
- > Use the reciprocal to determine the multiplicative inverse.

Note

A number multiplied by its reciprocal is equal to 1.

CONTENT

Example

1. What is the reciprocal of 4? This means the number multiplied by 4 to give 1 as a product Let the reciprocal be **m**.

$$4 \times m = 1$$

What number must be multiplied by 0.7 to give 1?

$$4m = 1$$

$$0.7 \times d = 1$$

$$\frac{7d}{7} = \frac{10}{7}$$

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

$$\frac{7d}{10} = 1$$

$$d = \frac{10}{7}$$

$$\mathbf{M} = \frac{1}{4}$$

$${}^{1}\mathcal{N} \times \frac{7d}{10} = 1 \times 10 \qquad d = 1 \frac{3}{7}$$

$$d = 1 \frac{3}{7}$$

The number is $\frac{1}{4}$

Application

- 1. What is the reciprocal of $2\frac{1}{4}$?
- 2. What number do we multiply by 6 to give 1 as a product?
- 3. What number must be multiplied by 0.2 to give 1?
- 4. What is the reciprocal of $\frac{3}{4}$?
- 5. Calculate the reciprocal of 8.

TOPIC FRACTIONS :

SUB TOPIC DIVISION OF FRACTIONS

COMPETENCES

By the end of the lesson, you should be able to:

- Divide fractions correctly.
- Use the reciprocal during division
- Multiply the fractions after getting the reciprocal.
- Divide fractions by fractions

Division of fractions

Note

- Get reciprocal of the divisor
- Multiply the dividend by the reciprocal got.
- Simplify the product to get your final answer.

1. Divide
$$\frac{2}{3} \div 2$$

$$=\frac{2}{3} \div \frac{2}{1}$$

$$=\frac{2}{3}$$
 x $\frac{1}{2}$

$$=\frac{1x1}{3x1}$$

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

2. Work out:
$$\frac{3}{4} \div \frac{1}{2}$$

2. Work out:
$$\frac{3}{4} \div \frac{1}{2}$$
 3. Divide $5 \div \frac{2}{3}$ $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \times \frac{2}{1}$ $= \frac{5}{1} \div \frac{2}{3}$

$$= \frac{3x2}{4x1} \qquad = \frac{5}{1} \times \frac{2}{3}$$

$$=\frac{3}{2}$$

$$= \frac{3}{2}$$

$$= 1\frac{1}{2}$$

$$= 7\frac{1}{2}$$

3. Divide
$$5 \div \frac{2}{3}$$

$$=\frac{5}{1} \div \frac{2}{3}$$

$$=\frac{5}{1} \quad x\frac{2}{3}$$

$$=\frac{15}{2}$$

$$=7\frac{1}{2}$$

Activity

Divide the following fractions

1.
$$\frac{3}{4} \div \frac{1}{2}$$

2.
$$2\frac{1}{2} \div 1\frac{1}{4}$$

- 3. $\frac{7}{12} \div \frac{3}{4}$
- 4. $\frac{1}{2} \div \frac{3}{4}$
- 5. $6 \div \frac{2}{3}$
- 6. $12 \div \frac{3}{4}$
- 7. $18 \div \frac{1}{6}$

Application of division of fractions

- 8. A bag contains $5\frac{1}{2}$ kg of maize four. Find the number of $\frac{1}{2}$ kg packets that will be obtained from the bag?
- 9. 12 litres of milk were given to children. If each child got $\frac{3}{4}$ of a litre, how many children got milk?
- 10.By what fraction must $6\frac{1}{2}$ be divided to get $2\frac{1}{2}$?
- 11. How many half litre bottles can be got from a 10 litre jerrycan?