

WEEK3 LESSON NOTE FOR MATHEMATICS

DIRECT AND INVERSE PROPORTION

- i. Direct proportion
- ii. Indirect proportion
- iii. Apply direct and inverse proportions to practical problems

PROPORTION

Proportion describes the relationship between two quantities such that change (increase or decrease) will lead to corresponding change (increase or decrease) in the other. There are two types of proportion, direct and indirect proportion.

DIRECT PROPORTION

When increase in one quantity leads to corresponding increase in the other or when decrease in one quantity leads to corresponding decrease in the other, then the quantities are said to be in direct proportion. For example, the more fuel added to a burning fire, the more it burns.

INVERSE PROPORTION

If the proportion is such that when one quantity increases, the other decreases proportionally, then the proportion is said to be inverse.

PRACTICAL APPLICATION OF PROPORTION

Example:

1. If 20 laborers can clear a school field for 28 days. How many days would it take 10 laborers to clear the field?

Solution:

20 laborers used 28days

1 laborer will use $20 \times 28 = 560$ days

10 labors can clear same field in $\frac{560}{10} = 56$ days.

2. 10 men can build a wall in 12 days. How long will it take 4 men?

Solution:

10 men built the wall in 12 days.

1 man will build it in 120 days

4 men will build it in $\frac{120}{4} = 30$ days.

EVALUATION:

1. A nurse counted 30 heart beats in 25 seconds. How many times the heart will beat in 1 minutes.
2. 8 men plough a farmland in 15 days. How many days will it take 5 men working at the same rate?

TRANSLATION OF WORD PROBLEMS INTO NUMERICAL EXPRESSIONS.

The following terms are commonly used in words expressions.

- **SUM:** The sum of two or more numbers is the result obtained when they are added together.
- **DIFFERENCE:** The *difference* between two numbers is the result obtained when one of the numbers is subtracted from the other.
- **POSITIVE DIFFERENCE:** This implies larger number *minus* smaller number.
- **NEGATIVE DIFFERENCE:** This implies smaller number minus larger number
- **NOTE:** When the nature of the difference required is not stated, we consider the *positive difference*.
- **PRODUCT:** When two or more numbers are multiplied together, the result obtained is known as the *product* of the numbers.
- **QUOTIENT:** The *quotient* of two numbers is the result obtained by dividing one number by another.

Examples:

Translate the following word problems into numerical expressions.

1. From the sum of 78 and 129 subtract 264

Solution:

$$(78 + 129) - 264$$

2. What must be multiplied by 0.75 to obtain 6?

Solution:

$$\text{Let the number be } x \Rightarrow x(0.75) = 6$$

3. Add 18 to the negative difference between 56 and 45.

Solution:

$$(45 - 56) + 18$$

SOLVING WORD PROBLEMS.

Example:

1. Find one-quarter of the positive difference between 15 and 55.

Solution:

$$\frac{1}{4}(55 - 15) = \frac{1}{4}(40) = 10.$$

2. Subtract 15 from the product of 5 and 15, then divide the result by 3.

Solution:

$$\frac{(5 \times 15) - 15}{3} = \frac{60}{3} = 20.$$

PRACTICE EXERCISE

- Divide 42 by the sum of 2 and 4.
- Find one-eighth of the sum 18 and the product of 6 and 12.
- A bottle of water can fill five cups of capacity 200ml, or four cups of capacity 250ml.
 - Does the number of cups vary directly or inversely with their capacity?
 - How many cups of capacity 100ml could the bottle fill?
- A bus travelling at steady speed, takes $2\frac{1}{2}$ hours for a certain journey. How long will a car take if it travels at three times the speed of the bus?
- Identify the rational and non-rational numbers among the following

a) $\frac{\pi}{2}$ b) $(\sqrt{17})^2$ c) $\frac{\sqrt{12}}{13}$

ASSIGNMENT

Translate the following word problems into numerical expressions.

1. When a number is trebled and five times the number is subtracted, the result is 3.7
2. The sum of three consecutive numbers is 108.
3. Divide the sum of 12 and -4 by the sum of -12 and 4.
4. If n is doubled and 7 subtracted, the result is 23.
5. The difference between certain number and -8 is 15.

KEYWORDS

- ✓ Consecutive
- ✓ Rational
- ✓ Non-rational

Proportion