

LESSON PLAN 11

TEACHER'S NAME :

SUBJECT: MATHEMATICS

CLASS: 8

UNIT : DIRECT & INVERSE PROPORTIONS

No.of Periods: 10+11=21

PERIOD ALLOTMENT

NAME OF THE UNIT	SUB-TOPICS	NO OF PERIODS REQUIRED			Time line for teaching	
		Teaching	Practice	TOTAL	From	To
EXPONENTS AND POWERS	11.1 PRE-REQUISITES & INTRODUCTION	1	1	2		
	11.2 DIRECT PROPORTION	4	5	9		
	11.3 INVERSE PROPORTION	5	5	10		
	TOTAL	10	11	21		

PRE-REQUISITES OF THE LESSON

Every Pupil is expected to have basic knowledge in

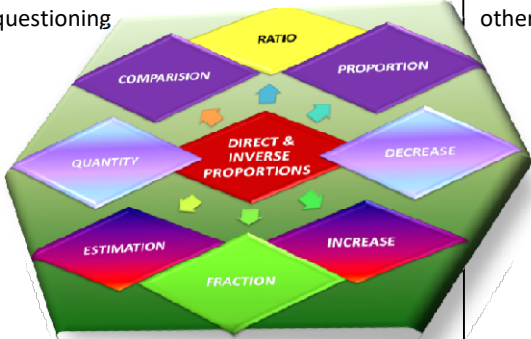
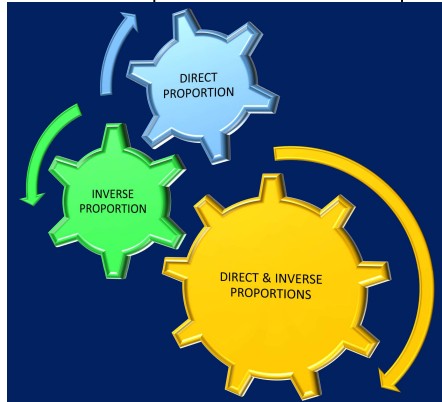
- # comparing quantities
- # calculating ratio and proportion between two quantities
- # four basic operations +,-,x,÷
- # operating fractional numbers and decimals.
- # having a logical approach in assessing what type of proportion really occurs in action in a given real life situation

LEARNING OUTCOMES

After Completion of this lesson every student will be able to


- # understand how ratio and proportions come handy in doing calculations in real life situations which involve proportions.
- # estimate the type of proportion whether it is a direct proportion or inverse proportion needed to apply in a given situation
- # applies and calculates the direct as well as inverse proportion wherever necessary
- # Utilize the concept of Direct & Inverse Proportions in real life sums
- # appreciate the utility of "Direct & Inverse Proportions" in real life situations

TEACHING PERIOD : 1 (PRE - REQUISITES & INTRODUCTION)

CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
PRE REQUISITES	Brain storming session involving children with pre-requisites vocabulary and concepts related to previous knowledge. Introduction of new vocabulary and key words associated with the concept through questioning # Direct & Inverse proportion # Estimation # Proportion # Comparison # Decrease # Increase # Quantity # Ratio # fraction	* Students read the pre requisites and answer the questions to the teacher (whole class activity)	Every Pupil will read and write the key words in their note books
MIND MAPPING	Teacher writes the key word " DIRECT AND INVERSE PROPORTIONS" on the black board and will elicit its other related words through questioning 	Heterogeneous groups are created. One group will read the words and other will explain the meaning	Pupils individually read the keywords associated with the lesson
RELEVANCE OF THE LESSON	Teacher conducts a discussion on the importance of the lesson through questioning 1) What could be the value of 24 pens if the cost of 4 pens is 20/-? 2) In a family of 4 their monthly earning of 20000/- is sufficient exactly. How many days the earning will last if one more member joined the family?	Students participate in the discussion and ask questions	Pupils individually write their responses to the questions asked
CONCEPT MAP	Teacher displays the concept map depicting various concepts that pupil are going to learn in this lesson 	Whole class read the concept map	
ASSESSMENT	Teacher poses some questions to test their knowledge on prerequisites.	every group will do the task by discussion among each other	every individual solves the task on their own

PRACTICE PERIOD: 1

CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books # Direct & Inverse proportion # Estimation # Proportion # Comparison # Decrease # Increase # Quantity # Ratio # fraction	Students read these key words in groups and will try to give examples to each key word	Every child comes to the board and reads the key words and notes them down in their note books
SIMILAR LINES READING	Teacher questions some real life examples where it is needed to calculate proportion and asks children to quote some more by watching similar lines	Each group will observe the similar lines and will frame some more by discussion	Every Individual will frame some more using similar lines
<p>1) Vidhijna pays 25/- for purchasing a book what is the number of books could she get for 125/-</p> <p>2) In a hostel the groceries worth 24000/- were supplied to 40 students which will be sufficient for one month. If some more children joined the hostel the groceries lasted in just 20 days. Find the number of children joined newly.</p>			
SUMMARY/ SYNOPSIS	Teacher writes synopsis on the board and asks children to read, note down and practice.	pupils will note down and read the summary in groups	every individual spells and reads the summary and notes it down
WRITING/ EDITING	Teacher conducts a dictation on key words ,pre-requisites and similar lines and asks children to exchange books for editing after writing is finished.	One group will check the writings of the other and vice versa	Slow learners are focused and teacher will ascertain that every individual learns the

TEACHING PERIODS : 2 to 5	DIRECT PROPORTION																		
CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)																
KEY WORDS	Brain storming session involving children with key words # Direct Proportion # Increase # Decrease # Vary # Constant # Quantities	* Students read the keywords answer the questions to the teacher (whole class	Every Pupil will read and write the key words in their note books																
CONCEPTUAL UNDERSTANDING	Teacher demonstrates the concept of direct proportion using some real life examples and an activity by dividing pupils into heterogeneous groups and each group will be given a wall clock and are asked to note down the angle turned by the minute hand along with the period of time in a tabular form showing the time after every interval of 15 min(10 min for another group so..on) starting from 12 'o'clock. With this activity each group will arrive at a tabular form showing the angle made for every regular interval of time through which teacher elaborates the concept of direct proportion.	Each group will understand the concepts by participation in the activity	every child learns the concept through the learning activity																
LEARNING ACTIVITY		<div style="border: 2px solid magenta; padding: 10px; text-align: center;"> <h2 style="color: blue; margin: 0;">DIRECT PROPORTION</h2> <p style="margin: 0;">$y \propto x$ $y = kx$</p>  </div>																	
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr style="background-color: #f4a460;"> <th>TIME PASSED (T) IN MINUTES</th> <th>T₁(15)</th> <th>T₂(30)</th> <th>T₃(45)</th> <th>T₄(60)</th> </tr> </thead> <tbody> <tr style="background-color: #f4a460;"> <th>ANGLE TURNED (A)</th> <td>90⁰</td> <td>180⁰</td> <td>270⁰</td> <td>360⁰</td> </tr> <tr style="background-color: #f4a460;"> <th>(T/A)</th> <td>$\frac{1}{6}$</td> <td>$\frac{1}{6}$</td> <td>$\frac{1}{6}$</td> <td>$\frac{1}{6}$</td> </tr> </tbody> </table>				TIME PASSED (T) IN MINUTES	T ₁ (15)	T ₂ (30)	T ₃ (45)	T ₄ (60)	ANGLE TURNED (A)	90 ⁰	180 ⁰	270 ⁰	360 ⁰	(T/A)	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
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SUMMARY	Teacher once again writes important key words and procedures and asks children to note down and adopt.	Pupils will note down and read the summary in groups	Every individual reads the summary and notes it down and adopts the procedure																
ASSESSMENT	Teacher gives some questions from Try These sections as well as some examples and asks children to solve those sums	Every group will do the sums by discussion among each other	Every individual solves the sums on their own																

PRACTICE PERIODS : 2 to 6 **DIRECT PROPORTION**

CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books # Direct Proportion # Increase # Decrease # Vary # Constant # Quantities	Whole class activity : one child comes to the board and reads the key words loudly and the remaining class follows.	Every child comes to the board and reads the key words and notes them down in their note books
SIMILAR LINES READING	Teacher solves some sums related to real life on direct proportion and will ask children to solve some more in the worksheet by watching similar lines	Each group will read the similar lines and will frame some more by discussion	Every Individual will do a few more by watching similar lines

					
# of bananas	3	6	9	12	15
# of boxes	1	2	3	4	5

Direct Proportion Formula

The **direct proportion formula** is an algebraic formula which represents the directly proportional relationship between two variables.

In maths we can use the proportionality symbol. The proportionality symbol is \propto .
If the variables were x and y , and y is directly proportional to x , we can write the relationship using the proportionality symbol.
 $y \propto x$

We can also write this as a formula using the constant of proportionality k .
 $y = kx$

Direct Proportion

Objective: To be able to find the constant of proportionality when variables are directly proportional and use the equation $ax = by$

Starter questions

Find x: 1. $20 = 4x$ 2. $54 = 9x$ 3. $7 = 56 \div x$ 4. $12 = 60 \div x$ 5. $11 = x + 5$	If A is 9 what is: 1. 5A 2. 3A + 4 3. A + 3 4. 10A - 12 5. $A^2 - 11$	B = 4 and C = 8 what is: 1. $4B + 2C$ 2. $10C - 3B$ 3. 8C 4. $-C + 8$ 5. $2(B+C)$
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Main questions

1. If A is directly proportional to B, write an equation in the form $A = kB$ linking the two variables if when $A = 8$ $B = 4$.
2. All of the variables below are directly proportional, write an equation linking them:
 - a. $V = 12$ when $M = 6$
 - b. $T = 5$ when $S = 1$
 - c. $Y = 34$ when $x = 2$
 - d. $H = 48$ when $M = 4$
 - e. $P = 5$ when $N = 10$
3. B is directly proportional to C, when B is 18 C is 27.
 - a. Write an equation linking B and C
 - b. Find B when $C = 66$
 - c. Find C when $B = 30$
4. Z is directly proportional to Y, when $Z = 55$, $Y = 5$
 - a. Write an equation linking Z and Y
 - b. Find Y when $Z = 77$
 - c. Find Z when $Y = 0.1$
5. N is directly proportional to L, when $N = 1.8$ $L = 0.6$
 - a. Write an equation linking N and L
 - b. Find L when $N = 3.2$
 - c. Find N when $L = 0.5$

Star questions

The more people who help to paint a room, the faster it gets painted, the number of people goes up, time goes down, this relationship is inversely proportional. If a is inversely proportional to b, $ak = b$.

If $a = 10$ and $b = 6$ and a is inversely proportional to b, write an equation linking a and b.

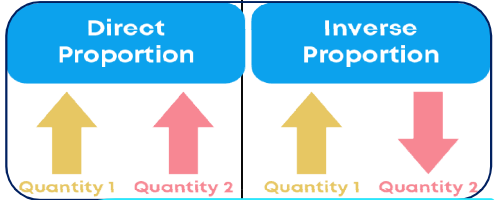
Find a when $b = 12$

Find b when $a = 4$

SUMMARY/ SYNOPSIS	Teacher once again writes important key words and definitions and asks children to note down and adopt.	Pupil groups will read and adopt the procedure	Teacher focuses on every individual so that every child is able to learn the concept in successive upcoming practice sessions
WRITING/ EDITING	Teacher gives some questions from Exercise 11.1 and asks children to solve those sums and teacher checks the writings of children	One group will check the writings of the other and vice versa	

TEACHING PERIODS : 6 to 10 **INVERSE PROPORTION**

CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)																								
KEY WORDS	Brain storming session involving children with key words # Inverse / Indirect Proportion # Increase # Decrease # Vary # Constant # Quantities # relation	* Students read the keywords answer the questions to the teacher (whole class activity)	Every Pupil will read and write the key words in their note books																								
CONCEPTUAL UNDERSTANDING	Teacher demonstrates the concept of inverse proportion using some real life examples and an activity by dividing pupils into heterogeneous groups and each group will be given 36 beads and are asked to arrange these beads on floor in rectangular shape with different combinations of rows and columns and the data is tabulated. Teacher draws the attention of the pupils towards the tabulated data and elaborates the concept of inverse proportion to children.	Each group will understand the concepts by participation in the activity	every child learns the concept through the learning activity and observation of TLM																								
LEARNING ACTIVITY	<div style="border: 2px solid magenta; padding: 10px; margin-bottom: 10px;"> <h2 style="text-align: center; color: orange;">INVERSE PROPORTION</h2> $y \propto \frac{1}{x} \quad y = \frac{k}{x}$ </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 10px;"> <thead> <tr style="background-color: #4a86e8; color: white;"> <th style="text-align: center;">NO.OF ROWS (R)</th> <th style="text-align: center;">R₁(1)</th> <th style="text-align: center;">R₂(2)</th> <th style="text-align: center;">R₃(3)</th> <th style="text-align: center;">R₄(4)</th> <th style="text-align: center;">R₅(6)</th> <th style="text-align: center;">R₆(9)</th> <th style="text-align: center;">R₇(12)</th> </tr> <tr style="background-color: #4a86e8; color: white;"> <th style="text-align: center;">NO.OF COLUMNS (C)</th> <th style="text-align: center;">C₁(36)</th> <th style="text-align: center;">C₂(18)</th> <th style="text-align: center;">C₃(12)</th> <th style="text-align: center;">C₄(9)</th> <th style="text-align: center;">C₅(6)</th> <th style="text-align: center;">C₆(4)</th> <th style="text-align: center;">C₇(3)</th> </tr> </thead> <tbody> <tr style="background-color: #d9e1f2;"> <th style="text-align: center;">(RxC)</th> <td style="text-align: center;">36</td> <td style="text-align: center;">36</td> <td style="text-align: center;">36</td> <td style="text-align: center;">36</td> <td style="text-align: center;">36</td> <td style="text-align: center;">36</td> <td style="text-align: center;">36</td> </tr> </tbody> </table> <div style="border: 2px solid cyan; padding: 10px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #4a86e8; color: white; padding: 5px;">One example arrangement of beads in rows and columns to explain inverse proportion</p> </div>			NO.OF ROWS (R)	R ₁ (1)	R ₂ (2)	R ₃ (3)	R ₄ (4)	R ₅ (6)	R ₆ (9)	R ₇ (12)	NO.OF COLUMNS (C)	C ₁ (36)	C ₂ (18)	C ₃ (12)	C ₄ (9)	C ₅ (6)	C ₆ (4)	C ₇ (3)	(RxC)	36	36	36	36	36	36	36
NO.OF ROWS (R)	R ₁ (1)	R ₂ (2)	R ₃ (3)	R ₄ (4)	R ₅ (6)	R ₆ (9)	R ₇ (12)																				
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SUMMARY	Teacher once again writes important key words and procedures and asks children to note down and adopt.	Pupils will note down and read the summary in groups	Every individual reads the summary and notes it down and adopts the																								
ASSESSMENT	Teacher gives some questions from Try These sections as well as some examples and asks children to solve those sums	Every group will do the sums by discussion among each other	Every individual solves the sums on their own																								



PRACTICE PERIODS : 7 to 11

INVERSE PROPORTION

CONCEPTS/STEPS	TEACHER ACTIVITY (I DO)	GROUP ACTIVITY (WE DO)	INDIVIDUAL ACTIVITY (YOU DO)								
KEY WORDS READING	Teacher writes the key words from previous class's teaching period and asks children to read and write them in note books # Inverse / Indirect Proportion # Increase # Decrease # Vary # Constant # Quantities # relation	Whole class activity : one child comes to the board and reads the key words loudly and the remaining class follows.	Every child comes to the board and reads the key words and notes them down in their note books								
SIMILAR LINES READING	Teacher solves some sums related to real life on inverse proportion and will ask children to solve some more in the worksheet by watching similar lines	Each group will read the similar lines and will frame some more by discussion	Every Individual will do a few more by watching similar lines								
<div data-bbox="228 667 841 1024" style="border: 2px solid orange; padding: 10px;"> <p style="text-align: center;">INDIRECT PROPORTION</p> <p style="text-align: center; font-size: small;">As one quantity increases, the other quantity decreases at the same rate and vice versa</p> <p>It takes four days for two laborers to finish painting a 40 square meter wall. How long will it take 8 laborers to finish painting the same wall?</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>First No. of days</td> <td>4</td> </tr> <tr> <td>First No. of laborers</td> <td>2</td> </tr> <tr> <td>Second No. of days</td> <td>n</td> </tr> <tr> <td>Second No. of laborers</td> <td>8</td> </tr> </table> <p style="text-align: center;">$4 : n = 8 : 2$</p> <p style="text-align: center;">$4 \times 2 = 8$</p> </div> <div data-bbox="228 1031 829 1346" style="border: 2px solid green; padding: 10px; margin-top: 10px;"> <p style="text-align: center; background-color: #e0e0ff;">Inverse Proportion Formula</p> <p>The inverse proportion formula is an algebraic formula which represents the inverse proportion relationship between two variables.</p> <p>If y is inversely proportional to x we can write: $y \propto \frac{1}{x}$</p> <p style="font-size: small;">α is the proportionality symbol, and means "is proportional to".</p> <p>We can write this as an equation using the constant of proportionality, k:</p> <p style="text-align: center;">$y = \frac{k}{x}$ or $xy = k$</p> <p style="font-size: small;">When two variables are inversely proportional, the product of the two variables is a constant, k.</p> </div>	First No. of days	4	First No. of laborers	2	Second No. of days	n	Second No. of laborers	8	<div data-bbox="850 632 1442 1339" style="border: 1px solid blue; padding: 10px; margin-top: 10px;"> <p style="text-align: center;">Indirect Proportion</p> <p style="font-size: small; text-align: center;">Objective: to be able to find missing values for variables if they are indirectly proportional</p> <p style="text-align: center; font-size: small;">Starter questions</p> <div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid yellow; padding: 5px; width: 30%;"> <p style="font-size: x-small;">If A is directly proportional to B, and when A=10 B=2 find a when:</p> <ol style="list-style-type: none"> 1. B=4 2. B=9 3. B=12.5 4. B=22.5 5. B=99.5 </div> <div style="border: 1px solid yellow; padding: 5px; width: 30%;"> <p style="font-size: x-small;">List some things which are directly proportional, e.g. time spent studying and score on a test (both go up and down together)</p> </div> <div style="border: 1px solid yellow; padding: 5px; width: 30%;"> <p style="font-size: x-small;">List some things which are indirectly proportional, e.g. number of people sharing and number of sweets each person gets (one goes up, one goes down)</p> </div> </div> <p style="text-align: center; font-size: small;">Main questions</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p style="font-size: x-small;">1. If A is indirectly proportional to B and when A=5 B= 4 :</p> <ol style="list-style-type: none"> a. Find k b. Write an equation linking A and B c. Find A when: <ol style="list-style-type: none"> i. B=9 ii. B=15 d. Find B when: <ol style="list-style-type: none"> i. A=3 ii. A=3 <p style="font-size: x-small;">2. If A is indirectly proportional to B and when A=7 B=12 :</p> <ol style="list-style-type: none"> a. Find k b. Write an equation linking A and B c. Find A when: <ol style="list-style-type: none"> i. B=6 ii. B=6 d. Find B when: <ol style="list-style-type: none"> i. A=10 ii. A=2 <p style="font-size: x-small;">3. If A is indirectly proportional to B and when A= -4 B= 10 :</p> <ol style="list-style-type: none"> a. Find k b. Write an equation linking A and B c. Find A when: <ol style="list-style-type: none"> i. B=8 ii. B=10 d. Find B when: <ol style="list-style-type: none"> i. A=1 ii. A=-0.5 </div> <div style="width: 45%;"> <p style="font-size: x-small;">4. If A is indirectly proportional to B and when A= 24 B=0.5 :</p> <ol style="list-style-type: none"> a. Find k b. Write an equation linking A and B c. Find A when: <ol style="list-style-type: none"> i. B=3 ii. B= -3 d. Find B when: <ol style="list-style-type: none"> i. A= -2 ii. A= 100 <p style="text-align: center; font-size: x-small;">Star questions</p> <p style="font-size: x-small;">1. If A is indirectly proportional to the square of B and when A=3 B=4 find:</p> <ol style="list-style-type: none"> a. B (to 1dp) when: <ol style="list-style-type: none"> i. A=3 ii. A=5 b. A (to 1dp) when: <ol style="list-style-type: none"> i. B=2 ii. B=5 </div> </div> </div>	Pupil groups will read and adopt the procedure	Teacher focuses on every individual so that every child is able to learn the concept in successive upcoming practice sessions
First No. of days	4										
First No. of laborers	2										
Second No. of days	n										
Second No. of laborers	8										
SUMMARY/ SYNOPSIS	Teacher once again writes important key words and definitions and asks children to note down and adopt.	Pupil groups will read and adopt the procedure	Teacher focuses on every individual so that every child is able to learn the concept in successive upcoming practice sessions								
WRITING/ EDITING	Teacher gives some questions from Exercise 11.2 and asks children to solve those sums and teacher checks the writings of children	One group will check the writings of the other and vice versa	Teacher focuses on every individual so that every child is able to learn the concept in successive upcoming practice sessions								