

Mathematics

Made Fun Inspired by Day to Day Real Life Examples

Made Fun Inspired by Day to Day Real Life Examples



Class VII Mathematics (NCERT)

Title: Mathematics made fun by nature inspired day to day real life examples

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WORKSHEETS

Evaluate yourself

Quiz

Project based study

Clay model, Vegetables MODELS, for variables and models and color diagrams.

Annexures

Activity on vegetables – 2D/3D shapes

Olympiad/ NSTSE/ solved question papers

Bibliography

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Preface

Class -VII Mathematics

[IMO](#) | [NSTSE-MATHS](#) | [Olympiad](#) | [NTSE-MATHS](#) | [SEAMO](#)

Title: MATHEMATICS MADE FUN INSPIRED BY DAY TO DAY REAL LIFE EXAMPLES

Mathematics is an excellent and intelligent creation by human being. Excellence in teaching – learning is beyond monotony. The book mathematics made easy is developed on basis of “**MOVIE BASED LEARNING INSPIRED BY DAY TO DAY REAL LIFE EXAMPLES**”. This book is all about discovering mathematic with fun, will cultivate the culture of learning, while enjoying. Research has proved that human brain is more receptive, cognitive and retentive if exposed to motion images, as compared to reading a text. This book contains nature inspired questions, emulate basic mathematical concepts. These **motion images** form reconfigurable brain patterns, these patterns have scientifically used **multiple areas of brain**, hence increased chances of retention and understanding. All these images are framed from real life examples viz **linking mathematics to real world** embarked high order thinking skill. More focus is given on algebra i.e. equations are connected with day to day life for easy grasp. Virtual labs app based, Clay model, paper cutting model, paper painting model and vegetable based project has been developed.

This book imparts simple and lucid contents. All topics have been treated in systematic form of pedagogy and they are very easy-to-learn. The book covers latest syllabus of NCERT and as per the pattern of CBSE on Comprehensive and Continuous Evaluation (**CCE**). **HOTS (High Order Thinking Skill)** questions have been placed in the book. The methodology used in the book will make the student actually understand what the concept is? **It is a great way of learning, as it aids the student interest,**



makes the learning process more enjoyable, and retains for longer time. Thus, children will develop their logical ability and skill at the very beginning of their life.

The complete course has been developed in three parts. First part consists of animated movie based on day to day real life examples. This movie is developed based on NCERT syllabus of 7th class. The second part of book is a primer. It has simple to learn solved and unsolved questions. These questions are associated with real life images. Each chapter is equipped with solved and unsolved questions along with simple and easy **worksheets, quizzes and basic project** based activities. The third part of the book is very comprehensive. Each chapter consists of four levels of unsolved problems. Each chapter includes detailed description of the topic as per NCERT and CBSE guide lines. There are four level of difficulties in solved and unsolved questions. Different level of problems will boost student's competitive interest.

[IMO](#) | [NSTSE-MATHS](#) | [Olympiad](#) | [NTSE-MATHS](#) | [SEAMO](#) based solved and unsolved questions are included in each chapter. The contents of the course revolve around a common school bus journey theme. The beauty of the theme based contents of the course, will keep students focused and concept oriented.

In this part algebra is given special treatment. Equations formation and solving is supported with graphs based on day to day real life examples. The contents of part three mostly belong to high order thinking skill as per NCF (National Curriculum framework).

For evaluation purpose worksheets, quiz and project based models have been included. These projects based activities can be completed by **(1) Clay models (2) Vegetables models (3) Painting diagrams (4) Interactive Video Games and (5) Paper cutting Model.** Short cut techniques and logic based questions are placed in annexure. **Logical reasoning and aptitude** based primary problems are also placed in annexure. Complete course contents have already been tested in the classrooms.

The book is extremely useful for mathematics teachers on innovative teaching methodology. **This book is specially designed for students of class VII covering CBSE, SCERT, NSTSE, IMO, NTSE-MATHS | SEAMO and Olympiads exams. The book covers mainly topics:** Chapter- 1 Number

system, Chapter- 2 Algebra, Chapter-3 Percentage, Chapter -4 Profit loss , Chapter -5 Principal and interest , Chapter -6 Ratio and proportion, Chapter -7 Work time, Chapter -8 Data handling ,Chapter -9 Mixer and allegations, Chapter -10 Probability and statistics, Chapter -11 Logic based questions , Chapter -12 Angles , Chapter -13 Geometry and Mensuration, WORKSHEETS nature inspired on each chapter, Quizzes nature inspired on each chapter. These worksheets and quiz can be assigned as home work on line using school website having unique students ID. Projects on each chapter can be worked in labs on Clay models , Vegetables models and paper cutting etc. These lab based projects can be implemented using customized software just like video games at later stages. Students can very well perform these projects on video game or app based platform. Hence , the course comprises components of **education outcome**, student centric, integrated curriculum, active learning, multimedia, **multiple form of assessment** and higher order thinking.

A note to the teacher is given that, start of this course shall be with nature inspired movie in CD, then book Part -1 course and at last part-2 course of this book shall be taught. The video based labs can be performed on web site. The complete material of the course and project based labs have been accordingly developed. Quiz will help students to evaluate them self and instant feed back will help to develop course.

The book provides the early gateway to IIT/IIM and competitive exams. by learning these concepts students can easily handle complex and critical problems. Thus, applying these mathematical concepts, students can get early success in competitive exams like Olympiads, NTSE and NSTSE.

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Chapter 1: Number system

ARITHMETICS :

During 1st to 4th Century (1-9 digits) number digits were conceptualized by Arabic mathematician Al Khwarizmi, 0 digit was then introduced by Indian mathematician Aryabhatta and infinity was also proposed by Indian named as Ramajun .

In 9 th century Al kind's published work on “use of Hindu numerals”

12th Century introduced decimal positional number decimal system.

The book titled “ Calculation with Hindu Numerals” used in trading Arabic countries.

NUMBER

Numbers are the most important tool in our day to day life. We use them in various activates in different ways, for example, to know the number of students in a particular class, to tell time to keep record, to pay bills, to count money etc.

The basic operations like addition, subtraction, Multiplication & division of number.

ASCENDING ORDER

When numbers are written from the smallest number to the largest number, then the numbers are in ascending order.

For example: - 326, 5810, 7268, 151896



DESCENDING ORDER

When the numbers are written from the largest number to the smallest number, then the numbers are in descending order.

For example: - 151896, 7268, 5810, 326,

PLACE VALUE AND FACE VALUE

The place value of a digit of a number depends upon its position in the number. The face value of a digit of number does not depend upon its position in the number. It's always remaining the same whenever it lies regardless of the place it occupies in the number.

For example:- The place value of 7 in the number 137480 is 7000.
The face value of 7 in the numbers 137480 is 7.

EXPANDED FORM

When a number is written as the sum of the place value of all the digit of the number, then the number is in its expanded form.

For example:-

The expanded form of number 867480 = 800000+ 60000 + 7000 + 400+ 80

SUCCESSOR

The successor of a give number is the number that just succeeds i.e., The number obtained by adding 1 to the given number.

For example:-

The successor of 5678 is $5678 + 1 = 5679$

The successor of 1234 is $1234 + 1 = 1235$

PREDECESSOR



The predecessor of a given number is the number that just precedes i.e. the number obtained by subtracting 1 from the given number.

For example:-

The predecessor of 5678 is $5678 - 1 = 5677$

the predecessor of 1234 is $1234 - 1 = 1233$

SYSTEM OF READING & WRITING NUMBERS

There are two system of reading & writing number:

- (1) The Indian system of numeration
- (2) The International system of numeration

INDIAN SYSTEM OF NUMERATION

In the Indian system of numeration, starting from the right, the first period is ones consisting of three place value (ones, tens & hundreds). The next period is thousand consisting of two value (thousand and ten thousands). The third period from the right is lakhs, consisting of two place value (Lakh & ten lakh) and then crore and 50 on. This system of numeration is also known as Hindu – Arabic system of numeration.

We use Commas' for separating the periods which help us in reading & writing large numbers. In the Indian system, the first comma comes after three digit from the right (i.e. after ones period) & the next comma comes after the next two digits two i.e. (after thousand period) & then every after two digits and so on.



Indian Place Value Chart

Crore (C)		Lakh (L)		Thousand (Th)		Ones		
Ten Crores	Crores (c)	Ten Lakh (T)	Lakh (L)	Ten Thousand (TTH)	Thousands (Th)	Hundred	Tens (T)	One (0)
10,00,00,000	1,00,00,000	10,00,000	1,00,000	10,000	1,000	100	10	1

For example:-

In the Indian system of numeration the number 74028 952 will be written as

7, 40, 28,952

International system of numeration

In the international system of numeration, Starting from right, the first period is ones, consisting of three place value (ones tens and hundreds) next period is thousand consisting of three place value (one thousand, ten thousands & hundred thousand) and them millions and after that billions In international system of numeration) the periods have three place value each.

Sine each period has three place value, so as to write a number with the help of commas, We have to put a comma after every three digit.

For example:-

74028352 will be written in international system as 74,028,95

International Place Value Chart

Billion			Million			Thousand			ones		
Hundred Billion (HB)	Ten Billion (TB)	One Billion	Hundred Million (HM)	Ten Million (TM)	One Million (H)	Hundred thousand (Hth)	Ten thousand (Th)	Thousand (Th)	Hundred (H)	Tens (T)	On es (o)
100,000,000,000	10,000,000,000	1,000,000,000	100,000,000	10,000,000	1,000,000	100,000	10,000	1,000	1,000	10	1

Roman Number

There is another numeration system which is called the roman numeration system. This is the oldest system of numeration developed by roman.

Roman Numerals	I	V	X	L	C	D	M
Numerals in Indian System	1	5	10	50	100	500	1000

K is used to denote 1000

V is used to denote 5000

For example:-

If we have to write 40

$$40 = 50 - 10 = XL$$

OPERATION ON NUMBERS

There are different operation on number, like addition Subtraction, Division &



Multiplication these are priorities according to the rule " BODMAS".

B → Bracket

O→ Of

D → Division

M → Multiplication

A → Add

S → Subtract

PATTERNS

Patterns arise due to special arrangement of numbers associated with the geometrical figures. The numbers are of different kind like

- (1) Natural Number
- (2) Polygon Number
- (a) Triangular Number
- (b) Square Number

For example:-

- (1) Pattern in natural number

$$1 \times 9 + 2 = 11$$

$$12 \times 9 + 3 = 111$$

$$123 \times 9 + 4 = 1111$$

$$1234 \times 9 + 5 = 11111$$

$$12345 \times 9 + 6 = 111111$$

$$123456 \times 9 + 7 = 1111111$$

$$1234567 \times 9 + 8 = 11111111$$

$$123456789 \times 9 + 9 = 111111111$$



(2) Pattern in polygon numbers

(a) Triangular Number

.

1, 3, 6, 10, 15

(b) Square Number

. . . . :

1, 4, 9, 16, 25, 36.....

EVEN NUMBER

A number which is a multiple of 2 is called an even number.

For example:- 2, 4, 6, 8, 10...

ODD NUMBER

A number which is not a multiple of 2 is called an odd number.

For example:- 1, 3, 5, 7, 9, 11.....

PRIME NUMBER

A number which is greater than 1 has exactly two factors 1 & the Number itself is called a prime number.

For example:- 2, 3, 5, 7, 11,

2 is least & only even prime number

COMPOSITE NUMBER

A Number greater than 1 which is not prime is called composite number.

For example:- 4, 6, 8, 9, 10

NATURAL NUMBER

All counting number (1, 2, 3, 4.....) are called natural numbers. It is denoted by N



$N = \{ 1, 2, 3, 4, \dots \}$

WHOLE NUMBER

If we add Zero in the set of natural numbers we get a new set of numbers called the whole numbers.

$W = \{ 0, 1, 2, 3, \dots \}$

Smallest whole number is Zero

NUMBER LINE:



Positive and negative value of any can number be displayed on number line

DIVISIBILITY TEST

(1) Test of Divisibility by 2

A number is divisible by 2, if its ones digit is 0, 2, 4, 6 & 8

For example:- 966, since the ones digit is 6 so 966 is divisible by 2

(2) Test of divisibility by 3

A number is divisible by 3, if the sum of its digits is divisible by 3

For example:- 1881, the sum of digits $1+8+8+1 = 18$ which is divisible by 3 so, 1881 is divisible by 3

(3) Test of divisibility by 4

A number is divisible by 4, if the number formed by last two digits is divisible by 4

For example:- 63784 since the last two digits are 84 which is divisible by 4 so, 63784



is divisible by 4

(4) Test of divisibility by 5

A number is divisible by 5 if its ones digit is either 5 or 0

For example:- 4320 because their ones digit is zero so 4320 is divisible by 5

(5) Test of divisibility by 6

A number is divisible by 6 if the number is divisible by 2&3

For example:- 5922 ones digit is 2 so, it is divisible by 2 the sum of digit $5+9+2+2=18$ which is divisible by 3 so, 5922 is divisible by 6

(6) Test of divisibility by 8

A number is divisible by 8, if the number formed by its last three digit is divisible by 8

For example:- 213456, the last three digit are 456 which is divisible by 8 so, the number 213456 is divisible by 8

(7) Test of divisibility by 9

A number is divisible by 9, if the sum of its digit is divisible by 9

For example:- 538425, the sum of the digit are $5+3+8+4+2+5=27$ which is divisible by 9 so, 538425 is divisible by 9

(8) Test of divisibility by 10

A number is divisible by 10 if the digit at ones place is zero

For example:- 980, 6390 all are divisible by 10 because their one digit is zero

(9) Test of divisibility by 11

A number is divisible by 11, if the difference between the sum of digit at odd place and the sum of digit at even place is either 0 or a multiple of 11

For example:- 27896

the sum of digit at odd place = $2+8+6=16$

the sum of digit at even place = $7+9=16$



Difference = 16 - 16 = 0

so, the number 27896 divisible by 11

Q (ps-1) 140673, 5078, 142560, 35746 write the numbers in descending order

Ans 142560, 140673, 35746, 5078

Q (ps-2) write the numbers in ascending order 42130, 5781, 425806, 35601,

Ans 5781, 35601, 42130, 425806,

Q (ps-3) write the place value of 2 in the numeral 5629037

Ans The place value of 2 in numeral 5629037 is 20000



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Q (ps-4) write the face value of 2 in the numeral 458296

Ans the face value of 2 in the numeral 458296 is 2

Q (ps-5) write the successor of 5678

Ans the successor 5678 is $5678+1= 5679$

Q (ps-6) write the predecessor of 100000

Ans The predecessor of 1 LAKH is $100000-1=99999$

Q (ps-7) Write 967480 in expended form

Ans $967480= 900000+60000+7000+400+80+0$

Q (ps-8) put the commas in proper place in the proper place in number 167380

Ans 1, 67,380

Q (ps-9) write the greatest number using the digit 4,7,5,0 3

Ans The greatest number using the digit 4, 7,5,0,3, is 75430

Q (ps-10) Find the sum of the place value of digit 3& 7 in the number 9030678

Ans The place value of 3 in number 9030678 is 30000

The place value of 7 in number 9030678 is 70

the sum of place value of 3 & 7 is

$30000+70= 30070$

Q (ps-11) write the smallest possible 6 digit number using the digit 5, 1, 6,3,8,9

Ans The smallest 6 digit number using the digit 5,1,6,3,8,9 is 135689

Q (ps-12) Write the standard numeral of the $900000+8000+400+20+8$

Ans the standard numeral of $900000+8000+400+20+8= 908428$

Q (ps-13) Compare the number 237725 & 237768

Ans The first second, third & 4th digit from the last are same in both number

237725 & 237768

The fifth digit in the number 237768 is 6 which is greater than the corresponding digit in the number 237725 which 5 so, 237768 is greater than 237725

Q (ps-14) There are 1700 coin in a black bag & 1210 coin in a red bag find the total number of coin in both bag

Ans Coins in black bag = 1700

Coins in red bag = 1210

Total number of coins in both bags = $1700 + 1210 = 2910$

Q (ps-15) Write the Roman numeral for 98

Ans $98 = (90+8) = (100-10) + 5 + 3 = \text{XCVIII}$

Q (ps-16) Compare the following using $>$, $<$, $=$

(1) LX, XL

Ans $\text{LX} > \text{XL}$

(2) LVIII , C

Ans $\text{LVIII} < \text{C}$

Q (ps-17) Write the whole number which is not a natural number

Ans Zero

Q (ps-18) Write the whole number which doesn't have predecessor

Ans Zero

Q (ps-19) Simplify

$$36 \div 2 \text{ of } 3 + 6 \times 2$$

Ans we first solve the of operation

$$36 \div 2 \text{ of } 3 + 6 \times 2$$

=

$$36 \div 6 + 6 \times 2 \quad (\text{2 of } 3 = 2 \times 3 = 6)$$

$$= 6 + 6 \times 2 \quad (\text{Divide} - : 36 \div 6 = 6)$$

$$= 6 + 12 \quad (\text{Mulitiply} - : 6 \times 2 = 12)$$

$$= 18 \quad (\text{Add} - : 6 + 12 = 18)$$

Q (ps-20) Solve $20 \text{ of } 3 \times (5 + 2)$

Ans $20 \text{ of } 3 \times (5 + 2)$

$$= 20 \text{ of } 3 \times 7 \quad (\text{Bracket} - : 5 + 2 = 7)$$

$$= 6 \times 7 \quad (\text{of} - : 2 \text{ of } 3 = 2 \times 3 = 6)$$

$$= 42 \quad (\text{multiply} - : 6 \times 7 = 42)$$

Q (ps-1) Simplify

$$12345 + 1234 + 123$$

$$\begin{array}{r} 12345 \\ + 1234 \\ + 123 \\ \hline 13702 \end{array}$$

Q (ps-2) Find the sum of the smallest six digit number and the greatest five digit number?

Ans Smallest six digit number = 100000

Greatest five digit number = 99999

$$\begin{array}{r} 100000 \\ + 99999 \\ \hline 199999 \end{array}$$

Q (ps-3) Solve $7123 - ? = 3058$

$$\text{Ans } 7123 - x = 3058$$

$$7123 - 3058 = x$$

$$x = 4065$$

Q (ps-4) Simplify

$$5789 \times 99$$

$$\text{Ans } 5789 \times 99$$

$$= 5789 (100-1)$$

$$= 578900 - 5789$$

$$= 573111$$

Q (ps-5) Multiply : 6258 by 125

$$\text{Ans } 6258 \times 125$$

$$= 6258 \times 5^3$$

$$= \frac{6258000}{2^3}$$



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$$\begin{aligned}
 &= \frac{6258000}{8} \\
 &= 782250
 \end{aligned}$$



Fig p-2 Class room with students

Number System: The number system is formulated based on digits 1-9, 0 to represent quantity of any object. They are used to carry out summation or addition , subtraction , division and multiplication. In this primer each chapter consists of two simple solved and two unsolved questions. These questions are based on school bus journey. To simplify, here one school class room is taken . This class have boys and girls in some ratio. For example 20 boys and 20 girls are seated in this class room. Arithmetic's is based on number system. With arithmetic's, one unknown quantity can be determined. Where as,algebra can determine more than one unknown quantities.

Solved questions:

Q(ps-1.1) The students seated in one classroom are 10 girls of age below 12 years and 12 girls are above 12 years. Similarly 15 boys of age below 11years and 20 above 11 years. After summation of all students, compute total strength of the classroom.

Sol: $10+12+15+20=57$

Q(ps-1.2) Based on above statement , how many total girl students are there in this class room?

Sol: $10+12=22$

Q(ps-1.3) How many total boy students are there in this class room?

Sol: $15+ 20=35$

Q (ps1.4) There are 98 classrooms in a school. Write the Roman numeral for 98

Ans: $98 (90 + 8) = (100 - 10) + 5 + 3 = \text{XCVIII}$

Q (ps1.5) A teacher in a class room asked to one of the student, how many prime numbers lying between 1 and 100 numbers.

Ans. There are 25 prime numbers lying in between 1 to 100 numbers.

2,3,5,7,11,13,17,19,23,29,31,37,41,43,47,53,59,61,67,71,73,79,83,93,97,

Unsolved Questions:

Q (pq1.1) In a class room, total students are 50. On Monday 10 front seats found vacant. How students attended the class.

Q(pq1.2) Define origin of number system and their use.

Q (pq1.3) There are 50 class rooms in a school, write the Roman numeral for so?

Q (pq1.4) A teacher in a class room asked to student. How many even number lying between 1 and 100 numbers.

ANSWER:

1.1) 40

1.3)L

1.2) 50 even number



WORKSHEETS WS-1 Number system

Identify number of boys and girls in the picture of a class room. How many total students are there?



Fig WS-1 class room with boys and girls

WS1.1 Write all types of numbers based on given below diagram

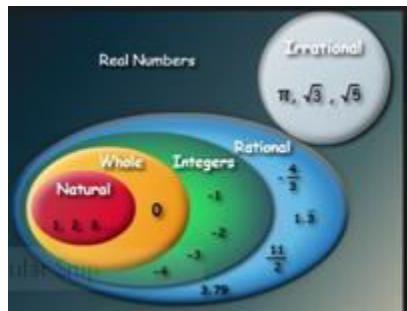


Fig WS-2 Number system

WS1.2 Identify numbers and write example of each type of numbers

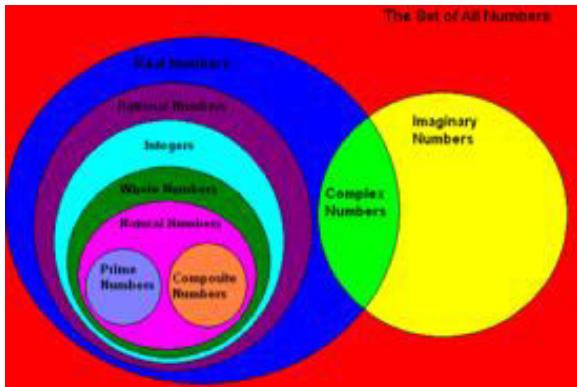


Fig WS-3 Number system

Sheet-1

Arrange the Roman numerals in increasing order.

- (1) LXXIX, CLII, XLII, XX, CCCXXXVIII, CXXII

Ans)

- (2) XVIII, XXXVII, IV, I, XIII, XVII, XXV

Ans)

- (3) XIX, XXXVIII, X, VIII, XV, V, XXX

Ans)

- (4) CXXXIX, LX, CCCXCVIII, I, XCI

Ans)

(5) CLVI, XCV, CCCXXXVII, LXII, CCCLXXXI, VIII, CXIX, CCLXXIV

Ans)

(6) CXXV, CCCXXXI, XIX, XC, CCLXIV, LVII, CLXXII

Ans)

Arrange the Roman numerals in decreasing order

(1) XXVII, XVI, VII, XXXIX, XVIII

Ans)

(2) XXIV, XXXIV, X, VI, XXXI, V

Ans)

(3) CXXXV, CCLXXVI, XXXIII, II, CLVII, CIV

Ans)



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(4) LV, CCLXXXII, CXLIII, CCCXX, XVI, CCIV, CLXXI, XCVII

Ans)

(5) XCIII, CCLXII, XI, CXL, LIX

Ans)

(6) CLIV, CX, XIII, CCXXI, CCCLXXIX, LXVI, CXLVII

Ans)

Answers

(1) Roman numerals in increasing order

- 1) XX, XLII, LXXIX, CXXII, CLII, CCCXXXVIII
- 2) I, IV, XIII, XVII, XVIII, XXV, XXXVII
- 3) V, VIII, X, XV, XIX, XXX, XXXVIII
- 4) I, LX, XCI, CXXXIX, CCCXCVIII
- 5) VIII, LXII, XCV, CXIX, CLVI, CCLXXIV, CCCXXXVII, CCCLXXXI
- 6) CXXV, CCCXXXI, XIX, XC, CCLXIV, LVII, CLXXII



Sheet-2

Roman numerals in decreasing order

- 1) XXXIX, XXVII, XVIII, XVI, VII
- 2) XXXIV, XXXI, XXIV, X, VI, V
- 3) CCLXXVI, CLVII, CXXXV, CIV, XXXIII, II
- 4) CCCXX, CCLXXXII, CCIV, CLXXI, CXLIII, XCVII, LV, XVI
- 5) CCLXII, CXL, XCIII, LIX, XI
- 6) CCCLXXIX, CCXXI, CLIV, CXLVII, CX, LXVI, XIII

Identify the number pattern and Fill in the missing numbers.

1)	2	4	6	8	10					
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2)	-5	-3	-1	1	3					
----	----	----	----	---	---	--	--	--	--	--

3)  40 30 20 10 0

--	--	--	--	--	--	--	--	--	--

4)  5 10 15 20 25

--	--	--	--	--	--	--	--	--	--

5)  18 15 12 9 6

--	--	--	--	--	--	--	--	--	--

6)  -3

--	--	--	--	--	--	--	--	--	--

7)  13 15

--	--	--	--	--	--	--	--	--	--

8)	7			28	35	42	49		63	
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Complete the Table-1

S.No.	Questions	Answers
1)	In a School Reception, 244 calls are made before noon and 389 calls are made after noon. Find the number of calls made in a day.	
2)	Ajay got ₹325 from her father and ₹289 from her mother. How much money does she have now?	
3)	In an annual celebration, 674 students participated. Of them, 392 were boys. Find the number of girls who participated.	
4)	Shilpa has a book which contains 649 pages. He has already read 495 pages. How many pages are unread?	
5)	The Children's Playschool took a school field trip. For the safety of the kids, each teacher was responsible for 24 kids. If 336 kids participated, how many teachers participated?	
6)	A tray can hold 234 eggs. If there are 18 rows in a tray, how many columns are there?	
7)	Raju works as carpenter for a chair	

	manufacturing company. He earns ₹450 per week. How much does he earn in 4 weeks?	
8)	A bolt manufacturing company packs 750 bolts in a carton. How many bolts are there in 8 cartons?	

Answers

(1) Missing numbers

1)  2 4 6 8 10 12 14 16 18 20

2)  -5 -3 -1 1 3 5 7 9 11 13

3)  40 30 20 10 0 -10 -20 -30 -40 -50

4)

5	10	15	20	25	30	35	40	45	50
---	----	----	----	----	----	----	----	----	----

5)

18	15	12	9	6	3	0	-3	-6	-9
----	----	----	---	---	---	---	----	----	----

6)

-3	-6	-9	-12	-15	-18	-21	-24	-27	-30
----	----	----	-----	-----	-----	-----	-----	-----	-----

7)

11	13	15	17	19	21	23	25	27	29
----	----	----	----	----	----	----	----	----	----

8)

7	14	21	28	35	42	49	56	63	70
---	----	----	----	----	----	----	----	----	----

Table -1

1) 633 calls in a day

2) ₹ 614

- 3) 282 girls
- 4) 154
- 5) 14 teachers
- 6) 13 columns
- 7) ₹1800
- 8) 6000 bolts

QUIZ: Number system

Q. (1) The Hindu – Arabic notation for X CVI is

- (a) 96
- (b) 106
- (c) 86
- (d) 76

Q. (2) the predecessor of the greatest 4 digit number is

- (a) 9999
- (b) 1000
- (c) 9998
- (d) 1001

Q. (3) the Roman numeral for 99 is

- (a) CXIX
- (b) XCIX

- (c) XCXI
- (d) XCXX

Q. (4) how many thousands make one million?

- (A) 1000 thousands
- (b) 100 thousands
- (c) 500 thousands
- (d) 10 thousands

Q. (5) the whole number which is not a natural number

- (a) 0
- (b) 1
- (c) -1
- (d) 2

Q. (6) A student multiplied 5.684 by 98 instead of 89. His answer was more than the correct answer?

- (a) 52.156
- (b) 51.256
- (c) 51.156
- (d) 52.256

Q. (7) a book of 1456 pages has 995904 words in it. How much number of words in each page?

- (a) 584
- (b) 684
- (c) 675
- (d) 595



Q. (8) what least value must be given to * so that the number $451^* 603$ is exactly divisible by 9?

- (a) 2
- (b) 5
- (c) 7
- (d) 8

Q. (9) the sum of two number is 2490 if 6.5% of one number is equal to 8.5% of other find the largest number

- (a) 1411
- (b) 1423
- (c) 1476
- (d) 1481

Q. (10) Find a number whose double is 45 greater than its half?

- (a) 45
- (b) 30
- (c) 60
- (d) 15

Q. (11) Find a number such that when 5 is subtracted from 5 times the number, the result is 4 more than twice the number?

- (a) 3
- (b) 5
- (c) 4
- (d) 8

Q. (12) a woman saves Rs. 561 every month. Estimate the amount of money saved by her in one year?

- (a) Rs. 6220
- (b) Rs. 6720
- (c) Rs. 6520
- (d) Rs. 6420

Answers

- 1. A
- 2. C
- 3. B
- 4. A
- 5. A
- 6. C
- 7. B
- 8. D
- 9. A
- 10.B
- 11.A
- 12.B

1: When is a fraction irrational?

- a) When it is a mixed number
- b) When it is improper
- c) When it is negative
- d) Never
- e) Always



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2: The number $\sqrt{16}$ is which of the following?

- a) Rational
 - b) Integer
 - c) Whole
 - d) Natural
 - e) All of the above
-

3: Some fractions can be reduced to integers

- a) True
 - b) False
-

4: The number $1.34343434\dots$ is which of the following?

- a) Irrational
 - b) Rational
 - c) Rational and Integer
 - d) Rational, Integer, and Whole
 - e) Rational, Integer, Whole, and Natural
-

5: π (pi) is which of the following

- a) Irrational
 - b) Irrational and Integer
 - c) Rational
 - d) Rational and Integer
 - e) Rational and Irrational
- 
-

PROJECT ACTIVITY

1. Color Diagrams - Diagrams and coloring



PR-1.Show fractions in the circle using color scheme

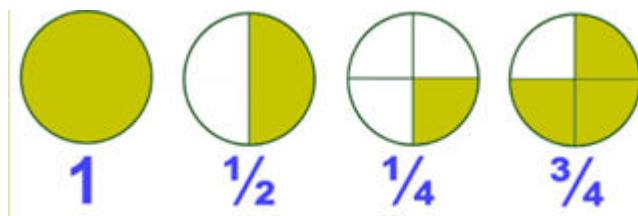


Fig Pr-1 coloring scheme showing fractions

2.Clay model – 2D /3D clay models-shape based

PR-2. Clay models or vegetable models i.e. rectangular and circular of various dimensions and 2D/ 3D designs.



3. Vegetable/ FRUITS model – Shape based 2D /3D vegetable models



Fig Pr-2Tinda vegetable can be cut into cuboids , sphere and triangular shapes

THE FRACTION CAN BE SHOWN USING TINDA PIECES INTO TWO OR FOUR.

4. Paper cutting models can also be used for introducing fractions
5. Poster based project on numbers and various number systems
- 6.

Chapter- 2 Algebra

Introduction:

The word "algebra" is derived from the Arabic word Al- Jabr. It is defined by **functions, variables and equations.** The functions can be defined as set of variables. The algebraic equations describe relationships between variables. Variable can have different numerical values and the value can change. It is denoted by alphabets x,y,z,a,b,c etc. From variables, the expressions can be generated. Variables, thus form expressions. For example" $(5x + 3)$ " ; It is an expression, where "x" is variable. The variable can have changing or varying numerical values. If $x=1 , 5, 7$ etc . The value of expression shall be 8,when $x=1$.

Algebra is about finding unknowns. It is about putting real life problems into equations for getting solutions. Algebra is used to solve word problems by plugging variables into an expression. Generation and manipulation of Variables , functions , linear equations and quadratic equations and their applications to word problems is all about algebra.

The algebra has been used to find two or more than two unknown quantities. These unknown quantities can be termed as variable. This is used to develop concepts in physics, engineering and programming. Expression can form equations if left hand side (LHS)expression is equal to right hand side (RHS) expression. For example $4x + 5 = 9$; hence , $x = 1$ Hence, equation is a condition of equality on variable. Both side expressions are equal in any equation. This is known as balanced equation. The equation is like weighting balance having equal weight on both sides . The application of these equations are to find value of unknowns..

In this chapter, formation of equations using nature inspired examples has been introduced. Unknown variables from nature has been picked up to formulate equations. As an Example , Taraju or weighing balance has been used for balancing of equations. Equations have been equated with balance or taraju as right side of traju is made equal to left side. On one side of taraju , variables like apples and bananas are kept and the other side weights are placed to equate weight of these fruits used as variables. Thus



both side are balanced. Once traju is found balanced , then value of unknown can be determined. On the similar pattern equations are balanced and then variables are determined.

2.1 ORIGIN OF ALGEBRA

The origin of Algebra came from an Arabic book titled “Compendious of calculation, completion and balancing” written By Muhammad ibn Musa al Khwarizm (AD 780 - 850) during 825 AD. In this book author, presented the first systematic solution of Algebra in Arabic. Algebra contained solution of linear and quadratic equations.

Algebra: Algebra came from two Latin words known as:

(1) Al- Jabr

(2) Muqubalah

Invention of Algebra

Muhammad ibn Musa al-Khwarizmi

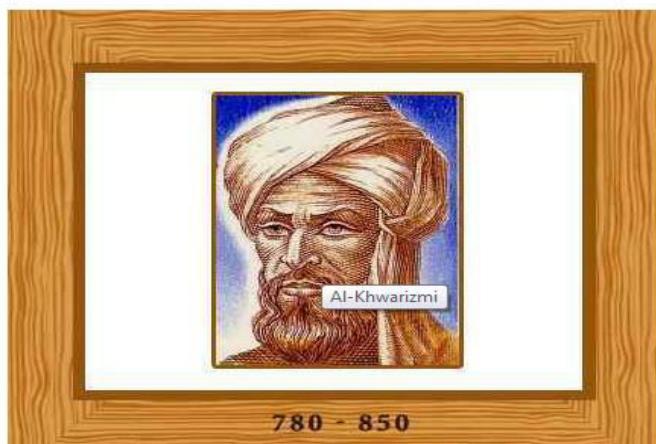


Fig 1 Khwarizmi mathematics inventor

Al- Jabr, means bone setting, or transpose and subtract from other side of equation

Muqubalah, means cancel out like terms on other side or balancing the equation .



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The word jabr (JAH- ber) and Muqubalah (mu-KAH-ba-lah) were used by al Khwarizm to designate two mathematical operations in solving algebraic equations.

JAH → means transpose (transfer to other side)

Examples:

Jabr :

$$x - 2 = 12x = 14$$

KAH → means cancel out or (Balance)

Muqabalah:

$$x + 7 = y + 7 \quad x = 7$$

Here, like terms 7 cancelled out both sides for balancing. There were few more books exist during same time written by al

- al-Khwarizmi “algebra,” from the title of his greatest mathematical work, Hisab al-Jabr wa-al-Muqabala.
- The word "algebra" is derived from the Arabic word *Al-Jabr*, and this comes from the treatise written in 830 AD
- The book, which was twice translated into Latin, by both Gerard of Cremona and Robert of Chester in the 12th century, works out several hundred simple quadratic equations by analysis as well as by geometrical example.
- It also has substantial sections on methods of dividing up inheritances and surveying plots of land.
- It is largely concerned with methods for solving practical computational problems rather than algebra as the term is now understood.
- Al-Khwarizmi confined his discussion to equations of the first and second degrees.
- His astronomical work, *Zij al-sind hind*, is also based on the work of other scientists.
- As with the Algebra, its chief interest is as the earliest Arab work still in existence in Arabic.
- Setting in motion a process that led to the use of the nine Arabic numerals, together with the zero sign given by Ayabhatta of Indian mathematician.
- Al-Khwarizmi supervised the work of 70 geographers to create a map of the then “known world”.
- Muhammad ibn Musa al-Khwarizmi died in c. 850 being remembered as one of the most seminal scientific minds of early Islamic culture



- As a branch of mathematics, **algebra** emerged at the end of 16th century in Europe
- word *al-jabr* presumably meant something like "restoration" or "completion"
- the word *mugabalah* is said to refer to "reduction" or "balancing"
- Euclid is regarded as the "father of geometry"
- **Aryabhata (476–550 AD) was an Indian mathematician who included zero in nine Arabic numerals(1-9).**

Algebra has following basic elements:

1. Variables
2. Functions
3. Constants
4. Coefficients
5. Single variable
6. Double variable
7. Dependents
8. Independents
9. Linear equations
10. Quadratic equations
11. Polynomials
12. Slope (first order terms)
13. Parabola (second order terms)
14. Shifted parabola





Fig 2.represent balancing of equations as $3x+2=14$

Balance with weights



Fig 3 Weighing balance used in equation formation

**Let one apple(x) and one Banana(y)
is subjected to weight in a Balance**

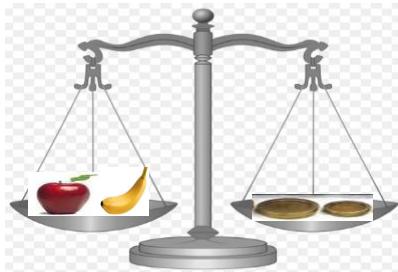


Fig 4 balance used in equation formation

Equation Formation and Balancing

a=One Banana (weight =100gm) or (Cost = Rs 10/-

b=One apple c (weight = 200gm) OR cost =Rs 20/-

c=One Papaya (weight =300gm) or cost= Rs 50/-

Equation formulation with weight or price

One Banana + 2 = 12 (cost of one banana= 10 Rs)

(a+2= 12)

One papaya+ one banana+ one apple = 80(cost)

(c+a+b=80)

One apple + two banana = 40(cost)

(B+2a= 40)

One Papaya + two apple + one banana= 100(cost)

(c+2b+a=100)

One banana +two apple + one papaya=

one papaya +two apple +one banana(equation balanced)

(a + 2b + c = c+2b+a)= 100(cost)

Algebraic Equation Representation:



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$$\begin{array}{l}
 \text{bird} + \text{pig} = 5\text{kg} \\
 \text{pig} - \text{bird} = 99\text{kg} \\
 \text{pig} + \text{pig} + \text{pig} = 12\text{kg} \\
 \text{bird} + \text{pig} + \text{pig} = ????
 \end{array}$$

Fig 3 Algebraic equation formation (example as $x+y+z= 105$, find x,y,z value from above fig)

2.2 WHAT IS ALGEBRA

Algebra is a branch of mathematics dealing with symbols and their applications. In elementary algebra those symbols represent quantities without fixed value known as variable. Just as sentence describe relationship between specific words. In algebra, equations describe relationships between variables. Algebra is about finding the unknown or it is about putting real life problem into equation and then solving them.

In these equations the numbers are the constant. Algebra can include real numbers, complex numbers, matrices, vectors etc. For example, a Joker was carrying a handful of balloons. Out of which 8 balloons flew away due to wind, leaving behind only 9 balloons. Now estimate, total number balloons? In algebra, this problem can be expressed as:

$$X - 8 = 9$$

here X is unknown, 8 balloons flew away and left with only 9. The goal in algebra is to find

out the unknown.

$$x - 8 = 9 \\ x = 8 + 9 \\ x = 17$$

Meaning that the balloon man started with 17 balloons.

2.3 WHY LEARN ALGEBRA?

In algebra addition, multiplication, subtraction , division, decimal, fraction, and the like terms ,unlike deals with numbers in some way or other. With equation these quantities can be better seen. Algebra give



insight to higher mathematics. Algebra develops our thinking skill specially logic, patterns, problem solving, deductive, inductive reasoning. Algebra help us to develop concept for physics and engineering and programming.

2.4 DIFFERENCE BETWEEN ALGEBRA AND ARITHMETIC

In schools Algebra starts with secondary classes and arithmetic i.e. number system starts at primary level. There is a huge gap between arithmetic and algebra. Algebra is used in even higher classes .

one unknown can be solved using arithmetic's, whereas two unknowns can only be solved using algebra.

Arithmetic is a branch of mathematic usually concerned with the four operations

Addition

Subtraction

Division

And multiplication of numbers

Example :

$$2 + 2 = 4, \quad 3 - 2 = 1$$

Algebra is a branch of mathematics that uses letter, symbols, and characters to represent numbers. It also expresses mathematical relationships between the symbols.

These symbols are called variables

$$\text{eg: } 5m + 6m = 11 \text{ meg: } 2x + 7 = 5$$

one can do arithmetic without doing algebra, $1+1 = 2$

but one cannot do algebra without doing arithmetic

$$32x + 9 = 0;$$



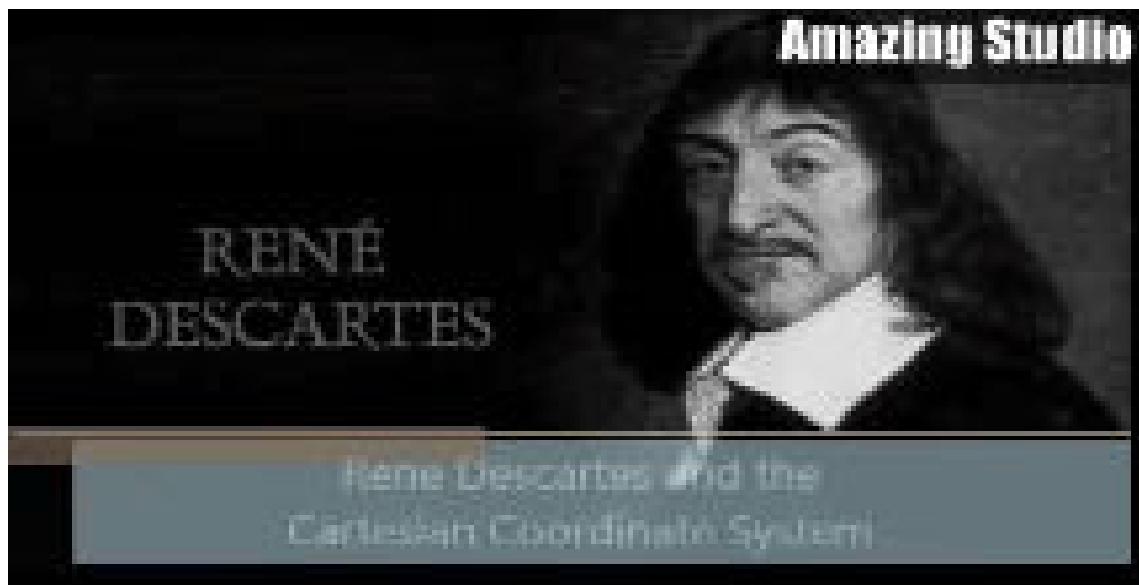


Fig 5 French Mathematician RENE DISCARTES, inventor of coordinate system x,y, z



Fig 6 Variable x representing river water, which is moving in one direction

'Z' Co-ordinate Variation

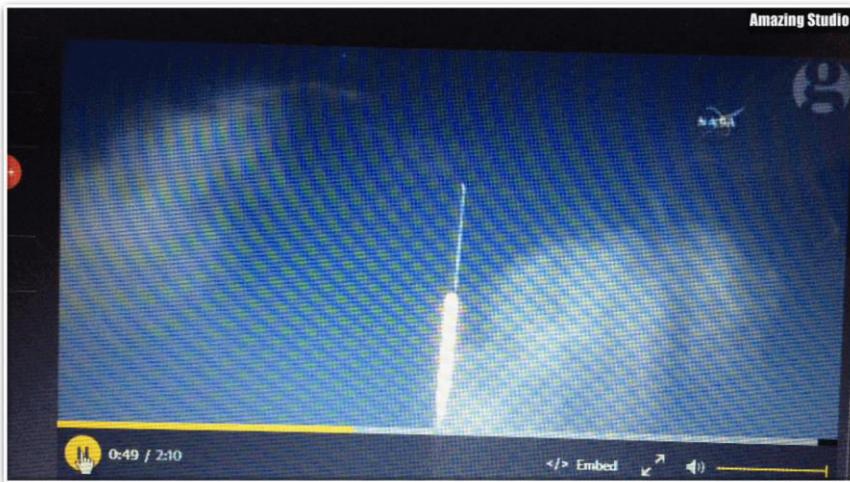


Fig 7 variable z, when rocket in moving up

Variable: a field is x,y variable. One direction is taken x and other direction will be y. space of field is x,y. When the object move in one straight direction i.e. x variable and other straight will be y direction.

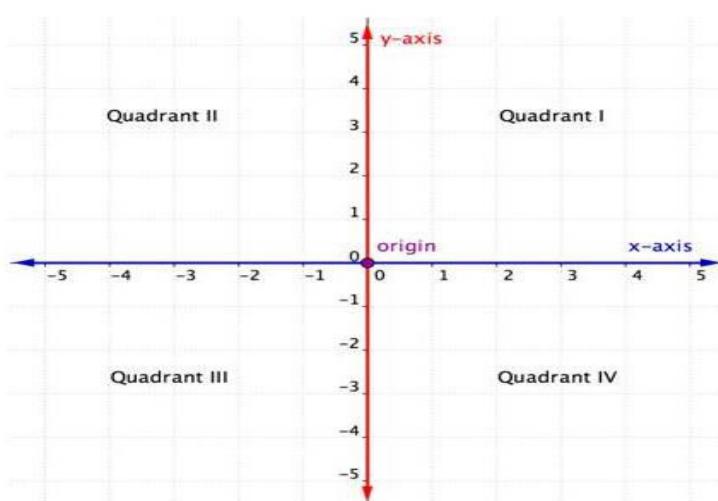


Fig 8 Variables x and y, horses moving in x direction, car moving in y direction

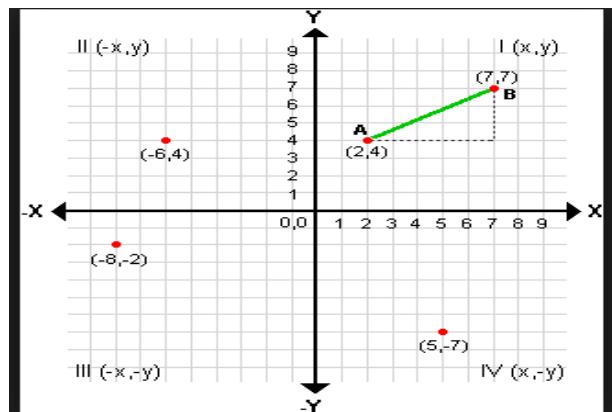
**Four side Traffic Crossing X (right side), Y (front side)
and -X (left side), -Y (back side)**



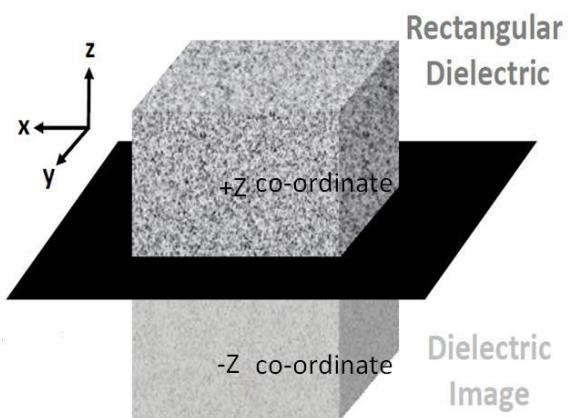
Co-ordinate System Notation



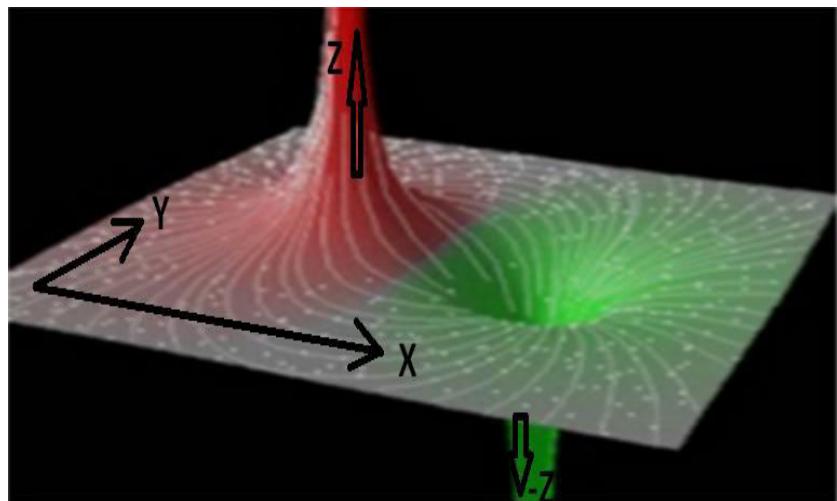
X, Y - Problems



Cuboid image depicting +/ -Z Coordinate



X, Y, Z Co-ordinates Visualisation



Independent and Dependent Variables



Crop cutting in field is x, y variable. Rice crop seeding is x-y variable. Grass cutting in field is x-y variable

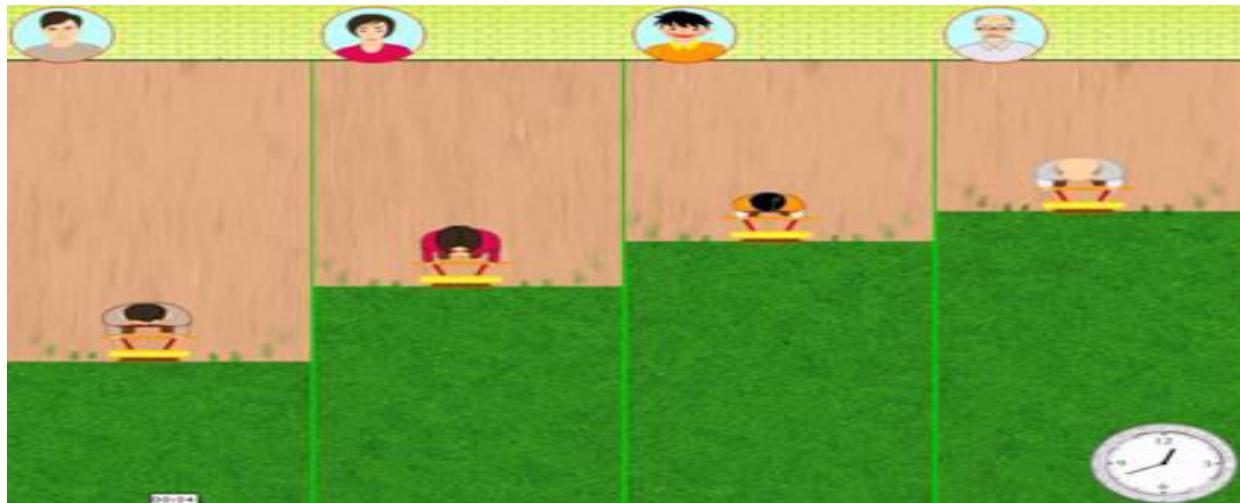


Fig13 x-y variables in grass cutting of the field



Fig 14 x and y variables i.e. car moving in y axis and horses are moving in x axis.

The letters used to represent number or some other quantities in general are called literal numbers or simply literal. Literals can take any value. They are also called variables

For example:

Ajay borrowed $x = \text{Rs. } 25$ from Vijay

Mona got $y = 12$ candies

Hence x, y denoted numbers are called literal numbers. In the formula for the area of rectangle, the letters L length and W width are variables

The algebraic equations describe relationships between variables. Algebra is used to solve word problems by plugging variables into an expression. . Generation and manipulation of Variables , functions , linear equations and quadratic equations and their applications to word problems is all about algebra.

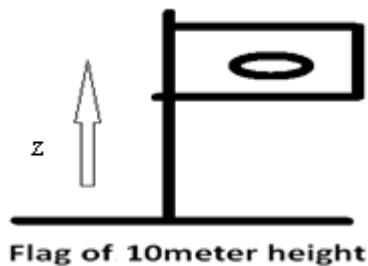
Positive Variable X :



The distance $x = 291$ kms

Fig 15 The distance covered by cart is x meters, where x is unknown hence called as variable.

Positive variable Z

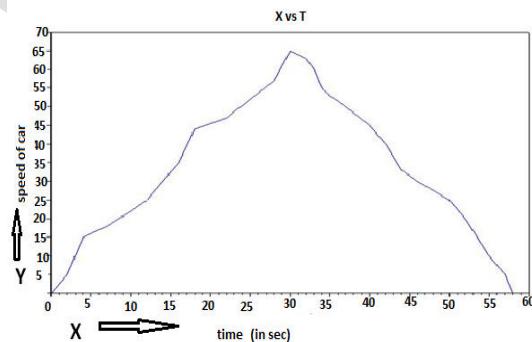


Flag of 10meter height

Fig 16 The Balloon hot air launching from ground to sky is known as z variable.

In flag, height takes z variable.

Positive variable x, z



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Fig 17 car speed on road

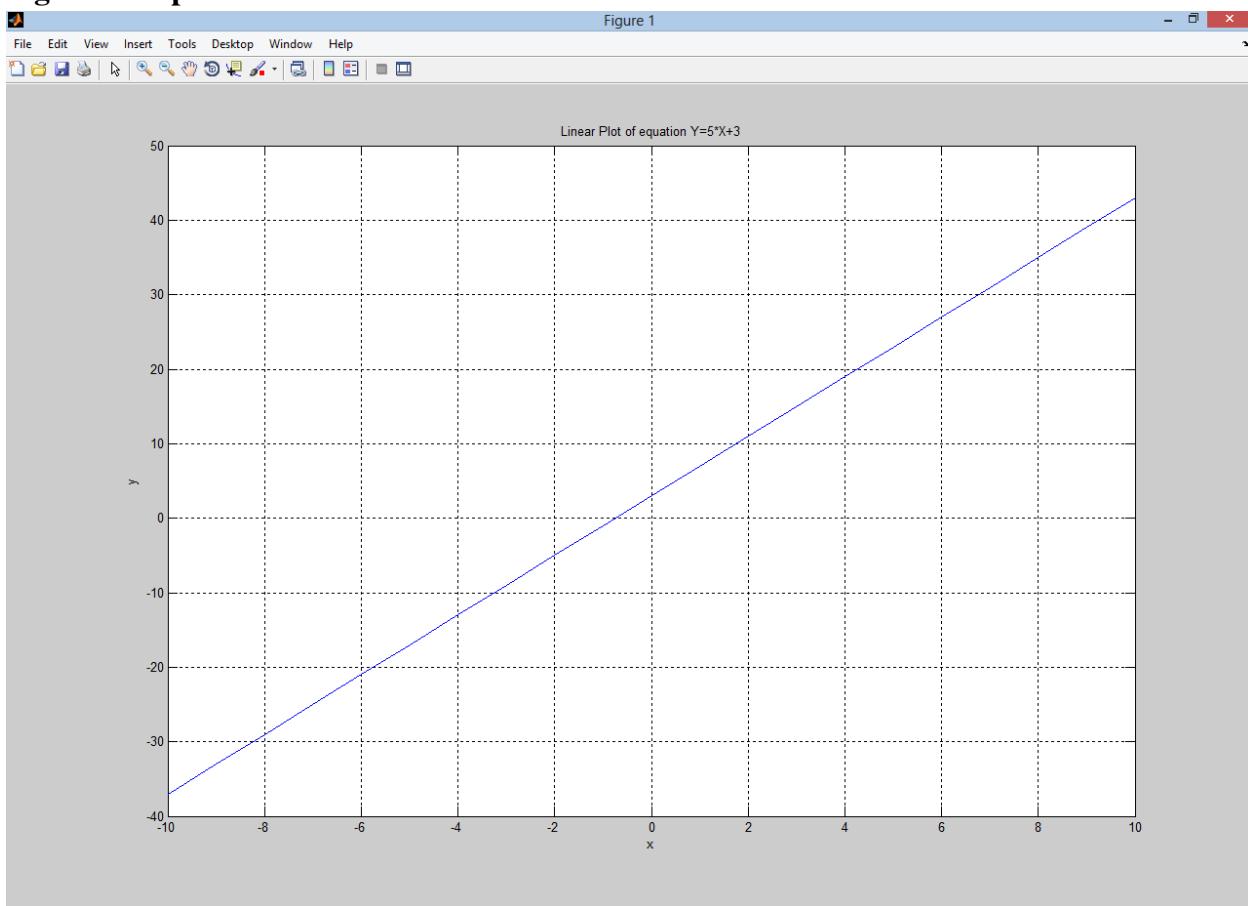


Fig 17 Plot of $y=5x+3$ or $y = mx + c$ where $m=5$,

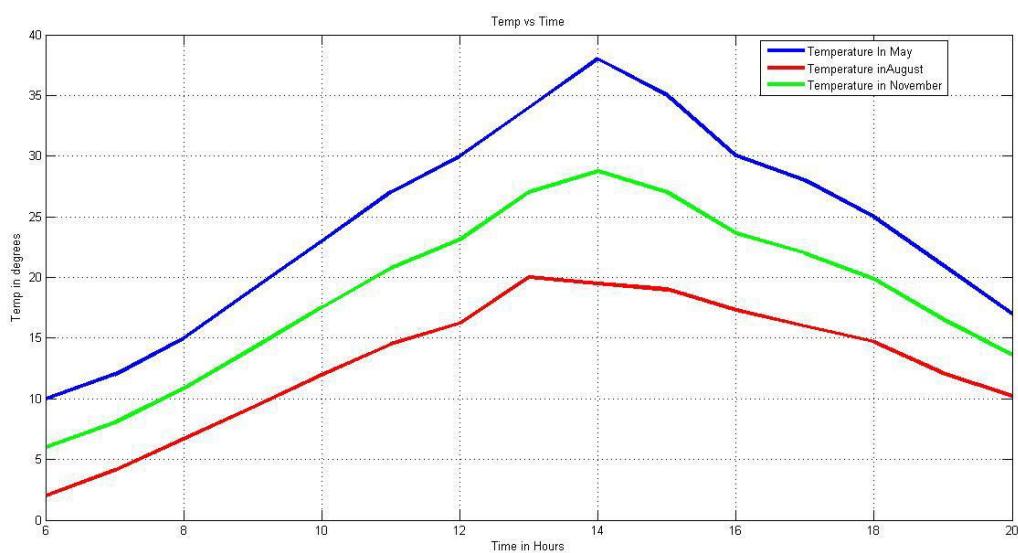


Fig 17 Day temperature as variable (Time(Hrs) vs Temperature (Degree centigrade)

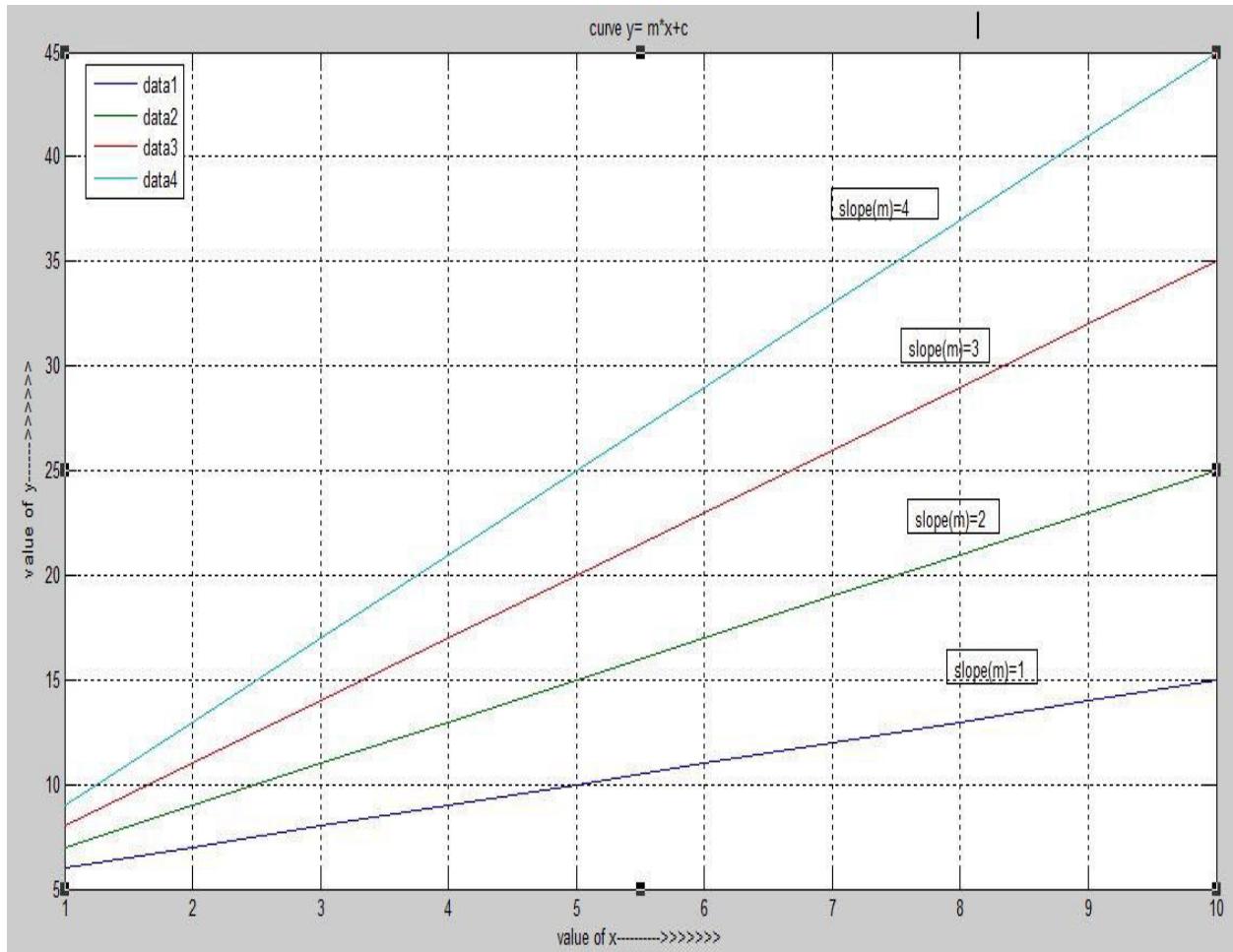


Fig 17 Linear equation plot at $m=1,2,3,4$.

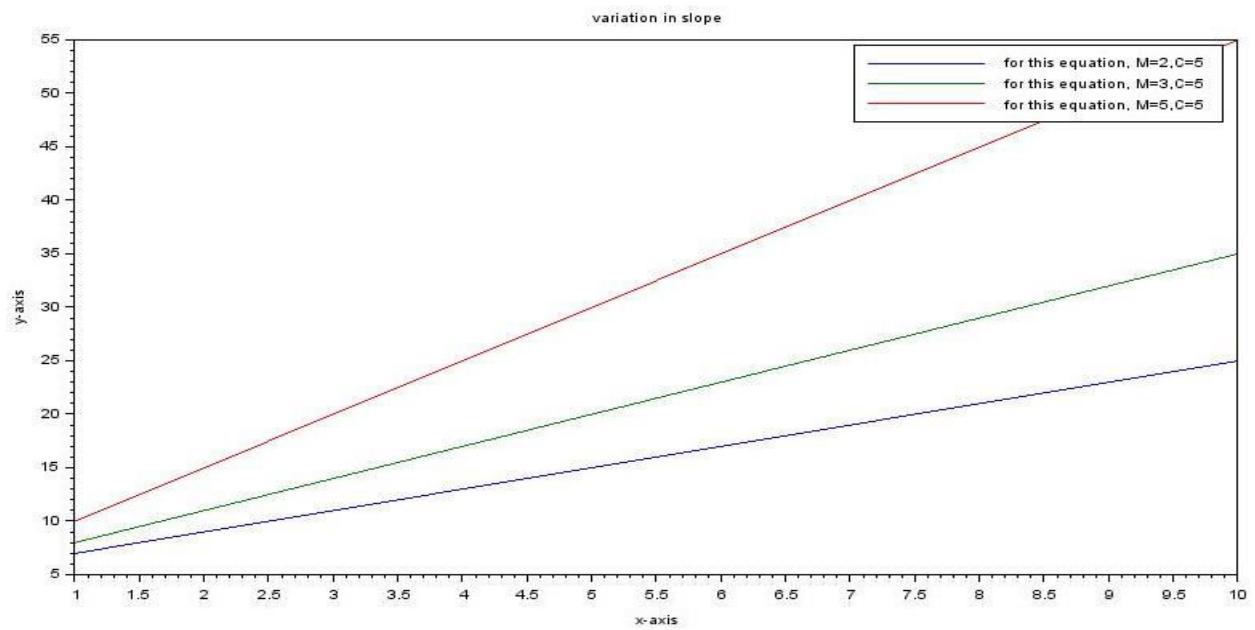


Fig 17 $y = mx + c$ at different $m = 2, 3, 5$ and $c = 7, 8, 10$

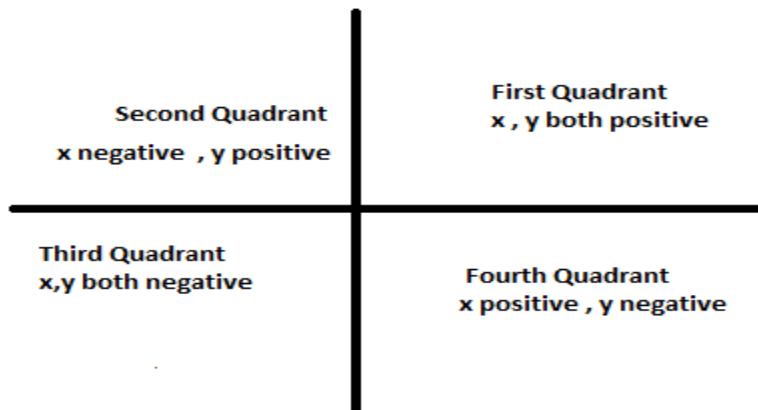


Fig 18 positive and negative values of x, y variables

Variable product = $a \times b$

Variable division = a/b

Variable addition = $a+b$

Variable subtraction= $a-b$

Exponent = a^3

Factors= $a.a.a.$

This is in contrast with Arithmetic's where basic operations are addition, subtraction, multiplication and division, except few advanced operations, such as manipulations of percentages, square roots, exponentiation, and logarithmic functions.

Primary education in mathematics often places a strong focus on algorithms for the arithmetic of natural numbers, integers, fractions, and decimals. Number theory, compound units, decimal etc and secondary education deals with their operations and applications.

Solved Questions:

Q(ps2.1) How many pencils are there, if x represent one pencil?

Ans: $x + x + x = 3x$;

Q(ps2.2) Find x , if $2x+4 = 10$

Ans: $2x+4 = 10$

$$2x = 10 - 4$$

$$2x = 6,$$

Hence , $x = 3$



Q(ps2.3) Find y if $2y+4 = 10+y$

$$\text{Ans: } 2y+4 = 10+y$$

$$2y - y = 10 - 4$$

$$y=6$$

Q(ps2.4) Answer the above question

Ans: From the above given image, we can express following:

$$x + x + x = 12$$

$$3x = 12$$

$$x=4 \text{ kg}$$

similarly, we can write

$$y + x = 5$$

$$y+4=5 \quad (\text{because } x=4)$$

$$y=5-4 = 1\text{kg}$$

also we can write

$$z-y = 99$$

$$z-1 = 99$$

$$z=99+1 = 100$$

next line we can write as

$$z + x + y = 100+4+1 = 105 \text{ kg}$$

Q (ps-5) Find the number which is 8 more than x

Ans the number which is 8 more than x would be obtained by adding 8 to x

\therefore The required number = $x+8$



Q (ps-6) Find the number which is 6 less than x

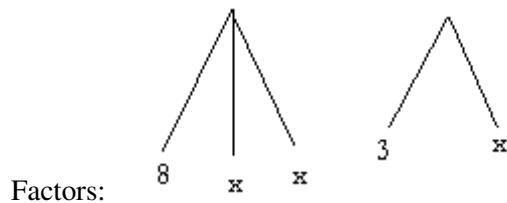
Ans the number which is 6 less. Than would be obtained by subtracting 6 from x

$$\therefore \text{the required number} = x - 6$$

Q (ps-7) Find the terms and factors of algebraic expressions $8x^2 + 3x$

Ans Expression : $8x^2 + 3x$

Terms : $8x^2$ $3x$



Q (ps-7) Write an algebraic expression whose terms are $6, 4x - 3xy$

Ans The algebraic expression with terms $6, 4x - 3xy = 6 + 4x - 3xy$

Q (ps-8) Find the value of $a^2 + x^2$ if $a = 3$ and $x = 2$

Ans $a^2 + x^2 = a \times a + x \times x$

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

$$= 9 + 4 = 13$$

Q (ps-9) Solve $2x + 3 = 5$

$$\underline{\text{Ans}} \quad 2x + 3 = 5$$

$$2x = 2$$

$$\Rightarrow x = 1$$

Q (ps-10) Solve $2m = 12 = 18$

$$\underline{\text{Ans}} \Rightarrow 2m = 18 - 12$$

$$\Rightarrow 2m = 6$$

$$\Rightarrow m = 3$$

Q (ps-11) A number increased by 7 is 11. Find the number?

Ans Let the number be x

number increased = $x + 7$

it is 11

$$x + 7 = 11$$

$$x = 11 - 7$$

$$x = 4$$

Q (ps-12) If $x = 10$ $y = 5$ find $x + y$?

$$\underline{\text{Ans}} \quad x + y = 10 + 15$$

$$\Rightarrow x + y = 25$$



Q (ps-13) If $x = 25$, $y = 7$ find $x - y$?

Ans $x + y = 25 - 7$

$x - y = 18$

Q (ps-14) If $x = 6$, $y = 2$ find xy ?

Ans $xy = 6 \times 2 = 12$

Q (ps-15) If $x = 12$ $y = 3$ find $x \div y$?

Ans $x \div y = \frac{x}{y} = \frac{12}{3} = 4$

Q (ps-16) write $a \times a \times a \times a \times a \times a$ in the exponential form

Ans $a \times a \times a \times a \times a = a^5$

Q (ps-17) write $x \times x \times p \times p$ in the exponential form

Ans $x \times x \times p \times p = x^2 \times p^2 = (xp)^2$

Q (ps-18) Evaluate $a + b + c$ if $a = 2$, $b = 3$, $c = -4$

Ans $a + b + c = 2 + 3 - 4 = 1$

Q (ps-19) find numerical coefficient & literal coefficient in expression $17xy$

Ans in expression $17xy$ the numberial coefficient of the $17xy$ is 17 & the literal coefficient is xy

Q (ps-20) State whether the given pair of terms are like or unlike terms

(a) $29x$, $29y$ (b) $3m^2p$, $7pm^2$

Ans (a) $29x$ & $29y$ are unlike terms having different algebraic factors i.e. x & y

(b) $3m^2p$, $7pm^2$ are like terms having the same algebraic factors i.e. m , m , p

Q (ps-21) Give one example of

- (a) Monomial
- (b) Binomial
- (c) Trinomial
- (d) polynomial

Ans (a) $8xyz$ is monomial because it contain only one terms

(b) $x^2 = 2xy$ is binomial because it contain two terms



(c) $a^2 + b^2 + 2ab$ is Trinomial because it contain three terms

(d) $x^2 + y^2 + 2xy + 8$ is Polynomial because it contain Several terms i.e. more than 3 term.

Q (ps-21) Find the exponential form of $a \times a \times b \times b \times b \times c \times c$

Ans $a \times a \times b \times b \times b \times c \times c = a^2 b^3 c^2$

Q (ps-22) Find the constant term in $3x + 6y + \frac{5}{11}$

Ans The constant term is $\frac{5}{11}$

Q (ps-23) Find the number of terms in algebraic expression $ax^3 + bx^2 + cx + 8$?

Ans the number of terms are 4

Q (s-24) Write 4 less than the quotient of x & y in algebraic expression

Ans $\frac{x}{y} - 4$

Q (ps-25) Find $6a - 3b$ if $a = 2$ & $b = 3$

Ans $a = 2$, $b = 3$

$$6a - 3b = 6(2) - 3(3)$$

$$= 12 - 9$$

$$= 3$$

Q (ps-26) one book weight 250g & one notebook weight 150g. Find the weight of x book & y notebooks?

Ans one book weights 250g

x book weights 250xg

 one notebook weights 150g

y notebook weights 150yg

Total weight of x book & y notebooks = $250x + 150y$

Q (25) Find the solution of $x - 1 = 8$

Ans $x - 1 = 8$

$$x = 8 + 1$$

$$x = 9$$

$$x - 1 = 8$$



Q (26) Find the root of the equation $2 \times y = 10$

Ans $2 \times y = 10$

$$2y = 10$$

$$\Rightarrow y = \frac{10}{2} = 5$$

Q (ps-27) Find the root of the equation $\frac{y}{3} + 7 = 10$

Ans $\frac{y}{3} + 7 = 10$

$$\frac{y}{3} = 10 - 7$$

$$\frac{y}{3} = 3$$

$$y = 9$$

Q (ps-28) write the equation when the product of x & 4 added to 6 give the result as 11

Ans $x \times 4 + 6 = 11$

$$4x + 6 = 11$$

Q (ps-29) form an equation for 3 less than the thrice of x is 11

Ans The thrice of $x = 3x$

$$3 \text{ less than thrice of } x = 3x - 3$$

$$3 \text{ less than the thrice of } x \text{ is } 11 \text{ mean } 3x - 3 = 11$$

Q (29) the function $f(x) = x + 5$ find $f(5)$?

Ans $f(x) = x + 5$

$f(5)$ means we have to find $f(x)$ at $x = 5$

$$\Rightarrow f(5) = 5 + 5$$

$$\Rightarrow f(5) = 10$$

Unsolved Questions:

Q(pq2.1) Find x , if $2x+7 = 23$

Q(pq2.2) Find z , if $3z = 28+ 2z$



Quiz:

Complete the given statement

1. Fourteen is the difference between a number x and =?
2. Seven less than a number X is =.....?
3. Nine more than twice a number Y =.....
4. A number n times 11 =.....?
5. A number added with 12=..... ?
6. 7 is 1/4 of some number=..... ?
7. Six less than the sum of 11 and 9 =?
8. A number X divided by 7 =.....?.

Answers

1. $x-7=14$

2. $x-7$

3. $2y+9$

4. $11n$

5. $x+12$

6. $7=x/4$

7. $11+9-6=X$

8. $X/7=Y$

Select most suitable option:

1. Solve for x: $5x-4-2x+1=8x+2$
(a) 2 ;(b)5; (c) 7; (d)...
2. If $12x=4(x+3)$:then what will be value of x
(a)2 ;(b)5; (c) 7; (d)...
3. $(x+4)(x-3)$; simplify
(a) 2 ;(b)5; (c) 7; (d)....

Answer: (d)



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Worksheets:

Algebra

Solve the Equations for getting value of a variable

1) $X + 2 = 8$

Ans)

2) $Y + 7 = 14$

Ans)

3) $Z + 9 = 7$

Ans)

4) $Y - 3 = 2$

Ans)

5) $G - 4 = 5$

Ans)



6) $H + 9 = 13$

Ans)

7) $3T = 9$

Ans)

8) $3X = 0$

Ans)

9) $\frac{Y}{2} = 5$

Ans)

10) $\frac{Q}{2} = 0$

Ans)



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$$11) -6 + H = 12$$

Ans)

$$12) -14 = Y - 6$$

Ans)

Answers

- 1) $X = 6$
- 2) $Y = 7$
- 3) $Z = -2$
- 4) $Y = 5$
- 5) $G = 9$
- 6) $H = 4$
- 7) $T = 3$
- 8) $X = 0$
- 9) $Y = 10$
- 10) $Q = 0$
- 11) $H = 18$
- 12) $Y = -8$

More Worksheet

Solve the quadratic equations

$$1) (X-3)(X-7)= 0$$

Ans)

$$2) (2X-1)(X+3) = 0$$

Ans)

$$3) (3X-4)(6X + 1) = 0$$

Ans)

$$4) X^2 + 5X + 4 = 0$$

Ans)

$$5) X^2 - 6X + 5 = 0$$

Ans)

$$6) X^2 - X - 12 = 0$$



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Ans)

- 7) A School football team lost 5 yards and then gained 9. What is the team's progress?

Ans)

- 8) A school student bought 10 notebooks and 5 pens costing 2 rupees each. How much did student pay?

Ans)

- 9) A student went to shop and purchased a Notebook such that Half a cost of Notebook plus 5 is 11.What is the cost of the Notebook ?

Ans)



10) A test has twenty questions worth 100 points. The test consists of True/False questions worth 3 points each and multiple choice questions worth 11 points each. How many multiple choice questions are on the test?

Ans)

11) The equations $5x + 2y = 48$ and $3x + 2y = 32$ represent the money collected from school concert tickets sales during two class periods. If x represents the cost for each adult ticket and y represents the cost for each student ticket, what is the cost for each adult ticket?

Ans)

12) A student chose a number, multiplied it by 2, then subtracted 138 from the result and got 102. What was the number he chose?

Ans)

Answers

1) $X = 3$ or 7

2) $X = \frac{1}{2}$ or -3

3) $X = \frac{4}{3}$ or $-\frac{1}{6}$

4) $X = -1$ or -4



5) $X = 1$ or 5

6) $X = -3$ or 4

7) 4 yards

8) 300 rupees

9) 12 rupees

10) 15

11) 8 rupees

12) 120

Quiz:

Q. (1) Solve $x^2 - 9 = 0$

- (a) ± 3
- (b) 3
- (c) 6
- (d) 9

Q. (2) Solve $x^2 - 3x - 4 = 0$

- (a) -1 & -4
- (b) -1 & 4
- (c) 4 & 2
- (d) 2 & -1

Q. (3) the function $f(x) = 2x^2 + 6x - 3$ find $f(-2)$

- (a) 23
- (b) 26
- (c) -23
- (d) 28

Q. (4) there are 355 students going for a picnic. If the seating capacity of a bus is 62 . Find the estimated number of buses needed to take the students for the picnic?



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- (A) 8
- (b) 7
- (c) 9
- (d) 6

Q. (5) A shopkeeper has 658 Kg of sugar. He sells 48 Kg of sugar every day. Estimate how much sugar is left after 8 days?

- (A) 200 Kg
- (b) 400 Kg
- (c) 500 Kg
- (d) 600 Kg

Q. (6) find “x” in equation $3x - 7 = 15$

- (a) $\frac{22}{3}$
- (b) $\frac{17}{3}$
- (c) $\frac{16}{3}$
- (d) 6

Q. (7) what should be added to 6.125 to get 10?

- (a) 4
- (b) 3.75
- (c) 3.875
- (d) 4.15

Q. (8) what should be subtracted from 102.55 to get the greatest 2 digit number?

- (a) 5
- (b) 3.55
- (c) 6.53
- (d) 7.83

Q. (9) Lata spend Rs. 18.75 for buying a pen and Rs. 2.25 for a pencil. Find the total amount spent by her?

- (a) 16.25
- (b) 17



- (c) 21
- (d) 18

Q. (10) four more than the number is 22 find the number??

- (a) 18
- (b) 16
- (c) 24
- (d) 25

Q. (11) Raju has three boxers whose total weight is $60\frac{1}{2} Kg$. Box B weights $3\frac{1}{2}$ Kg more than box A & box C weights $5\frac{1}{3}$ kg more than box B. Find the weight of Box A?

- (a) $\frac{289}{18}$
- (b) $\frac{289}{15}$
- (c) $\frac{289}{16}$
- (d) 230

Q. (12) $f(x) = x - 6 + x^2 - 1$ find $f(3)$?

- (a) 10
- (b) 11
- (c) 12
- (d) 13

Answers

1. A
2. B
3. C
4. D
5. A
6. A
7. C
8. B
9. C
10. A
11. A
12. B



Projects :

Vegetable /Clay models/ Color diagrams

1. Two Tinda and three Potato total cost equal to ten rupees , also each Tinda and Potato cost difference is eight rupee, Then compute cost of each tinda and potato?
Then change cost of each item and form different equation .i.e. cost of tinda and potato in rupee value.
Answer: $2X + 3Y = 10$; $X - Y = 8$; let X is Tinda and Y is potato.
2. Record the day temperature on hourly basis and plot it as variable Time vs Temperature
3. Grow a plant and record its height monthly, develop graph height vs months as variable .
4. Record shade length of any object on hourly basis and plot graph.
5. Plant a tree in school or home and record it height in cms first of every month. This is variable x, y or z.
6. Water this plant twice a week at regular interval, the tree will grow faster. Note down height of tree every month This is again a variable. Growth of plant is function of water.
7. Take a Weighing Balance(Taraju) and few vegetables and weight them with different combination of vegetables. Maintain a record. This will teach us how to form algebraic equation.
8. Analyze plot of linear equation , slope equation and quadratic equation and compare them from real world i.e.. Road shape slant height and flyover or under pass.
9. Fruit vendor can be called in school, items (type of fruits) and cost can be tabulated to form an equation.
10. Canteen items can be tabulated with cost to form different set of equations.
11. Write an equation and carry out multiplication, addition, subtraction and division both sides with same quantity and observe if any change is found in the equation.
12. Carry out application of an equation for real life problem solution.



Chapter -3 Percentage

Introduction: This chapter discusses concept based percentage solution , where examples have been taken from real life. School bus journey video concept has been extended. Air environment composed of various gases are presented in percentage. It indicates if total quantity is 100, then what is net amount of a particular gas content i.e. oxygen , nitrogen and other gases. Also complete earth has water and land, is shown in percentage. Other examples based on fruits and vegetables have been picked up from our day to day life. Bus internal seating arrangement sketch has been made. Here, front ten seat are kept vacant and other forty seats has been occupied by students. Total capacity of this bus is 50 seats.

Class room seating capacity and students present in the class room can also be seen in percentage. Boys and girls present in class room can be defined in percentage. Their obtained marks can also be defined in percentage . Result of class room is expressed in percentage. The projects have been developed based on fruits and vegetables placed in a basket . Each fruit is expressed in percentage of total. This can be seen using video game to express each in percentage. Students can visit any garden or kitchen garden and note down name of plants with quantity and place them in tabular form. Each type of tree can be expressed in percentage. Fig 1 -6 have been included from physical world. They will students to learn the meaning of percentage. Video game based project and lab activity has also been included as soft copy in this book.



Fig 1 School class room with boys and girls

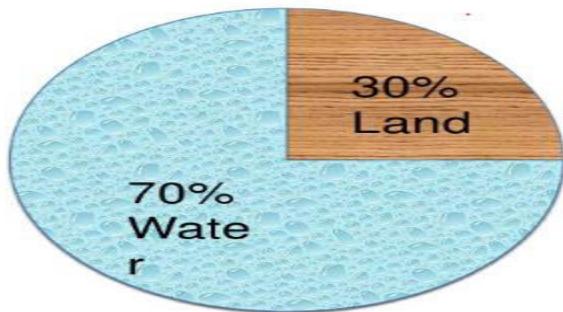


Fig 2 On earth water and land

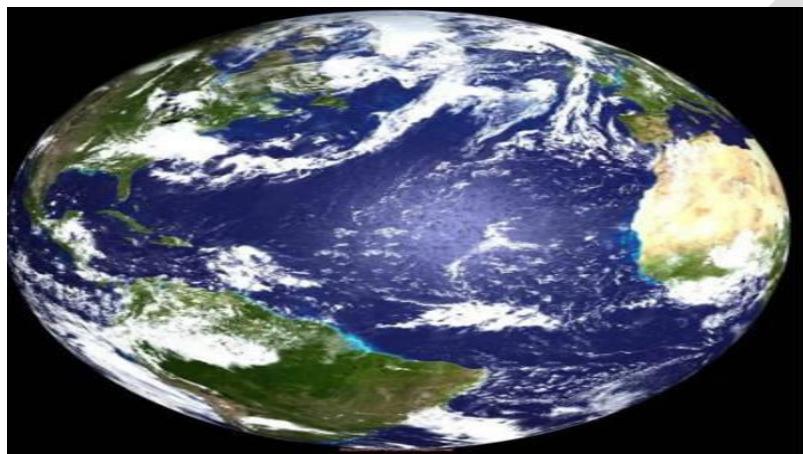


Fig 3 Earth having water and land

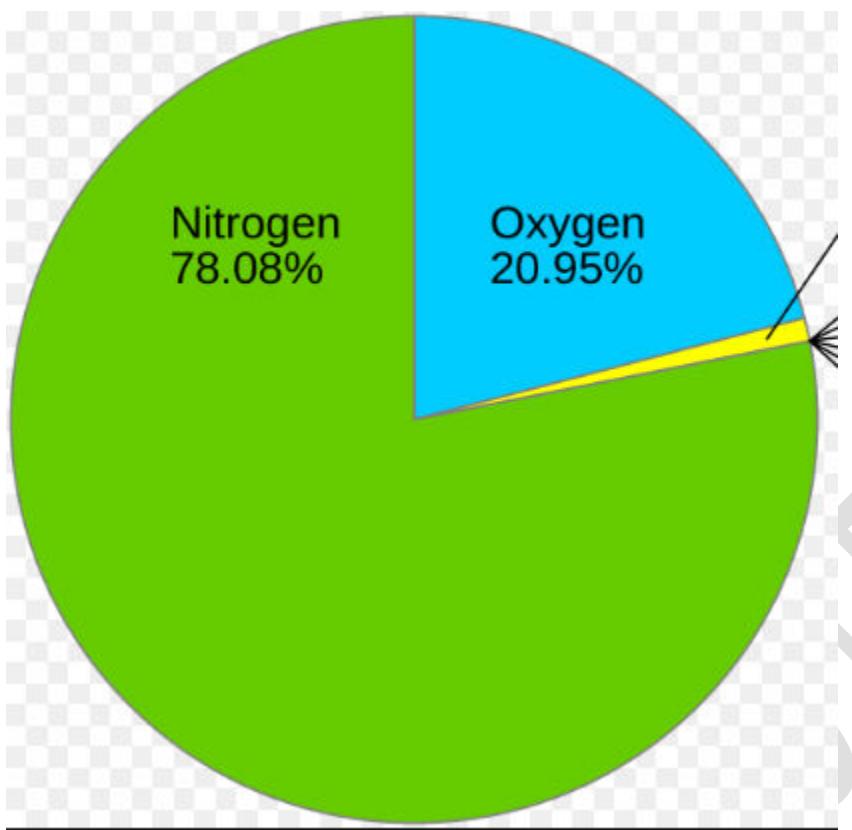


Fig 4 content of oxygen in atmosphere air



Fig 5 Bananas and apples in a basket

Based on seating arrangement percentage questions has been formulated.

The "Percent" word comes from the latin word per centum. The latin word Centum means 100, for example a century is 100 years. When we say "Percent" we are really saying "per 100".

One percent (1%) means 1 per 100.

So 75% really means $\frac{75}{100}$

And 100% is $\frac{100}{100}$, or exactly 1 (100% of any number is just the number, unchanged)

And 200% is $\frac{200}{100}$, or exactly 2 (200% of any number is twice the number)

Some Other examples are:-

$$(1) 5 \text{ percent} = 5\% = 5/100 = 0.05$$

$$(2) 20 \text{ percent} = 20\% = 20/100 = 0.20$$

$$(3) 25 \text{ percent} = 25\% = 25/100 = 0.25$$

$$(4) 50 \text{ percent} = 50\% = 50/100 = 0.50$$

$$(5) 100 \text{ percent} = 100\% = 100/100 = 1$$

$$(6) 150 \text{ percent} = 150\% = 150/100 = 1.5$$

The percentage means many hundredths. X percent means x hundredth. So, we can write as X%

(1) TO EXPRESS PERCENTAGE AS A FRACTION

$$x\% = \frac{x}{100}$$

$$y\% = \frac{y}{100}$$

$$\text{For example: } - 20\% = \frac{20}{100} = \frac{1}{5}$$

$$70\% = \frac{70}{100} = \frac{7}{10}$$

(2) TO EXPRESS FRACTION AS A PERCENTAGE

$$\frac{x}{y} = \left(\frac{x}{y} \times 100 \right)\%$$

$$\text{For example: } - \frac{1}{2} = \left(\frac{1}{2} \times 100 \right)\% = 50\%$$

$$\frac{11}{10} = \left(\frac{11}{10} \times 100 \right)\% = 110\%$$

(3) TO EXPRESS DECIMAL AS A PERCENTAGE

$$\text{For example: } - 0.7 = \left(\frac{7}{10} \times 100 \right)\% = 70\%$$

$$1.59 = (1.59 \times 100)\% = 159\%$$

(4) TO EXPRESS PERCENTAGE INTO DECIMAL FRACTION

$$70\% = \frac{70}{100} = 0.7$$

$$88\% = \frac{88}{100} = 0.88$$

(5) TO EXPRESS PERCENTAGE INTO FRACTION

For example:- $75\% = \frac{75}{100} = \frac{3}{4}$

eg. $90\% = \frac{90}{100} = \frac{9}{10}$

eg. $20.6\% = \frac{20.6}{100} = \frac{206}{1000} = \frac{103}{500}$

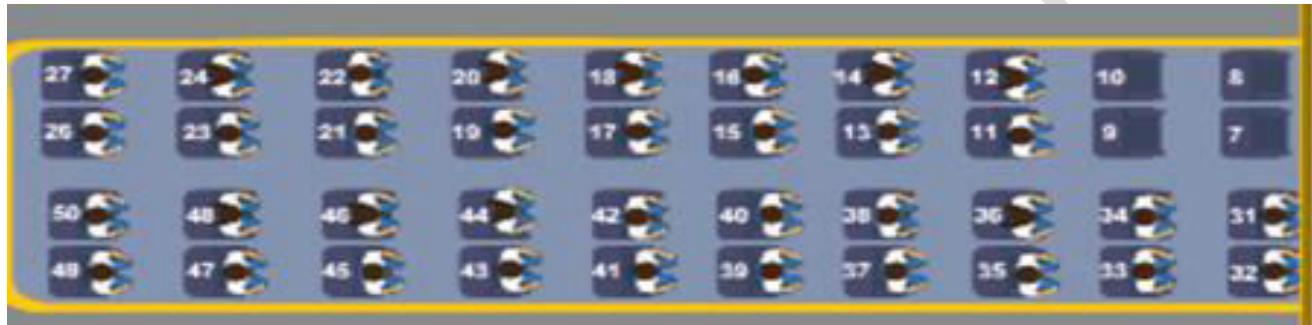


Fig 6 School children sitting inside the bus with few seats kept vacant in the front rows

Percentage –Solved questions:

Q (ps3.1) A School bus is having 50 seats, out of which 30 seats are occupied by girls and boys of different age group. Find the percentage of vacant seat in this bus.

Ans: Total Number of Seats = 50
 occupied seats = 30
 remaining seats = 20
 % vacant seat = $\frac{20}{50} \times 100 = 40\%$

Q (ps3.2) There are 50 seats in a school bus, 40 seats have been occupied by student and other 10 seats are lying vacant. Find the ratio of vacant seat to total no of seats in this bus.

Ans: Vacant seats = 10
 total seats = 50
The ratio of vacant seat : total number of seat = $\frac{10}{50} = 1 : 5$

Unsolved questions:

Q(pq3.1) The ratio of number of boys and girls in a school bus is 5:9. Find the number of girls if the total number of students in the school bus is 56?

Q (pq3.2) In a school bus, the ratio of number of boys to girl is 8: 5 if there are 25 girls. Find the total number of student in the school bus ?

Q (pq-3) 270 candidate appeared for an examination , out of which 252 passed. Find the pass and fail percentage?

ANSWERS : 1) 36 , 2) 65 3) Pass Percentage = $93\frac{1}{3}\%$, Fail percentage = $6\frac{2}{3}\%$

MORE SOLVED QUESTIONS:

Q (1) 56% of the student travel by school bus. Express in a fraction

$$\text{Ans } 56\% = \frac{56}{100} = \frac{14}{25}$$

Q (2) There are so seats in a school bus 40 seats occupied by students & 10 seats vacant find the percentage of the vacant seats

$$\text{Ans Total No. of seats} = 50$$

$$\text{Vacant seats} = 10$$

$$\text{percentage} = \frac{10}{50} \times 100 = 20\%$$

Q (3) In a school, there are 500 students out of these 275 are boys & rest are girls. Find the percentage of boys & girls

$$\text{Ans Total No. of student} = 500$$

$$\text{No. of boys} = 275$$

$$\begin{aligned}\text{No. of girls} &= 500 - 275 \\ &= 225\end{aligned}$$

$$\text{percentage of boys} = \frac{275}{500} \times 100 = 50\%$$

$$\text{percentage of girls} = \frac{225}{500} \times 100 = 45\%$$

Q (4) If 20% of students absent in the class express in decimal

$$\text{Ans } 20\% = \frac{20}{100} = 0.2$$

Q (5) A teacher ask to student 2 is what percent of 50?

$$\begin{aligned}\text{Ans Percentage} &= \left(\frac{2}{50} \times 100\right)\% \\ &= 4\%\end{aligned}$$

Q (6) 36 Students can sit in a classroom out of these 36 student, 10 students absent. Find the fraction of present students

$$\text{Ans Total No. of students} = 36$$

$$\text{Students absent} = 10$$

$$\text{Students present} = 36 - 10 = 26$$



$$\text{Required fraction} = \frac{36}{26} = \frac{13}{18}$$

Q (7) The ratio of No. of boys & girls is 3 :2 if 20% of the boys and 25% of the girls are scholarship holders what percentage of the students does not get the scholarship

Ans Let boys = 3x

girls= 2x

Number of those who do not get scholarship= 80% of 3x + 75% of 2x

$$= \frac{80}{100} \times 3x + \frac{75}{100} \times 2x$$

$$= \frac{24x}{10} + \frac{15x}{10}$$

$$= \frac{39x}{10}$$

Total number of boys & girls = $2x+3x=5x$

$$\text{percentage} = \frac{\frac{39x}{10}}{5x} \times 100$$

$$= \frac{39x}{10} \times \frac{1}{5x} \times 100$$

$$= 78 \%$$

Q (8) In a final exam, A student out of 100 marks score 95 marks in mathematics, 75 marks in English, 80 marks in Hindi, 85 marks in social studies & 80 marks in science. Find the percentage?

Ans total number of marks = 500

Total No. scored marks = $95+75+80+85+80 = 415$

$$\text{percentage} = \frac{415}{500} \times 100$$

$$= 83 \%$$

Q (9) Rita the student of class VIII weight decreased from 80 Kg to 60 Kg. Find the percentage decrease

Ans Decrease in weight = $80 - 60 \text{ Kg} = 20 \text{ Kg}$

$$\% \text{ decreased} = \frac{20}{80} \times 100 \% = 25\%$$

Q (10) The distance between the school & the will station was 200Km. It was measured as 280 Km. Find the percentage error?

Ans Error = $280 \text{ Km} - 200 \text{ Km}$

Error = 80 km

$$\% \text{ Error} = \frac{\text{Error}}{\text{actualvalue}} \times 100$$

$$\% \text{ Error} = \frac{80}{200} \times 100 = 40 \%$$

Q (11) The cost of school bus fare has risen by 20% to Rs.600 what was the original price of the school bus fare?

Ans Let the original price be Rs. x increase in price = 20 % of Rs. x

$$= \frac{20}{100} \times \text{Rs. } x$$

$$= \text{Rs. } \frac{x}{5}$$

\therefore Increased price = original price + increase in price

$$\text{Increase price} = \text{Rs. } x + \text{Rs. } \frac{x}{5} = \text{Rs. } \frac{6x}{5}$$

Given now cost of the bus fare =Rs. 600

$$\begin{aligned}\frac{6x}{5} &= 600 \\ \Rightarrow x &= \frac{600 \times 5}{6} = 500 \\ \therefore \text{Original price was Rs. } 500\end{aligned}$$

Q (12) In a class 80 students passed and the rest failed. If 80 % of the students failed, find the number of students in the class.

Ans Let the total number of student be x 80% of the students failed= 20 % of the students passed

$$20\% \text{ of } x = 80$$

$$\frac{20}{100} \times x = 80$$

$$x = \frac{80 \times 100}{20}$$

$$\Rightarrow x = 400$$

Hence, total number of student in class is 400

Q (13) Two candidate A & B contest an election for the post of president in a school. A get 46% of the valid votes & is defeated by 1600 votes find the total no. of valid voters cast in the election

Ans A gets 46 % of the valid voter

B get (100-46) % of the valid voter

\Rightarrow B get 54 % of the valid voters

$$\therefore \% \text{ difference between the voters} = 54 \% - 46 \% = 8 \%$$

$$\therefore 8 \% \text{ of valid voter} = 1600$$

Let valid voter = x

$$8 \% \text{ of } x = 1600$$

$$\frac{8}{100} \times x = 1600$$

$$x = \frac{1600 \times 100}{8}$$

$$x = 20000$$

Hence the number of valid voter cast in the election was 20,000

Q (14) The income of school bus driver was increased by 10 % and later decreased by 10% what is the total change in the percent in school bus driver's income?

Ans Let school bus driver's income by Rs. 100

10% increase means that income become, $100 + 10\% \text{ of } 100$

$$= 100 + \frac{10}{100} \times 100$$

$$= 110$$

$$\text{Decreased income} = 110 - \frac{10}{100} \times 110$$

$$= 110 - 11$$

$$= 99$$

$$\therefore \% \text{ change in income} = \frac{\text{change in income}}{\text{original income}} \times 100$$

$$\therefore \% \text{ change in income} = \frac{100 - 99}{100} \times 100$$

$$= \frac{1}{100} \times 100$$

$$= 1 \%$$

Q (15) in an examination a candidate named Rajesh score 30% & fails by 40 marks while another candidate named Ajay score 40 % get 20 marks more than minimum pass marks. Find the max & min pass marks

Ans Let the maximum marks be x

\therefore pass marks for Rajesh = 30 % of x + 40

$$= \frac{30x}{100} + 40$$

pass marks for Ajay = 40% of x - 20

\therefore pass marks for both the cases are same

$$\therefore \frac{30x}{100} + 40 = \frac{40x}{100} = 200$$

$$\Rightarrow \frac{40x}{100} - \frac{30x}{100} = 40 + 20$$

$$\Rightarrow \frac{10x}{100} = 60$$

$$\Rightarrow x = \frac{60 \times 100}{10} = 600$$

\therefore Maximum marks = 600

$$\text{minimum pass marks} = \frac{30}{100} \times 600 + 40$$

= 220 marks

Q (16) The Physics teacher of Kendriya Vidyalaya gives 40% his salary to his children & 20% of the remaining to trust. If he is still left with Rs. 9600, what did he originally have?

Ans Let the original amount of money with him be Rs. 100

$$\therefore 40 \% \text{ of the original money given to children} = \frac{40}{100} \times 100 = 40$$

\therefore Remaining money = 100-40 = 60

$$\text{money given to trust} = 20 \% \text{ of remaining} = \frac{20}{100} \times 60 = \text{Rs. } 12$$

\therefore Remaining money = 60-12 = Rs. 48

It is given that remaining money = Rs. 9600

When remaining money is Rs. 48, original money = Rs. 100

$$\text{when remaining money is Rs. 1, original money} = \text{Rs. } \frac{100}{48}$$

$$\text{When remaining money is Rs. 9600, original money} = \text{Rs. } \frac{100}{48} \times 9600$$

= 20,000

Q (17) A School Peon whose income is Rs. 576 a month spend Rs. 432 a month. What percentage of income does he save

Ans Total income = Rs. 576

Spend income = Rs. 432

Save = 576 - 432 = 144

$$\% \text{ of income save} = \frac{144}{576} \times 100$$

= 25 %

Q (18) If 70 % of the students in a school are boys and the number of girls is 540. Find the number of boys in school

Ans Given that 70% of the student in a school are boys

\Rightarrow 30% of student in a school are girls

number of girls = 540

let x be the total no of student



30% of $x = 540$

$$\frac{30}{100} \times x = 540$$

$$x = \frac{540 \times 100}{30}$$

$$x = 1800$$

Number of boys = 70 % of x

$$= \frac{70}{100} \times 1800$$

$$= 1260$$

Q (19) in a locality near a school bus stop, the fruit seller had some apples. He Sold 40 % more than he ate. If he sold 70 apples. How many did he eat

Ans Let x be the No. of apples he ate

∴ He sold 40% more than he ate means he sold $\left(x + \frac{40}{100}x\right)$ apples

$$= x + \frac{2}{5}x = \frac{7x}{5} \text{ apples}$$

given apples sold = 70

$$\frac{7x}{5} = 70$$

$$\Rightarrow x = \frac{70 \times 5}{7} = 50$$

∴ Hence he ate 50 apples.

Q (20) in a Chemistry lab, an alloy of tin & topper consist of 15 parts of tin & 105 parts of copper. Find the percentage of copper in the alloy.

Ans Since the alloy contain 15 parts of tin & 105 part of copper

$$\therefore \text{percentage} = \frac{15}{15+105} \times 100\%$$

$$= \frac{15}{120} \times 100\%$$

$$= 12.5 \%$$

$$\therefore \text{percentage of copper} = \frac{105}{15+105} \times 100\%$$

$$= \frac{105}{120} \times 100\%$$

$$= 87.5 \%$$

Q (21) in a class test, Raju got 70% marks and Seema got 480 marks in a test. The maximum marks of test is equal to the marks obtained by Raju & Seema together. How many marks did Raju Score in test?

Ans Raja got 76 % marks

Seema got (100-76) % of marks

i.e. 24 % of marks

Given Seema got 480 marks

Let total marks be x

$$\frac{24}{100} \times x = 480$$

$$x = \frac{480 \times 100}{24}$$

$$x = 2000$$

Raja marks + Seema's marks = total marks

Raja's marks +480 = 2000

$$\begin{aligned}\text{Raja's marks} &= 2000 - 480 \\ &= 1520\end{aligned}$$

Q (22) A School teacher carrying chalk in hand which contains 10% calcium, 3 % carbon & 12% oxygen.
Find the amount in (grams) of each of these compound in 1 kg of chalk

$$\text{Ans } 1 \text{ Kg} = 100 \text{ g}$$

$$\text{Amount of calcium} = \frac{10}{100} \times 1000 = 100 \text{ g}$$

$$\text{amount of carbon} = \frac{3}{100} \times 1000 = 30 \text{ g}$$

$$\text{amount of oxygen} = \frac{12}{100} \times 1000 = 120 \text{ g}$$

Q (23) there are 120 girls & 57 boys in a school. If 5 % of the girls leave & no new pupils are admitted.
What percentage of the whole school will be boys

$$\text{Ans No. of girls} = 120$$

$$\text{No. of boys} = 57$$

$$5 \% \text{ girls leave} = \frac{5}{100} \times 120 = \frac{600}{100} = 6$$

$$\text{No. of girls left} = 120 - 6 = 114$$

$$\text{total No. of girls & boys} = 114 + 57$$

$$= 171$$

$$\% \text{ of boys} = \frac{57}{171} \times 100$$

$$= 33 \frac{1}{3} \%$$

Simple questions::

Q (1) If the juice container is half filled then write in percentage?

$$\text{Ans } \frac{1}{2} \times 100 = 50 \%$$

Q (2) Express 25 % filled juice container in fraction?

$$\text{Ans } 25 \% = \frac{25}{100} = \frac{1}{4}$$

Q (3) Express 75 % filled juice container in decimal?

$$\text{Ans } 75 \% = \frac{75}{100} = 0.75$$

Q (4) Express $\frac{2}{5} \%$ into fraction equivalent?

$$\text{Ans } \frac{2}{5} \% = \frac{2}{5} \times \frac{1}{100} = \frac{1}{250}$$

Q(5) What percent of $\frac{2}{8}$ is $\frac{1}{40}$?

$$\text{Ans It is } \frac{\frac{1}{2}}{\frac{8}{40}} \times 100$$

$$= \left(\frac{1}{40} \times \frac{8}{2} \times 100 \right) \%$$

$$= 10 \%$$

WORKSHEETS:

WS-2 Percentage

Complete the table-1 and also Find which is more and How much

S.No.	Questions	Answers
1)	15% of 200 or 20% of 100	
2)	10% of 150 or 5% of 200	
3)	40% of 85 or 45% of 80	
4)	65% of 500 or 55% of 700	
5)	30% of 150 or 20% of 250	
6)	40% of 225 or 45% of 220	
7)	25% of 848 or 20% of 950	

Complete the table-2

S.No	Questions	Answers
1)	25 is what % of 50?	
2)	16 is what % of 200?	
3)	224 is what % of 640?	
4)	12 is what % of 120?	

5)	10 % of what number is 8?	
6)	34% of what number is 51?	
7)	4% of what number is 5?	

Answers: Table 1

1) 15% of 200; 30

2) 10% of 150; 5

3) 45% of 80; 2

4) 55% of 700; 60

5) 30% of 150; 5

6) 40% of 225; 9

7) 20% of 950; 22

ANSWERS: TABLE -2

1) 50 %

2) 8 %

3) 35 %



4) 10 %

5) 80

6) 150

7) 125

Quiz:

Q. (1) Find 12% of Rs. 1200

- (a) 144
- (b) 132
- (c) 128
- (d) 198

Q. (2) If 23% of a is 46 find the value of a

- (a) 1200
- (b) 280
- (c) 200
- (d) 148

Q. (3) 72% of 25 students are good at mathematics how many are not good at it?

- (A) 5
- (b) 7
- (c) 1
- (d) 8

Q. (4) Ajay gets 98 marks in his exams. This marks to be 56% of the total marks what are the maximum marks?

- (A) 175
- (b) 210
- (c) 112
- (d) 180



Q. (5) A school nursery has 5000 plants. 5% of the plants are roses and 1% are mango plants. What is the total no. of other plants?

- (A) 4000
- (b) 4700
- (c) 3800
- (d) 3500

Q. (6) Asha got 86.875% marks in the annual examination. If she got 695 marks find the total number of marks of the examination?

- (A) 800
- (b) 1100
- (c) 100
- (d) 500

Q. (7) Ashu went to school for 216 days in a full year. If her attendance is 90%. Find the number of days on which the school was opened?

- (A) 200
- (b) 300
- (c) 240
- (d) 220

Q. (8) 270 candidates appeared for an examination, of which 250 passed. Find the pass percentage?

- (A) 80 %
- (b) $83\frac{1}{2}\%$
- (c) $90\frac{1}{3}\%$
- (d) $93\frac{1}{3}\%$

Q. (9) Raju require 40% marks to pass. If he gets 185 marks, falls short by 15 marks what were the maximum marks he could have get?

- (A) 500
- (b) 200
- (c) 800
- (d) 1000

Q. (10) 2 is what percent of 50?

- (A) 4 %



- (b) 5 %
- (c) 8 %
- (d) 10 %

Q. (11) in an examination, 35% of the students passed & 455 failed. How many students appeared for the examination?

- (A) 490
- (b) 700
- (c) 845
- (d) 1300

Q. (12) Three students contested an election & received 1136, 7636 and 11628 votes what percentage of the total votes did the winning candidate get?

- (A) 57%
- (b) 60%
- (c) 65%
- (d) 90%

Answers

1. A
2. C
3. B
4. A
5. B
6. A
7. C
8. D
9. A
10. A
11. B
12. A

More questions:

- Q.1 Total capacity of class room is 50, if there 25 girls student how many percent boys are there?
- Q.2 The apple is cut into four equal parts , how to express each part in percentage?
- Q.3 If one student scores 450 marks out of 500, what is his score in percent?
- Q.4 If there are 60 seats in a bus and 10 seats are lying vacant, how much percent seats are occupied?

- Q.5 Express bus seats occupancy in percent?
Q.6 If there 20 girls in this bus, express boys in percentage?
Q.7 Express girls travelling in this bus in percentage?

Project:

1. A Visit of one class can be arranged to nearby garden or kitchen garden. Students can note down name of trees or plants with quantity. Place them in a table. Express each type of tree in percentage from the total trees.
2. Take one piece of apple , cut this apple into two equal half pieces. Now each part of apple is 50%. Repeat this activity on these two half pieces , now there will be four pieces of one apple. Now the complete apple has been cut into four pieces. Each piece now indicate 25%. Repeat this activity on other vegetables like TINDA, kharbuja (melon),orange , mousimi, other seasonal fruits and vegetables.
3. Clay based cylindrical object. Cut it into 10 equal parts by cutter. Now eah piece is 10percent.
4. Take 10 number of green chilly in one bowl . Now divide these chilies into two bowls equally , they represent 50 percent. Similarly, these chilies can represent 10, 20 ,30 ,40 ,50 60 , 70 ,80 percent.
5. Draw pie chart for air in atmospheric with a distribution chart, show content of oxygen in this air in %?
6. Draw a chart of marks scored in final exam by students in a class.
7. Video game of garden and kitchen garden can be generated for expressing each type of plant or tree in percentage.
8. Mix of vegetables and fruits in basket can be presented in percentage, ratio, mixture, work time, algebraic equations.



Chapter- 4 Profit and Loss

Introduction

This chapter deals with problem on profit and loss . Examples has been taken from real life. Shopping complex, malls, market deals with sale and purchase of items. Cost price indicates purchase of articles and sale price of same item indicates sales. Hence , concept of sale and purchase has been taken to work with loss and profit. Loss and profit always depends on cost price. Hence for simplicity it can be expressed in percentage. Few daily life examples are shopping complex, service provided, mother dairy running a rickshaw, cloth shop etc.

A shopkeeper has purchased few cloths from industry outlet at lower price and sold them in retail at higher price . Thus selling at higher price can earn him profit. But, during off season, he sells the same clothes at discounted rate or lower then purchase price, this is because he wants to clear the stock . Thus, he books loss on left over cloths. If profit volume is large as compared to loss making sale , the average business is profit making. The profit and loss is computed on cost price. The profit /loss can also be expressed in percentage. Students can visit to mother dairy. They can ask vender cost price of the milk and sale price of milk of any day. SP-CP will give profit amount. This amount can be expressed in percentage. Video game of mother dairy or shopkeeper and customer showing profit loss can be generated and same can be expressed in percentage. Video game Interface will have control of milk, qty, cost price and selling price.





Fig 1 Mother dairy selling milk to local people



Fig 1 Battery Rikshaw carrying passengers

Second example has been taken based on profit and loss earned by a battery rickshaw driver. He takes rickshaw on rent and earn his livelihood on daily basis. Due to rainy day he earns less than the rent thus books loss on that day. Rest of the days he earns profit.



Fig Investment or Cost Price



Return or Sale price is more than cost price

A vendor purchased vegetables and breads and sold them after cooking it as "Grill veg sandwich"

Fig 2 Money growing due to profit

COST PRICE

The amount paid to purchase a product or the price at which product is made is known as its cost price

SELLING PRICE

The price at which product is sold is known as its selling price

PROFIT

If selling price is greater than cost price. The difference between the selling price and the cost price is called. Profit or gain. The profit percent is the profit that would be obtained for a C.P of Rs. 100

$$\Rightarrow S.P > C.P$$

$$(1) \text{profit or gain} = S.P - C.P.$$

$$(2) \text{profit percent (gain percent)} = \frac{\text{profit}}{C.P} \times 100$$

$$(3) \text{profit percent or gain percent} = \frac{S.P - C.P}{C.P} \times 100$$

$$(4) S.P = \frac{(100 + \text{Gain}\%)}{100} \times C.P$$

$$(5) C.P = \left(\frac{100}{100 + \text{Gain}\%} \right) \times S.P$$

LOSS

If selling price of product is less than cost price, the difference between the cost price and selling price is called loss

$$\Rightarrow C.P > S.P$$

The loss percentage is the loss that would be made for a C.P of Rs. 100

$$(1) \text{Loss} = C.P - S.P.$$

$$(2) \text{Loss percent} = \frac{\text{Loss}}{C.P} \times 100$$

$$(3) \text{Loss percent} = \frac{C.P - S.P}{C.P} \times 100$$

$$(4) S.P = \left(\frac{100 + \text{Loss}}{100} \right) C.P$$

$$(5) C.P = \left(\frac{100}{100 + \text{Loss}\%} \right) \times S.P$$

When a person sell two similar item one at a profit of $x\%$ & other at a loss of $x\%$ then the loss is given by

$$\text{Loss percent} = \left(\frac{\text{Common loss} + \text{profit}\%}{10} \right)^2 = \left(\frac{x}{10} \right)^2$$

DISCOUNT

We have seen while buying goods that on every article there is a price marked. This price is known as marked price of the article. In order to clear the stock or to increase sales, sometimes shopkeeper offers a certain percent of rebate on the marked price this rebate is known as discount.

$$(1) S.P = \text{marked price} - \text{Discount}$$

$$\rightarrow S.P = M.P - \text{Discount}$$

$$(2) S.P = M.P \left(\frac{100 - \text{Discount}\%}{100} \right)$$

$$(3) M.P = S.P \left(\frac{100}{100 - \text{Discount}\%} \right)$$

$$(4) \text{Discount \%} = \frac{\text{Discount}}{M.P} \times 100$$



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Fig 3 Shop keeper selling cloths in a shop



Fig 4 Shopkeeper purchases cloths in bulk at Rs 1200/- per piece

Q (ps4.1) A shop in locality give 20% discount what would be the selling price of the Coat marked at Rs. 1200

Ans:

$$\begin{aligned} \text{Marked price} &= \text{Rs. } 1200 \\ \text{Discount} &= 20 \% \text{ of Rs. } 200 \\ \text{Discount} &= \frac{20}{100} \times \text{Rs. } 1200 = \text{Rs. } 240 \\ \text{S.P} &= \text{M.P} - \text{Discount} \\ &= \text{Rs. } 1200 - \text{Rs. } 240 \\ &= \text{Rs. } 960 \end{aligned}$$



Fig 5 Shopkeeper earns profit in selling cloths at price Rs 1500/- per piece in season sale

Q (ps4.2) Find the selling price if a profit 5 % is made on a dresses of Rs. 1500 with Rs. 50 Overhead charge

$$\text{Ans: C.P of } = \text{Rs. } 700$$

$$\text{overhead expenses} = \text{Rs. } 50$$

$$\text{Effective cost price} = \text{Rs. } 700 + \text{Rs. } 50 = \text{Rs. } 750$$

$$\text{profit} = 5\%$$

$$S.P = \left(\frac{100+\text{profit}}{100} \right) \times ECP$$

$$S.P = \left(\frac{100+5}{100} \right) \times 750$$

$$S.P = \frac{105}{100} \times 750$$

$$S.P = \text{Rs. } 787.50$$



Fig p-9 Shopkeeper book loss in selling at price Rs 1000/- per piece in off season sale



Fig 6 Profit and loss in business

Profit and Loss –

Solved questions:

Q (ps5.1) A coat cost price is Rs.2000 and it is sold at a price of Rs2400. Find the total profit and its percentage profit ?

Ans: Cost price = Rs. 2000

Selling price = Rs. 2400

$$\text{Profit} = \text{S.P} - \text{C.P}$$

$$\text{Profit} = 2400 - 2000$$

$$\text{Profit} = 400$$

$$\begin{aligned}\text{profit \%} &= \frac{\text{Profit}}{\text{c.p}} \times 100 \\ &= \frac{400}{2000} \times 100 \\ &= 20\%\end{aligned}$$

Q (ps5.2) The difference between the sale price and cost price of woolen coat is Rs. 240. If shopkeeper earns profit 20% find the selling price

Ans: Let C.P is Rs.x

$$\text{S.P} = \left(\frac{100 + \text{Gain}}{100} \right) \times \text{C.P}$$

$$\text{S.P} = \frac{120}{100} \times$$

$$\text{S.P} = \frac{6x}{5}$$

$$\Rightarrow \frac{6x}{5} - x = 240$$

$$\Rightarrow \frac{6x - 5x}{5} = 240$$

$$\Rightarrow x = 240 \times 5$$

$$\Rightarrow x = 1200$$



$$S.P = \frac{6x}{5} = \frac{6}{5} \times 1200 = 1440$$

Unsolved questions:

Q (pq5.1) Find the selling price of shirt if he earns a profit of 5% on a man's wear . He bought this shirt at Rs. 1150 with Rs 50 as transportations charges?

Q (pq5.2) Vineet bought two coats and trousers from the shop for Rs. 30,000. By selling one coat and one pent at loss of 15% and other at a gain of 19%. Find the selling price?

ANSWERS

(1) Rs. 1260

(2) Rs. 17500

More SOLVED QUESTIONS:

Q (1) A student buys a pen for Rs. 90 and sells it for Rs. 100 find his gain & gain percent

Ans C.P of pen = Rs. 90

S.P of pen = Rs. 100

S.P > C.P

Gain = S.P – C.P

Gain = 100 – 90 = Rs. 10

Gain percent = $\frac{\text{Gain}}{\text{C.p}} \times 100$

$$= \frac{10}{90} \times 100$$

$$= 11\frac{1}{9}\%$$

Q (2) A shop is situated near a locality Raju bought a wrist watch for Rs. 2000 at sold if for Rs. 1900 find the loss & loss percent

Ans C.P of wrist watch = Rs. 2000

S.P of wrist watch = Rs. 1900

Loss = C.P – S.P

$$\text{Loss} = 2000 - 1900$$

Loss = Rs. 100

$$\text{Loss percent} = \frac{100}{2000} \times 100 = 5\%$$



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Q (3) A shop in locality give 20% discount what would be the selling price of the dress marked at Rs. 200

Ans Marked price = Rs. 200

Discount = 20 % of Rs. 200

$$\text{Discount} = \frac{20}{100} \times \text{Rs. } 200 = \text{Rs. } 40$$

S.P = M.P - Discount

$$= \text{Rs. } 200 - \text{Rs. } 40$$

$$= \text{Rs. } 160$$

Q (4) A study table marked at Rs. 15,000 is available for Rs. 14,400 Find the discount given & the discount percent

Ans M. P = Rs. 15000

Selling price = Rs. 14,400

Discount = M. P - S. P

$$= 15000 - 14400$$

$$= 600$$

$$\text{Discount percent} = \frac{\text{Discount}}{\text{M. P}} \times 100$$

$$= \frac{600}{15000} \times 100$$

$$= 4 \%$$

Q (5) The school has purchased a lawn Mover we Rs. 1150 with Rs. 50 As a transportation charges. Find the selling price of low mover if profit percent of 5% is made on it.

Ans M. P = Rs. 15000

C.P of lawn mover = Rs. 1150

overhead expenses = Rs. 50

Effective cost price = Rs. 1150+50 = Rs. 1200

profit = 5 %

$$\text{S.P} = \left(\frac{100 + \text{profit \%}}{100} \right) \text{ effective C. P}$$

$$\text{S.P} = \left(\frac{100 + 5}{100} \right) \times 1200$$

$$\text{S.P} = \text{Rs. } 105 \times 12 = \text{Rs. } 1260$$

Q (6) A school has purchased a LCD screen for seminar hall. The price of LCD screen is Rs. 13,000. The sales tax charged on it is at the rate of 12%. Find the amount the school will have to pay?

Ans List price of LCD screen = Rs. 13,000

Rate of sales tax = 12%

sales tax = 12% of Rs. 13000

$$= \frac{12}{100} \times 13000$$

$$= \text{Rs. } 1560$$

$$\text{Total amount} = \text{Rs. } 13000 + \text{Rs. } 1560 = \text{Rs. } 14560$$

Q (7) A book seller sold 300 copies of a book at profit of 15% to the school library. If a book cost him Rs. 12. Find the selling price of the book

Ans Profit = 15%

One book cost price = Rs. 12

300 books cost price = $300 \times 12 = 3600$

$$\text{S. P} = \left(\frac{100 + \text{Profit \%}}{100} \right) \times 3600$$



$$S.P = \frac{115}{100} \times 3600$$

$$S.P = 115 \times 36$$

$$S.P = \text{Rs. } 4140$$

Q (8) In a test, the teacher has told the student to complete this table,

	C.P	S.P	Gain	Gain%
1	200	240	—	—
2	300	—	5	—
3	1800	1960	—	—
4	—	1000	50	—

$$\text{Ans (1)} \quad C.P = \text{Rs. } 200$$

$$S.P = \text{Rs. } 240$$

$$\text{Gain} = S.P - C.P$$

$$= 240 - 200$$

$$= 40$$

$$\begin{aligned}\text{Gain \%} &= \frac{\text{Gain}}{\text{C.P}} \times 100 \\ &= \frac{40}{200} \times 100 = 20\%\end{aligned}$$

$$(2) \quad \text{Gain} = \text{Rs. } 5$$

$$C.P = 300$$

$$\text{Gain} = S.P - C.P$$

$$S.P = \text{Gain} + C.P$$

$$S.P = 5 + 300$$

$$S.P = 305$$

$$\text{Gain \%} = \frac{\text{Gain}}{\text{C.P}} \times 100$$

$$\text{Gain \%} = \frac{5}{300} \times 100 = 1.66 \%$$

$$(3) \quad C.P = \text{Rs. } 1800$$

$$S.P = \text{Rs. } 1960$$

$$\text{Gain} = S.P - C.P$$

$$\text{Gain} = 1960 - 1800$$

$$\text{Gain} = 160$$

$$\text{Gain \%} = \frac{160}{1800} \times 100$$

$$\text{Gain \%} = 8.88 \%$$

$$(4) \quad \text{Gain} = 50$$

$$S.P = \text{Rs. } 1000$$

$$\text{Gain} = S.P - C.P$$

$$C.P = S.P - \text{Gain}$$

$$C.P = 1000 - 50 = 950$$

$$\text{Gain \%} = \frac{\text{Gain}}{\text{C.P}} \times 100$$



$$= \frac{50}{950} \times 100 \\ = 5.26 \%$$

Q (9) Arun bought a school shoes where the discount given was 20% if the amount he boys is Rs. 1600 find the market price

Ans Let M. P = Rs. 100

Discount = 20% of Rs. 100

$$= 20$$

S. P = M. P – Discount

$$S. P = 100 - 20 = 80$$

When S. P is 80 M. P = Rs. 100

$$\text{when S. P is 80 M. P = Rs. } \frac{100}{80}$$

$$\text{When S. P is Rs. 1600, M. P = } \frac{100}{80} \times 100 = 2000$$

Q (10) The market price of the Raju's school shirt was Rs. 165 & it was sold at discount of 20 %. Find the discount allowed on the shirt and also its selling price

Ans M. P of shirt = Rs. 165

Discount % = 12 %

Discount = 12% of Rs. 165

$$\text{Discount} = \frac{12}{100} \times 165$$

$$= \text{Rs. } 19.80$$

S. P = M. P – Discount

$$S. P = 165 - 19.80$$

$$S. P = 145.20$$

Q (11) A trader marks his good 40% above the cost price and given a discount of 20 % on the market price. Find his gain percent

Ans Let C. P = Rs. 100

$$M. P = 100 + \frac{40}{100} \times 100$$

$$= 100 + 40$$

$$= 140$$

$$\text{Discount} = \frac{20}{100} \times 140 = \text{Rs. } 28$$

S. P = M. P – Discount

$$= 140 - 28 = 112$$

Gain = S. P – C. P

$$= 112 - 100$$

$$\text{Rs. } 12$$

$$\text{Gain \%} = \frac{\text{Gain}}{\text{C. P}} \times 100$$

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

Q (12) A dealer of scientific instrument allow 20 % discount to the school on the marked price of the instrument & Still make a profit of 25%. If his gain over the sale of an instrument is Rs. 50. Find the marked price of the instrument



Ans Gain % = Rs. 25

Gain = Rs. 150

$$\text{Gain\%} = \frac{\text{Gain}}{\text{C.P}} \times 100$$

$$25 = \frac{150}{\text{C.P}} \times 100$$

$$\text{C.P} = \frac{150 \times 100}{25} \times \text{Rs. } 600$$

Gain % = 25 & C.P = Rs. 600

$$\text{S.P} = \left(\frac{100 + \text{Gain\%}}{100} \right) \times \text{C.P}$$

$$\text{S.P} = \frac{100 + 25}{100} \times 600$$

$$\text{S.P} = \frac{125}{100} \times 600 = 750$$

S.P = Rs. 750 & Discount = 20%

$$\text{M.P} = \frac{100 \times \text{S.P}}{(100 - \text{Discount})}$$

$$\Rightarrow \text{M.P} = \left(\frac{100 \times 750}{100 - 20} \right)$$

$$\text{M.P} = \frac{75000}{80} = 937.50$$

Q (1) A shop gives 20% of discount on coat marked with rupees 120 what would be the sale price of the coat?

Ans we have

Marked = Rs. 120

Discount = 20%

$$\text{Discount} = \frac{20}{100} \times 120 = \text{Rs. } 24$$

Selling price = Marked price - Discount price
= 120 - 24 = Rs. 96

Q (2) A table marked at Rupees 15,000 is available for Rs. 14,400. Find the discount and discount percent

Ans Marked price = Rs. 15000

Selling price = Rs. 14,400

Discount = Marked price - selling price

$$\text{Discount} = 15000 - 14400 = 600$$

$$\text{Discount \%} = \left(\frac{600}{15000} \times 100 \right) \% = 4 \%$$

Q (3) A mobile phone cost price is 2000 and it is sold at a price of 2400. Find the profit & profit percentage?

Ans cost price = Rs. 2000

Selling price = Rs. 2400

Profit = S.P - C.P

Profit 2400 - 2000

Profit = 400

$$\text{profit \%} = \frac{\text{Profit}}{\text{C.P}} \times 100$$



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$$= \frac{400}{2000} \times 100 \\ = 20\%$$

Q (4) Find a selling price of bag if profit of 5% is made on a bag of Rs. 700

Ans S.P=?

C.P= Rs. 700

profit = 5 %

$$S.P = \left(\frac{100+\text{profit}}{100} \right) C.P$$

$$S.P = \left(\frac{100+5}{100} \right) \times 700$$

$$S.P = \text{Rs. } 7.35$$

Q (5) A book cost price is Rs. 240 and sold at price of Rs. 200. Find the loss & loss percentage

Ans C.P = Rs. 240

S.P= Rs. 200

Loss = C.P – S.P

$$\text{Loss} = 240 - 200 = 40$$

$$\text{Loss \%} = \frac{\text{Loss}}{\text{C.P}} \times 100$$

$$= \frac{40}{240} \times 100$$

$$= 16.66 \%$$

Unsolved Questions:

Q (1) Ajay buys a geometry box for rs. 2750 and sells it for Rs. 28.60. Find the profit percent?

Q (2) Find cost price , when selling price of water bottle is Rs. 40.60 & gain of 16%

Q (3) Raju buys a pen for rs. 25 and sells it for Rs. 20. Find the loss and loss percent?

Q (4) A person sells a toy for a price which gives him a profit of 20% on cost price of Rs.500 calculates the selling price of an article?

Q (5) Raju buys a cycle of Rs. 1400 and sells it at loss of 15% what is the selling price of the cycle?

Answers

Ans (1) 4%

Ans (2) Rs. 35

Ans (3) loss = Rs. 5 & Loss percent = 20%

Ans (4) Rs. 600

Ans (5) Rs. 1190



Worksheets:

WS-5 PROFIT LOSS

Complete the table and analyze carefully whether its profit or loss

S.No.	Cost Price	Selling price	Profit	loss
1)	₹250	₹285		
2)	₹2200			₹220
3)		₹18	₹2	
4)		₹25		₹5
5)	₹3000		₹150	
6)	₹ 960	₹720		
7)	₹ 90	₹ 100		
8)		₹1147		₹ 93
9)	₹ 750		₹ 125	
10)		₹ 6890	₹ 265	

Answers:

1)Profit = ₹ 35

2)selling price = ₹ 1980

3)Cost price= ₹ 16



4) Cost price = ₹ 30

5) Selling Price = ₹ 3150

6) Loss = ₹ 240

7) Gain = ₹ 10

8) cost price = ₹ 1240

9) selling price = ₹ 875

10) cost price = ₹ 6625

Sheet-2

Q(11) A Shopkeeper bought a DVD for ₹ 750 and sold it for ₹ 875. Find gain per cent?

Ans)

Q(12) Shop owner sold his dinning table set at a loss of 20%. If he had sold it for ₹ 800 more, he would have received a profit of 5%. Find the cost price?

Ans)

Q(13) A shop gives 20% of discount on jeans with rupees 120 what would be the selling price of the Jeans?



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Ans)

Q(14)The cost of 11 pencils is equal to the selling price of 10 pencils. Find the loss or profit percent, whatever may be the cost of 1 pencil?

Ans)

Q(15)If sheela purchased a washing machine for Rs. 5,400 included 8% vat. Find the price before vat was added?

Ans)

Answers

11)(50/3) %

12)₹ 3200

13)₹ 96

14)Profit percent = 10%

15)₹5000



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Quiz:

- Q.1 If cost of Raymond suit to shopkeeper is Rs 5000/- , and sells it to customer for Rs 6000/- what is profit.
- Q.2 Express the above in percent?
- Q.3 If cost price of few ice creams is Rs 300/-and selling price is Rs 60/- , find loss
- Q.4 Express this loss in percent?
- Q.5 If rent paid for rickshaw is Rs 200 /- for one day and earning is Rs 500/- on that day. What is profit?
- Q.6 Express profit in percentage?
- Q.7 If his earning is only Rs 100/- on that day , what is loss amount?
- Q.8 Express this loss in percent?
- Q.9 pocket money of student for Jan month is Rs 500/- . she spends Rs 450 /- in this month. Hence, there is a profit of Rs 50/-

Projects:

1.. Monthly expenses to be lower than income PROFIT. If Monthly expenses are more than income LOSS. Generate a video of woman employee having salary Rs per month. She spends $x+2$ this month. It means loss of Rs 2. Next month her expenses are $x-2$. Hence , this is profit of Rs x. Shopping video can be generated. This can also be seen with students pocket money. Next level can be developed with some indirect ways.

2.Ice cream vendor buy ice-cream qty 20 @ Rs 20 each. Due to electric current not available on that day, only 10 ice creams @ 25 each could be sold , rest got melted. Thus vendor booked loss of Rs 150. Record this loss data.

3.Else graph can be prepared by students on profit /loss.



4. Analysis of profit and loss can be studied with balance sheet of sabji vendor/ chocolate vender balance sheet/ fruit vendor / milkman / ice cream vendor / show balance of society mother dairy

5 Show rupees 100 as items purchases and 150 rupees received in return then rupees 50 will be profit earned . And if earned are less than investment then it will be loss

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Rajveer S Yaduvanshi

Chapter 5 Principal and interest

Introduction: This chapter deals with banking problems. Money if given on loan , the concept of principal and interest will arise. Money growing concept will be developed.

Principal amount is deposited by a person in a bank at some fix rate of interest, thus he earns interest on principal amount as profit . This profit is booked depending on rate of interest, principal amount and time duration.. There are various schemes of deposit available in the bank. The interest earned directly depend on principal amount. Hence , this illustrates money growing concept.



Fig.1 Money growing

PRINCIPAL

The money borrowed or lent. It is denoted by P.

INTEREST

It is the additional money paid to the lender, for the use of the money borrowed. It is denoted by I.

RATE

Interest for 1 year is per Rs. 100. It is denoted by R.

TIME

The Time period for which the money is borrowed. It is denoted by T.

SIMPLE INTEREST

When the interest is paid to the lender regularly every year or every half year on the same principle we call the interest as simple interest. It is generally represented by S.I.

AMOUNT

The sum of principal & interest is called amount. It is represented by A.

FORMULA FOR SIMPLE INTEREST

$$S.I = \frac{P \times R \times T}{100}$$

Where,

S. I = Simple Interest

P = Principal

R = Rate

T = Time Period

COMPOUND INTEREST

In simple interest, principal remains constant but in compound interest, the principal goes on changing periodically.

In case of compound interest, the principal for the second year is the sum of the principal for the first year & the simple interest for the first year. Similarly the principal for the third year is the sum of the principal for the second year & the simple interest for the second year and so on.

FORMULA FOR COMPOUND INTEREST

$$A = P(1 + \frac{R}{100})^n$$

$$C.I = A - P$$

Where

C.I is compound interest

A = Amount

P = Principal

R = Rate of interest

n = Number of year

$$\Rightarrow C.I = P(1 + \frac{R}{100})^n - P$$

$$\Rightarrow C.I = P \left[\left(1 + \frac{R}{100}\right)^n - 1 \right]$$

SPECIAL FORMULAS

(1) when Interest is compounded annually

$$A = P(1 + \frac{R}{100})^n$$

(2) when Interest is compounded half yearly

$$A = P(1 + \frac{\frac{R}{2}}{100})^{2n}$$

(3) when interest is compounded quarterly

$$A = P(1 + \frac{\frac{R}{4}}{100})^{4n}$$

the formula $A = P(1 + \frac{R}{100})^n$ is called the compound interest law and applies to any quantity which increase or decrease so that the amount at the end of each period of constant length bears a constant ratio to the amount at the beginning of that period. This ratio is called growth factor. If it is greater than 1 & called decay factor is less than 1.

APPRECIATION & DEPRECIATION

When the value of product increased with the passage of time, product is said to appreciate.

For example:- Piece of land

If we buy a piece of land

We will probably find that in a few year we get better price for it than the price we paid

$$P_n = P_0 \left(1 + \frac{R}{100}\right)^n$$

P_n = Value after n year

P_0 = Present value

R= Rate of interest

n= number of years

When the value of product decreased with the passage of time, the product is said to depreciate.

For example:- If man buy a scooter & for year, it is obvious that the scooter will not be worth the same as new one the scooter will thus have depreciated in value

$$P_n = P_0 \left(1 - \frac{R}{100}\right)^n$$

P_n = Value after n year

P_0 = Present value

R= Rate of interest

n= number of years



Fig p-11 School bus passing through bank to deal with money related questions

Interest and Principal (Simple Interest and Compound Interest) – Solved questions:

Q (ps6.1) The rate of interest of bank is 1 % per month Ajay deposited Rs. 6250 for 73 days.

Find the simple interest and amount?

Ans P = Rs. 6250

Rate = 1 % per month

Rate = $(1 \times 12) \% = 12 \% \text{ P.A}$

Time = 73 days

Time = $\frac{73}{365} \text{ year} = \frac{1}{3} \text{ year}$

Simple Interest = $\frac{6250 \times 12 \times 1}{100 \times 5} = 150$

Total Amount = Principal + Simple Interest

= Rs6250 + Rs150

= Rs6400

Q (ps6.2) Bank loaned Rs. 10,000 to Kavita to enable him to purchase a T.V set if bank charged interest at the rate of 12.5 % per annum – compounded annually. Calculate the amount that Kavita will have pay to bank after 2 Years?

Ans:

P = Rs. 10,000

Rate 12.5 %

= $\frac{25}{2} \% = 12.5\%$

T = 2 year

A = $P \left(1 + \frac{R}{100}\right)^n$

A = $10,000 \left(1 + \frac{25}{200}\right)^2$

A = 12656.25

Hence, the amount will have to paid by Kavita after 2 year = Rs. 12656.25

SIMPLE TYPE SOLVED QUESTIONS:

Q(1) Find simple interest on Rupees 10000 at 2 % per annum for 2 year

Ans principle, p = 10000

Rate, R% = 2%

Time, T = 2 year

We know that

$$S.I = \frac{P \times R \times T}{100}$$

$$S.I = \frac{10000 \times 2 \times 2}{100} = \text{Rs. } 400$$

Q(2)The simple interest on a certain sum for 2 years at 4 % per annum is 4000 find the principle

Ans S. I = 4000

T= 2 year

R= 4 %



P = ?

$$S.I = \frac{P \times R \times T}{100}$$

$$S.I = \frac{P \times 4 \times 2}{100}$$

$$P = \frac{4000 \times 100}{8}$$

P = Rs. 50,000

Q(3) Find the interest and amount to be paid on Rs 10,000 at 5 % per annum for 2 years

Ans P = 10,000

R = 5 %

T = 2 year

$$S.I = \frac{P \times R \times T}{100}$$

$$S.I = \frac{10,000 \times 5 \times 2}{100}$$

S.I = Rs.1000

Amount = principle + simple interest

A = Rs. (10,000+1000)

A = Rs. 11000

Q(4) Find the time period and rate when a sum taken for 2 year at 6% per annum compounded half yearly

Ans T = 2 year

R = 6 %

For compounded half yearly Rate = $\frac{6}{2}\%$ for half yearly

Rate = 3 % per half year

Time = 2×2 half year

Time = 4 half year

\Rightarrow R 3% per half year & T = 4 half years

Q(5) A sum is taken for one year of 16 % per annum. If interest is compounded after every three months, how many times will interest be charged in one year?

Ans Rate of interest = 16 % per annum = $\frac{16}{4}\%$ per quarter = 4 % per quarter

Time = 1 year = 4 quarter

Thus, interest will be charged in one year at 4 % per annum quarter

MORE SOLVED QUESTIONS:

Q (1) The rate of interest of bank is 1% per month. Ajay deposited Rs. 6250 for 73 days. Find the simple interest & amount?

Ans p = Rs. 6250

R = 1% per month

R = $(1 \times 12)\%$ per annum = 12% P.A

T = 73 days

$$T = \frac{73}{365} \text{ year} = \frac{1}{5} \text{ year}$$

$$S.I = \frac{P \times R \times T}{100}$$

$$S.I = \frac{6250 \times 12 \times 1}{100 \times 5} = \text{Rs. } 150$$

$$\text{Amount} = P + S.I$$

$$= 6250 + 150 = 6400$$

Q (2) A bank has a rate of interest of 4% per annum. M.s. Shashi deposited Rs. 1000 for two year find the compound interest ?

Ans principal for the first year = Rs. 1000

P = Rs. 1000

R = 4.5 P.A

$$\text{Interest for the first year} = \frac{1000 \times 4 \times 1}{100} = \text{Rs. } 40$$

$$\therefore \text{Interest} = \frac{P \times R \times T}{100}$$

Amount at the end of first year

$$= 1000 + 40 = 1040$$

$$[\because A = P + I]$$

Now, principal for the second year = Rs. 1040

Interest for the second year

$$= \frac{1040 \times 4 \times 1}{100} = \text{Rs. } 41.60$$

Amount at the end of second year = Rs. 1040 + Rs. 41.60

$$= \text{Rs. } 1081.60$$

We know that

$$C.I = A - P$$

$$C.I = 1081.60 - 1000$$

$$= 81.60$$

Q (3) Bank loaned Rs. 10000 to Kavita to enable him to purchase at T.V set. If Bank charged Interest at the rate of 12.5% per Annum-compounded yearly. Calculate the amount that Kavita will have pay to bank after 2 year

Ans principal P = Rs. 10,000

Rate r = 12.5 % yearly

$$= \frac{25}{2} \%$$

Time = 2 year

$$\text{Amount, } A = P \left(1 + \frac{R}{100}\right)^n$$

$$A = 10,000 \left(1 + \frac{25}{200}\right)^2$$

$$A = 10,000 \left(1 + \frac{225}{200}\right)^2$$

$$A = 12656.25$$

Hence, amount that 1. will have to paid by Kavita after
2 years = Rs. 12656.25

Q (4) A bank loaned Rs. 81920 to Ajay to enable him to purchase a bike. If bank charged interest at the rate of 12.5% per annum, compounded half yearly calculate the amount that Ajay will have pay to bank after $1\frac{1}{2}$ years.

Ans principal (P) = Rs. 81920

rate (R) = 12.5 %

$$R = \frac{25}{2} \% \text{ yearly}$$

$$R = \frac{1}{2} (\frac{25}{2}) \% \text{ half yearly}$$

$$R = \frac{25}{4} \% \text{ half yearly}$$

$$\text{Time (n)} = 1\frac{1}{2} \text{ years}$$

$$n = \frac{3}{2} \text{ years}$$

$$n = \frac{3}{2} \times 2 = 3 \text{ half year}$$

$$\text{Amount A} = P(1 + \frac{R}{100})^n$$

$$A = 81920(1 + \frac{25}{4 \times 100})^3$$

$$A = 81920(1 + \frac{1}{16})^3$$

$$A = 81920 \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16}$$

$$A = \text{Rs. } 98260$$

Hence, amount that will have to paid by Ajay after $1\frac{1}{2}$ year = Rs. 98260.

Q (5) Ajay & Vijay borrowed Rs. 60,000 & Rs. 50,000 respectively from a bank for a period of 3 years. Ajay paid simple interest at rate of 10% P.A, while Vijay paid compound interest at the Rate of 10% P.A compounded annually. Who paid more interest and by how much?

Ans P = Rs. 60,000

T = 3 Years

R = 10 % P.A

$$\begin{aligned} S.I. &= \frac{P \times R \times T}{100} \\ &= \frac{60,000 \times 10 \times 3}{100} = \text{Rs. } 18,000 \end{aligned}$$

Ajay paid Rs. 18,000 Interest

P = Rs. 50,000

T = 3 year

R = 10% P.A compounded annually

$$A = P(1 + \frac{R}{100})^n$$

$$A = 50,000(1 + \frac{10}{100})^3$$

$$50,000(\frac{11}{10})^3$$

$$A = 50,000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$$

$$A = \text{Rs. } 66550$$

C.I. = A - P

$$= 66550 - 50,000$$

$$= \text{Rs. } 16,550$$

Vijay will paid Rs. 16,550 interest

Hence Ajay will paid more interest than Vijay more money paid by Ajay = $18,000 - 16,550 = 1450$

Ajay will paid more Rs. 1450

Ajay will paid more Rs. 1450 than Vijay

Q (6) Ramesh deposited Rs. 7500 in a bank which pays him 12 % interest per annum compounded half yearly. What is the amount which he receives after 18 months?



Ans P = Rs. 7500

R = 12 % per annum

n = 18 month

n = $\frac{18}{12}$ year = $\frac{3}{2}$ year

we know that for compounded half yearly

$$\text{amount } A = P \left(1 + \frac{\frac{R}{2}}{100}\right)^{2n}$$

$$A = 7500 \left(1 + \frac{12}{100}\right)^{2 \times \frac{3}{2}}$$

$$= 7500 \left(1 + \frac{6}{100}\right)^3$$

$$= 7500 \left(\frac{106}{100}\right)^3$$

$$= \text{Rs. } 8932.62$$

Ramesh receives amount Rs. 8932.62 after 18 months.

Q (7) Sudha deposited RS. 7500 for 6 month at the rate of 8 % interest compounded quarterly. Find the amount he received after 6 month.

Ans P = Rs. 7500

R = 8 % per annum

n = 6 month

n = $\frac{6}{12}$ year = $\frac{1}{2}$ year

we know that for compounded quarterly

$$\text{Amount, } A = P \left(1 + \frac{\frac{R}{4}}{100}\right)^{4n}$$

$$A = 7500 \left(1 + \frac{8}{400}\right)^{4 \times \frac{1}{2}}$$

$$A = 7500 \left(1 + \frac{1}{50}\right)^2$$

$$A = 7500 \left(\frac{51}{50}\right)^2$$

$$A = 7500 \times \frac{51}{50} \times \frac{51}{50}$$

$$A = \text{Rs. } 7803$$

Sudha will receives Rs. 7803 after 6 months.

Q (8) Ranjana buys a refrigerator for Rs. 4000 on credit. The rate of interest for the first year is 5 % and the rate of interest for the second year is 15% how much will it cost her if she pays the amount after two years?

Ans P = Rs. 4000

R₁ = 5 % per annum

R₂ = 15 % per annum

∴ amount after 2 years

$$= P \left(1 + \frac{R_1}{100}\right) \left(1 + \frac{R_2}{100}\right)$$

$$= 4000 \left(1 + \frac{5}{100}\right) \left(1 + \frac{15}{100}\right)$$

$$= 4000 \left(1 + \frac{1}{100}\right) \left(1 + \frac{3}{100}\right)$$

$$= 4000 \left(\frac{21}{20}\right) \left(\frac{23}{20}\right)$$

$$= \text{Rs. } 4830$$

Thus, the refrigerator will cost Rs. 4830 to Ranjana

Q (9) The population of the town is increasing at the rate of 5% per annum. What will be the population of town after two year. If the current population is 10000.

Ans P = initial population = 10000

R = Rate of growth of population

R = 5 % per annum

n = number of year = 2 year

we know that

$$P_n = P \left(1 + \frac{R}{100}\right)^n$$

population after two year

$$= P \left(1 + \frac{R}{100}\right)^2$$

$$= 10,000 \left(1 + \frac{5}{100}\right)^2$$

$$= 10,000 \left(1 + \frac{1}{20}\right)^2$$

$$= 10,000 \left(\frac{21}{20}\right)^2$$

$$= 10,000 \times \frac{21}{20} \times \frac{21}{20}$$

$$= \text{Rs. } 11025$$

Hence, population after 2 year = Rs. 11025

Q (10) the population of a certain city is Rs. 1, 25,000. If the annual birth rate is 33 % and the annual death rate is 1.3 % calculate the population after 3 years?

Ans Present population of the city

(P) = 1, 25,000

Time (n) = 3 years

Rate of birth (R_1) = 3.3 %

Rate of death (R_2) = 1.3 %

so that net rate of increase

$$R = (R_1 - R_2) = 3.3 - 1.3 = 2 \%$$

we know that

$$P_n = P \left(1 + \frac{R}{100}\right)^n$$

Population after 3 years

$$P = 125000 \left(1 + \frac{2}{100}\right)^3$$

$$P = 125000 \left(\frac{51}{50}\right)^3$$

$$P = 125000 \times \frac{51}{50} \times \frac{51}{50} \times \frac{51}{50}$$

$$P = 132651$$

Q (11) Raju purchased a scooter for Rs. 25,000. In the cost of the boat is depreciating at the rate of 5 % per annum. Calculate its value after 2 years

Ans Present value of the scooter = Rs.25, 000

Rate (R)of depreciation = 5 %

Time (n) = 2 years

we know that

$$P_n = P \left(1 - \frac{R}{100}\right)^n$$

\therefore The value of the scooter after 2 years

$$\begin{aligned}
 & 25000 \left(1 - \frac{5}{100}\right)^2 \\
 &= 25000 \left(1 - \frac{1}{20}\right)^2 \\
 &= 25000 \times \frac{19}{20} \times \frac{19}{20} \\
 &= \text{Rs. } 22562.5
 \end{aligned}$$

Q (12) Ashutosh purchased an old car for Rs. 16,000. If the cost of old car after 2 years depreciates to Rs. 14440. Find the rate of depreciation

Ans Let the rate of depreciation be R % per year. Then,

$$\begin{aligned}
 14440 &= 16000 \left(10 - \frac{R}{100}\right)^2 \\
 \frac{14440}{16000} &= \left(10 - \frac{R}{100}\right)^2 \\
 \Rightarrow \frac{361}{400} &= \left(10 - \frac{R}{100}\right)^2 \\
 \left(\frac{19}{20}\right)^2 &= \left(10 - \frac{R}{100}\right)^2 \\
 \Rightarrow \frac{19}{20} &= 1 - \frac{R}{100} \\
 \Rightarrow \frac{R}{100} &= 1 - \frac{19}{20} \\
 \Rightarrow \frac{R}{100} &= \frac{1}{20} \\
 \Rightarrow R &= \frac{100}{20} = 5
 \end{aligned}$$

Hence the rate of depreciation is 5 % per annum.

Unsolved questions

Q (pq5.1) At what rate percent per annum will a sum of money double in 10 years?

Q (pq5.2) Mr.Kamal a school Teacher borrows Rs. 12,500 at 12% per annum for 3 years at simple interest and Radha, a School attendant borrows the same amount for the same time period at 10% per annum compound annually. Who pays more interest and by how much?

Q (pq-3) the rate of interest of bank is $16\frac{2}{3}\%$ per annum Rajesh deposited Rs. 68000 for 9 months. Find the simple interest

ANSWERS

- 1) 10% per annum
- 2) kamal pays more interest Rs. 362.50 more interest



3) S. I = Rs. 8500

SIMPLE TYPE UNSOLVED QUESTIONS:

Q (1) Find the simple interest on Rs. 1500 at 5% per annum after 2 years?

Q (2) The simple interest on a certain sum for 3 years at 4% per annum is 4800. Find the principal?

Q (3) Find the interest and amount to be paid on Rs. 25000 at 2% per annum after 5 years.

Q (4) Find the time period and rate for $1\frac{1}{2}$ years at 8 % per annum is compounded half yearly?

Q (5) Find the compound interest on Rs. 8000 at 10% per annum for 3 years?

ANSWERS:

Ans (1) Rs. 1500

Ans (2) Rs 40,000

Ans (3) Rs 2500, Rs 27500

Ans (4) 4% half year, 3 half years

Ans (5) Rs. 2648

WORKSHEETS:

WS-11 Simple and Compound interest

Use simple interest to find the ending balance and complete the table

S.No	Questions	Answers
1)	₹34,100 at 4% for 3 years	
2)	₹4,000 at 3% for 4 years	
3)	₹43,800 at 4.8% for 2 years	
4)	₹35,800 at 8.2% for 3 years	
5)	₹7,400 at 10.5% for 1/ 4 years	
6)	₹210 at 8% for 7 years	



Answers

1) ₹38,192.00

2) ₹4,480.00

3) ₹48,004.80

4) ₹44,606.80

5) ₹7,594.25

6) ₹327.60

Find the total value of the investment after the given time and complete the table

S.No	Questions	Answers
1)	₹7,300 at 7% compounded semiannually for 3 years	
2)	₹130 at 9.4% compounded quarterly for 2 years	
3)	₹\$12,700 at 8.8% compounded half yearly for 1 year	
4)	₹\$1,240 at 8% compounded annually for 2 years	
5)	₹\$21,000 at 13.6% compounded quarterly for 4 years	
6)	₹1,500 at 7% compounded annually for 3 years	

Answers

1) ₹8,973.56

2) ₹156.55

3) ₹13,842.19

4) ₹1,446.34



5) ₹35,854.85

6) ₹1,837.56

QUIZ:

Q. (1) Rohan deposited Rs. 8000 with a bank for 3 years at an interest of 15% per annum. What is the compound interest that Rohan gets after 3 years?

- (A) 4167
- (b) 4165
- (c) 8167
- (d) 8160

Q. (2) Sonia took a loan of Rs. 16,000 from bank at a rate of $12\frac{1}{2}\%$. Per annum calculate the total compound interest payable by Sonia after 3 years?

- (A) 6716
- (b) 6815.25
- (c) 6781.25
- (d) 6800

Q. (3) Ajay deposited Rs. 1000 in bank of Patiyala at the rate of 8% per annum for $1\frac{1}{2}$ years when interest is compounded half yearly. Find the compound interest?

- (A) 124.86
- (b) 125
- (c) 127
- (d) 123.60

Q. (4) Raju deposited Rs. 7500 in a bank which pays him 12% interest per annum compounded quarterly. What is the amount which he receives after a months?

- (A) 7676.5
- (b) 8000



- (c) 6100.5
- (d) 8195.45

Q. (5) Shipla borrowed a sum of Rs. 1200 from bank to purchase a refrigerator. If rate of interest is 5% per annum compound interest that shilpa has to pay to the bank after 3 years?

- (A) 1863.50
- (b) 1800
- (c) 1891.50
- (d) 5000

Q. (6) Rajesh lent Rs. 8000 to his friend for 3 years at the rate of 5 % per annum compound interest. What amount does Rajesh get after 3 years?

- (A) 9361
- (b) 9000
- (c) 9580
- (d) 9261

Q. (7) Ram Singh buys a washing machine for Rs. 400 on credit. The rate of interest for the first year is 5 % and of the second year is 15%. how much will it cost him if he pays the amount after two years?

- (A) 4800
- (b) 4830
- (c) 4850
- (d) 4840

Q. (8) Find the simple interest on Rs. 300 at $6\frac{1}{4}\%$ per annum for 73 days?

- (A) 38



- (b) 37.50
- (c) 39
- (d) 40

Q. (9) at what rate percent of simple interest will a sum of money double itself in 12 years?

- (A) $8\frac{1}{4}\%$
- (b) $8\frac{1}{3}\%$
- (c) $8\frac{1}{2}\%$
- (d) $9\frac{1}{2}\%$

Q. (10) the simple interest on a sum of money is $\frac{4}{9}$ of the principal. Find the rate percent, if both are numerically equal?

- (A) 6%
- (b) $6\frac{1}{4}\%$
- (c) $6\frac{2}{3}\%$
- (d) 7%

Q. (11) in what time will Rs. 800 amount to Rs. 882 at 5% per annum compounded annually?

- (A) 2 years
- (b) 4 years
- (c) 6 years
- (d) 8 years

Q. (12) Ritesh lent Rs. 1600 to Teena at the rate of $12\frac{1}{2}\%$ per annum compound interest find the amount payable by Teena to Ritesh after 3 years?



- (A) 22786
- (b) 22768
- (c) 25681
- (d) 22781.25

Answers

- 1. A
- 2. C
- 3. A
- 4. D
- 5. C
- 6. D
- 7. B
- 8. B
- 9. B
- 10.C
- 11.A
- 12.D

Simple questions:

- 1. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:
 - (a) Rs. 650
 - (b) Rs. 690
 - (c) Rs. 698
 - (d) Rs. 700
- 2. Find the simple interest on Rs 7000 at $50/3\%$ for 9 months
 - (a) Rs. 1075
 - (b) Rs. 975
 - (c) Rs. 875



- (d) Rs. 775
3. Sahil took a loan for 6 years at the rate of 5% per annum on Simple Interest, If the total interest paid was Rs. 1230, the principal was
- 4100
 - 4200
 - 4300
 - 4400
4. Find the rate at Simple interest, at which a sum becomes four times of itself in 15 years.
- 10%
 - 20%
 - 30%
 - 40%

PROJECT:

- Students can read record of bank pass book. Entries for principal amount and interest can be distinguished.
- VISIT OF STUDENTS IN NEAR BY BANK.
- Provide comparative statement of various banks on interest in tabular form , let the students find out which bank is giving higher rate of interest.
- Money growing concept** can be shown with help of 1000 rupee notes
- One fruit vendor takes loan from landlord Rs 2000/- on a day ,he purchase fruits from whole sale market , and sell them for Rs 4000/- in retail. He return with interest to landlord Rs 2500/- Here land lord earn interest of Rs 500/- and vendor earns profit of Rs1500/-
-

The interface features a question box at the top left asking: "How much interest does a \$90 investment earn at 15 percent over 1 year?". To the right is a score counter showing "SCORE" and "0". Below the question is a "RESET" button. A large hand icon is positioned on the left side. At the bottom, there are four columns of money icons: the first column shows \$1 bills, the second shows \$5 bills, the third shows \$10 bills, and the fourth shows \$20 bills. Below these are rows of coins: quarters, dimes, nickels, and pennies.

For each problem, click on the correct denominations in the cash drawer so that they add up to the simple interest.

Click on the reset button to put the money back in the register and start over again.

This game can be created in different levels. Stage 1 is display interest based on P,R,T and match this result using currency denominations.

Stage 2 can be interest is displayed compute time.

Stage 3 can be amount is displayed , compute Rate of interest and match this answer.

Student should feel as if he is playing video game and solving problems on principal and interest.

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Rajveer S Yaduvanshi

Chapter- 6 Ratio and proportion

Introduction: Children in School bus and class room are divided into different groups based on age , marks obtained , height , male -female etc. Hence such distribution generated data and data types. This data has been used to develop ratio and proportion questions.

Hence , this chapter includes real life questions. Few example are globe having water and land ratio. Also environment having oxygen, nitrogen and other small gasses.



Fig 1 Globe showing water (blue) and land part (other than blue)

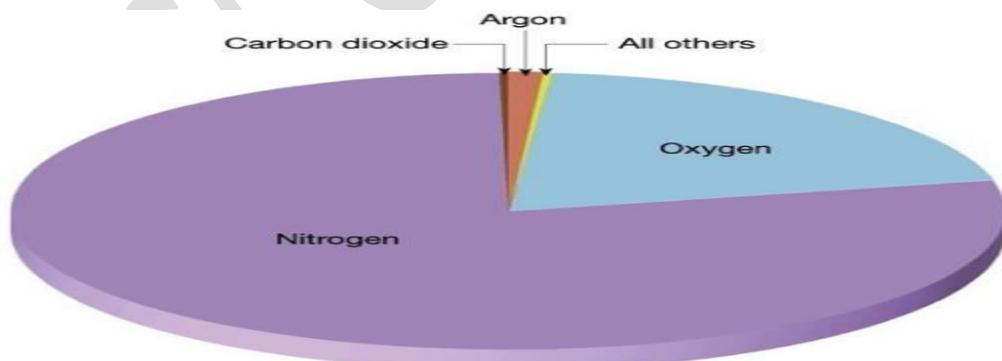


Fig 2 Environment on earth composition of (by volume) 78.09% nitrogen, 20.95% oxygen, 0.93% argon, 0.039% carbon dioxide, and small amounts of other gases.



Fig 1 School bus reaches to school, students de-board from bus and go to class room

Ratio

In our day to day life, we compare one quantity with another quantity of the same kind by using the method of subtraction & 'method of division'

the ratio of two quantities a & b in the same units is the fraction $\frac{a}{b}$ we write as a:b

In the ratio a:b we call a as the first term or antecedent and b as the second term or consequent

eg: the ratio 5: 11 represent $\frac{5}{11}$ with antecedent = 5, consequent = 9

$$\frac{5}{11} = \begin{matrix} 5. \\ \text{Antecedent} \end{matrix} \quad \begin{matrix} 11 \\ \text{Consequent} \end{matrix}$$

Properties of ratio

when we compare two quantities, the following must be taken care of

(1) a ratio is usually expressed in its simplest form

$$\text{eg. } \frac{12}{36} = \frac{1}{3} = 1:3$$

(2) both the quantities should be in the same unit so, ratio is number with no unit involved in it

eg. 100g : 2kg

$$= 100g : 2000g$$

$$= \frac{100}{2000}$$

$$= 1:20$$



(3) The order of the quantity of a ratio is very important

eg. 5:7 is different from 7:5 they are not equal

$$5 : 7 \neq 7 : 5$$

Equivalent ratio

a ratio is similar to a fraction so, if we divide or multiply the numerator

(Antecedent) & denominator (consequent) by the same numbers

we get

$$\text{eg: } 5 : 7 = \frac{5}{7}$$

if we multiply $\frac{5}{7}$ by the same number say 3 we get the ratio

$$\Rightarrow \frac{5 \times 3}{7 \times 3} = \frac{15}{21}$$

$\Rightarrow 15 : 21$ is equivalent to $5 : 7$

Ratio is a number with no unit

Ratio should always be expressed in its simplest form

$$\text{eg: } \frac{12}{36} = \frac{12 \div 12}{36 \div 12} = \frac{1}{3}$$

So, 12:36 is equivalent to 1:3

Comparison of ratios

to compare two ratios we have to follow these steps:

Step 1: convert each ratio into a fraction in its simplest form.

Step 2 : find the LCM of Denominators of the fractions obtained in Step 1

Step 3 : Convert the denominators equal to LCM obtained in Step 2 in each fraction

Step 4 : Now, compare the numerator of the fractions the fraction with a greater numerator will be greater than other.

$$\text{Eg. } 5 : 6 = \frac{5}{6} \quad \& \quad 7 : 8 = \frac{7}{8}$$

LCM of 6 & 8 = 24

$$\frac{5}{6} = \frac{5 \times 4}{6 \times 4} = \frac{20}{24}$$

$$\frac{7}{8} = \frac{7 \times 3}{8 \times 3} = \frac{21}{24}$$

$$\therefore 21 > 20$$

$$\text{So, } \frac{21}{24} > \frac{20}{24} \text{ or } \frac{7}{8} > \frac{5}{6}$$

Hence , $7 : 8 > 5 : 6$



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Proportion

A proportion is an equation with a ratio on each side. It is a statement that two ratios are equal. When two ratios are equal then such type of equality of ratio is called proportion and their terms are said to be in proportion.

Eg. If the cost of 3 pens is Rs. 21 and that of 6 pen is Rs. 42, then the ratio of pens is $3 : 6 = 21 : 42$ therefore the terms 3, 6, 21, & 42 are in proportion

Generally, the four terms $a, b, c, \& d$ are in proportion if $a : b = C : d$

thus, $a : b :: c : d$ means

$$\frac{a}{b} = \frac{c}{d} \text{ or } ad = bc$$

Conversely if $ad = bc$, then

$$\frac{a}{b} = \frac{c}{d} \text{ or } a : b :: c : d$$

Here a is the first term, b is the second terms, C is the third term & d is the fourth term
the first and fourth terms are called extreme terms or extreme and the second & third terms are called middle terms or means

Product of extreme = product of means

$$ad = bc$$

Continued proportion

In a proportion, the 2nd & 3rd term are equal then the proportion is called continued proportion

$$\text{Eg. } 2 : 4 :: 4 : 8$$

Mean Proportion

If the term $a, b, \& c$ are in continued proportion than b is called the mean proportion of $a \& c$

$$\text{Eg. } a : b :: b : c$$

$$\frac{a}{b} = \frac{b}{c}$$

$$\Rightarrow b^2 = ac$$

Third proportion

If the terms $a, b \& c$ are in continued proportion, then c is called the third proportion

Unitary method

The method of finding the value of a unit quantity of an item on the basic of the given information and



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then finding the value of the desired quantity of the same item is called a unitary method

Eg. If cost of 6 toffee is Rs. 20

then what will be the cost of 12n toffee

Cost of 6 toffee = Rs. 20

$$\text{Cost of 1 toffee} = \frac{20}{6}$$

$$\text{Cost of 12 toffee} = \frac{20}{6} \times 12 = \text{Rs. 40}$$

If two quantities are varies directly we can write $x \propto y$ if two quantities varies indirectly we can write

$$x \propto \frac{1}{y}$$

Solved questions:

Q(1) compare that ratio 5 : 6 & 7 : 8

$$\text{Ans } 11:6 = \frac{5}{6} \text{ & } 7:8 = \frac{7}{8}$$

LCM of 6 & 8 = 24

$$\frac{11}{6} = \frac{11 \times 4}{6 \times 4} = \frac{44}{24}$$

$$\frac{7}{8} = \frac{7 \times 3}{8 \times 3} = \frac{21}{24} \therefore 44 > 21$$

$$\text{So, } \frac{44}{24} > \frac{21}{24}$$

$$\text{or } \frac{11}{6} > \frac{7}{8}$$

Q(2) there are so seats in a school bus 40 seats occupied by student & 10 seats vacant. Find the ratio of vacant seat & total no of seat

Ans Vacant seats = 10

total no of seats = 50

$$\begin{aligned} \text{the ratio of vacant seat & total number of seat} &= \frac{10}{50} \\ &= 1 : 5 \end{aligned}$$

Q(3) The two student Seema & Reema sitting in a school bus Seema has a weight of 60 Kg & Reema has a 40 Kg weight compare the ratio of their weight

Ans Weight of Seema = 60 Kg

Weight of Reema = 40 Kg

$$\text{Ratio} = \frac{\text{Weight of Seema}}{\text{Weight of Reema}}$$

$$\text{Ratio} = \text{Ratio} = \frac{60}{40} = 3 : 2$$

Q(4) the ratio of number of boys and girls in school bus are 7 : 8 if the percentage increased in the numerology boys and girls be 20% & 10% respectively. What will be the new ratio?

Ans The no of boys and girls in the college be $7x$ & $8x$.



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The increased number is $(120\% \text{ of } 7x) (110\% \text{ of } 8x)$

$$= \frac{120}{100} \times 7x \text{ & } \frac{110}{100} \times 8x \\ = \frac{42x}{5} \text{ & } \frac{44x}{5}$$

$$\text{The ratio} = \frac{\frac{42x}{5}}{\frac{44x}{5}} = \frac{42}{44} = 21.22$$

Q(5) the ratio of earning of school bus driver & conductor is 2:1. If the earning of driver increase by 50% & the earning of conductor decrease by 25% the new ratio

Of their earnings

Ans Let the earning of school bus driver & conductor be Rs. $4x$ & $7x$

New earning of driver = 150% of Rs. $2x$

$$= \frac{150}{100} \times 2x = \text{Rs. } 3x$$

New earning of conductor = 75% of Rs. $1x$

$$= \frac{75}{100} \times x \\ = \text{Rs. } \frac{3x}{4}$$

$$\Rightarrow \text{New ratio} = \frac{3x}{\frac{3x}{4}}$$

$$\text{New ratio} = \frac{4}{1} = 4:1$$

Q(6) The salaries of three teachers in the school are in the ratio 2:3:5 if the increment of 15%, 10% & 20% are allowed respectively in their salaries. What will be the new ratio of their salaries?

Ans Let the first teacher salary = $2x$

let the second teacher salary = $3x$

let the third teacher salary = $5x$

$$1^{\text{st}} \text{ teacher's new salary} = \frac{115}{100} \text{ of } 2x = \frac{23}{10}x$$

$$2^{\text{nd}} \text{ teacher's new salary} = \frac{110}{100} \text{ of } 3x = \frac{33}{10}x$$

$$3^{\text{rd}} \text{ teacher's new salary} = \frac{120}{100} \times 5x = 6x$$

$$\therefore \text{new ratio} = \frac{23}{10}x : \frac{33}{10}x : 6x = 23 : 33 : 60$$

Q(7) the seats for mathematics, Physics and chemistry are in the ratio 5:7:8 in a school. There is a proposal to increase these seats by 40%, 50% & 75 what will be the ratio of increased seats

Ans let the number of seats for Maths physics and chemistry be $5x$, $7x$ & $8x$



No. of increased seats are (140% of 5x) & (150% & 7x) & (175% of 8x)

$$\text{No. of increased seat in math} = \frac{140}{100} \times 5x = 7x$$

$$\text{No. of increased seat in physics} = \frac{150}{100} \times 7x = \frac{21x}{2}$$

$$\text{No. of increased seat in chemistry} = \frac{175}{100} \times 8x = 14x$$

$$\text{New Ratio} = 7x : \frac{21x}{2} : 14x$$

$$= 14x : 21x : 28x$$

$$= 2 : 3 : 4$$

Q (8) the ratio of number of boy & girls in a school is 5:9 find the number of girls. If the total number of student in the class is 56.

Ans Total number of student = 56

the ratio of boys & girls = 5:9

let no. of boys = 5x

let no. of girls = 9x

total no. of boys + girls = 14x

$$14x = 56$$

$$x = \frac{56}{14} = 4$$

No of girls = 9x

$$= 9 \times 4$$

$$= 36$$

Q (9) Find x where $x : 3 :: 4 : 12$

Ans Here $x, 3, 4$ & 12 are in proportion

$$\frac{x}{3} = \frac{4}{12}$$

$$12x = 3 \times 4$$

$$12x = 12$$

$$x = \frac{12}{12} = 1$$

Q (10) the cost of 1 packet toffee Rs. 24. The Raju standing in bass top waiting for school bus has purchased 5 packet of toffee. How much do 5 packet cost?

Ans Let the cost of 5 packet toffee be x

Packet of	Cost
1	24
5	x

$$\frac{1}{24} = \frac{5}{x}$$



$$x = 24 \times 5$$

$$x = \text{Rs. } 120$$

Q (11) RamPrakash the driver of school bus drives his car at a constant speed of 12 Km per 10 minute.

How long will it take to cover 108Km

Ans Let Ramprakash take x min to cover 108 Km

Speed (in Km) Cost

$$\begin{array}{rcl} 12 & 10 \\ 108 & x \\ \hline 12 & = & \frac{108}{x} \end{array}$$

$$12 \times x = 108 \times 10$$

$$x = \frac{108 \times 10}{12}$$

$$x = 90 \text{ minutes}$$

Packet of Cost

$$\begin{array}{rcl} 1 & 24 \\ 5 & x \end{array}$$

Q (12) the school bus fare for 14 Km is Rs. 98. Find the fare for 28 Km

Ans let the fare for 28Km be x

School bus fare Cost

$$\begin{array}{rcl} 14\text{Km} & \text{Rs. } 98 & \frac{14}{98} = \frac{28}{x} \\ 28\text{Km} & x & \end{array}$$

$$14x = 28 \times 98$$

$$\Rightarrow x = \frac{28 \times 98}{14}$$

$$\Rightarrow x = \text{Rs. } 196$$

Q (13) in a school library 12 books cost Rs. 132 what is the cost of 15 books?

Ans Let the cost of 15 books be x

Books Cost

$$\begin{array}{rcl} 12 & 132 \\ 15 & x \end{array}$$

$$\frac{12}{132} = \frac{15}{x}$$

$$12x = 132 \times 15$$

$$x = \frac{132 \times 15}{12}$$

$$x = \text{Rs. } 165$$

Q (14) A Milkman contain the mixture of milk & water in the ratio 4: 3. If 5 liter of water is added to the mixture, the ratio becomes 4:5 find the quantity of milk in the given mixture

Ans Let the quantity milk & water be $4x$ liters & $3x$ liters



$$\frac{4x}{3x+5} = \frac{4}{5}$$

$$20x = 4(3x + 5)$$

$$20x = 12x + 20$$

$$20x - 12x = 20$$

$$8x = 20$$

$$x = \frac{20}{8} = 2.5$$

Quantity of milk = $2.5 \times 4 = 10$ liters

Q (15) in a school bus, the ratio of number of boys to girl is 8: 5 if there are 25 girls. Find the total number of student in the school bus

Ans Let the number of boys & girls be $8x$ & $5x$

No. of girls = 25

$$5x = 25 \Rightarrow x = \frac{25}{5} = 5$$

$$\text{no of boys} = 8x = 8 \times 5 = 40$$

$$\begin{aligned}\text{total no of student} &= \text{no. of boys} + \text{no. of girls} \\ &= 25 + 40 \\ &= 65\end{aligned}$$

Q (16) in a school 20% of the boys & 25% of girls are scholarship holder. Find the ratio of boys & girls find the ratio of boys & girls who does not get scholarship

Ans No. of boys get scholarship = 20%

No. of boy not get scholarship = $100-20= 80\%$

No. of girls get scholarship 25%

No. of girls not get scholarship = $100-25= 75\%$

$$\begin{aligned}\text{Ratio of boys \& girls who does not get scholarship} &= \frac{80}{75} \\ &= 16 : 15\end{aligned}$$

Q (16) The speed of three school bus are in the ratio $5 : 4 : 6$. Find the ratio between the time taken by them to travel the same distance

Ans Ratio of speed of three school bus = $5 : 4 : 6$

$$\text{Speed} = \lambda \frac{1}{\text{Time}}$$

$$\text{Ratio of time taken} = \frac{1}{5} : \frac{1}{4} : \frac{1}{6}$$

LCM of 5, 4, & 6 = 60

$$\begin{aligned}\text{Ratio of time taken} &= \frac{60}{5} : \frac{60}{4} : \frac{60}{6} \\ &= 12 : 15 : 10\end{aligned}$$



Q(16) A certain amount of scholarship brilliant has been divided between two study not Raju & Rahul in the ratio 4 : 3 if get scholarship Rs. 4800 what was the total amount

Ans Rahul's scholarship Rs. 4800

let Raju scholarship share = $4x$

Rahul scholarship share= $3x$

$$3x = 4800$$

$$x = 1600$$

$$\text{Raju's Scholarship} = 4 \times 1600 = 6400$$

$$\text{total amount} = 4800 + 6400 = 11200$$

More Solved questions:

Q(pq6.1) The ratio of number of boys and girls in the bus is 4 : 3. If there are 18 girls in a bus, find the number of boys in the bus and the total number of students in the school bus.

Ans Number of girls in the bus = 18

Ratio of boys and girls = 4 : 3

According to the question,

$$\text{Boys/Girls} = 4/3$$

$$\text{Boys}/18 = 4/3$$

$$\text{Boys} = (4 \times 18)/3 = 24$$

$$\text{Therefore, total number of students in bus} = 24 + 18 = 42.$$

Q (pq6.2) In a class 80 students passed and the rest failed. If 80 % of the students failed, find the number of students in the class.

Ans Let the total number of student be x 80% of the students failed= 20 % of the students passed

$$20\% \text{ of } x = 80$$

$$\frac{20}{100} \times x = 80$$

$$x = \frac{80 \times 100}{20}$$



$$\Rightarrow x = 400$$

Hence, total number of student in class is 400

Unsolved questions:

Q (pq6.1) 270 candidate appeared for an examination of which 252 passed find the pass percentage?

Q (pq6.2) In an examination 35% of the students passed and 455 failed. How many students appeared for the examination?

Q (pq-3) In a school, the ratio of number of boy to girl is 8:5. If there are 160 girls, find the total number of student in the school?

ANSWERS

1) $93\frac{1}{3}\%$

2) 700

3) Total number of student = 416

Worksheets:

WS- 4 Ratio and proportion

Q(1) Arrange the following ratios in descending order.

$2 : 3, 3 : 4, 5 : 6, 1 : 5$

Ans)



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Q(2) Two numbers are in the ratio 3 : 4. If the sum of numbers is 63, find the numbers.

Ans)

Q(3) If $x : y = 1 : 2$, find the value of $(2x + 3y) : (x + 4y)$

Ans)

Q(4) A bag contains Rs510 in the form of 50 p, 25 p and 20 p coins in the ratio 2 : 3 : 4. Find the number of coins of each type.

Ans)

Q(5) School awarded the prize money among Ron, Sam and Maria in the ratio 2 : 3 : 5. If Maria got Rs150, find the total amount and the money received by Ron and Sam.

Ans)

Answers



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- 1) $5 : 6 > 3 : 4 > 2 : 3 > 1 : 5$
- 2) the two numbers are 27 and 36.
- 3) 8 : 9
- 4) number of 50 p coins, 25 p coins and 20 p coins are 400, 600, 800
- 5) the total amount = Rs180

Sheet-2

Q(1) The ratio of number of boys and girls is 4 : 3. If there are 18 girls in a class, find the number of boys in the class and the total number of students in the class.

Ans)

Q(2) There are 70 seats in a school bus 40 seats occupied by student and 30 seats vacant. Find the ratio of vacant seat and filled seat?

Ans)

Q(3) The two student Ajay and Abhay sitting in a school bus Ajay has a weight of 80 Kg and Abhay has a 60 Kg weight compare the ratio of their weight

Ans)



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Q(4) What must be added to each term of the ratio $2 : 3$, so that it may become equal to $4 : 5$?

Ans)

Q(5) Two numbers are in the ratio $1:3$ and their sum is 96. Find the numbers

Ans)

Answers

- 1) total number of students = $24 + 18 = 42$.
- 2) $3:4$
- 3) $4:3$
- 4) 2
- 5) 24, 72

WS4.1 Are the following ratios equivalent?

- (a) $3 : 5$ and $15 : 25$



- (b) 1 : 4 and 2 : 3
- (c) 8 : 3 and 24 : 30
- (d) 2.5 : 3.5 and 0.5 : 0.7

Make a Proportion

In each set you will be given four numbers. Use the numbers to create an equivalent proportion.

Completed Example

$$\begin{array}{ll} 3, 2, 9, 6 = & 2:6 = 3:9 \\ \text{Given} & \text{Proportion} \end{array}$$

Given	Proportion
9, 5, 27, 15	
16, 4, 8, 2	
7, 10, 60, 42	

Fig WS7 Table ratio and proportion

Quiz:

- Q. (1) the height of Ajay is 170 Cm & the height of Reema is 160 Cm find the ratio of height of Ajay & Reema?
- (A) 17:16
 - (b) 15:16
 - (c) 11:17
 - (d) 16:11

Q. (2) reduce the ratio 12:32 in simplest form?

- (A) $\frac{5}{8}$
- (b) $\frac{6}{8}$
- (c) $\frac{3}{8}$
- (d) $\frac{1}{8}$

Q. (3) two numbers are in the ratio 3:5 & their sum is 96 find the largest number?



- (A)50
- (b) 40
- (c) 60
- (d) 80

Q. (4) the length of rectangular plot is 16m & its breadth is 8.5m find the ratio of length to breadth?

- (A)32: 17
- (b) 17: 32
- (c) 1: 18
- (d) 32: 15

Q. (5) the ratio of number of boys & girls in a class is 5: 9 find the number of girls if the total number of student in the class is 56?

- (A)56
- (b) 36
- (c) 48
- (d) 18

Q. (6) the price of scooter & TV are in the ratio 7: 5 if the scooter costs Rs. 8000 more than TV set find the price of TV. Set?

- (A)20,000
- (b) 24,000
- (c) 28,000
- (d) 32,000

Q. (7) the ratio of income of A & B is 5:4 and the ratio of their expenditure is 3:2. If at the end of the year, each saves Rs. 1600 find he income of A?

- (A)3400
- (b) 3600
- (c) 4000
- (d) 4400

Q. (8) the ratio of number of boy and girls in a school is 7:8 if the percentage increase in the number of boy & girl is 20% and 10% what will be the new ratio?

- (A)8: 9
- (b) 17: 18
- (c) 21: 22
- (d) 25: 24

Q. (9) $x:95 = 51:85$ find the value of x?

- (A)76
- (b) 57



- (c) 114
- (d) 188

Q. (10) if a bus travel 129Km in 3 hours and a train travels 315 Km in 5 hours find the ratio of the speed of bus & train?

- (A)3:5
- (b) 12:31
- (c) 43:63
- (d) 43:76

Q. (11) the ratio of length to breadth of school ground is 2:1 if the length of the ground is 70m find the breadth of the ground?

- (A)35m
- (b) 50m
- (c) 70m
- (d) 110m

Q. (12) in a school 500 students out of these 300 are boys and rest are girl find the ratio of girl & boy?

- (A)5:2
- (b) 2 : 3
- (c) 3:2
- (d) 5 : 6

Answers

1. A
2. C
3. C
4. A
5. B
6. C
7. C
8. C
9. B
10. C
11. A
12. B



QUIZ: Ratio & Proportion

Q. (1) the height of Ajay is 170 Cm & the height of Reema is 160 Cm find the ratio of height of Ajay & Reema?

- (A) 17: 16
- (b) 15: 16
- (c) 11: 17
- (d) 16: 11

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- (A) $\frac{5}{8}$
- (b) $\frac{6}{8}$
- (c) $\frac{3}{8}$
- (d) $\frac{1}{8}$

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- (A) 50
- (b) 40
- (c) 60
- (d) 80

Q. (4) the length of rectangular plot is 16m & its breadth is 8.5m find the ratio of length to breadth?

- (A) 32: 17
- (b) 17: 32
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- (c) 48
- (d) 18

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Q. (7) the ratio of income of A & B is 5:4 and the ratio of their expenditure is 3:2. If at the end of the year, each saves Rs. 1600 find he income of A?

- (A) 3400
- (b) 3600
- (c) 4000
- (d) 4400

Q. (8) the ratio of number of boy and girls in a school is 7:8 if the percentage increase in the number of boy & girl is 20% and 10% what will be the new ratio?

- (A) 8: 9
- (b) 17: 18
- (c) 21: 22
- (d) 25: 24

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- (A) 76
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Q. (10) if a bus travel 129Km in 3 hours and a train travels 315 Km in 5 hours find the ratio of the speed of bus & train?

- (A)3: 5
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- (c) 43: 63
- (d) 43: 76

Q. (11) the ratio of length to breadth of school ground is 2:1 if the length of the ground is 70m find the breadth of the ground?

- (A)35m
- (b) 50m
- (c) 70m
- (d) 110m

Q. (12) in a school 500 students out of these 300 are boys and rest are girl find the ratio of girl & boy?

- (A)5: 2
- (b) 2 : 3
- (c) 3: 2
- (d) 5 : 6

Answers

1. A
2. C
3. C
4. A



- 5. B
- 6. C
- 7. C
- 8. C
- 9. B
- 10.C
- 11.A
- 12.B

- Q.1 If there are 30 girl students and 20 boys students in a school bus, what is ratio of boys to girls?
- Q.2 If 2kg water is mixed with 6 kg milk , what is ratio of milk to water?
- Q.3 Tea comprises of what elements?
- Q.4 what is the ratio of these element in tea?
- Q.5 If there are 40 bananas to be distributed equally in 10 children, how much each will get?
- Q.6 If these 40 bananas to be distributed in 3:1 ratio in girls : boys in a class room having five girls and five boys. How much each will get?
- Q.7 Mixing of two colors to convert into third color? RBG into white ,black yellow etc
- Q.8

Projects:

- 1.Student can make chapatti with a mix of atta (flour) and water in circular and rectangular shape.
- 2.Students can add salt in one glass of water and record saltyness taste as observation.



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3. Record total number of boys and girls in one class room for of one week.

4. first add one spoon salt , then two spoon and three spoon into one glass of drinking water and record taste. Make a note and observe the recording.

5. Other examples are kichdi is ratio of dal and rice,

6. sabji is ratio and proportion of masala , salt chilly etc ,

7. tea and coffee in ratio of sugar, milk and water

8. breathing air is mixture of oxygen , nitrogen and others

9. fruits and vegetables from gardens and placing them in a common basket. Separate them , count and place each type in a table. Total quantity and each quantity can be classified into different formats viz percentage, ratio and proportion , mixture,plot graphs etc.



Fig3 Plucking guava fruits from tree.



Fig 4 Mangoes on a tree ready for plucking



Fig 5 lady finger growing on a plant



Fig6 Brinjals ready for plucking in garden



Fig 7 lady plucking fruits from tree



Fig 8 Capsicum ready for plucking



Fig9 lady plucking apples from a tree

Video game : Take one big basket and place these fruits and vegetables of fixed quantity into this basket.

These mixed fruits and vegetables need to be counted and arranged in tabular format. Express each type in percentage and verify this result by selecting right currency denomination.

This answer will say correct if denomination chosen are correct one.

Take number of fruits and vegetables of two different types, and compute ratio. Verify same with currency denominations

Now take one clock and record time for counting these fruits and vegetables if only one person is doing the task.

Record time for this same task if two , three, four persons are doing the task.



Chapter - 7 Work and Time

Introduction: In this chapter work and time concepts has been discussed using daily life example with the help of visual concepts. Video game based study has been developed along with evaluation and feed back mechanism. Based on work time an interactive video game has been developed. Students can select man power , time and amount of work using controls. Multiple scenarios have been used to modify these problems. Solution of each problem is seen like a movie.

The school play ground using greenery maintenance work has been taken as work executed. Time required to execute this work has been shown by clock. The number of persons required to complete this work has been shown in each slots. For completing same work in less time more persons can work in one slot. Also young person can execute same task faster as compared to old person or lady or child. One day work is required in each case . Using video based labs on simple questions can be used as concept or foundation questions. Later complex or critical questions can be solved using same concepts. These above mentioned things have been shown in fig.1.

The work and time concepts has been presented using real life examples. School play ground's greenery maintenance has been depicted as work. Clock shown in figure1 has been used for recording time taken to complete this work. Here four persons of differential capability has been taken in the example . The field is divided into four slots. Each person takes different time to cut grass of his slot.

School play ground with grass is shown in the below picture. There are four workers trimming the grass with grass cutter machines . In the picture , one man , one woman, one young boy and an old man are working in this field. Work performance is defined by amount of area of grass cutting.

Time taken by each person may be more or less.

In this picture, young man is more efficient, as grass trimmed area in one hour is more as compared to others. Similarly other three workers can be differentiated.

LABS : By video game method following is shown:

1. Work done by each person is displayed
2. Work done by two persons of same capability is displayed
3. Work done by two persons of different capability is displayed
4. Then smart controls have been provided for varying time/ manpower /work .
5. Intelligent formula of work ,time and manpower have been integrated .
6. Work done by two similar persons and two different persons doing work has been shown.
7. Part Work done by one or two or more persons , then left and remaining work completed by other person or persons.
8. Work extension or reduction



9. Man power increase or decrease
10. Work time increase or decrease
11. Start of work and stop of work
12. While doing mathematics students feel as if they are playing a video game. In fact they are solving work time mathematics problems.

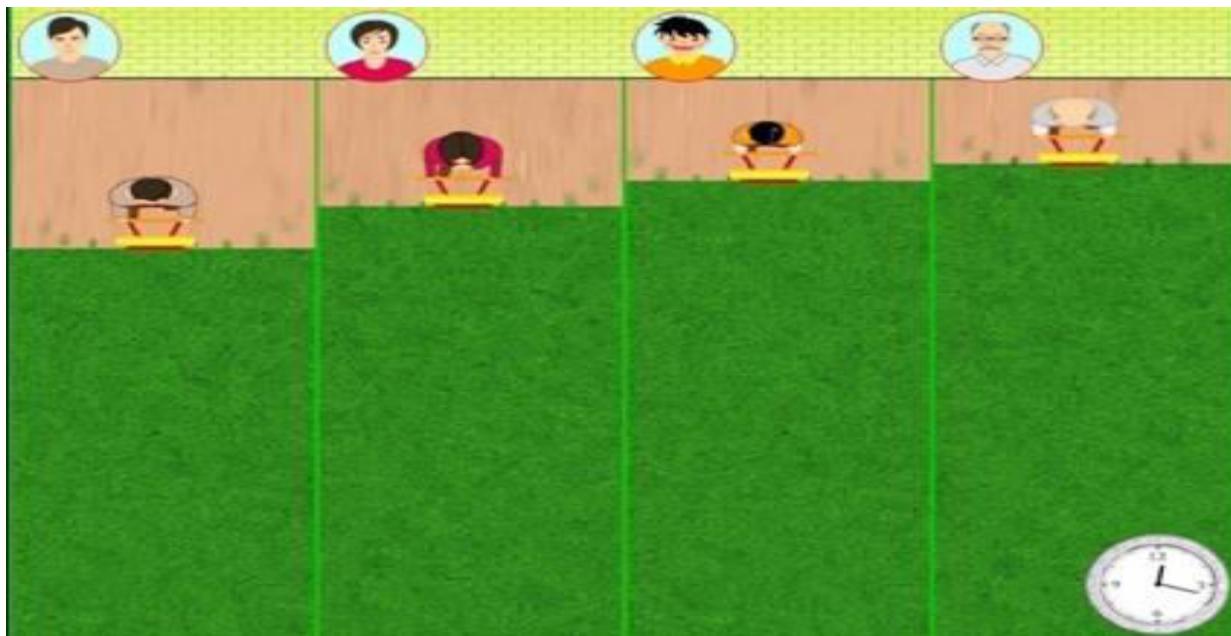


Fig. 1 Grass trimming work done cricket ground by four persons

Basic information:

- The work and time concepts have been presented using real life examples.
- School play ground's greenery maintenance has been depicted as work.
- There are four persons of differential capability have been taken in the example.
- The field is divided into four slots.
- In the picture, one man, one young boy, one woman and an old man are working in each area of slots.
- Each person takes different time to cut grass of his slot as shown with person.
- One can drag any person to any field slot to assign work.
- Drag multiple persons to any field slot to assign group work.
- Start work for grass cutting.
- After finishing work you can observe time taken to complete one unit of work is displayed
- Tabulate work, time and manpower in tabular format for further analysis.
- Fig 1-10 have been shown to clear work time concepts.

Work and Time

Instruction:

- The work and time concepts has been presented using real life examples.
- School play ground's greenery maintenance has been depicted as work.
- There four persons of differential capability has been taken in the example.
- The field is divided into four slots.
- In the picture , one man, one young boy,one woman and an old man are working in this slots.
- Each person takes different time to cut grass of his slot as shown with person.
- Drag any person to any field slot to assign work.
- Drag multiple persons to any field slot to assign group work.
- Click on Start to start grass cutting.
- After finishing work you can observe time taken to complete one unit of work

Start Timer : 0:0:0

Fig. 2 Grass trimming work done cricket ground by four persons with intelligent control

Fig. 3 Grass trimming work done by one person in just 4 seconds

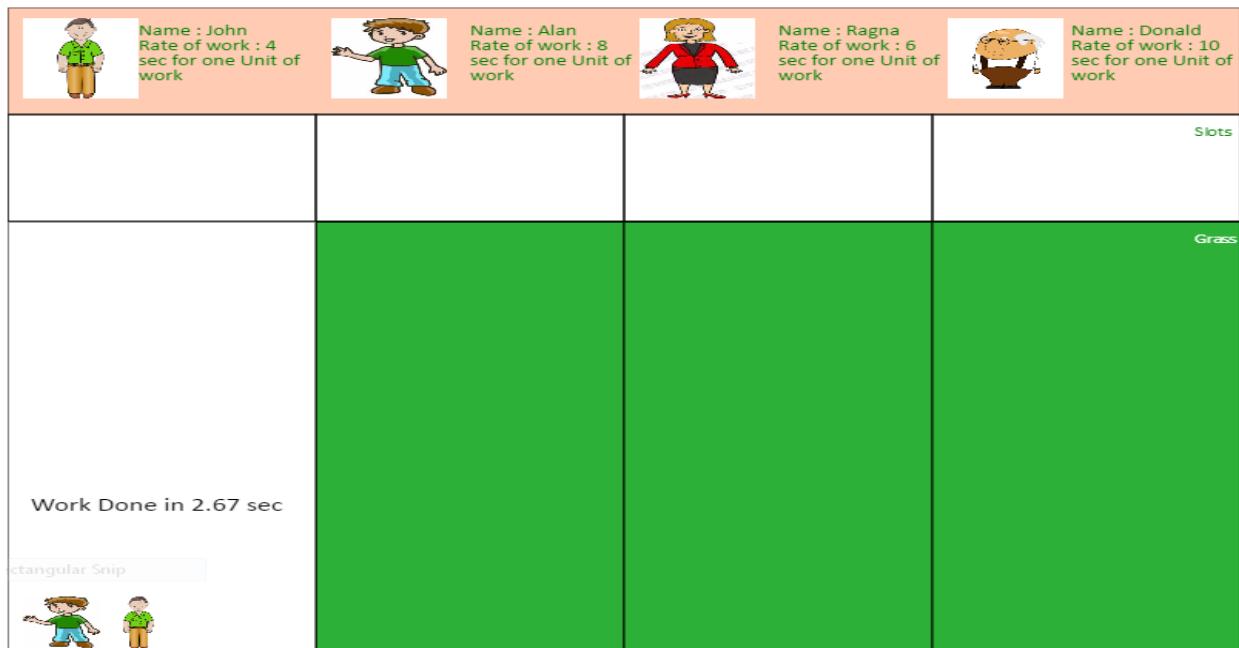


Fig. 4 Grass trimming work done by two persons in just 2.67 seconds

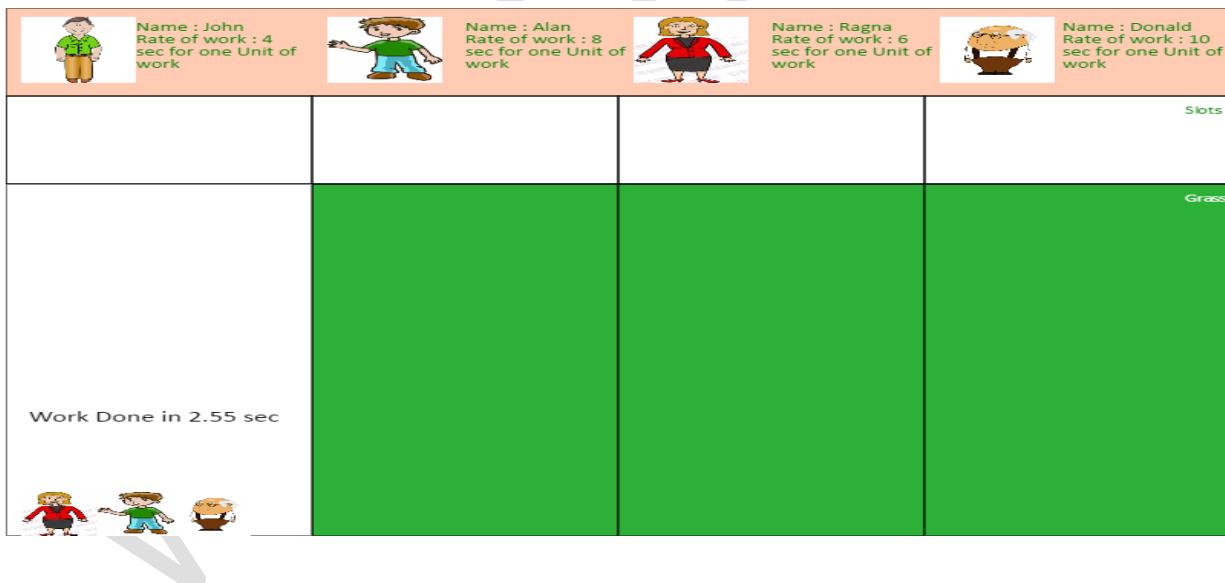


Fig. 5 Grass trimming work done by three persons in just 2.55 seconds



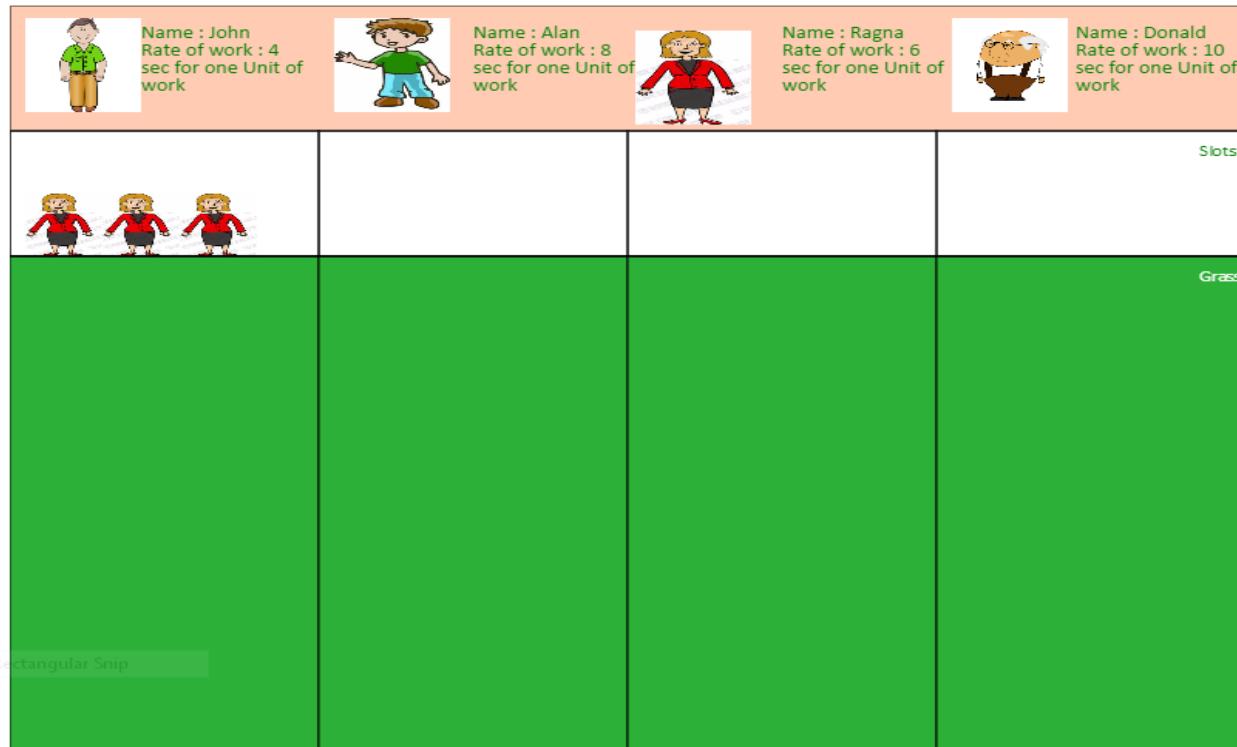


Fig. 6 Grass trimming work taken up by three similar persons

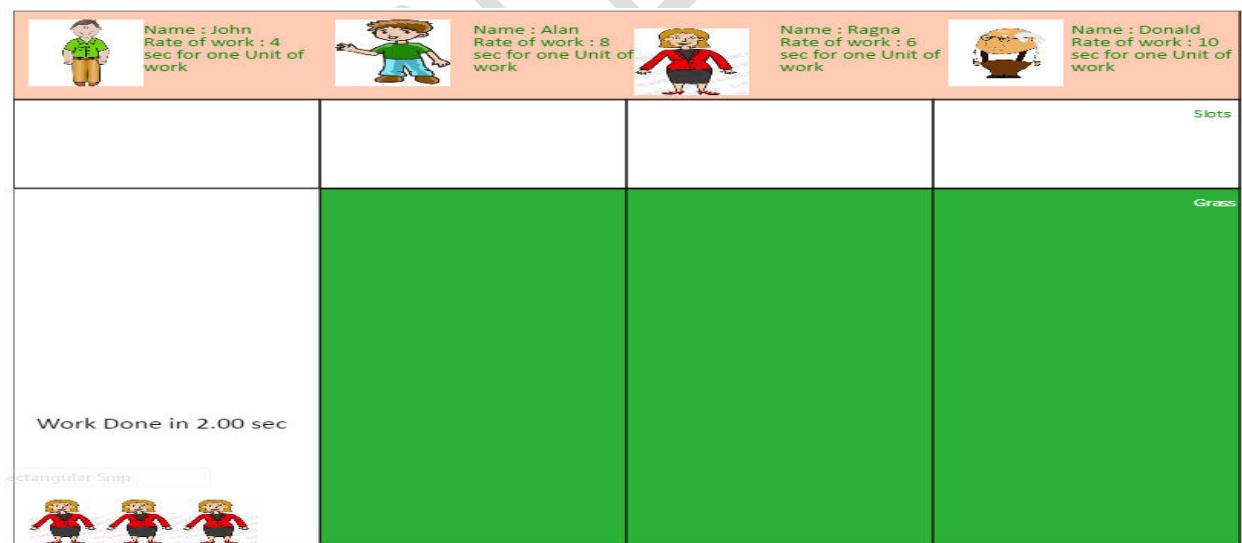


Fig. 7 Grass trimming work completed by three similar persons in just 2 seconds

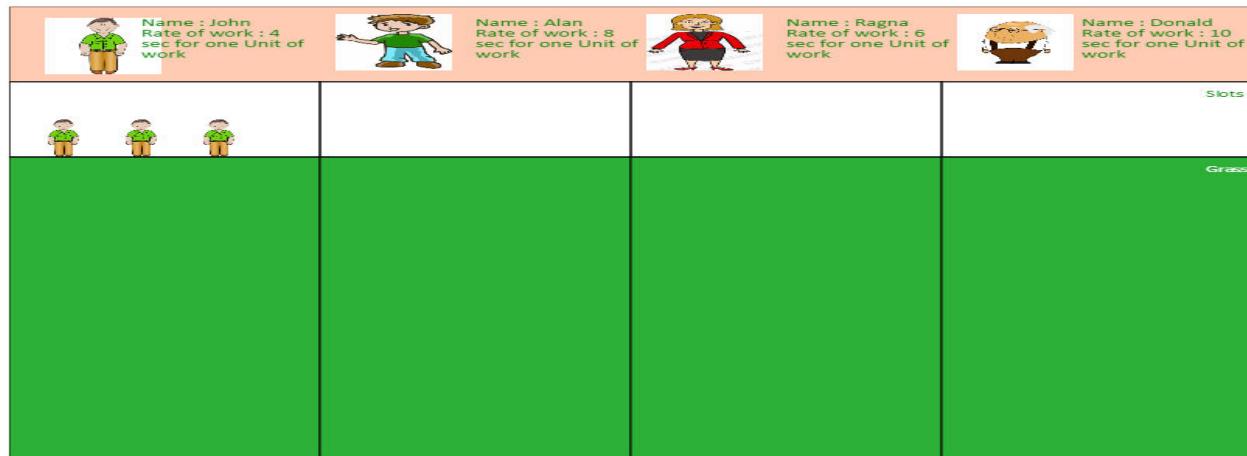


Fig. 8 Grass trimming work started by three similar persons

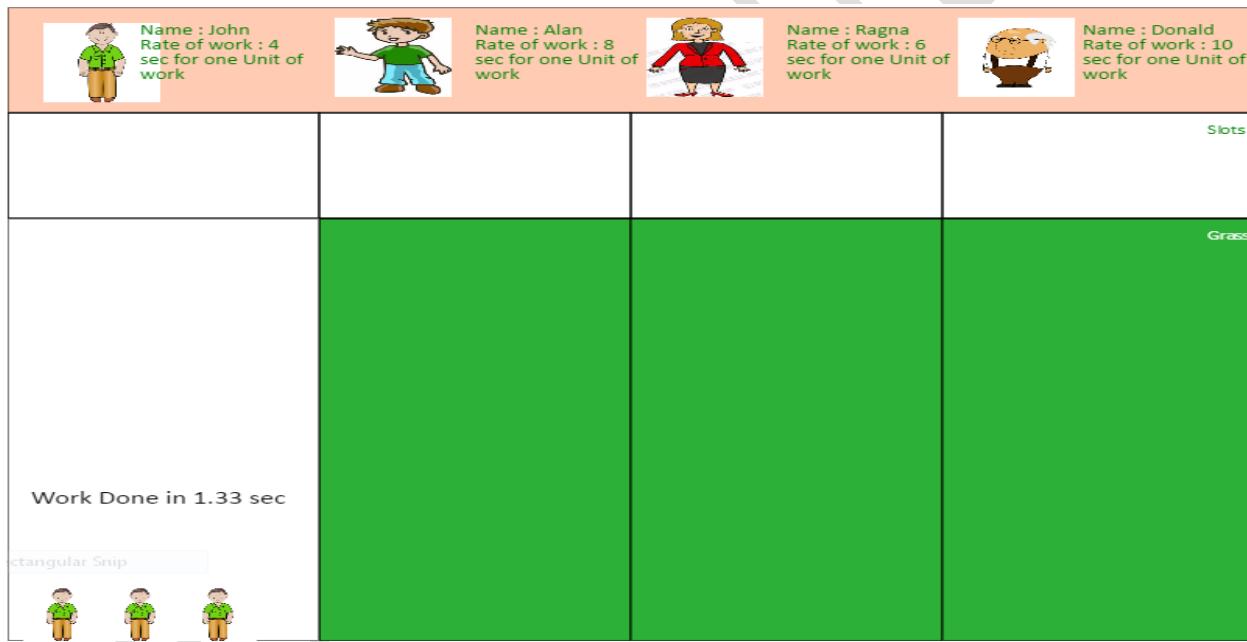
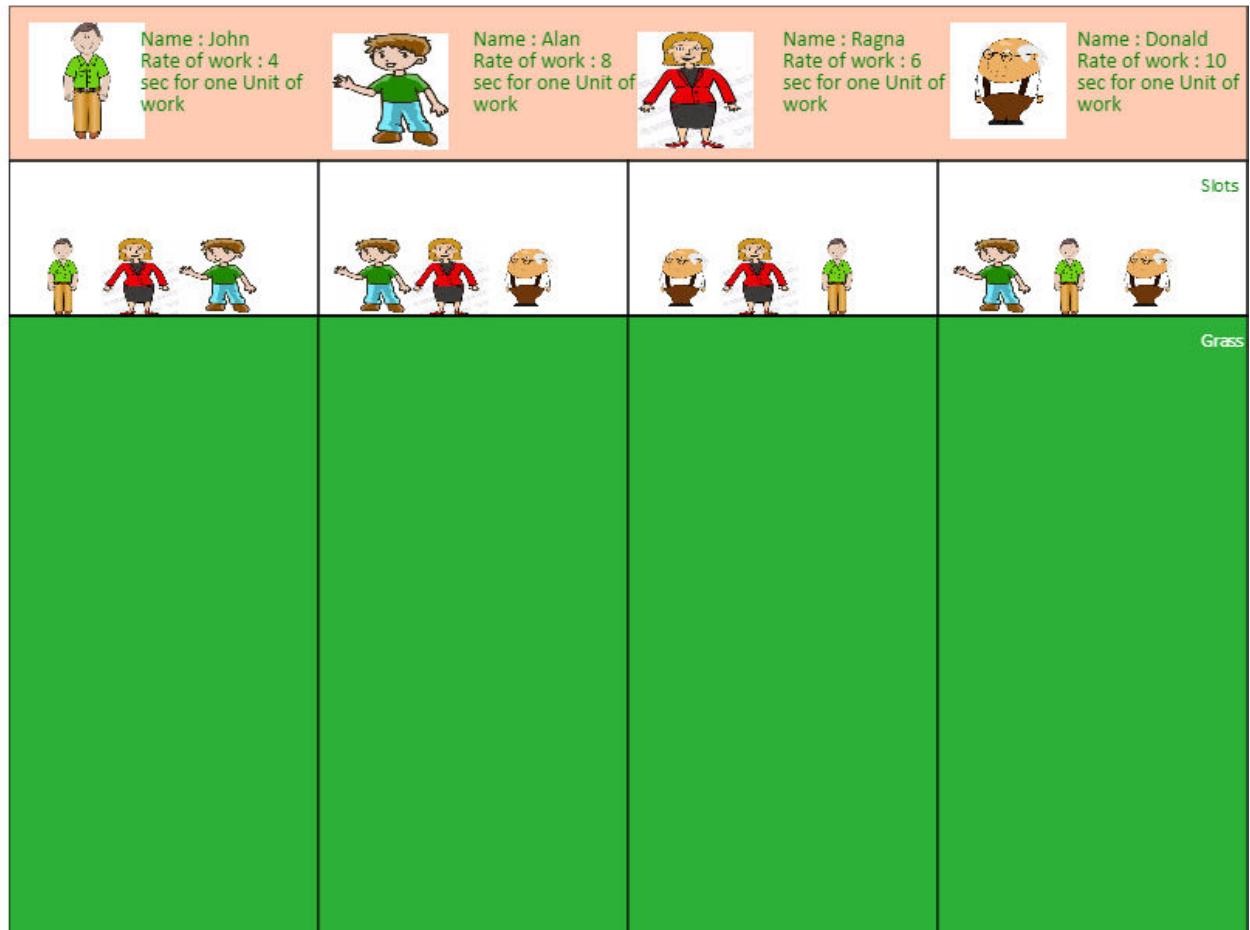


Fig. 9 Grass trimming work completed by three similar persons in just 1.33 seconds



	Name : John Rate of work : 4 sec for one Unit of work		Name : Alan Rate of work : 8 sec for one Unit of work		Name : Ragna Rate of work : 6 sec for one Unit of work		Name : Donald Rate of work : 10 sec for one Unit of work
							Slots
Work Done in 4.44 sec	Work Done in 2.40 sec	Work Done in 2.67 sec	Work Done in 3.75 sec	 	 	 	 

Fig 9 work done by two persons in each slot



VISCON



Rajveer S Yaduvanshi

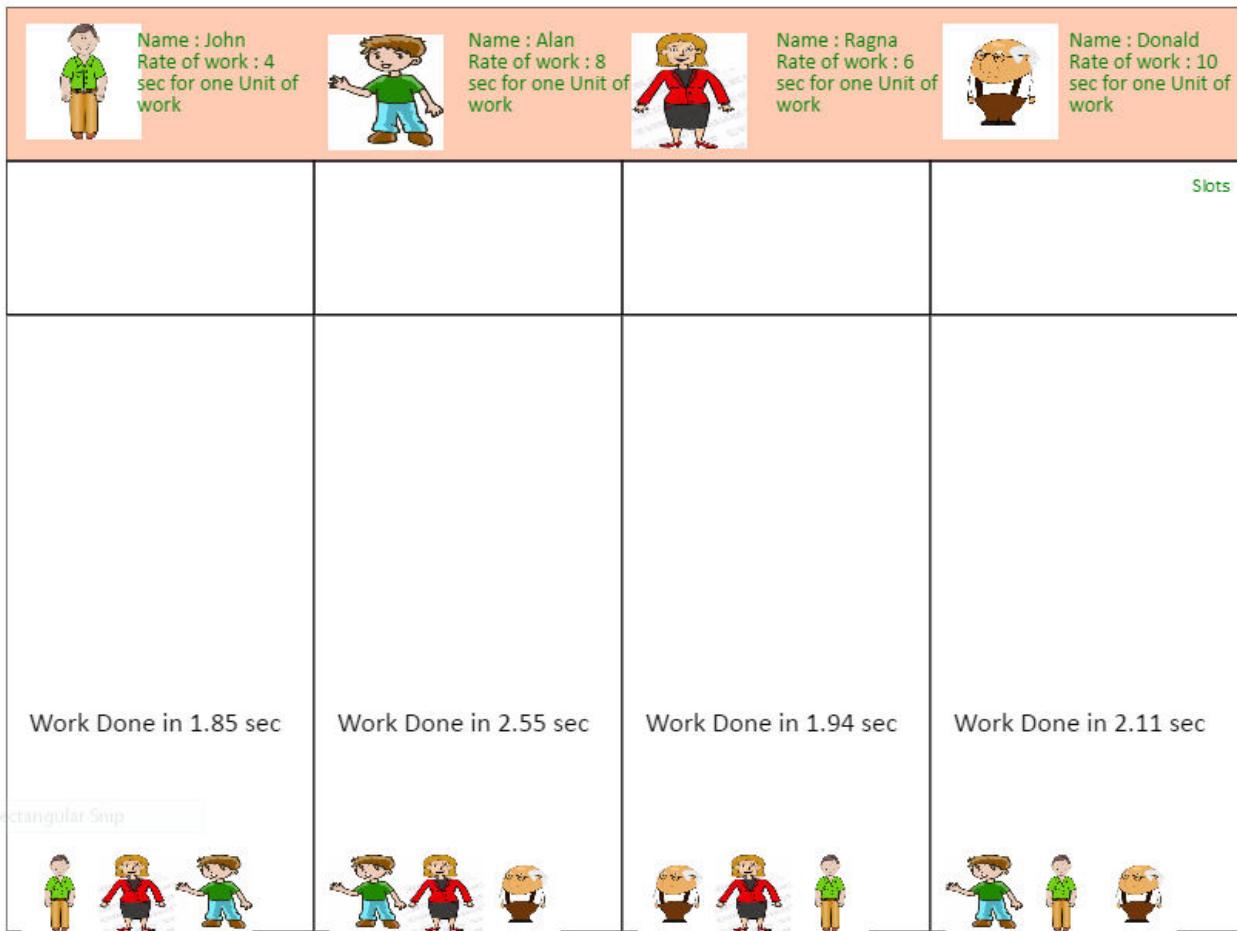


Fig 10 work completed by three persons in each slot

Activity name: Work Time

Instruction:

- Maintenance of greenery in a School play ground has been depicted as work.
- The field is divided into four slots. You can set the work for any of the slots.
- There are four persons of different capabilities shown. Each person takes different time to cut grass of his slot as shown with person. **You can change work rate of a person by clicking on person.** Provision to edit their profiles will be provided in a later version.
- You can change total amount of work by providing value in the text box below.**
- Drag any person to any field slot to assign work. You can drag multiple persons also to a field.
- Click on **Start** to start grass cutting. To redo the experiment, click on "restart".
- After finishing work you can observe time taken to complete given unit of work. The work done by individuals in a slot are given in different colors.

Please enter Work Unit.

Timer : 0:0:0

Name : John Rate of work : 4 sec for one unit of work	Name : Alan Rate of work : 8 sec for one unit of work	Name : Ragna Rate of work : 6 sec for one unit of work	Name : Donald Rate of work : 10 sec for one unit of work

Fig 11 modified video with enhanced features

Activity name: Work Time

Instruction:

- Maintenance of greenery in a School play ground has been depicted as work.
- The field is divided into four slots. You can set the work for any of the slots.
- There are four persons of different capabilities shown. Each person takes different time to cut grass of his slot as shown with person. **You can change work rate of a person by clicking on person.** Provision to edit their profiles will be provided in a later version.
- You can change total amount of work by providing value in the text box below.**
- Drag any person to any field slot to assign work. You can drag multiple persons also to a field.
- Click on **Start** to start grass cutting. To redo the experiment, click on "restart".
- After finishing work you can observe time taken to complete given unit of work. The work done by individuals in a slot are given in different colors.

Please enter Work Unit.

Start Timer : 0:0:0

Slots	Slots	Slots	Slots
John	Alan	Ragna	Donald
Name : John Rate of work : 4 sec for one unit of work	Name : Alan Rate of work : 8 sec for one unit of work	Name : Ragna Rate of work : 6 sec for one unit of work	Name : Donald Rate of work : 10 sec for one unit of work
			

Fig 12 work unit doubled from single

Activity name: Work Time

Instruction:

- Maintenance of greenery in a School play ground has been depicted as work.
- The field is divided into four slots. You can set the work for any of the slots.
- There are four persons of different capabilities shown. Each person takes different time to cut grass of his slot as shown with person. **You can change work rate of a person by clicking on person.** Provision to edit their profiles will be provided in a later version.
- You can change total amount of work by providing value in the text box below.**
- Drag any person to any field slot to assign work. You can drag multiple persons also to a field.
- Click on **Start** to start grass cutting. To redo the experiment, click on "restart".
- After finishing work you can observe time taken to complete given unit of work. The work done by individuals in a slot are given in different colors.

Please enter Work Unit.

Restart Timer : 0:4:5

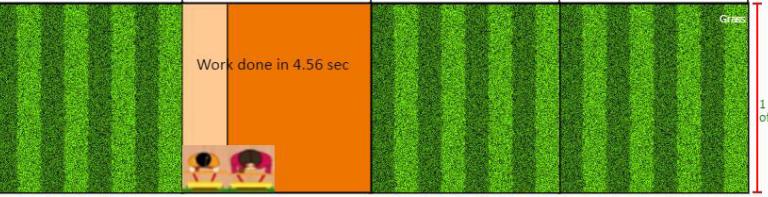
Slots	Slots	Slots	Slots
John	Alan	Ragna	Donald
Name : John Rate of work : 4 sec for one unit of work	Name : Alan Rate of work : 19 sec for one unit of work	Name : Ragna Rate of work : 6 sec for one unit of work	Name : Donald Rate of work : 10 sec for one unit of work
			

Fig 13 work units changed to 19 from 8 of boy

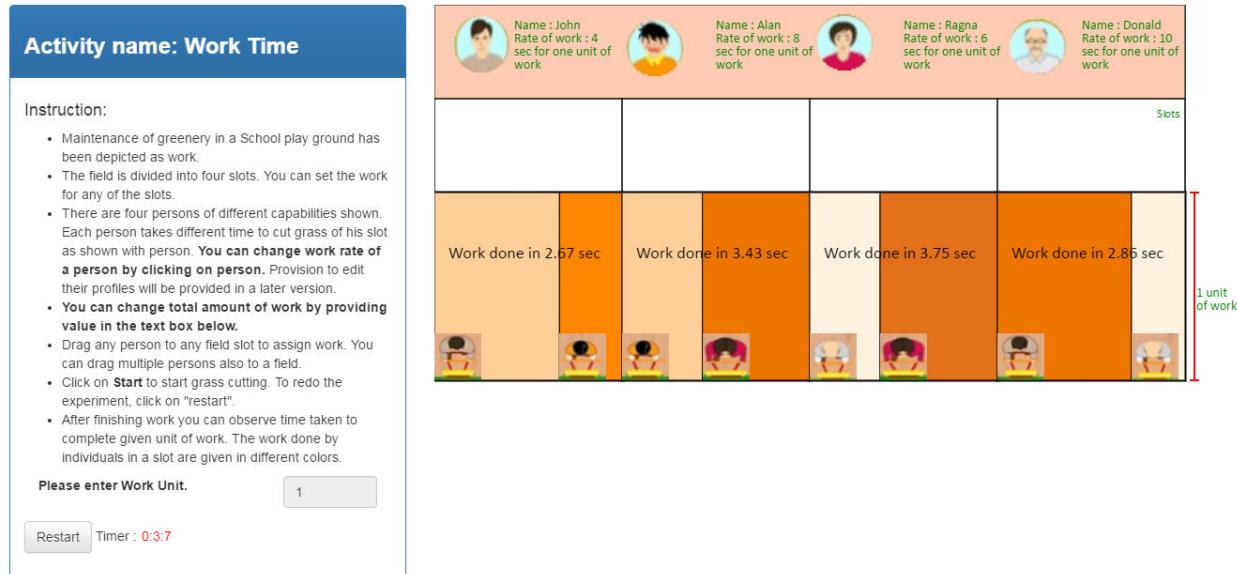


Fig 14 work completed by group of different people

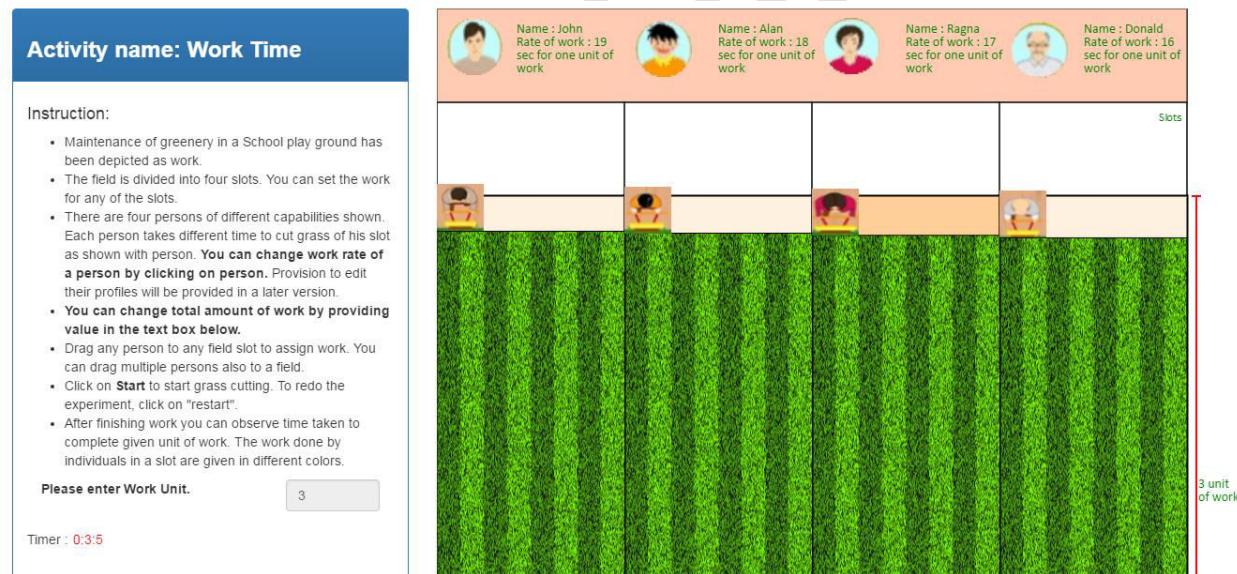


Fig 15 part work done by individuals

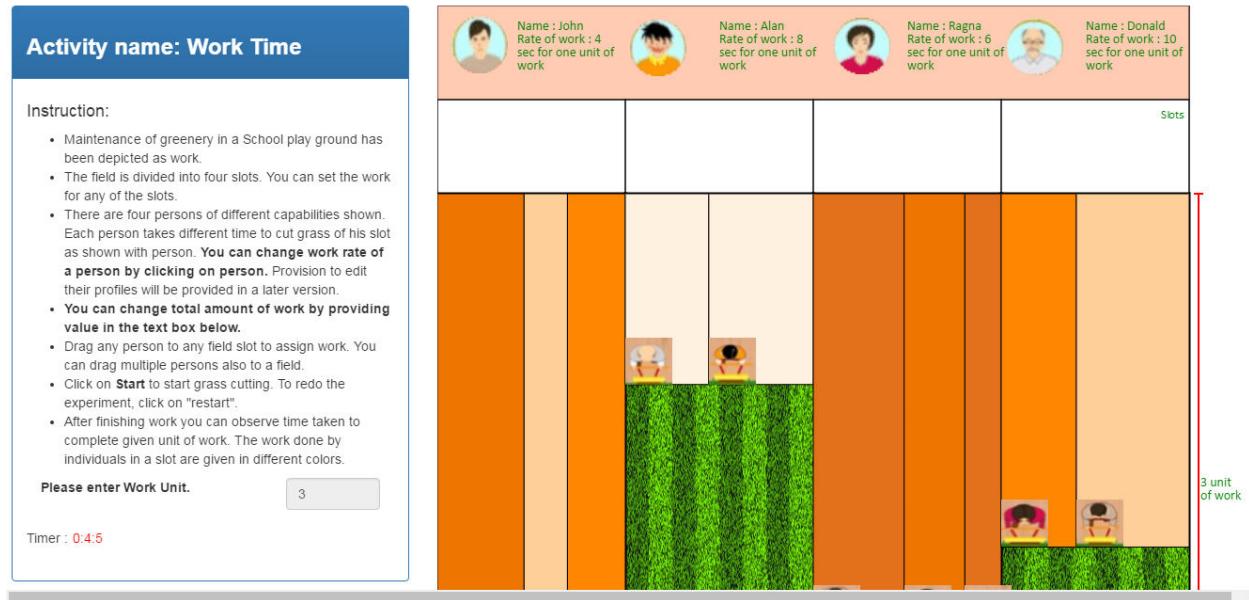


Fig 16 differential work status

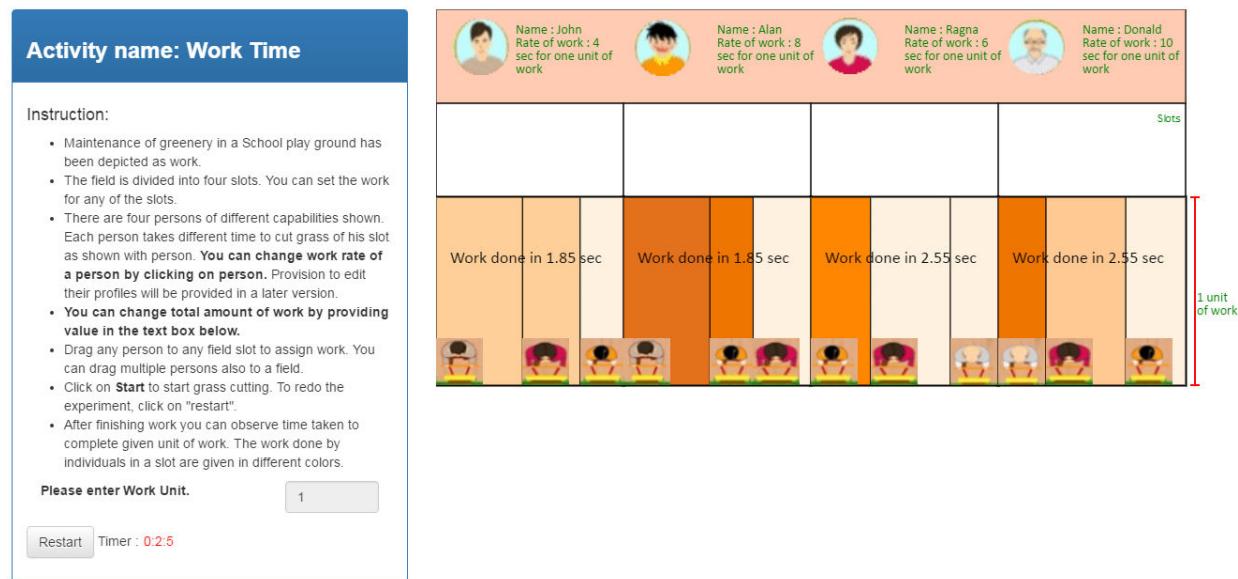


Fig 16 differential work completed

Basics of work time:

In solving problem on work and time , following points based on above diagram should be remembered:-

(a) If a man finishes total work in x days, then 1 day he does $\frac{1}{x}$ of the total work

For example:- If a man finishes some work in 4 days, then 1 day he does $\frac{1}{4}$ of the work.

(b) Conversely, if the work in 1 day that a man does is given, then the total number of days, taken to finish the work = $\frac{1}{\text{One day's work}}$

For example:- If a man does $\frac{1}{20}$ of the work in 1 day, then the total number of days required to finish the

Work = $\frac{1}{\frac{1}{20}} = 20$ i.e. 10 days.

If A can do a piece of work in n days, then A's 1 day's work = $\frac{1}{n}$.

If A's 1 day's work $\frac{1}{n}$ then A can finish the work in n days.

if A is twice as good as B, then

Ratio of work done by A & B = 2:1

Ratio of time taken by A & B to finish work = 1:2

Unitary method of work time:

To calculate work done in a given time in general if a person A completes a piece of work in a 'n' days, then A's one day work =

If a man takes 10 days to complete a piece of work, then according to the unitary method work done in one day =

Adam can finish the work in 15 days.

Therefore, Adam's 1 day's work = $1/15$

Brandon can finish the work in 10 days.

Therefore, Brandon's 1 day's work = $1/10$

So, (Adam + Brandon)'s 1 day's work =

Work time problems on Pipes and Cisterns



Rajveer S Yaduvanshi

A pipe is connected with a tank or Cistern that fills it, is known as an inlet. A pipe is connected with a tank or cistern, emptying it, is known as outlet. A Cistern or a water tank is connected with two types of pipes. One which fills it up called an inlet and the other which empties it out called an outlet.

(a) if pipe fills a water tank in 5 hour, then in one hour it fills $\frac{1}{5}$ Th part of it. In short we can say that the work done by the pipe in 1 hour is $\frac{1}{5}$.

(b) if an outlet empties a tank in 5 hour, then in 1 hour it empties $\frac{1}{5}$ Th part of the tank we can say that the work done by the outlet in 1 hour is $(-\frac{1}{5})$.

The Work done by inlet is always positive where the work done by the outlet is always negative.

SOLVED QUESTIONS- School Journey based

Q (1) Amit alone plough a field in 4 hour. & Sumit alone takes 6 hour to plough the same field. How long will they take if both Amit & Sumit work together?

Ans Time taken by Amit to do the work= 4 hour

$$\text{work done by Amit in 1 hour} = \frac{1}{4}$$

Time taken by Sumit to do the work = 6 hour

$$\text{Work done by Sumit in 1 hour} = \frac{1}{6}$$

$$\text{work done by both Amit \& Sumit in 1 hour} = \frac{1}{4} + \frac{1}{6} = \frac{3+2}{12} = \frac{5}{12}$$

Hence Amit& Sumit plough the field in $\frac{12}{5}$ hour i.e. $2\frac{2}{5}$ hour.

Q (2) Together Ram & Shyam plough a field in 4 Ram alone take 12 days to plough the same field. In how many days can Shyam alone plough the field?

Ans Time taken by Ram & Shyam to plough the field together = 4 day

$$\text{Ram \& Shayam's 1 day's work} = \frac{1}{4}$$

Time taken by ram to plough the field = 12 days

$$\text{Ram's 1 day's work} = \frac{1}{12}$$

Shyam's 1 day's work = (Ram & Shaym's)

1 day's work) - (Ram 1 day's work)

$$= \frac{1}{4} - \frac{1}{12}$$

$$= \frac{3-1}{12} = \frac{2}{12} = \frac{1}{6}$$

Shyam can plough the field in 6 days.



Rajveer S Yaduvanshi

Q(3) Raju & Chotu clean the floor of the school building in 8 days. Alone Raju can do the Job in 40 days. In how many days Chotu alone clean the floor of the school building?

Ans Raju & Chotu clean the floor of the school building in 8 days

$$\text{Raju \& Chotu's 1 day's work} = \frac{1}{8}$$

Alone Raju can clean the floor in 40 days

$$\text{Raju's 1 day's work} = \frac{1}{40}$$

$$\text{Chotu's 1 day's work} = (\text{Raju \& Chotu's 1 day's work}) - (\text{Raju's 1 day's work})$$

$$\begin{aligned} &= \frac{1}{8} - \frac{1}{40} \\ &= \frac{5-1}{40} = \frac{4}{40} \\ &= \frac{1}{10} \end{aligned}$$

Chotu alone clean the floor of the school building in 10 days.

Q(4) In a school three typist A, B & C together type in 8 hour B & C together can type the work in 12 hour. In how many hours a alone can type the same work?

Ans A,B,& C together type in 8 hours A, B,& C's, 1hour work $\frac{1}{8}$

B & C together can type in 12 hours B & C's 1 hour work $= \frac{1}{12}$

A's 1 hour work = (A+B+C)'s 1 hour

Work – (B+C) 's 1 hour work

$$\begin{aligned} \text{A's 1 hour work} &= \frac{1}{8} - \frac{1}{12} \\ &= \frac{3-2}{24} \\ &= \frac{1}{24} \end{aligned}$$

A can type the same work in 24 hours.

Q(5) Anuj painst the school building in 20 minute & his sister Janki can do so in 25 minute. They paint the building together for 5 minute. At this Juncture they have a quarrel & Janki leaves it. In how minute will Anuj finish the remaining painting work?

Ans Anuj can paint the school building in 20 min

$$\therefore \text{Painted by Anuj in 1 minute} = \frac{1}{20}$$

Janki can paint the school building 25 minutes

$$\therefore \text{Portion of the school building painted by Janki in 1 minute} = \frac{1}{25}$$

Portion of the school building painted by Anju & Janki together in 1 minute

$$\begin{aligned} &= \frac{1}{20} + \frac{1}{25} \\ &= \frac{5+4}{100} \\ &= \frac{9}{100} \end{aligned}$$



Portion of the school building painted by Anuj & Janki together in 5 min = $\frac{9}{5} \times 5 = \frac{9}{20}$

$$\therefore \text{Portion remaining unpainted} = 1 - \frac{9}{20} = \frac{11}{20}$$

Anuj can paint the whole building in 20 minute

$$\text{Anuj can paint the remaining portion in } \frac{11}{20} \times 20 = 11 \text{ min.}$$

Q (6) Ramesh & Suresh can cut the grass of the school field in 10 hours Suresh & Chotu can cut it in 15 hours and Ramesh & Chotu can cut it in 12 hours how long will they take to do it together?

Ans (Ramesh+ Suresh)'s 1 hour's work = $\frac{1}{10}$ (1)

(Suresh + Chotu)'s 1 hour's work (2)

(Ramesh + Chotu)'s work = $\frac{1}{12}$ (3)

Adding eq. (1) & (2) & (3) we get 2(Ramesh + Suresh + Chotu)'s 1 day's

$$\text{work} = \frac{1}{10} + \frac{1}{15} + \frac{1}{12}$$

$$2(\text{Ramesh} + \text{Suresh} + \text{Chotu})'s 1 \text{ day's work} = \frac{6+4+5}{60} = \frac{15}{60}$$

$$\therefore (\text{Ramesh} + \text{Suresh} + \text{Chotu})'s 1 \text{ day's work} = \frac{1}{2} \times \frac{15}{60} = \frac{1}{8}$$

\therefore Together Ramesh, Suresh & Chotu can cut the grass in 8 day's

Q (7) Meena, Kiran & Shweta can together weave a carpet in 4 days. Kiran by herself can weave the same sized carpet in 12 days & Shweta can do it in 10 days. How long will Meena take to do the work by herself?

Ans Time taken by Meena, Kiran & Shweta to weave the carpet = 4 days

$$(\text{Meena} + \text{Kiran} + \text{Shweta})'s 1 \text{ day's work} = \frac{1}{4}$$

Time taken by Kiran to weave the carpet = 12 days

$$\text{Kiran's 1 day's work} = \frac{1}{12}$$

Time taken by Shweta to weave the carpet = 10 days

$$\text{Shweta's 1 day's work} = \frac{1}{10}$$

Meena's 1 day's work =

(Meena + Kiran + Shweta)'s 1 day's work – Kiran's 1 day's work – Shweta's 1 day's work

$$= \frac{1}{4} - \frac{1}{12} - \frac{1}{10}$$

$$= \frac{15 - 5 - 6}{60}$$

$$= \frac{4}{60}$$

$$= \frac{1}{15}$$

Hence, Meena can weave the carpet in 15 days.

Q (8) Ramu & Shamu can polish the floor of the school building in 30 days. Ramu alone can do $\frac{1}{3}$ of this job in 20 days. In how many days Shamu can polish the floor of the school building?



Ans Ram & Shamu can polish the floor of the building in 30 days

$$\therefore (\text{Ramu} + \text{Shamu})\text{'s 1 day's work} = \frac{1}{30}$$

Ramu alone can do $\frac{1}{3}$ of the work in 20 days

\therefore Ramu alone can do the complete work in $3 \times 20 = 60$ days

$$\text{Ramu's 1 day's work} = \frac{1}{60}$$

$$\text{Shamu's 1 day's work} = (\text{Ramu} + \text{Shamu})\text{'s 1 day's work} - \text{Ramu 1 day's work} = \frac{1}{30} - \frac{1}{60}$$

$$\frac{2-1}{60} = \frac{1}{60}$$

Shamu alone can also do the same work in 60 days.

Q (9) A water tank of school can be filled by one tap in 4 hours and another tap in 6 hours how long will it take to fill the water tank if both tape opened together?

Ans One tap fills the water tank in 4 hours and the other tap fills the water tank in 6 hour

$$\therefore \text{Work done by tap 1 in 1 hour} = \frac{1}{4}$$

$$\text{Work done by other tap in 1 hour} = \frac{1}{6}$$

$$\text{Work done by both tap in 1 hour} = \frac{1}{4} + \frac{1}{6}$$

$$= \frac{3+2}{12} \\ = \frac{5}{12}$$

\therefore Both the tap opened together will fill the water tank of school in $\frac{12}{5}$ hours

Q (10) A water tank of school can be filled by a tap in 8 hour & emptied by an outlet pipe in 12 hours.

How long will it take to fill the water tank if both the tap & pipe are opened together ?

Ans the time taken by tap to fill the tank = 8 hours

time taken by pipe to empty the tank= 12 hours

$$\text{work done by the tap in 1 hour} = \frac{1}{8}$$

$$\text{work done by the pipe in 1 hour} = -\frac{1}{12}$$

when opened together, the work done by the tap & the pipe

$$= \frac{1}{8} + \left(-\frac{1}{12}\right)$$

$$= \frac{3-2}{24} = \frac{1}{24}$$

When both are opened together, the water tank of the school can be filled in 24 hours

Q (11) A pipe can fill the water tank of school in 6 hour. Due to leak in the bottom it is filled in 8 hours.

When the water tank is full, in how much time will it emptied by the leak?

Ans When there is no leakage the pipe can fill the water tank in 6 hours

the pipe fill $\frac{1}{6}$ th part of the water tank in 1 hour. When there is leakage the pipe can fill the water tank in 8 hours



Thus, in case of leakage, the pipe fills $\frac{1}{8}$ th part of the water tank in 1 hour

$$\text{i.e. in 1 hour due to leakage } \left(\frac{1}{6} - \frac{1}{8}\right) \text{ th} = \frac{4-3}{24}$$

$= \frac{1}{24}$ th part of the water tank is emptied out. Hence the water tank of school will be emptied by the leakage in 24 hours.

Q(12) a water tank in colony has two inlet pipe A & B which can fill it in 15 hours and 20 hours respectively. An outlet pipe can empty the full water tank in 12 hours. If all the three pipes are opened together in the empty water, tank, how much time will they take to fill the water tank completely?

Ans Time taken by inlet pipe & to fill the tank = 15 hours

time taken by inlet pipe B to fill the tank= 20 hours

Time taken by outlet pipe c to empty the tank = 12 hours

\therefore inlet pip A fills $\frac{1}{15}$ th part of the water tank in 1 hour

\therefore Inlet pipe B fills $\frac{1}{20}$ th part of the water tank in 1 hour

\therefore outlet pipe empties $\frac{1}{12}$ th part of the water tank in 1 hour

thus, in 1 hour $(\frac{1}{15} + \frac{1}{20} - \frac{1}{12})$ th part of the tank filled.

Part of the tank filled in 1 hour

$$\begin{aligned}&= \frac{1}{15} + \frac{1}{20} - \frac{1}{12} \\&= \frac{4+3-5}{60} \\&= \frac{2}{60} \\&= \frac{1}{30}\end{aligned}$$

\therefore If all three pipes are opened together then the water tank of the colony will be filled in 30 hours.

Simpler solved questions:

Q(13)Raju can reap a field in 9 days, which Ram alone can reap in 6 days. In how many days, both together , Can reap this field ?

Ans Raju's 1 day's work = $\frac{1}{9}$

Ram's 1 day's work = $\frac{1}{6}$

(Raju + Ram)'s 1 day's work = $\frac{1}{9} + \frac{1}{6}$

$$\begin{aligned}&= \frac{2+3}{18} \\&= \frac{5}{18}\end{aligned}$$

\therefore Both together can reap the field in $\frac{18}{5}$ day i.e. $3\frac{3}{5}$ days.



Q(14) Ajay & Vijay together can complete a piece of work in 4 days. If Ajay alone can complete the same work in 12 days. In how many days can Vijay alone complete that work?

Ans (Ajay + Vijay)'s 1 day's work = $\frac{1}{4}$

Ajay's 1 day's work = $\frac{1}{12}$

Vijay's 1 day's work = (Ajay + Vijay)'s 1 day work - Ajay's 1 day work

$$\Rightarrow \text{Vijay's 1 day's work} = \frac{1}{4} - \frac{1}{12}$$

$$= \frac{3-1}{12}$$

$$= \frac{2}{12} = \frac{1}{6}$$

Vijay alone can complete the work in days.

Q(15) Mohan can do a piece of work in 33 days what work he will do in 1 day?

Ans We know that, if a person can do a piece of work in n days.

Then, person 1 day's work = $\frac{1}{n}$

Mohan can do a piece of work in 33 days

Mohan 1 day's work = $\frac{1}{33}$

$$\Rightarrow \text{Required work done} = \frac{1}{33} \text{ part}$$

Q(16) Sheela is twice as good a workman as Jyoti and together they finish a piece of work in 18 days. In how many days Sheela alone will finish the work

Ans Sheela does one work in x days

Then, Jyoti will do the same work in $2x$ days

$$\therefore \frac{1}{x} + \frac{1}{2x} = \frac{1}{18}$$

$$\frac{2+1}{2x} = \frac{1}{18}$$

$$\frac{3}{2x} = \frac{1}{18}$$

$$2x = 54$$

$$x = 27$$

Sheela can finish the work in 27 days.

Q(17) A company has a job to prep- are certain number cans and there are machines $x, y, \& z$ for this job x can complete the job in 3 days, y can complete the job in 4 days z can complete the job in 6 days. How many days company will take to complete the job, if all machines are used simultaneously?

Ans X Machine 's 1 day's work = $\frac{1}{3}$

Y Machine 's 1 day's work = $\frac{1}{4}$

Z machine 's 1 day's work = $\frac{1}{6}$

Work done by all the machine working together



$$\begin{aligned}
 &= \frac{1}{3} + \frac{1}{4} + \frac{1}{6} \\
 &= \frac{4+3+2}{12} = \frac{9}{12} \\
 &= \frac{3}{4}
 \end{aligned}$$

Hence, required number of days to complete the job = $\frac{4}{3}$ days

Simple solved questions:

Q(18) if a field is 50 m long and 40 m wide , find area of this field ?

Ans: $50 \times 40 = 200 \text{ m}^2$

Q(19) Find cost of grassing in this area @ Rs 10 per m^2 ?

Ans: $200 \times 10 = \text{Rs.}2000/-$

Q(20) if one per does the work of grassing @ 20m^2 per day , how time is required complete this work?

Ans: $200 \div 20 = 10 \text{ days}$

Q (21) Amit alone can trim the grass of cricket ground in 4 hour. Sumit alone takes 6 hour to do this work in the same field. How long will they take if both Amit and Sumit work together?

Ans: Time taken by Amit to do the work= 4 hour

work done by Amit in 1 hour = $\frac{1}{4}$

Time taken by Sumit to do the work = 6 hour

Work done by Sumit in 1 hour = $\frac{1}{6}$

work done by both Amit and Sumit in 1 hour = $\frac{1}{4} + \frac{1}{6} = \frac{3+2}{12} = \frac{5}{12}$

Hence, Amit and Sumit trim the grass of field in $\frac{12}{5}$ hour i.e. $2\frac{2}{5}$ hour.

Q (22) Together Ram and shyam can trim the grass of ground in 4 days. Ram alone takes 12 days to trim the grass of same field. In how many days can Shyam alone trim the grass of the field?

Ans: Time taken by Ram and Shyam to trim the grass of this field together = 4 day

Ram and Shayam's 1 day's work = $\frac{1}{4}$

Time taken by ram to complete work = 12 days

Ram's 1 day's work = $\frac{1}{12}$

Shyam's 1 day's work = (Ram and Shaym's)



1 day's work) - (Ram 1 day's work)

$$= \frac{1}{4} - \frac{1}{12}$$
$$= \frac{3-1}{12} = \frac{2}{12} = \frac{1}{6}$$

Shyam can complete the work in 6 days.

Q (23) Ramesh and Suresh can cut the grass of the school field in 10 hours Suresh and chotu can cut it in 15 hours and Ramesh and Chotu can cut it in 12 hours, how long will they take to do it together?

Ans: (Ramesh+ Suresh)'s 1 hour's work = $\frac{1}{10}$ (1)

(Suresh + Chotu)'s 1 hour's work (2)

(Ramesh + Chotu)'s work = $\frac{1}{12}$ (3)

Adding eq. (1), (2) and (3), we get 2 (Ramesh + Suresh + Chotu)'s 1 day's

$$\text{work} = \frac{1}{10} + \frac{1}{15} + \frac{1}{12}$$

$$2 (\text{Ramesh} + \text{Suresh} + \text{Chotu})'s 1 \text{ day's work} = \frac{6+4+5}{60} = \frac{15}{60}$$

$$\therefore (\text{Ramesh} + \text{Suresh} + \text{Chotu})'s 1 \text{ day's work} = \frac{1}{2} \times \frac{15}{60} = \frac{1}{8}$$

∴ Together Ramesh, Suresh & Chotu can cut the grass in 8 day's

Unsolved simple questions:

Q (1) Ram finish the whole work in 5 days. How much work he will do in 1 day?

Q (2) A can do a piece of work in 5 days. How many days will we take to complete 3 works of the same type

Q (3) Ajay complete the work in 10 days and Sumit complete the same work in 15 days in how many days they together will do the same work?

Q (4) A and B together can do a piece of work in 6 days and A alone can do it in 9 days in how many days can B alone do it?

Q (5) 16 men can do a piece of work in 10 days. How many men are needed to complete the work in 40 days.

Answers:

Ans (1) $\frac{1}{5}$ th part of work

Ans (2) 15 days

Ans (3) 6 days

Ans (4) 18 days

Ans (5) 4 Men



Unsolved questions:

Q (6) Ajay complete the work in 10 days and Sumit complete the same work in 15 days in how many days they together will do the same work?

Q (7) A and B together can do a piece of work in 6 days and A alone can do it in 9 days in how many days can B alone do it?

Q(8) the lawn grass cutter A and B together trim the field grass in 4 days. If lawn grass cutter “A” alone can complete the same work in 12 day. In how many days can lawn grass cutter “B” alone complete that work?

ANSWERS

- (1) 6 days
- (2) 18 days
- (3) Lawn cutter B can complete the work in 6 days.

Worksheets: 1

Q(1)) If 5 women gardner or 8 men gardner in a School can do a work in 84 days. In how many days can 10 women gardner and 5 men gardner can do the same work?

Ans)



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Q(2) Ajay and Sheela, working together can finish a School assignment Project in 6 days, while Ajay alone can do it in 9 days. How much time will Sheela alone take to finish it?

Ans)

Q(3) Machine A can TRIM the school field GRASS in 15 hours while Machine B can do it in 12 hours. How long will both take to do it, working together?

Ans)

Q(4) Lawn Mover A, B and C can Cut the grass in 8 days, 12 days and 15 days respectively. How long will they take to finish it if they work together?

Ans)

Q(5) Ramesh and Suresh paints a School building in 18 days; Suresh and Mukesh can do it in 24 days while Mukesh and Ramesh can finish it in 36 days. In how many days can Ramesh, Suresh and Mukesh finish it, if they all work together?

Ans)

Answers

- 1) 32 days
- 2) 18 days
- 3) 6 hours 40 minutes.
- 4) $3 \frac{7}{11}$ days
- 5) 16 days.



Work Sheet -2

Q(6) Three taps A, B and C can fill an overhead tank in 6 hours, 8 hours and 12 hours respectively. How long would the three taps take to fill the empty tank, if all of them are opened together?

Ans)

Q(7) Pinki alone plough a field in 4 hour. & Rinki alone takes 6 hour to plough the same field. How long will they take if both Rinki & Pinki work together?

Ans)

Q(8) Pipe A can fill an empty tank in 5 hours while pipe B can empty the full tank in 6 hours. If both are opened at the same time in the empty tank, how much time will they take to fill it up completely?

Ans)

Q(9) Two motor mechanics, Rohit and Mohit, working together can overhaul a School bus in 6 hours. Rohit alone can do the job in 15 hours. In how many hours, can Mohit alone do it?

Ans)

Q(10) A cistern has two inlets A and B which can fill it in 12 minutes and 15 minutes respectively. An outlet C can empty the full cistern in 10 minutes. If all the three pipes are opened together in the empty tank, how much time will they take to fill the tank completely?

Ans)



Answers

6)2.1 hours 40 minutes.

7) $2\frac{2}{5}$ hour

8)30.1 ours.

9)10 ours

10)20 minutes

Quiz based questions:

Q. (1) a grass cutting machine X cuts the grass in 10 hours & machine y cuts the grass in 15 hours. In How many time both machine together will do the same work?

- (a) 5 hours
- (b) 6 hours
- (c) 8 hours
- (d) 9 hours

Q. (2) Ajay can reap a field in 9 days, which ram alone can reap in 12 days. In how many days, both together can reap this field?

- (a) $5\frac{1}{7}$ days
- (b) 5 days
- (c) 10 days
- (d) 6 days

Q. (3) Ajay and Vijay together can dig a trench in 12 days. Which Ajay can dig in 30 days. In how many days Vijay alone can dig it?

- (a) 10 days
- (b) 15 days
- (c) 20 days
- (d) 25 days



Q. (4) Ashish can build a wall in 30 days, which Rajesh alone can build in 40 days. If they build together & get a payment of Rs. 700 what is Rajesh's share?

- (A) 300
- (b) 400
- (c) 500
- (d) 700

Q. (5) together Raj, & Sheela Plough a field in 4 days. Sheela alone takes 6 days to plough the same field. In how many days can Raj alone plough the field?

- (a) 12 days
- (b) 15 days
- (c) 10 days
- (d) 17 days

Q. (6) Rohan can paint $\frac{1}{3}$ of a painting of school building in 6 days. How much days will he take to complete the painting?

- (a) 12 days
- (b) 10 days
- (c) 18 days
- (d) 9 days

Q. (7) Ajay plough the field in 25 days an Vijay can finish it in 20 days. They work together for 5 days and then Ajay goes away. In how many days will Vijay finish the remaining work?

- (a) 13 days
- (b) 12 days
- (c) 10 days
- (d) 11 days

Q. (8) 5 peons can clean the floor of school building in 8 days. How many days will it take if 12 peons do the Job?

- (a) $3\frac{1}{3}$ days
- (b) 6 days
- (c) $9\frac{1}{3}$ days
- (d) 18 days



Q. (9) a school tank can be filled by one tap in 8 hours, and another in 4 hours how long will it take to fill the school tank if both taps are opened together?

- (a) 2 hours
- (b) $2 \frac{2}{3}$ hours
- (c) 3 hours
- (d) 4 hours

Q. (10) a school tank can be filled by a tap in 4 hours and emptied by an outlet pipe in 6 hours. How long will it take to fill the school tank if both the tap & pipe are opened together?

- (a) 12 hours
- (b) 15 hours
- (c) 18 hours
- (d) 20 hours

Q. (11) pipe A can fill a school tank in 5 hours, pipe B can fill a school tank in 10 hours and pipe C can fill a school tank in 30 hours. If all the pipes are open, In how many hours will the tank be filled?

- (a) 2 hours
- (b) 2.5 hours
- (c) 3 hours
- (d) 3.5 hours

Q. (12) Pipe A & B can fill a school tank in 5 & 6 hours pipe C can empty it in 12 hours. If all the three pipes are opened together, then the tank will be filled in how many hours?

- (a) $2 \frac{8}{11}$ hours
- (b) $3 \frac{9}{17}$ hours
- (c) $1 \frac{13}{17}$ hours
- (d) $4 \frac{1}{2}$ hours

Answers

1. B
2. A
3. C
4. A



- 5. A
- 6. C
- 7. D
- 8. A
- 9. B
- 10. A
- 11. C
- 12. B

More quiz based questions:

Q. (13) a grass cutting machine X cuts the grass in 10 hours & machine y cuts the grass in 15 hours. In How many time both machine together will do the same work?

- (a) 5 hours
- (b) 6 hours
- (c) 8 hours
- (d) 9 hours

Q. (14) Ajay can reap a field in 9 days, which ram alone can reap in 12 days. In how many days, both together can reap this field?

- (a) $5\frac{1}{7}$ days
- (b) 5 days
- (c) 10 days
- (d) 6 days

Q. (15) Ajay and Vijay together can dig a trench in 12 days. Which Ajay can dig in 30 days. In how many days Vijay alone can dig it?

- (a) 10 days
- (b) 15 days
- (c) 20 days
- (d) 25 days

Q. (16) Ashish can build a wall in 30 days, which Rajesh alone can build in 40 days. If they build together & get a payment of Rs. 700 what is Rajesh's share?

- (A) 300
- (b) 400



- (c) 500
- (d) 700

Q. (17) together Raj, & Sheela Plough a field in 4 days. Sheela alone takes 6 days to plough the same field. In how many days can Raj alone plough the field?

- (a) 12 days
- (b) 15 days
- (c) 10 days
- (d) 17 days

Q. (18) Rohan can paint $\frac{1}{3}$ of a painting of school building in 6 days. How much days will he take to complete the painting?

- (a) 12 days
- (b) 10 days
- (c) 18 days
- (d) 9 days

Projects and Labs:

Note down the time using clock for a piece of work done by single person , two person and more than two persons in a tabular form. Comments on the results placed in table. Then change work length, time length and man power as choice and compute other parameters not given in questions or as assigned by teacher. All these options available in video game.



1. Grass Cutting work carried out in the playing ground field by one person, two persons of similar and then two persons of dissimilar category. Next work carried out four persons of similar caliber. Work done by four persons of different category .
2. Mutter peeling/ garlic peeling work done for 1 kg raw material. Use stop watch and note down the timing of work completed.
3. Lemon and potato mixed in container to be separated using stop watch and note down time.
4. beans mixed with peas(mutter) to be separated using stop watch and note down the timing.
5. 10 number Pencil sharpening by one student /two students , note down the time using stop watch.
6. Arranging of library books subject wise by one student or more students using stop watch.
7. Note down the time with two/ three/ four students doing same above work:
8. Store few fruits and vegetables in a basket , now ask one student count and note down time.
Now depute two persons for the same task and note down time. Compare time taken for the task.



Chapter- 8 Data handling

Introduction: In this chapter data generation and its representation with the help of real life examples such as enrolment of Aadhar card. This has been discussed at lengths.. Data or information help us to take decisions based on past experience. It also help to predict about certain events. You must have seen in news papers and TV channels about elections exit poll results . This is due to availability of data and the role played by data. Visual formats of data collection has been shown for easy grasp and concepts. Data thus generated has also been shown in terms of bar and pie charts. Data collection, organization , representation and analysis give us inferences or predictions or in other words it tells us history and future of any organization. As an example video of Aadhar card centre has been taken. Thus Data of men , women and children can be mined and displayed in various formats. The Aadhar card centre is shown in the fig. 1. Video of Aadhar data centre is included in CD. This figure is taken from School Bus Journey.

Here, school bus is passing through the road and on the way one Aadhar card centre is located in one building. Men ,woman, children visit this centre to get their Aadhar cards made .The computer operator records their name , father name , age , address, sex, photographs, biometric and Irish scans of all individuals and uploads the data . Data of each person is thus generated and stored in computer. Based on this data , grouping of men /woman/ children becomes possible. Also number of persons residing in any locality can be mined based on any one parameter. Thus , data handling becomes possible. This data can be shown with different type of graphs. Data collection, recording and presentation in some form depending upon requirements will be the main objective of this chapter. Average, mean, median, mode and graphs on data will be used to fulfill the objective. The projects and video game based labs have been developed. These labs are based on fruits , vegetables, class room size and Aadhar card centre. The simple and intelligent video formats will make the concept of data handling and representation problems very easy, conceptual and interesting.



Fig.1 A school bus passing through Aadhar card centre in market on the way to school journey.



Fig.2 Aadhar card centre collection, recording and presentation of data using computer and scanner in locality.

Basic terms used in chapter:

DATA

The Collection of information is called data. It can be in the form of numbers, words, pictures, digits.

For example:- Ms. Sunita has done a survey in College to find out the favorite game of the students.

Games	Basket Ball	Cricket	Football	Chess	Badminton	Tennis	Volley ball
Number of Students	305	218	102	68	265	145	98

There are two types of Data:-

- 1) Primary Data
- 2) Secondary Data

PRIMARY DATA

The Data collected directly from the source is called the Primary Data.
For Example:- The Data collected by Ms. Sunita is Primary Data.

SECONDARY DATA

When the Data is collected from an external source, it is called the secondary Data.

For example the data collected from Newspaper, Magazines & internet etc. is secondary Data.

ORGANIZATION OF DATA

Organization of data refers to a meaningful arrangement of data that provides the desired information at glance.

For example:- A group of college students took part in science exhibition. The judges gave the following grades: 5, 2, 4, 6, 2, 7 etc. This data makes no sense and It is senseless Data. This is data but not meaningful. Arrange the data in tabular form to make it meaningful.

Name of the student	Grade
Ajay	7
Vijay	2
Mansi	5
Raju	4
Kunal	6
Shyam	2
Akshay	3
Yogita	4
Divya	3

Mean: sum of all observations/number of observations

Mode: observation that occur most often or frequent.

Median: measure of centre tendency or middle observation



Range: spread of observations highest to lowest or vice versa defined the range of observations.

REPRESENTATION OF DATA

Data can be represented graphically to give a clear idea of what it represents. It is easier to interpret and organize data using pictorial representation.

There are many ways to represent numerical data pictorially:-

- 1) Pictographs
- 2) Tally graphs
- 3) Bar Graphs

These Graphs help in suitable representation of data.

PICTOGRAPH

A pictograph is a way of represent a concept or an object by illustration. A pictograph uses picture or symbol to represent an assigned amount of Data.

For example:- The pictograph Shows that 15 books are purchased in different days.

DAYS	PURCHASED BOOKS
Sunday	
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	

TALLY CHART



A tally chart is a table with tally marks to show a valuable data set. A tally chart is one method of collecting data with tally marks. Tally marks are frequencies, occurrences, or total numbers being measured for a specific category in a data set. Tally charts are used throughout the world and are great visual representations of group observations.

For example:- Number of pets used in the house.

Pets	Tally Marks	Total
Dogs	III	8
Birds	II	7
Fish		4
Cats	III	9
		28

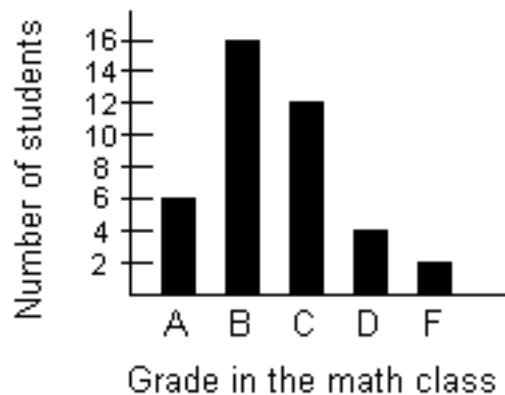
BAR GRAPH

A Bar graph has a rectangular bar and length of each bar represents the given number. This method of representing data is called Bar graph or Bar chart. A bar chart or bar graph is a chart that presents grouped data with rectangular bars with lengths proportional to the values that they represent. Bar graph is the simplest way to represent a data.

The bars can be plotted vertically or horizontally. A vertical bar chart is sometimes called a column bar chart.

A Bar graph is a chart that uses either horizontal or vertical bars to show comparisons among categories. One axis of the chart shows the specific categories being compared, and the other axis represents a discrete value.

For example:- Grades of students in Maths class

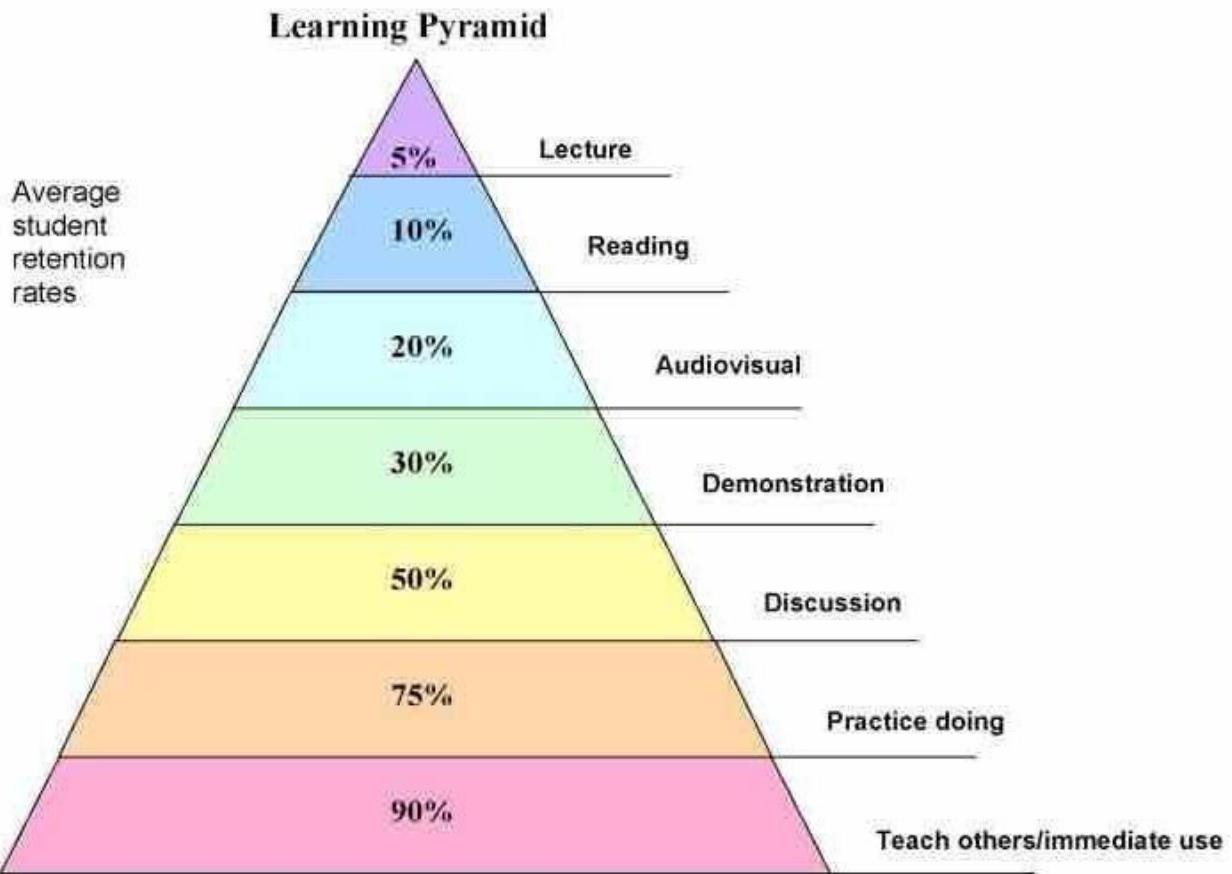


STEPS IN CONSTRUCTION OF BAR GRAPHS/COLUMN GRAPH

The following steps in construction of bar graphs/column graph:

1. On a graph, draw two lines perpendicular to each other, intersecting at 0.
2. The horizontal line is x-axis and vertical line is y-axis.
3. Along the horizontal axis, choose the uniform width of bars and uniform gap between the bars and write the names of the data items whose values are to be marked.
4. Along the vertical axis, choose a suitable scale in order to determine the heights of the bars for the given values. (Frequency is taken along y-axis).
5. Calculate the heights of the bars according to the scale chosen and draw the bars.
6. Bar graph gives the information of the number of children involved in different activities.

7. Pyramid



SOLVED QUESTIONS BASED ON CHAPTER

Q(1) In a class of 35 children, absentees in a particular week were shown by a pictograph as shown here.

Days	Number of Students
Monday	☺ ☺ ☺ ☺
Tuesday	☺ ☺ ☺
Wednesday	☺
Thursday	☺ ☺ ☺ ☺ ☺ ☺
Friday	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺
Saturday	☺ ☺ ☺ ☺ ☺

Read the picture and answer the following question

(1) How many children were absent on Monday?

Ans. 4 Children absent on Monday

(2) how many children present on Tuesday?

Ans. No of absentee = 3

Total no. of student = 25

No. of present student = $25 - 3 = 22$

(3) On which day maximum absentee were there?

Ans. on Friday, there were the maximum number of absent

Q (2) Read the pictograph showing the number of animals in Zoo and answer the following question?

Bear	
Deer	
Tiger	
Monkey	
Elephant	

(1) how many animals are there in the Zoo?

Ans. No. of Bear = 3

No. of Deer = 4

No. of tiger = 2

No. of Monkey = 6

No. of Elephant = 3

Total no. of animals = $3+4+2+6+3 = 18$



(2) How many Tigers are there in the Zoo?

Ans. The no. of tigers in the zoo is 2

(3) which animal has large number of population?

Ans. Large number of population is of Monkey

Q (3) The table shows the number of patients who visited hospital during a week?

Day	Mon	Tue	Wed	Thu	Fri	Sat	Sun
No. of patient	205	105	200	110	180	120	100

Read the table & answer the following question?

(1) on which day the maximum number of patient visited the hospital?

Ans. on Monday, maximum number of patient visited the hospital

(2) on which day the minimum number of patient visited the hospital?

Ans. on Sunday the minimum number of patient visited the hospital.

(3) how many patients visited on Wednesday?

Ans. on Wednesday 200 patients visited the hospital.

Q (4) The following pictograph shown the number of buses in five villages

Village	Buses
A	
B	



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C	
D	
E	

Read the picture & answer the following question?

(1) which village has the minimum no .of buses?

Ans. C Village has the minimum no. of buses

(2) Which village has the maximum no .of buses?

Ans. E village has the maximum no. of buses

(3) What is the total no. of buses in all the five villages?

Ans. No. of buses in village A = 4

No. of buses in village B = 6

No. of buses in village C = 2

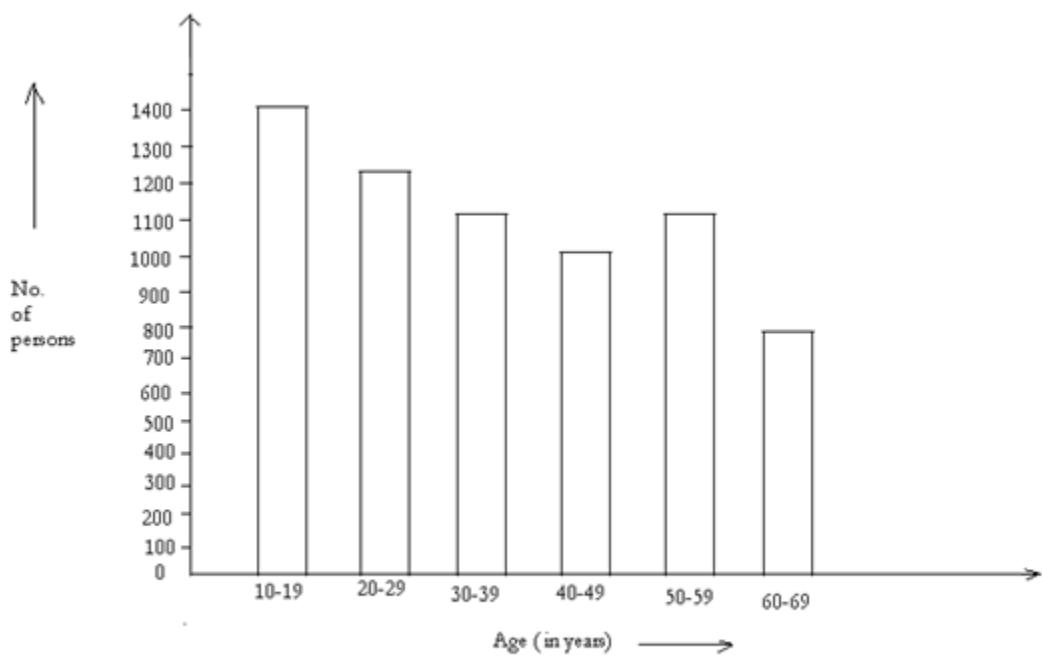
No. of buses in village D = 4

No. of buses in village E = 7

Total no. of buses = $4 + 6 + 2 + 4 + 7 = 23$

Q (5) Study the graph of Aadhar centre of Janakpuri and answer the following question?





(1) What is the number of person in the age group of 30 – 39 years?

Ans. 1100 person in the age group of 30 – 39 years

(2) what is the number of persons living in the town in the age group of 60 – 59?

Ans. 700 person in the age group of 60 – 69 years

(3) how many more persons are there in the age group 10 – 19 years than in the age group 30 – 39 years?

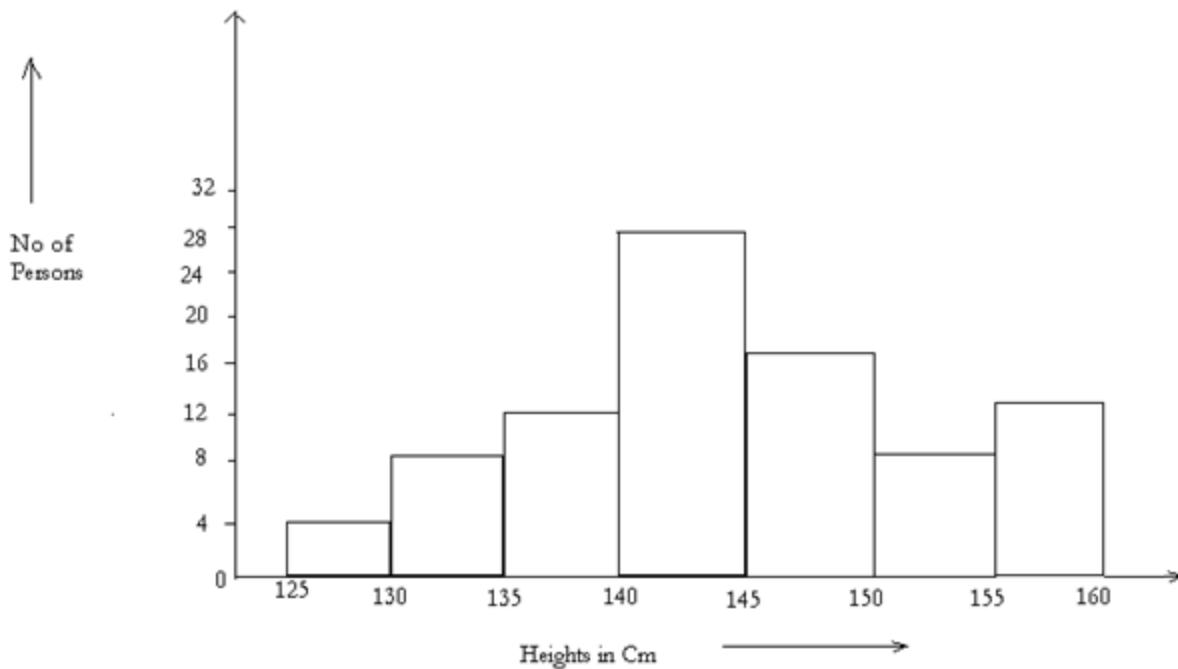
Ans. No. of person in the age group 10 – 19 year = 1400

No. of person in the age group 30 – 39 year = 1000

10 – 19 year age group has 400 more persons

Q (6) Study the graph of Aadhar centre of Janakpuri and answer the following questions?





(1) What information is being given by the graph?

Ans. Given histogram depicts height (in Cm) of Number of persons

(2) which group does contain maximum persons?

Ans. The class interval 140 – 145 contain maximum number of persons. Numbers of persons have height between 140 Cm & 145 Cm.

(3) How many person have height of 145 Cm & more?

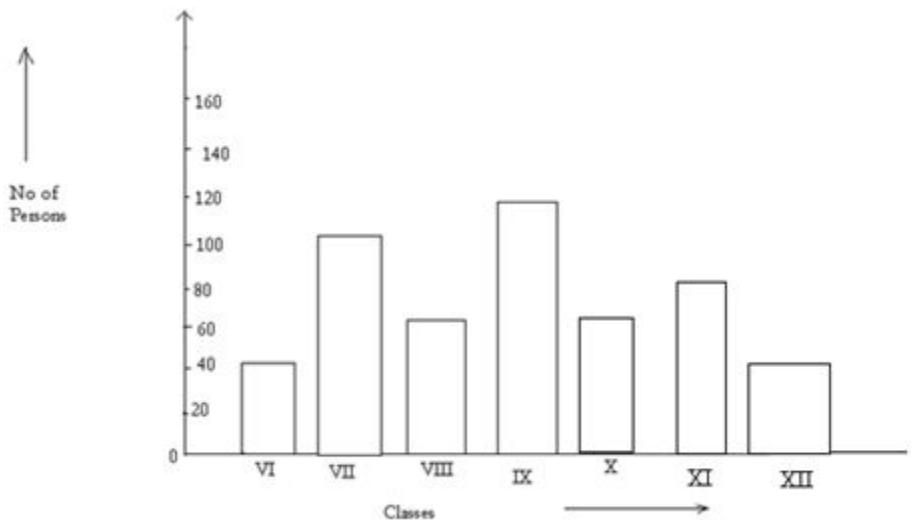
Ans. No. Of person have height 145 Cm and more

$$= 16 + 8 + 12$$

$$= 36$$

Q (7) Study the graph and answer the following question?





(1) How many students are there in class VI?

Ans. Number of student in class VI = 40

(2) How many more students are there in class IX than in class VIII?

Ans. No. of students in class IX is more than that of class VIII = $120 - 65 = 60$

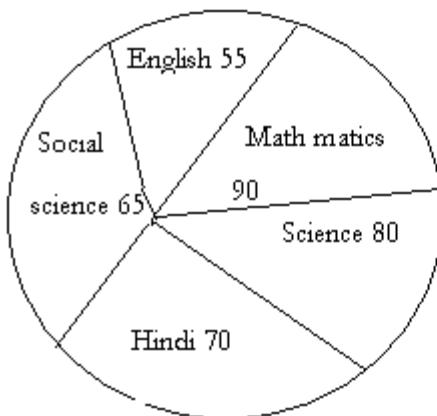
(3) Which class has the maximum number of students?

Ans. Class IX has the maximum number of students.

(4) Which class has the minimum number of students?

Ans. Class VI & XII has the minimum number of students.

Q (8) the following pie chart gives the marks scored in an examination by student in various subjects. If the total marks obtained by the students were 540, answer the following questions



(1) In which subject did student score 105 marks?

Ans. Total marks = 540

Marks obtained in a subject = central angle of the $\frac{\text{corresponding sector} \times \text{total marks}}{360^\circ}$

$$\text{Mathematics Marks} = \frac{90 \times 540}{360} = 135$$

$$\text{Science Marks} = \frac{80 \times 540}{360} = 120$$

$$\text{Hindi Marks} = \frac{70 \times 540}{360} = 105$$

$$\text{Social science Marks} = \frac{65 \times 540}{360} = 97.5$$

$$\text{English Marks} = \frac{55 \times 540}{360} = 82.5$$

Subject	Central angles	Marks obtained
Mathematics	90°	$\frac{90 \times 540}{360} = 135$
Science	80°	$\frac{80 \times 540}{360} = 120$
Hindi	70°	$\frac{70 \times 540}{360} = 105$
Social science	65°	$\frac{65 \times 540}{360} = 97.5$
English	55°	$\frac{55 \times 540}{360} = 82.5$



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From the table It is concluded that that 105 marks are scored in Hindi

(2) How many more marks were obtained by the student in mathematics than in Hindi?

Ans. Marks scored in Mathematics = 135

marks scored in Hindi = 105

∴ Difference of marks scored in mathematics & Hindi = $135 - 105 = 30$

(3) How many marks student did score in science?

Ans. Marks Scored in science = 120

Q (9) Give below the age of 25 students of class XII in a school. Prepare a discrete frequency distribution

15,16,16,14,17,17,16,15,15,16,16,17,15,16,16,14,16,15,14,15,16,16,15,14,15,

Ans Frequency distribution of age of 25 students

Age	Tally mark	Frequency
14		4
15		8
16		10
17		3
Total		25

Q (10) The final marks in Physics of 30 students are as follows:

53,61,48,60,78,68,55,100,67,90,75,88,77,37,84,58,60,48,62,56,44,58,52,64,
98,59,70,39,50,60,

Answer the following question

(1) what is the height score?

Ans. 100

(2) What is the lowest score?

Ans. 37



(3) If 40 is pass marks how many have failed?

Ans. 2

(4) How many scored 75 or more?

Ans. 8

(5) How many scored less than 50?

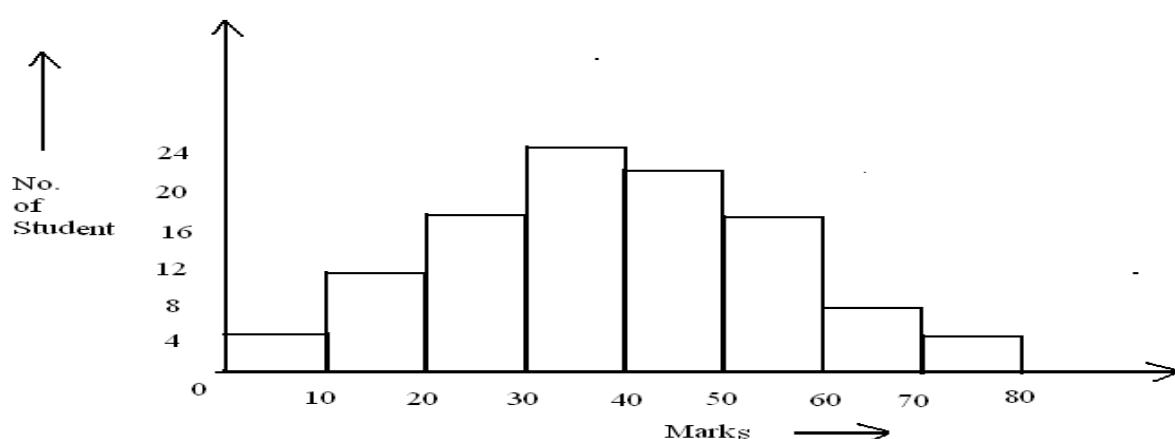
Ans. 5

Q (11) The following table gives the marks scored by 100 students in an entrance examination

Marks	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80
No. of Student	4	10	16	22	20	18	8	2

Represent this data in the form of histogram?

Ans

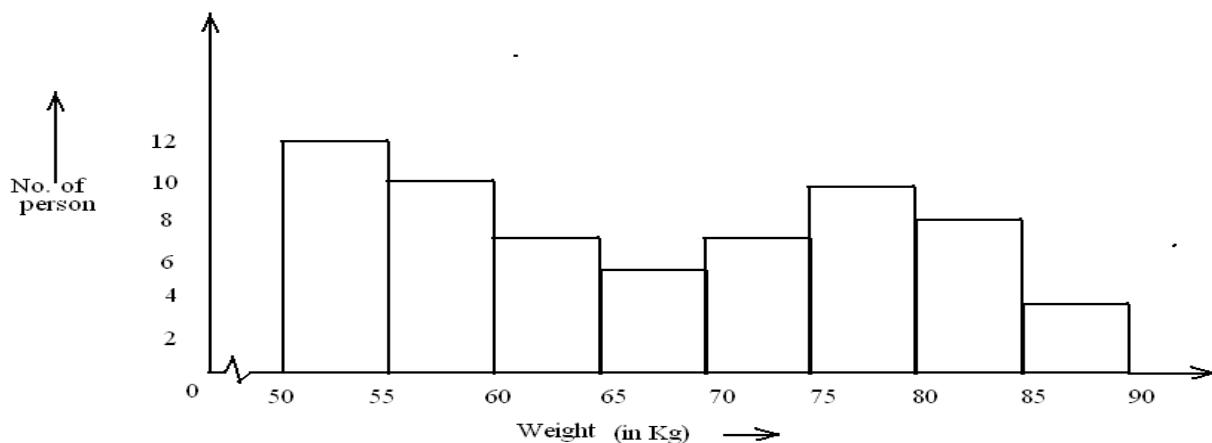


Q (12) The following is the distribution of weight (in kg) of 50 person

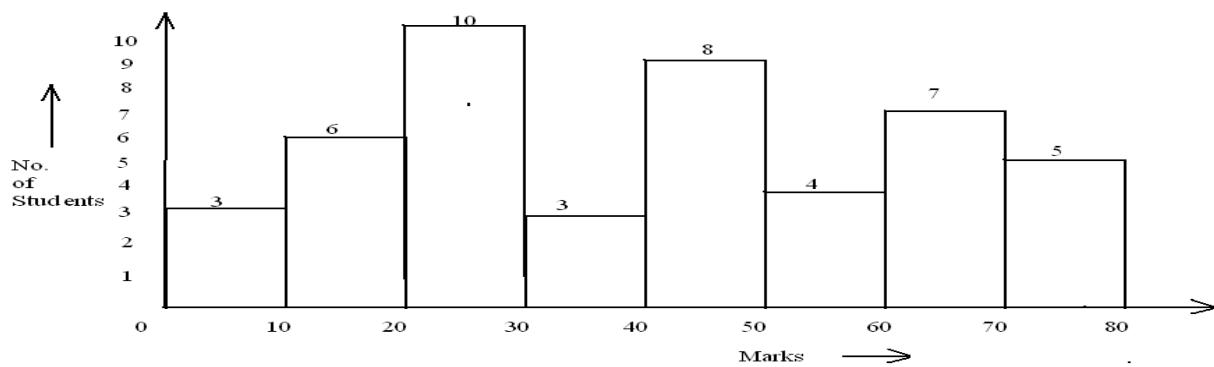
Weight (in kg)	50–50	55–60	60–65	65–70	70–75	75–80	80–85	85–90
No. of Person	12	8	5	4	5	7	6	3

Represent this data in the form of histogram?

Ans.



Q (13) The following histogram depicts the marks obtained by 45 students of a class. Look at the histogram and answer the following questions



(1) What is the class size?

Ans. The class interval are 0–10, 10 – 20, 20 – 30 70 – 80. So class size = 10

(2) How many students obtained less than 10 marks?

Ans. The number of student who obtained less than 10 marks are 3

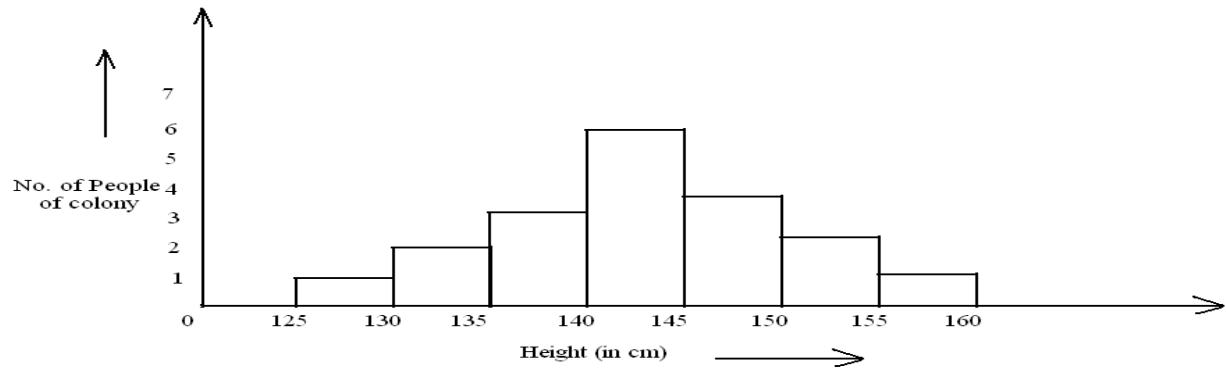
(3) How many students obtained 30 or more marks but less than 40?

Ans .The number of student obtained 30 or more marks but less than 40 are 3

(4) If passing marks are 30, what the number of failures?

Ans .If passing marks are 30, number of failures = $3+6+10= 18$

Q (14) Observes the Histogram & answer the following questions



(1) what information is given by the graph?

Ans. Given histogram depicts height (in Cm) of the people of colony.

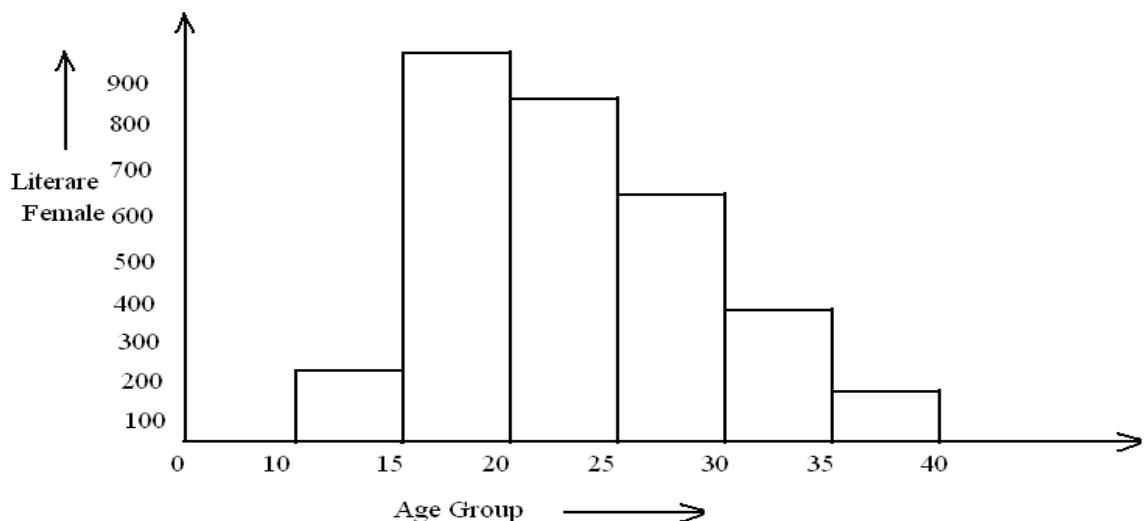
(2) Which graph does contain maximum people?

Ans. The class interval 140–145 contain maximum number of people this means that maximum no. of people have height between 140 Cm & 150 Cm.

(3) How many people have height of 145 Cm & more?

Ans. No. of people having height 145 Cm & more = $4+2+1= 7$

Q (15) The following histogram shows the number of literate females in the age group of 10 to 40 years in a town



(1) what is the age group in which the number of literate female is the highest?

Ans . 15–20 is the age group in which the number of literate female is the highest

(2) What is the class width?

Ans. The class width is 5

(3) What is the lowest frequency?

Ans. The lowest frequency is 150

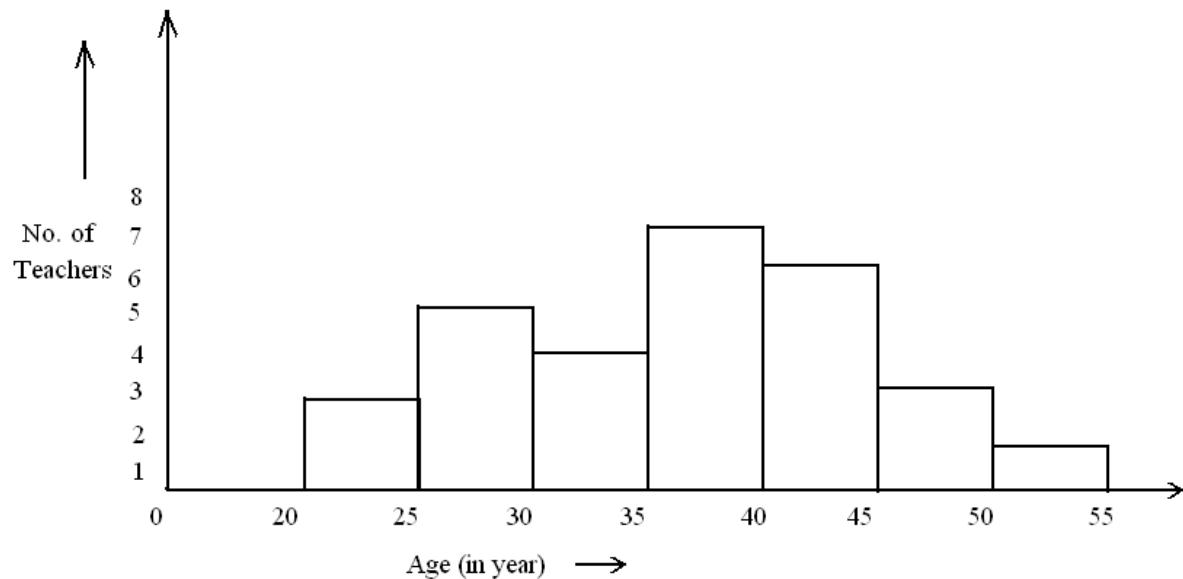
(4) In which group literate females are the least?

Ans. The literate female are the least in 35–40 years age group.

Q (16) The following histogram shows the frequency distribution of the ages of 22



teachers in a school



(1) What is the number of eldest & youngest teachers in the school?

Ans .The number of eldest teacher is 1 & the number of youngest teacher is 2

(2) Which age group teachers are more in the school and which least?

Ans. 35-40 year age group is more & 50 – 55 year age group is least

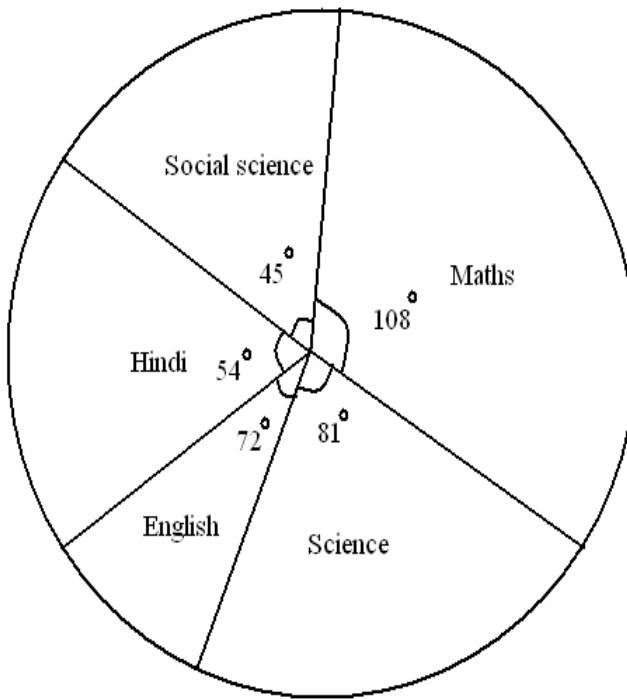
(3) What is the size of the classes ?

Ans. The class size is 5

(4) what are the class marks of the classes?

Ans. The class marks of the classes are 22.5, 27.5, 32.5, 37.5, 42.5, 47.5, 52.5 because the mid value of the class is called class mark.

Q (17) The pie chart shows the marks obtained by the students in an examination. If the student secures 440 marks in all, calculate his marks in each of the given subject?



Ans. Marks scored in Maths = $\frac{\text{Central angle of the corresponding sector}}{360^\circ} \times \text{Total marks}$

$$\text{Marks scored in Maths} = \frac{108}{360} \times 440 = 132$$

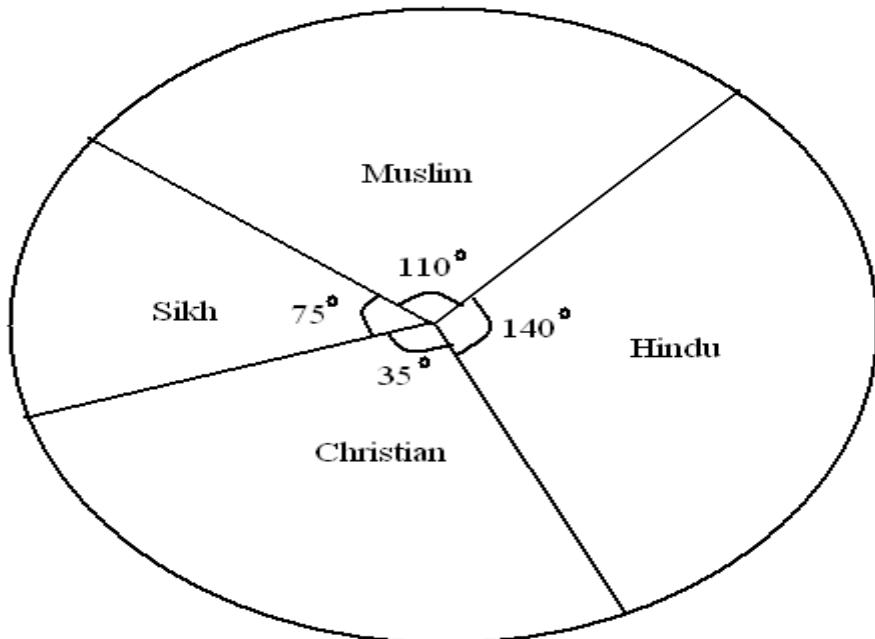
$$\text{Marks scored in science} = \frac{81}{360} \times 440 = 99$$

$$\text{Marks scored in English} = \frac{72}{360} \times 440 = 88$$

$$\text{Marks scored in Hindi} = \frac{54}{360} \times 440 = 66$$

$$\text{Marks scored in social science} = \frac{45}{360} \times 440 = 55$$

Q (18) According to the aadhar card the people has been characterized according to their religion. The pie chart shows the characterized people. Find the Hindu, Muslim, Sikh & Christian people if the total number of people is 1080.



Ans. Number of people = $\frac{\text{Central angle of the corresponding sector}}{360^\circ} \times \text{Total people}$

$$\text{Hindu people} = \frac{140}{360} \times 1080 = 420$$

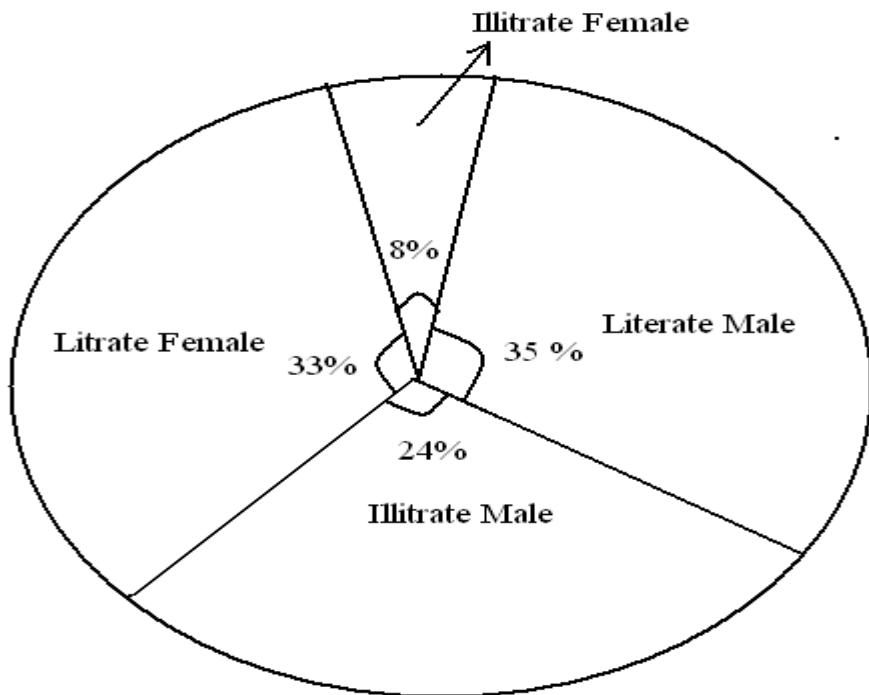
$$\text{Muslim people} = \frac{110}{360} \times 1080 = 330$$

$$\text{Sikh people} = \frac{75}{360} \times 1080 = 225$$

$$\text{Christian people} = \frac{35}{360} \times 1080 = 105$$

Q (19) The following pie chart shows the percentage of literate & Illiterate- males & females in a city

Total number = 2,50,000



(1) What is the number of literate males?

Ans. Percentage of literate male= 35 %

Total number = 2, 50,000

$$\text{number of Literate male} = \frac{35}{100} \times 250000 = 87500$$

(2) What is the number of literate males?

$$\text{Ans. Number of Literate} = \frac{33}{100} \times 250000 = 82500$$

(3) What is the number of illiterate males?

$$\text{Ans. Number of illiterate male} = \frac{24}{100} \times 250000 = 60,000$$

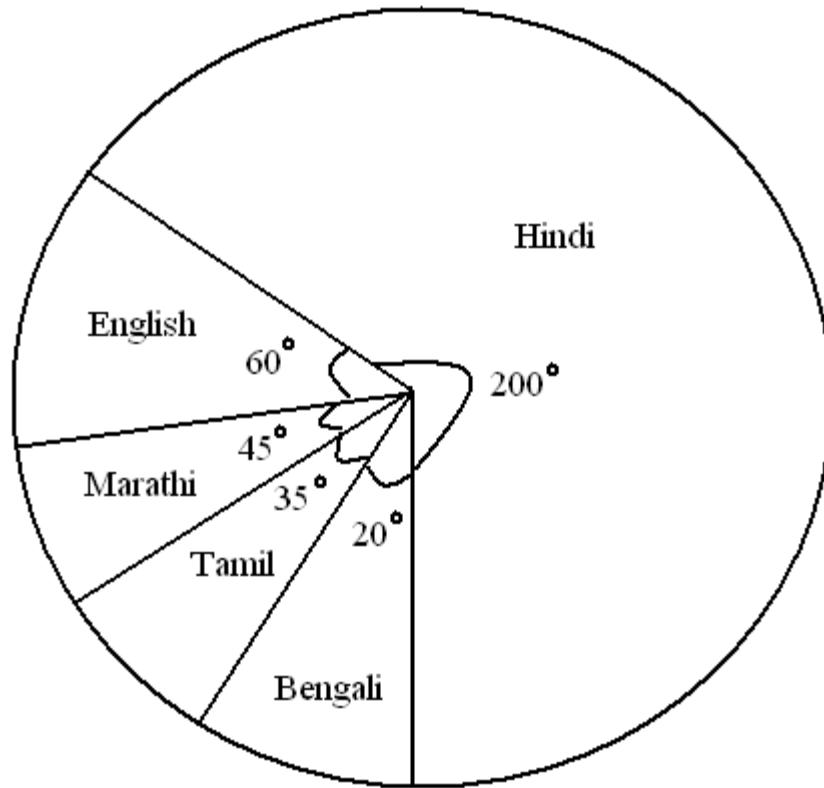
(4) What is the number of illiterate females?

$$\text{Ans. Number of illiterate female} = \frac{8}{100} \times 250000 = 20,000$$

(5) What is the difference between the number of literate males & literate females?

Ans Difference between number of Literate male & Literate female= 87500-82500
= 5000

Q (20) The pie chart shows the number of people speaking different language find the number of different language. If the total number of people is 72,000



Ans. Total number of people = 72,000

$$\text{People who speak Different language} = \frac{\text{Central angle}}{360^\circ} \times \text{Total people}$$

$$\text{People who speak Hindi language} = \frac{200^\circ}{360^\circ} \times 72000 = 40,000$$

$$\text{People who speak} = \frac{60}{360} \times 72000 = 12,000$$

$$\text{People who Speak Marathi language} = \frac{45}{360} \times 72000 = 9000$$

$$\text{People who Speak Tamil language} = \frac{35}{360} \times 72000 = 7000$$

$$\text{People who speak Bengali language} = \frac{20}{360} \times 72000 = 4000$$

Data Handling -SOLVED QUESTIONS

Q (ps8.1) Study the graph of Aadhar CARD centre of Janakpuri, Delhi and answer the following questions?

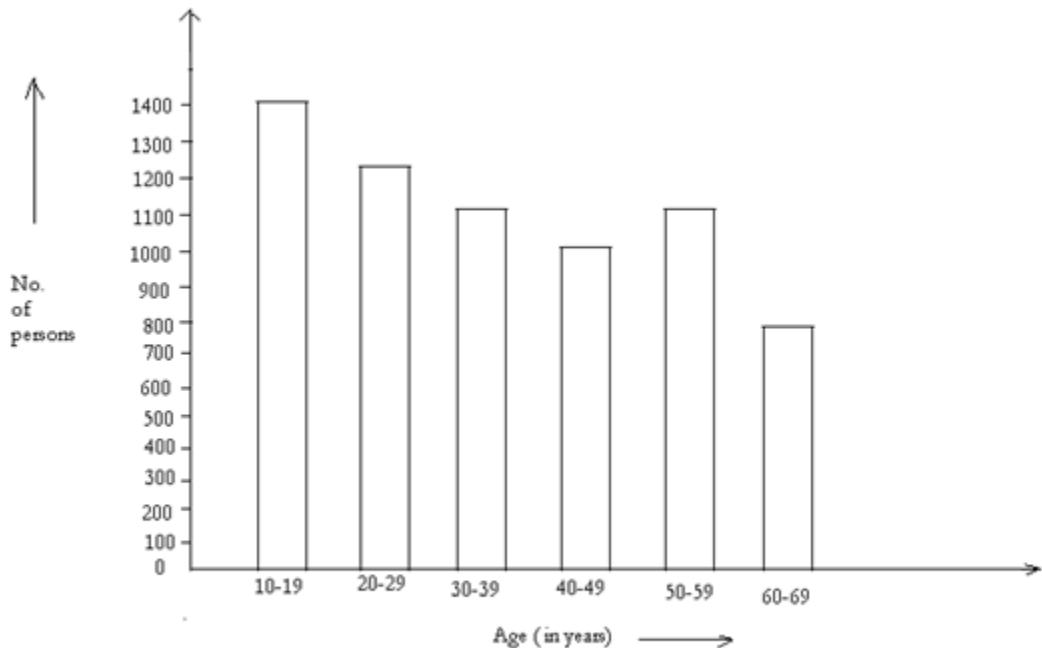


Fig p-15 Aadhar card centre for data statistics

(ps81.) What is the number of person in the age group of 30 – 39 years?

Ans: 1100 person in the age group of 30 – 39 years

(ps8.2) What is the number of persons living in the JANAKPURI, Delhi in the age group of 60 – 59?

Ans: 700 person in the age group of 60 – 69 years

(ps8.3) How many more persons are there in the age group 10 – 19 years as compared to age group 30 – 39 years?

Ans: No. of person in the age group 10 – 19 year = 1400

No. of person in the age group 30 – 39 year = 1000

10 – 19 year age group has 400 more persons

Q (ps8.4) According to the adhar card CENTRE the people has been characterized according to their religion. The pie chart shows the religion based people in degrees . Find the Hindu, Muslim, Sikh AND Christian people if the total number of people is 1080.

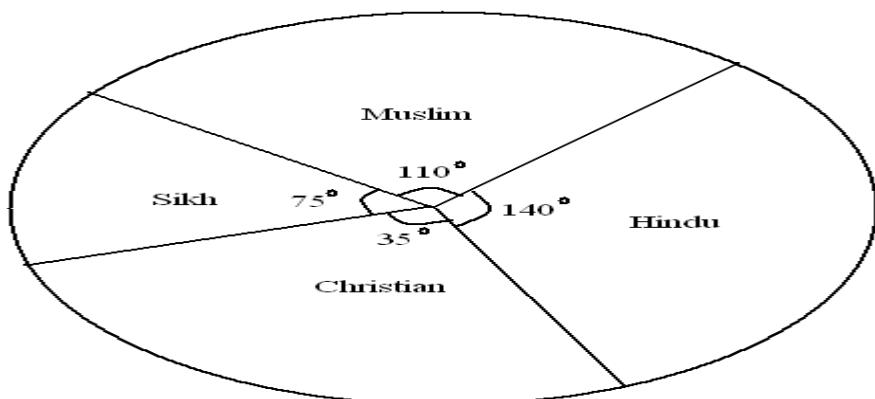


Fig p-16 Aadhar card centre for data statistics in the form of pie chart

$$\text{Ans. Number of people} = \frac{\text{Central angle of the corresponding sector}}{360^\circ} \times \text{Total people}$$

$$\text{Hindu people} = \frac{140}{360} \times 1080 = 420$$

$$\text{Muslim people} = \frac{110}{360} \times 1080 = 330$$

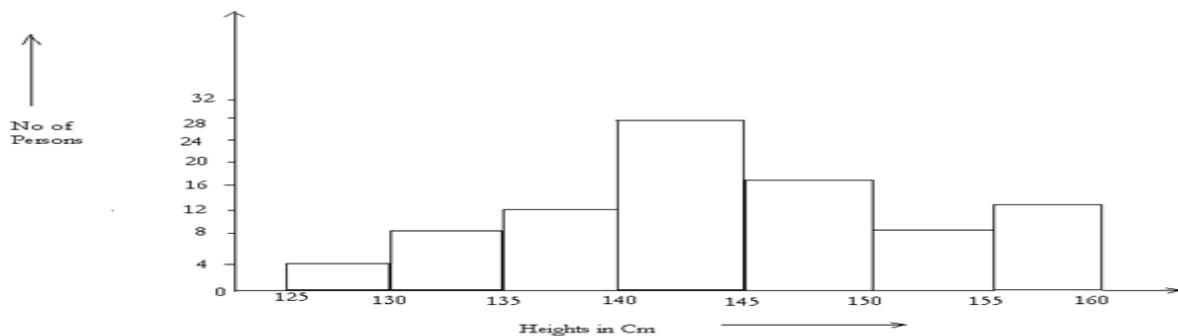
$$\text{Sikh people} = \frac{75}{360} \times 1080 = 225$$

$$\text{Christian people} = \frac{35}{360} \times 1080 = 105$$

UNSOLVED QUESTIONS

Q (pq8.1) Study the graph of Aadhar centre of Janakpuri and answer the following questions?

Fig p-19 Aadhar card centre for data statistics



- (1) What information is being given by the graph?
- (2) which group does contain maximum persons?
- (3) How many persons have height >145 cms?

Q (pq8.2) The pie chart shows the number of people speaking different language find the number of People who speak different language. If the total number of people is 72,000

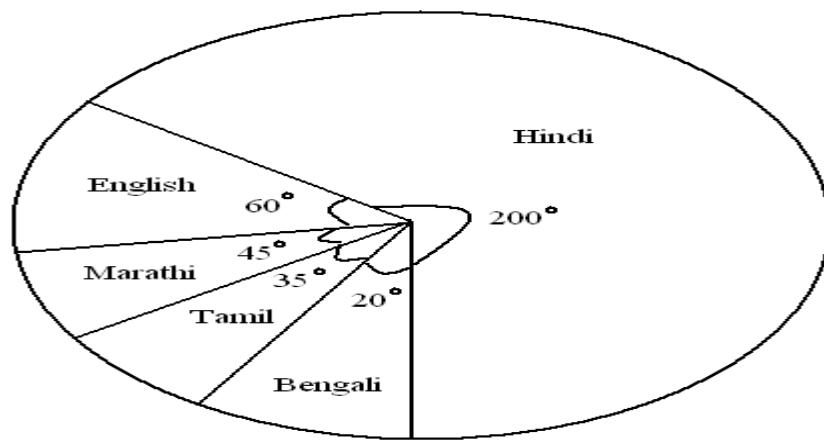


Fig p-20 Aadhar card centre showing data statistics based language people speak in India in degree

Ans: Total number of people = 72,000

$$\text{People who speak Different language} = \frac{\text{Central angle}}{360^\circ} \times \text{Total people}$$

ANSWERS

1) Ans

Given histogram depicts height (in Cm) of Number of persons

2) Ans

The class interval 140 – 145 contain maximum number of persons. Numbers of persons have height between 140 Cm & 145 Cm.

3) Ans

No. Of person have height 145 cms and more = 36

1) People who speak Hindi language = 40,000

People who speak English language = 12,000

People who Speak Marathi language = 9000

People who Speak Tamil language = 7000

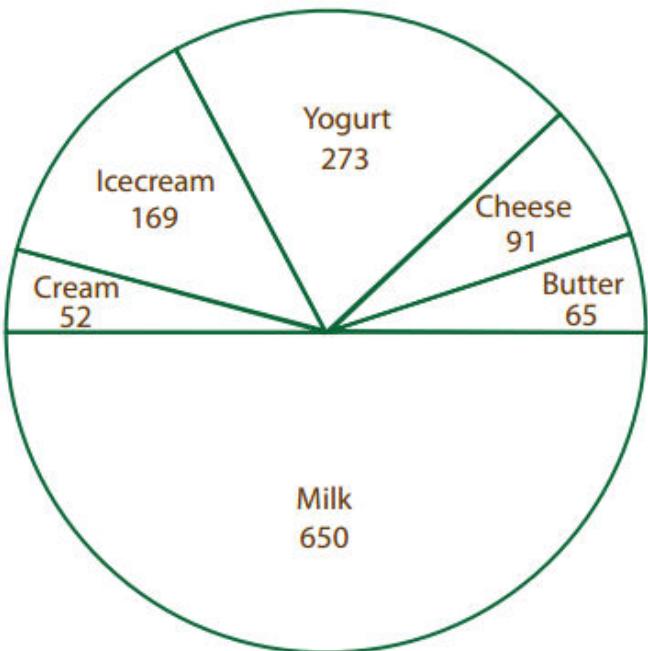
People who speak Bengali language = 4000

Worksheets: Data handling

Pie Chart on the number of dairy products sold in a day in School Canteen.

Answer the questions based on the pie graph.





1. Which dairy product was sold the least?

Ans

2. What percent of the dairy product sold was ice cream?

Ans

3. How much of yogurt was sold more than butter in percentage?

Ans

4. Which product sales was 50% of the total sales?

Ans

5. What is the percent of cheese sold?

Ans

Answers

1) Cream

2) 13 %

3) 16 %

4) Milk

5) 7 %



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Sheet-2

School has Five different clubs. The data shows the number of students in each club. Use the information to draw a pictograph and answer the questions.

s. No.	Clubs	Number of students
1)	Dance club	8
2)	Drama club	6
3)	Sports club	7
4)	Art club	4
5)	Debate club	6

Key
 = 16 Students

- 1) Which club has fewest students? How many?

Ans

2) How many students are there in either art club or debate club?

Ans

3) How many more students are there in the sports club than the drama club?

Ans

4) How many more students are needed for the drama club to have equal students as the dance club?

Ans

Answers



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1) Art club , 56

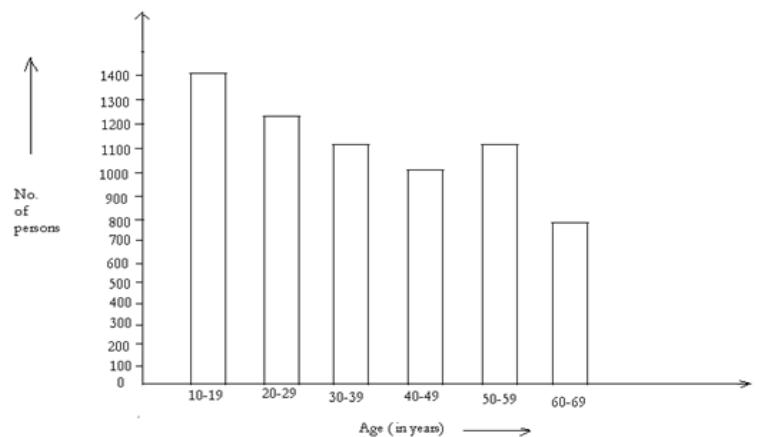
2) 152

3) 40

4) 56

Sheet-3

Study the graph of Aadhar centre of Dwarks and answer the following questions?



(1) What is the number of person in the age group of 30 – 39 years?

Ans

(2) what is the number of persons living in the town in the age group of 60 – 59?

Ans.

(3) how many more persons are there in the age group 10 – 19 years than in the age group 30 – 39 years?

Ans.

Answers

- 1) 1100 person in the age group of 30 – 39 years
- 2) 700 person in the age group of 60 – 69 years
- 3) 10 – 19 year age group has 400 more persons

The members lend books from School Library. The pictograph shows the number of books checked out in ve days. Use the information from the graph tto answer the questions.



S.No.	Days	Number of Books Checked out
1)	Monday	
2)	Tuesday	
3)	Wednesday	
4)	Thursday	
5)	Friday	



1) How many books were checked out on Thursday?

Ans

2) Which day fewest books were checked out?

Ans

3) How many fewer books were checked out on Monday than Friday?

Ans

4) Name the days where the number of checkouts was less than 50 books?

Ans

5) How many books were lent in 5 days?

Ans

Answers

1) 28

2) Thursday

3) 14

4) Wednesday and Thursday

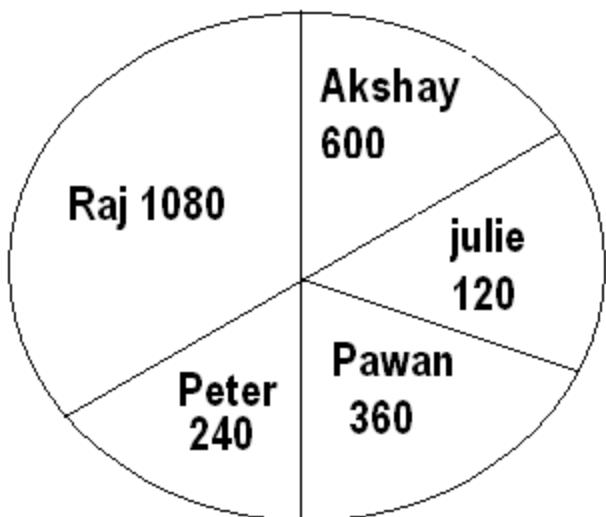
5) 280



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Quiz:

NPN high school conducted an election for the post of school president. The pie graph displays the result of the election. Read the pie chart and answer the questions (Q1 to Q4)



Q. (1) who became the school president

- (a) Raj
- (b) Akshay
- (c) Peter
- (d) Julie

Q. (2) what fraction for vote did Pawan get?

- (a) $\frac{3}{20}$
- (b) $\frac{1}{20}$
- (c) $\frac{1}{10}$
- (d) 20



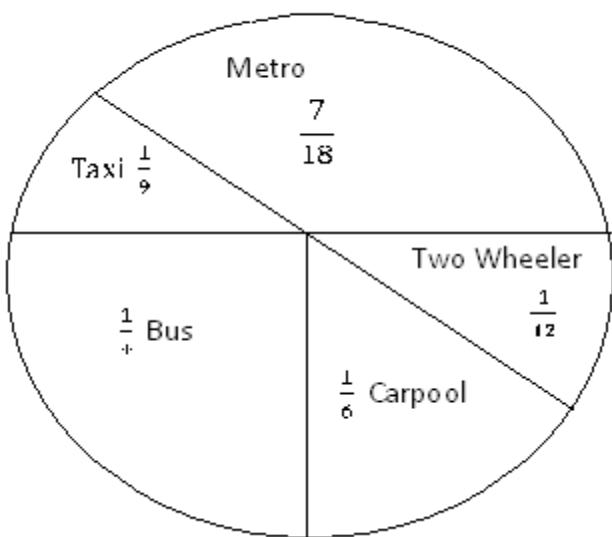
Q. (3) how many votes did Peter get than Julie?

- (A) 240
- (b) 120
- (c) 360
- (d) 100

Q. (4) what is the percentage of vote received by Akshay?

- (A) 60%
- (b) 50%
- (c) 70%
- (d) 45%

Delhi is distinguished from other cities for its significant use of public transportation. The pie chart shows the fraction of population commuting by different modes of public transport- Study the graph and answer the Questions (Q5 to Q8)



Q. (5) what fraction of people use the metro?

- (A) $\frac{7}{18}$
- (B) $\frac{7}{16}$
- (c) $\frac{1}{4}$
- (d) $\frac{1}{6}$

Q. (6) which mode of transport is used by one- ninety of population?

- (A) Carpool
- (b) Bus
- (c) Taxi
- (d) Metro

Q. (7) which transport is used three times more than two wheeler?

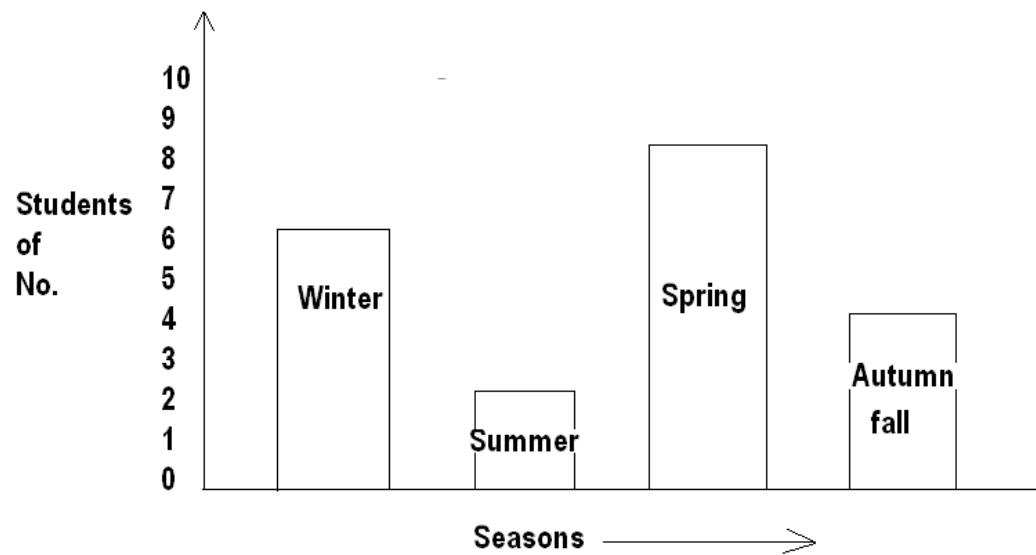
- (A) Bus
- (b) Taxi
- (c) Metro
- (d) Carpool

Q. (8) which transport is used by the least fraction of people?

- (A) Two wheeler
- (b) Metro
- (c) Bus
- (d) Taxi

Mrs. Anuja asked her student about their favorite seasons. She recorded the result in a bar graph to answer the question (Q9 to Q12)





Q. (9) how many students likes autumn?

- (A) 5
- (b) 6
- (c) 4
- (d) 8

Q. (10) how many like winter?

- (A) 6
- (b) 5
- (c) 7
- (d) 8

Q. (11) which season is most popular?

- (A) Spring
- (b) summer
- (c) Winter
- (d) autumn

Q. (12) which season is least popular?

- (A) winter
- (b) autumn
- (c) spring
- (d) winter

Answers

- 1. A
- 2. A
- 3. B
- 4. D
- 5. A
- 6. C
- 7. A
- 8. A
- 9. C
- 10. A
- 11. A
- 12. D

Projects and video game based labs:

1. Collect data of trees inside your society or colony or sports complex or garden nearby. Write names of trees, total quantity of tree, type of trees. Develop one table and present them in graph format
2. Write total number of students in class , boys and girls students , age of students and marks obtained in mathematics.
3. Represent them in different graphical form i.e.Pie , histogram etc.
4. Mixed vegetables and fruits in a basket like potatoes, apples , oranges, lady fingers, capsicums etc are mixed in one basket. Make a list of all items with quantity in this basket. Find out percentage of each items. Place them in the chart format.
5. Generate video game of this project by mixing vegetables and fruits in a basket and generate data of these vegetables and fruits.
6. Generate video game of polling station in any locality.



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7. Let the students make a visit to society they live in and make list of cars parked in the society in total. Now let them record their make. Let them place these car in tabular form with make, quantity of each.
8. Vegetables and fruits activity on video game for counting, placing them in tabular form and plotting graphs of different types.
9. Vegetable bag containing 5 Kg mix of different vegetables i.e. potato , lady finger, tomato, tinda , ginger , count number of pieces of all type of vegetables and place them in a table. Now segregate and place them in different container. Thus, a data is generated.
10. In a Class room total number of boys and girls counting and placing them in a table can be an example of data. Number of students scored more than 90 percent marks can be a new class of data. Students age can also be a data.
11. Number of total lectures delivered periods in a week, day, month can be a data .This data can be mined based on subjects

NOTE: Data driven concept, study and contents can make students understand better.



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Chapter -9 Mixer and allegations

Introduction: Mixer is combination of two matters or materials in some proportions. Objective is to quantify these materials based on certain relationships. In this image, water and milk is shown to produce mixture of thick and thin milk. The cost of milk will depending upon quality of mixture.

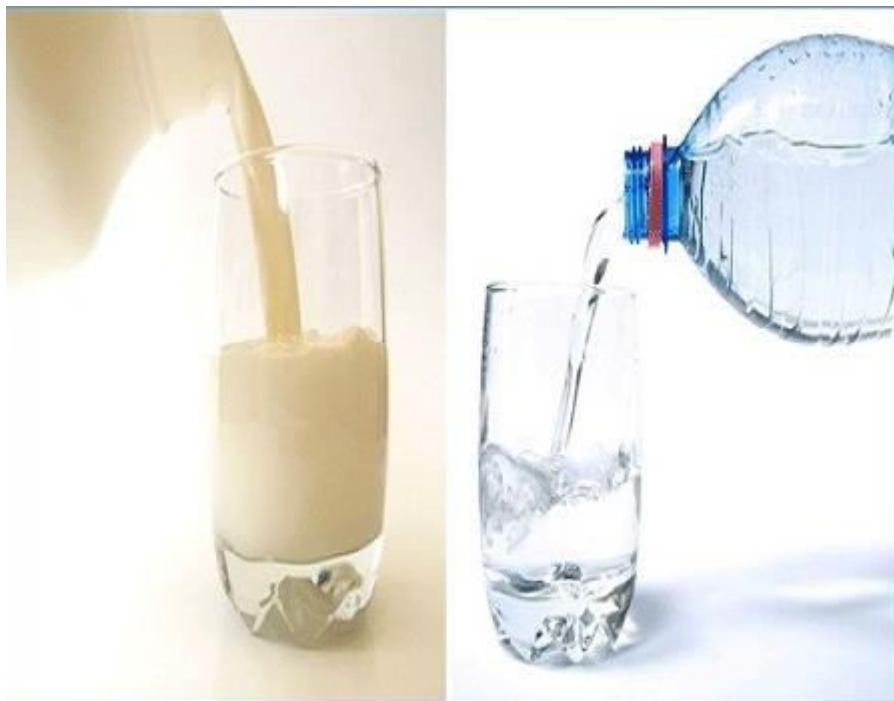


Fig 1 Milk mixture preparation by adding certain amount of water

Air Composition (% by volume)

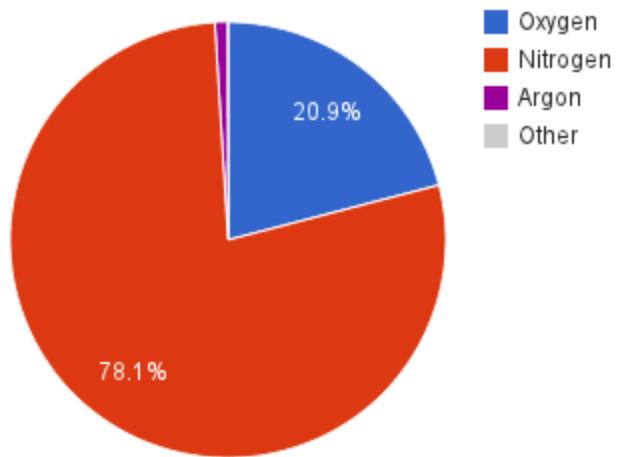


Fig 2 Air in atmosphere is mixture



Fig 3 Coffee in a cup is mixture



Fig 4 Green Chatni is a mixture

MIXTURE

A Mixture is basically combination of two or more substance i.e. is mixing of two or more substance.

For example:-

- 1) 30% acid solutions is mixed 70 % acid solutions.
- 2) 20% water is mixed with 80% pure milk.



ALLIGATION

It is the rule that enables us to find the ratio in which two or more ingredients at the given price must be mixed to produce a mixture of a desired price. A process



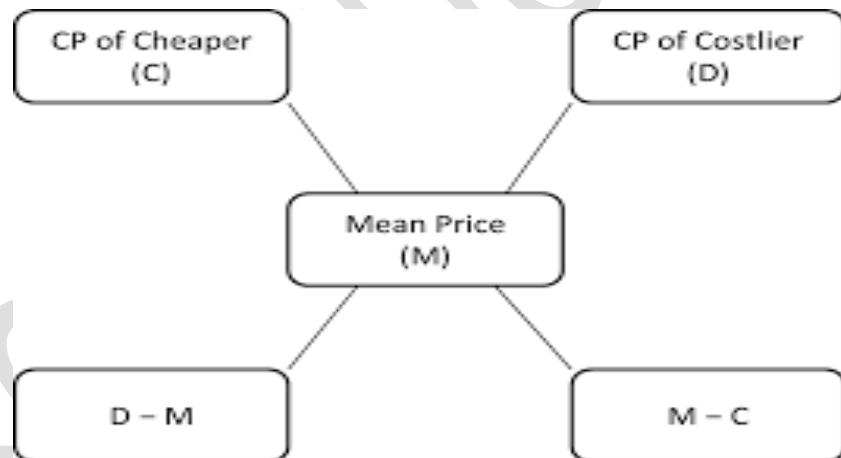
or rule for the solution of problems concerning the compounding or mixing of ingredients differing in price or quality.

MEAN PRICE

The cost price of a unit quantity of the mixture is called the mean price.

BASIC FORMULA

If two ingredients A and B of price x and y respectively are mixed and the price of resultant mixture is M (mean price) then the ratio (R) in which ingredients are mixed is given by, the rule of allegation



Thus the required ratio is

$$R = \frac{D-M}{M-C}$$

MIXTURE OF MORE THAN TWO ELEMENTS



In order to calculate final ratio of ingredients when mixture contains more than two ingredients,

1. Take two ingredients such that 1st ingredient is LOWER than the mean value and the other one is HIGHER than the mean value.
2. Calculate the ratio of ingredients
3. Repeat for all possible pairs
4. Final ratio is the ratio obtained from step 2 (if an ingredient is common in the ratios, add values for this particular ingredient)

Mixer and allegations- SOLVED QUESTIONS

Q (ps-1) If 20 ltr of milk and 10 ltr of water are mixed in a container , what is the volume of total solution.

Ans : $20 \text{ ltr} + 10 \text{ ltr} = 30 \text{ Ltr}$

Q (ps-2) Calculate percentage of water in the total solution of above mixture?

Ans : $(10 / 30) \times 100 = 33.3\%$

Q (ps-3) If impurity in solution is 10%, what is purity of solution?

Ans: 90%

Q (ps-4)How many liters of 20 % milk should be added to 160 liters of a 70 % milk to obtain a mixture that is a 30% milk solution?

Ans: let x be the amount of 20 % milk

$$20 \% \text{ of } x + 70 \% \text{ of } 160 = 30 \% \text{ of } (x + 160)$$

$$\frac{20}{100} \times x + \frac{70}{100} \times 160 = \frac{30}{100} (x + 160)$$

$$0.20x + 0.70(160) = 0.30(x + 160)$$

$$0.30x - 0.20x = 112 - 48$$



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$$\Rightarrow 0.10x = 64$$

$$\Rightarrow \frac{10}{100}x = 64$$

$$\Rightarrow x = \frac{64 \times 100}{10} = 640$$

Hence, add 640 liter of 20 % milk solutions

Q(ps-5) How many liters of 10 % milk should be added to 80 liters of a 35 % milk solution to obtain a mixture that is a 30% milk solution?

Ans : Let x be the amount of 10 % milk solution

$$10 \% \text{ of } x + 35 \% \text{ of } 80 = 30\% \text{ of } (x + 80)$$

$$\frac{10}{100} \times x + \frac{35}{100} \times 80 = \frac{30}{100} (x + 80)$$

$$0.10x + 0.35(80) = 0.30(x + 80)$$

$$0.30x - 0.10x = 28 - 24$$

$$\Rightarrow 0.20x = 4$$

$$\Rightarrow \frac{20}{100}x = 4$$

$$\Rightarrow x = \frac{4 \times 100}{20} = 20$$

Hence, add 20 liter of 10 % milk solutions

UNSOLVED QUESTIONS

Q (pq9.1) A person stole milk from a shop which contained 40% of milk and he replaced what he had stolen by milk containing only 16% milk. The shop has then the milk having strength of 24% only. How much did the person steal?

Q (pq9.2) A flask contain 160 mL of solution that is 25% milk by volume. How much milk must be added to the flask so that the resulting solution is 60% milk by volume?

Q (pq-3) 85 litre mixture contain milk and water in the ratio 27 :7. How much more water is to be added to get a new mixture containing milk & water in the ratio 3: 1



ANSWERS

Ans(1) Shopkeeper has $\frac{1}{3}$ part and thief has $\frac{2}{3}$ part

Ans(2) 140 ml

Ans(3) 5 litre

Some more solved questions:

Q (1) In what proportion must rice at Rs. 3.00 per kg be mixed with rice at Rs. 4.00 per kg so that the mixture be worth Rs. 3.80 a kg?

Ans By the allegation rule

$$\frac{\text{(quantity of cheaper rice)}}{\text{(Quantity of dearer rice)}} = \frac{20}{80} = \frac{1}{4}$$

∴ They must be mixed in ratio 1 : 4

Q (2) the average age of Boys is 20 and the average age of girl is 25 years. Find the ratio of Boy and girl if the average age of class is 22 years

Ans s Let Boys = x

Girls = y

$$\frac{20x + 25y}{x+y} = 22$$

$$20x + 25y = 22x + 22y$$

$$25y - 22y = 22x - 20x$$

$$3y = 2x$$

$$\Rightarrow \frac{x}{y} = \frac{2}{3}$$

The ratio of Boy + girl is 2:3

Q (3) Two varieties of sugar I Rs. 5 per kg & 2nd Rs. 7 per kg mixed together. The average cost is Rs. 6.5 per kg. In what ratio he mixed both varieties?

Ans Let 1 variety be x

2 variety be y

$$\frac{5x + 7y}{x+y} = 6.5$$

$$5x + 7y = 6.5x + 6.5y$$

$$7y - 6.5y = 6.5x - 5x$$

$$0.5y = 1.5x$$

$$\Rightarrow \frac{x}{y} = \frac{0.5}{1.5}$$



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$$\Rightarrow \frac{x}{y} = \frac{1}{3}$$

the two varieties mixed in 1:3

Q (4) the average height of girls is 156 cm and that of boys is 174 cm, if the average height of all the class is 160 cm. calculate the ratio of girls & boys in the class

Ans By allegation rule

$$\text{Ratio of girl & boy} = \frac{14}{4} = 7:2$$

Q (5) Raju bought a wheat for 30 per pound & other type at so per pound. If he mixed the wheat in a certain ratio and the mixture cost 33 per pound calculate the ratio in which the quantities are mixed

Ans By allegation rule

the ratio of 1 & 2 = 17:3 type of wheat

Q (1) what is the Freezing point of water (in o_C)

Ans $0 o_C$

Q (2) what is the Freezing point of water (in o_F)

Ans $32 o_F$

Q (3) what is boiling point of water (in o_C)

Ans $100 o_C$

Q (4) what is the boiling point of water (in o_F)

Ans $212 o_F$

Q (5) what is the room temperature (in o_C & in o_F)

Ans $25 o_C$ $77 o_F$

Unsolved questions

Q (1) two varieties of pulses I Rs. 20per kg & Rs. 25kg are mixed together. The average cost is Rs. 22per kg. Is Rs. 22per kg. In what ratio both varieties are mixed?

Q (2) A gold smith has two Quantities of Gold one of 12 carat and other of 20 carat. In what proportion should he mix both to make an armament of 18 carat?

Q (3) Suman bought a rice for 20 per kg and other type at so per kg. If he mixed the rice in a certain ratio and the mixture cost Rs. 38 per kg calculate the ratio in which the quantities are mixed?

Q (4) the average weight of boy in a school is 58 kg and that of girl is 48 kg. If the average weight of world is 55 kg. Calculate the ratio of boy & girls?



Q (5) two varieties of salt are I type Rs. 4 per kg & 2n Rs. 8 per kg. The average cost is Rs. 5 per kg. In what ratio both varieties of salt are mixed?

Answers

- Ans (1) 3 : 2
- Ans (2) 1:3
- Ans (3) 2:3
- Ans (4) 7 : 3
- Ans (5) 3 : 1

Worksheet:

Quiz : Q. (1) a mixture contains milk and water in the ratio 4:3. If 5 liters of water is added to the mixture, the ratio becomes 4:5. Find the ratio quantity of milk in the given mixture?

- (A) 10 liters
- (b) 5 liters
- (c) 6 liters
- (d) 8 liters

Q. (2) an alloy to contain topper and Zinc in the ratio 9:4. How much Zinc required to be melted with 24 Kg of topper?

- (A) $10\frac{2}{3}$ Kg
- (b) $10\frac{1}{3}$ Kg
- (c) $9\frac{2}{3}$ Kg
- (d) 9 Kg



Q. (3) 60 Kg of an alloy A is mixed with 100 Kg of alloy B. If alloy A has lead & tin in the ratio 3:2 and alloy B has tin & copper in the ratio 1:4 find the amount of tin in the new alloy?

- (A) 36 Kg
- (b) 44Kg
- (c) 53Kg
- (d) 80 Kg

Q. (4) 15 liters of mixture contain 20% alcohol and the rest water. If 3 liters of water be mixed with it. Find the percentage of alcohol in the new mixture?

- (A) 15%
- (b) $16\frac{2}{3}\%$
- (c) 17%
- (d) $18\frac{1}{2}\%$

Q. (5) 20 liters of mixture contain milk and water in the ratio 5:3. If 4 liters of this mixtures be replaced by 4 liters of milk. What would be the ratio of milk to water in the new mixture?

- (A) 2: 1
- (b) 8: 3
- (c) 7: 3
- (d) 4: 3

Q. (6) 85 Kg of mixture contain milk and water in the ratio 27:7 how much more water is to be added to get a new mixture containing milk and water in ratio 3:1?

- (A) 2Kg
- (b) 1Kg



- (c) 3 Kg
- (d) 5 Kg

Q. (7) in what ratio must a grocer mix two varieties of rice costing Rs. 15 & 20 per Kg respectively as to get a mixture worth Rs. 16.50 per Kg?

- (A) 3: 7
- (b) 7: 3
- (c) 5: 7
- (d) 7: 5

Q. (8) in what ratio must sugar at Rs. 62 per kg be mixed with sugar at Rs. 72 per kg so that the mixture must be worth Rs. 64.50 per Kg?

- (A) 3: 1
- (b) 4: 3
- (c) 3: 2
- (d) 5: 3

Q. (8) in what ratio must sugar at Rs. 62 per kg be mixed with sugar at Rs. 72 per kg so that the mixture must be worth Rs. 64.50 per Kg?

- (A) 3: 1
- (b) 4: 3
- (c) 3: 2
- (d) 5: 3

Q. (9) one quantity of wheat at Rs. 9.30 per Kg is mixed with another quality at a certain rate in the ratio 8:7. If the mixture so formed be worth Rs. 10 per Kg. what is the rate per Kg of the second quality of wheat?

- (A) 10.30



- (b) 10.60
- (c) 11
- (d) 10.80

Q. (10) Silver is 19 times as heavy as water & copper is a times as heavy as water.
In what ratio should these be mixed to get an alloy 15 times as heavy as water?

- (A) 1: 1
- (b) 2: 3
- (c) 1: 2
- (d) 3: 2

Q. (11) tin & copper are matted together in the ratio 9:11 what is the weight of melted mixture. If 28.8Kg of him has been consumed in it?

- (A) 58Kg
- (b) 60Kg
- (c) 64 Kg
- (d) 70 Kg

Q. (12) in what ratio must close at Rs. 9.30 per kg be mixed with coffee at Rs. 10.80 per kg so that the mixture be worth Rs. 10 per Kg.?

- (A) 8: 7
- (b) 7: 9
- (c) 7: 15
- (d) 8: 15

Answers

1. A



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- 2. A
- 3. B
- 4. B
- 5. C
- 6. D
- 7. B
- 8. A
- 9. D
- 10.D
- 11.C
- 12.A

Q.1 Take one glass of water having 300ml + add 500ml milk what is ratio of mixture?

Q.2 Tea have ratio of water : milk as 2:3 calculate amount of water and milk in 500 ml tea

Q.3 Coffee has mixture of coffee beans , milk , sugar as 1:3:1 in 200ml , calculate quantity of each.

Q.4 A gold smith has two Quantities of Gold one of 12 carat and other of 20 carat. In what proportion should he mix both to make an armament of 18 carat?

Q.5 Suman bought a rice for 20 per kg and other type at 30 per kg. If he mixed the rice in a certain ratio and the mixture cost Rs. 38 per kg calculate the ratio in which the quantities are mixed?

Q.6 the average weight of boy in a school is 58 kg and that of girl is 48 kg. If the average weight of world is 55 kg. Calculate the ratio of boy & girls?

Q.7 two varieties of salt are I type Rs. 4 per kg and Rs. 8 per kg. The average cost is Rs. 5 per kg. In what ratio both varieties of salt are mixed?



Projects:

1. Take one glass of water add one spoon salt into it and taste it. It is salty

Now add two spoons of salt and taste it. Now is more salty and having more salty.

Now add one more spoon salt it will become more salty due to three spoon salts

Taste independently water and salt.

1. Tea and coffee is also mixture of milk , sugar and tea or coffee. Qty of each item can be placed in table form
2. Getting chatni made from mixy or grinder is mixture. Hence, chatni green or red we eat with dosa or roti is mixture.
3. Air is mixture of nitrogen 78%, oxygen 21% and gases 1%. Test these contents.
4. Birthday cake is mixture of maida , sugar , milk , egg ,baking soda , chocolate etc. Tabulate contents qty.
5. Mix two water colors in transparent tube with water and see changes in the color, now mix one more color and see changes. This is mixture.
6. Take one basket and place few mangoes, apples , potatoes , capsicum and lady fingers. Roll basket so that these items have been mixed. Now make a table of these with items name and quantity . We can place them in percentage, item wise.



Chapter -10 Speed, Time and Distance

Introduction: Train moving at the rate of 90kms per hr from Delhi to Mumbai. If the distance between two cities is 1800 kms, how much time it will take to reach the destination. Here, speed of train is fixed , hence it is very easy to calculate the time.



Fig p-23 train track on which trains are moving and the school bus is passing through under pass.

Speed and Distance-SOLVED QUESTIONS

Q_1 The school bus carrying 8th class student cover 25 Km in 1 hour the school bus carrying teaching staff cover 35 Km in hour what is the difference in their speed

Ans Time taken by school bus carrying 8th class student = 1 hour

Distance covered = 25 Km

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{25}{1} = 25 \text{ Km/hr}$$

Time taken by school bus carrying teaching staff= 2 hour

Distance covered = 35 Km

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{35}{2} = 17.5 \text{ Km/hr}$$

Difference in Speed = $25 - 17.5 = 8.5 \text{ Km/hr}$

Q_2 In a race two student Ajay & Vikas is cycling at a speed of 25 Km/hr & $8\frac{m}{sec}$ who will win the race ?

Ans Ajay is cycling at a speed of 25 Km/hr

Vikas is cycling at a speed of 8 m/sec

$$1\frac{m}{sec} = \frac{18 \text{ km}}{5 \text{ hr}}$$

$$\text{Vikas s cycling at a speed of } \frac{8 \times 18}{5} = 28.8 \text{ Km/hr}$$

So, Vikas will win the race



Q.3 In a school, the competition of shooting held, & Akshay fired a gun and the sound it was heared by Sanjay at distance of 4 Km. The Speed of the sound in air is 1000 Km/hr . Find the time taken by sound to reach sanjay rom Akshay after the bullet was fired

Ans Speed of sound = 1000 Km/hr

Distance travel by sound = 4 Km/hr

$$\text{Time Taken} = \frac{\text{Distance}}{\text{Time}} = \frac{4}{1000} \times 60 \times 60 \text{ Sec}$$
$$= 14.4 \text{ Sec}$$

Q.17 the school bus runs at maximum speed of 65 m/sec what distance it cover in 30 sec

Ans time = 30 sec

Speed = 65m/sec

Distance = Speed× Time

$$= 65 \times 30 = 1950 \text{ m}$$

Q.19 Find the speed of the cyclist racing in a competition when it covers a distance of 350 in 20sec.

Convert the speed m/sec into Km/hr

Ans Distance = 350 m

Time = 20 sec

Speed = $\frac{\text{Distance}}{\text{Time}}$

$$\text{Speed} = \frac{350}{20} = 17.5 \frac{\text{m}}{\text{sec}}$$

$$1 \text{ m/sec} = \frac{18}{5} \text{ Km/hr}$$

$$17.5 \text{ m/sec} = \frac{17.5 \times 18}{5}$$

$$= 63 \text{ Km/hr}$$

Problems on train

Speed = $\frac{\text{Distance}}{\text{Time}}$

the SI unit of distance is Km or metse

1 Km = 1000 m

The SI unit of speed is m/sec or Km/hr

$$1 \text{ Km/hr} = \frac{5}{18} \text{ m/sec}$$

$$1 \text{ m/sec} = \frac{18}{5} \text{ Km/hr}$$

the SI unit of time is second or hour

Time taken by train of length x meters to pass a pole or a standing man or a signal post is equal to the time taken by train to cover x meters

Time taken by train of length x meters to pass a platform of length y meters is the time taken by train to cover (x+y)

If two train are moving in the same direction at x m/sec or y m/sec where x>y. The relative velocity = x+y m/sec



If two train are moving in opposite direction at x m/sec & y m/sec the relative velocity = $x+y$ m/sec.

Q (1) A train 200 m long is running at speed of 25 m/sec find the time taken by train to pass a man standing near the railway line

Ans Speed = 25 m/sec

Distance = 200 m

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\text{Time} = \frac{200}{25}$$

$$\text{Time} = 8 \text{ sec}$$

Q (2) a train moves with the speed of 30 m/sec convert it into Km/hr?

Ans Speed = 30 m/sec

$$1 \text{ m/sec} = \frac{18}{5} \text{ Km/hr}$$

$$30 \text{ m/sec} = 30 \times \frac{18}{5}$$

$$= 108 \text{ Km/hr}$$

so speed of the train in Km/hr is 108 Km/hr

Q (3) a train moves with speed of 54 Km/hr . Convert into m/sec?

Ans Speed = 54 Km/hr

$$1 \text{ Km/hr} = \frac{15}{18} \text{ M/sec}$$

$$54 \text{ Km/hr} = \frac{5}{18} \times 54$$

$$= 15 \text{ m/sec}$$

So, speed of the train in m/sec is 15 m/sec

Q (4) a train 280 m long, running with of 63 Km/hr. Find the time taken by it to pass a pole?

Ans Distance = 280 m

Speed = 63 Km/he

$$1 \text{ Km/hr} = \frac{5}{18} \text{ m/sec}$$

$$63 \text{ Km/hr} = 63 \times \frac{5}{18}$$

$$= \frac{35}{2} \text{ m/sec}$$

$$\Rightarrow \text{Speed} = \frac{35}{2} \text{ m/sec}$$

we know that

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\text{Time} = \frac{280}{\frac{35}{2}}$$



$$\text{Time} = 280 \times \frac{2}{35}$$
$$\Rightarrow \text{Time} = 16 \text{ sec}$$

Q (5) How long does a train 110 metres long running at the speed of 72 Km/hr take to cross a bridge 132 metres in length?

Ans Speed = 72 Km/hr

$$1 \text{ Km/hr} = \frac{5}{18} \text{ m/sec}$$

$$\text{speed} = 72 \times \frac{5}{18} = 20 \text{ m/sec}$$

length of train = 110 metres

length of bridge = 132 metres

$$\text{total distance} = 110 + 132 = 242 \text{ m}$$

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\text{Time} = \frac{242}{20}$$

$$\text{Time} = 12.1 \text{ sec}$$

Q (6) a train of length 150 m takes 40.5 seconds to cross a tunnel of length 300 metres what is the speed of the train in Km/hr?

Ans Length of train = 150 m

Tunnel length = 300 m

$$\text{Total Distance} = 150 + 300 = 450 \text{ m}$$

Time = 40.5 sec

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed} = \frac{450}{40.5} \text{ m/sec}$$

$$1 \text{ m/sec} = \frac{18}{5} \text{ Km/sec}$$

$$\text{Speed} = \frac{450}{40.5} \times \frac{18}{5}$$

$$= 40 \text{ Km/hr}$$

Q (7) a train 132 m long passed a telegraph pole in 6 second find the speed of the train in Km/hr

Ans Distance = 132 m

Time = 6 sec

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed} = \frac{132}{6} \text{ m/sec}$$

$$1 \text{ m/sec} = \frac{18}{5} \text{ Km/hr}$$

$$\text{Speed} = \frac{132}{6} \times \frac{18}{5}$$

$$\text{Speed} = 79.2 \text{ Km/hr}$$



Q (8) a train 240 m long passed a pole in 24 second. How long will it take to pass a platform 650 m long?

Ans Length of train = 240 m

Train passed a pole in 24 sec

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed} = \frac{240}{24} = 10 \text{ m/sec}$$

Length of platform = 650 m

Total Distance = 240 + 650 = 890 m

Speed = 10 m/sec

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\text{Time} = \frac{890}{10}$$

Time = 89 second

Q (9) Two trains 100 metres & 120 metres long are running in the same direction with speed of 72 Km/hr & 54 Km/hr. In how much time will the first trains cross the second?

Ans Relative speed of the train = $72 - 54 = 18 \text{ Km/hr}$

$$1 \text{ Km/hr} = \frac{5}{18} \text{ m/sec}$$

$$\text{Relative speed} = 18 \times \frac{5}{18} = 5 \text{ m/sec}$$

Total Distance = $100 + 120 = 220$

$$\text{Time taken by train to cross each other} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{220}{5} = 44 \text{ sec}$$

Q (10) Two train moving in opposite direction @ 60 Km/hr & 90 Km/hr their length are 1.10 Km & 0.9 Km respectively. Find the time taken by the slower train to cross the faster train?

Ans Relative speed = $60 + 90 = 150 \text{ Km/hr}$

$$1 \text{ Km/hr} = \frac{5}{18} \text{ m/sec}$$

$$\text{Relative speed} = 150 \times \frac{5}{18}$$

$$= \frac{125}{3} \text{ m/sec}$$

Distance covered = $1.10 + 0.9 = 2 \text{ Km} = 2000 \text{ m}$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\text{Time} = \frac{2000}{\frac{125}{3}}$$

$$\text{Time} = 2000 \times \frac{3}{125}$$

$$= 48 \text{ sec}$$

Q (11) Two trains of equal length take 10 seconds and 15 seconds respectively to cross a telegraph



post. If the length of each train be 120 metres, in what time will they cross each other travelling in opposite direction?

Ans Time taken by first train = 10 second

Time taken by second train = 15 second

length of both train = 120 m

$$\text{speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed of first train} = \frac{120}{10} = 12 \text{ m/sec}$$

$$\text{Speed of second train} = \frac{120}{15} = 8 \text{ m/sec}$$

$$\text{Relative speed} = 12+8 = 20 \text{ m/sec}$$

$$\text{Total Distance} = 120+120 = 240$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{240}{20} = 12 \text{ second}$$

Q (12) a man standing on a railway bridge which is 180 m long. He finds that a train crosses the bridge in 20 seconds but him in 8 seconds. Find the length of the train & its speed?

Ans Let length of train be x more train covers x metre in 8 second & $(x+180)$ metre in 20 seconds

$$\therefore \frac{x}{8} = \frac{x+180}{20}$$

$$20x = 8x + 1440$$

$$20x - 8x = 1440$$

$$12x = 144$$

$$\Rightarrow x = \frac{1440}{12} = 120$$

$$\Rightarrow \text{Length of the train} = 120 \text{ m}$$

we know that

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed} = \frac{120}{8} \text{ m/sec}$$

$$1 \text{ m/sec} = \frac{18}{5} \text{ Km/hr}$$

$$\text{Speed} = \frac{120}{8} \times \frac{18}{5}$$

$$\text{Speed} = 54 \text{ Km Ph}$$

Q (ps10.1) The school bus run at maximum speed of 65 m/sec, what distance it will covers in 30 sec?

Ans: Time = 30 sec

speed = 6 m/sec

Distance = speed \times time



$$= 65 \times 30 = 1950 \text{ m}$$

(ps10.2) A School bus running at the rate of 5 Km/hr, crosses a bridge in 15 minute. Find the length of the bridge (in meters) ?

Ans: Speed = 5 Km/hr = $\frac{5 \times 5}{18} = \frac{25}{18} \text{ m/sec}$

Distance = Speed \times Time

Time = 15 minute = $15 \times 60 = 900 \text{ sec}$

Distance covered = $(\frac{25}{18} \times 100) \text{ m} = 1250 \text{ m}$

UNSOLVED QUESTIONS

Q (ps10.1) The school bus run at maximum speed of 60m/sec what distance it covers in 20 sec

Q (ps10.2) The school bus is running at a speed of 108 Km/hr. What distance will it cover in 15 second?

Q (ps10.3) The Distance between school and home of Rajesh is 50 Km. The school bus cover the distance from home to school 25 km per hour and return back at speed of 20 km per hour. Find the average speed of the bus ?

ANSWERS

1) Distance = 450m

2) Distance = 1200

3) 22.2 km/hr

Worksheet:

Quiz:

Q.1 Secondary school is 20 kms from residence, bus is moving at a speed of 40 kmph, how much time it will take to reach school.

Q.2. Speed of bus is 30 kmph , travel time is 20 minutes , calculate distance of school from residence.

Q.3 Distance school is 5kms from residence and it takes 10 minute to reach to school. At what speed bus is plying?

Q.4 On a River Bridge bus running is moving at the rate of 5 km/hr, crosses a bridge in 15 minute. Find the length of the bridge.

Q.5 train 250 m long passed a pole in 25 second. How long will it take to pass a platform 750 m long?



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Quiz additional questions:

Q. (1) a school bus moves at the speed of 80 Km/hr what is the speed of the school bus in m/sec?

- (a) 8 m/Sec
- (b) 80 m/Sec
- (c) $22\frac{2}{9}$ m/Sec
- (d) $22\frac{1}{9}$ m/sec

Q. (2) a school coves 200 meter in 24 second find the speed of the school bus?

- (a) 20Km/hr
- (b) 24 Km/hr
- (c) 28.5 Km/hr
- (d) 30 Km/hr

Q. (3) a school bus is running at a speed of 108 Km/hr what distance will it cover in 15 seconds?

- (a) 450m
- (b) 400m
- (c) 500m
- (d) 486m

Q. (4) a school student run race of 750m in 2 min 30sec. What is the speed of the student?

- (a) 18Km/hr
- (b) 15 Km/hr
- (c) 12 Km/hr
- (d) 14 Km/hr

Q. (5) a school bus running at a speed of 5 Km/hr crosses a bridge in 15 minutes. Find the length of the bridge in metres?

- (a) 600
- (b) 750
- (c) 1000
- (d) 1250

Q. (6) how long will a boy take to run round a square field of side 35 metres, if runs at a rate of 9 Km/hr?



- (a) 50Sec
- (b) 52Sec
- (c) 54Sec
- (d)56Sec

Q. (7) a speed of 36 Km/hr is same as?

- (a) 57 m/Sec
- (b) 10 m/Sec
- (c) 5 m/Sec
- (d) 8 m/Sec

Q. (8) a speed of 55m/sec is same as?

- (a) 198 Km/hr
- (b) 111 Km/hr
- (c) 178 Km/hr
- (d) 200 Km/hr

Q. (9) a school bus covered a distance in 2 hour 45 minute at a speed of 4 Km/hr. how much time will be taken to cover it at a speed of 16.5 Km/hr?

- (a) 40 Min
- (b) 41 Min 15 Sec
- (c) 45 Min
- (d) 90 Min

Q. (10) a student walking at 3Km/hr crosses a square field diagonally in 2 minute. Find the area of the field?

- (a) 2500 m^2
- (b) 5000 m^2
- (c) 5200 m^2
- (d) 2600 m^2

Q. (11) a boy goes to school with a speed of 3 Km/hr and return to the village with a speed of 2 Km/hr. If he takes 5 hour in all. Find the distance between the village and the school?

- (a) 6Km
- (b) 7Km
- (c) 8Km



(d) 9Km

Q. (12) the ratio between the speeds of two school buses is 7:8. If the second school bus runs 400 Km in 4 hours find the speed of the first school bus?

- (a) 170 Km/hr
- (b) 180 Km/hr
- (c) 70 Km/hr
- (d) 87.5 Km/hr

Answers

- 1. C
- 2. D
- 3. A
- 4. A
- 5. D
- 6. D
- 7. B
- 8. A
- 9. A
- 10. B
- 11. A
- 12. D

Project:

- 1. Take one stop watch. Organize 100 meters, running race , note down time taken by each student. Now compute speed.
- 2. Note down time of bus start and stop during school journey. Now check meter of bus for distance. Now compute average speed.
- 3. Perimeter circular field or ground is 2kms, one round, two round and three rounds and note down the steps. Now compute average speed , if time is measured in minutes by wrist watch.
- 4. Visit to railway station. note down time each train takes to cross platform. Record time for three or four trains.

Toy trains or battery operated toys can be used for this activity in school labs .



VISCON EDUTECH



Rajveer S Yaduvanshi

Chapter - 11 Probability

Introduction: The school bus reaches in time everyday. There are chances of getting it late once or twice in a month. This may be due to heavy traffic or red light failure or bad weather or problem in bus. Based on this data, probability of getting late can be predicted.

Probability can also be studied as pulling a card of ace, when taken out from 52 cards. In this case , probability of getting desired card is very less.

On tossing a coin , getting head or tail has more probability as compared to pulling a specific card from the bunch of 52 cards.

Similarly , getting four in dice has different set of probability.

Winning a cricket match between two teams has different probability as compared to winning the match when played in between five teams.



Fig1 tossing of a coin

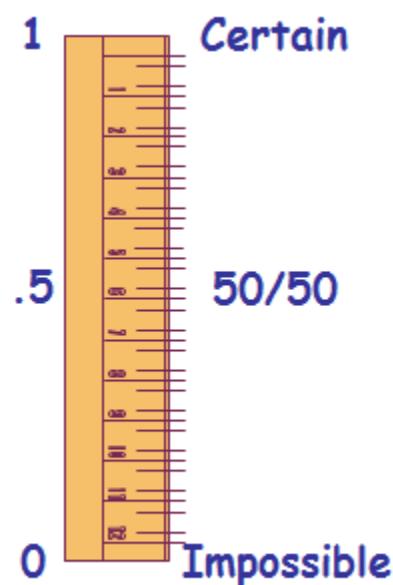
Probability : It is measure of uncertainty or amount of uncertainty of any event. Probability is the mathematics of chance. It tells us the relative frequency with which we can expect an event to occur. The greater the probability the more likely the event will occur. It can be written as a fraction, decimal, percent, or ratio. Probability is the numerical measure of the likelihood that the event will occur.



The Probability is always between 0 and 1 and the Sum of the probabilities of all events is 1.



Basket ball playing



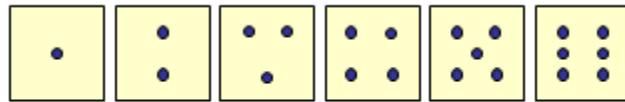
SAMPLE SPACE

A probability experiment is an action through which specific results (counts, measurements, or responses) are obtained.

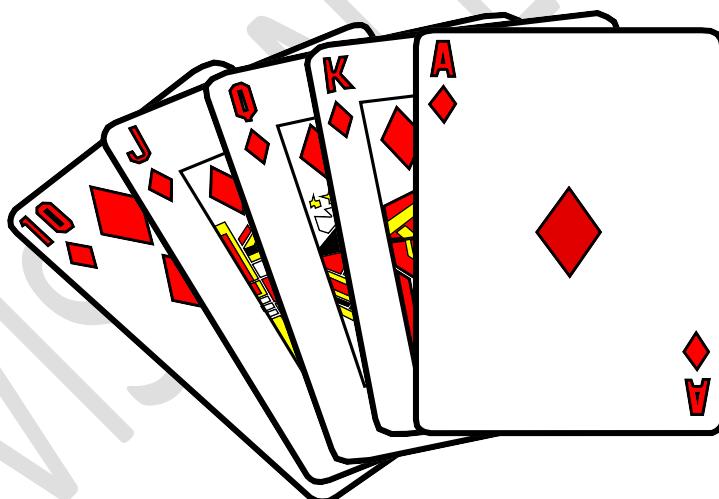
The result of a single trial in a probability experiment is an outcome.

The set of all possible outcomes of a probability experiment is the sample space, denoted as S.

For example:- All 6 faces of a die: $S = \{ 1, 2, 3, 4, 5, 6 \}$



Other Examples of Sample Spaces may include: Lists, Tables, Grids, Venn Diagrams, Tree Diagrams



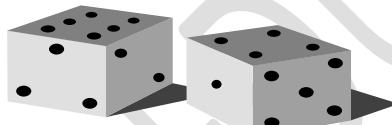
EVENTS

An event consists of one or more outcomes and is a subset of the sample space. Events are often represented by uppercase letters, such as A, B, or C.

Notation: The probability that event E will occur is written $P(E)$ and is read “the probability of event E.” The probability of event E is :-

$$P(E) = \frac{\text{Number of Event Outcomes}}{\text{Total Number of Possible Outcomes in } S}$$

Consider a pair of Dice and Each of the Outcomes in the Sample Space are random and equally likely to occur.



TYPES OF PROBABILITY

There are three types of probability :-

1. THEORETICAL PROBABILITY

Theoretical probability is used when each outcome in a sample space is equally likely to occur.

$$P(E) = \frac{\text{Number of Event Outcomes}}{\text{Total Number of Possible Outcomes in } S}$$



2. EXPERIMENTAL PROBABILITY

Experimental probability is based upon observations obtained from probability experiments.

$$P(E) = \frac{\text{Number of Event Occurrences}}{\text{Total Number of Observations}}$$

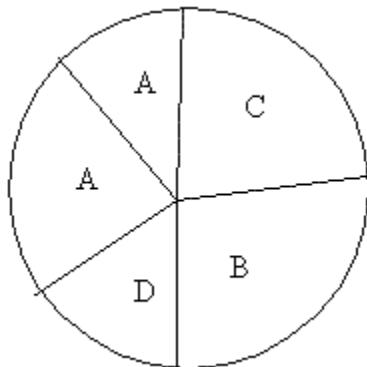
The experimental probability of an event E is the relative frequency of event E

3. SUBJECTIVE PROBABILITY

Subjective probability is a probability measure resulting from intuition, educated guesses, and estimates. Therefore, there is no formula to calculate it. It is usually found by consulting an expert.

SOLVED QUESTIONS

Q(1) List the outcomes you can see in the experiment Spinning a wheel



Ans) The List of Events is as follows: A, B, C, D

Q(2) List the outcomes you can see in the experiment Tossing two coins together

Ans) There will be following combinations of Head and Tail if two coins are tossed together:HH, HT, TH, TT.

Q(3) When a die is thrown, list the outcomes of an event of getting

(i) (a) a prime number (b) not a prime number.

(ii) (a) a number greater than 5 (b) a number not greater than 5.

Ans) List of events when a die is thrown:

1, 2, 3, 4, 5, 6

(i) List of Prime Numbers:- 2, 3, 5

(ii) List of Non-prime numbers:- 1, 4, 6

(iii) List of Number >5:- 6

(iv) List of Number Not greater than 5:-1, 2, 3, 4, 5

Solved questions :

Q(ps-10.1) When a coin is tossed before playing a match, what is the probability of getting head or tail?

Ans : 50%

Q(ps-10.2) what is the winning probability of three teams playing in a group?

Ans: more than uncertainty as compared to two teams.





Fig p-24 Tossing of a coin, which team will bat first is question of probability

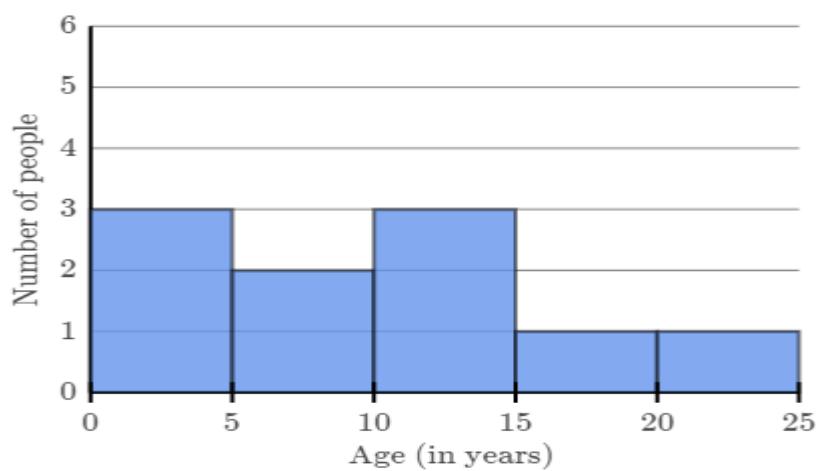


Fig 25 The probability is $3/10$, between 10-15 years of age students

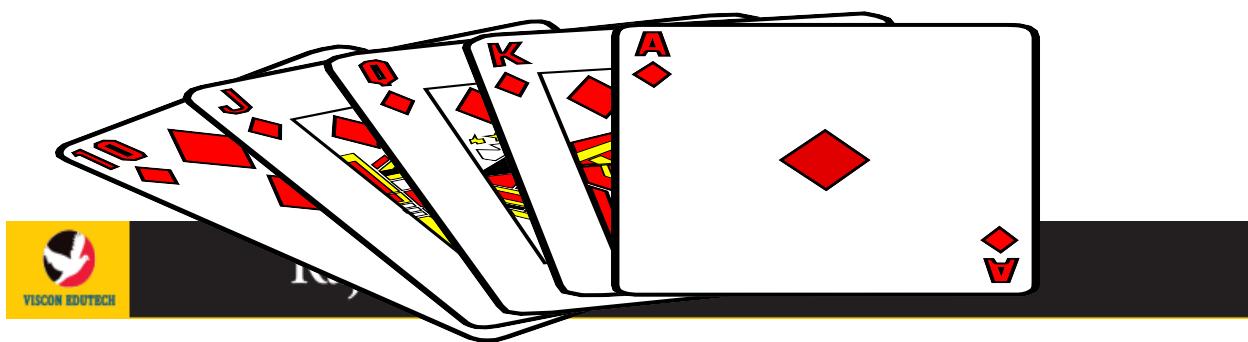


Fig p-26 There are 52 cards, probability of getting ace

SOLVED QUESTIONS{ probability}

Q(ps-1) Find the probability of getting an ace from a well shuffled deck of 52 playing cards?

Ans) : Total Number of events = 52

Number of Favorable outcomes = 4 (because there are 4 aces in a pack of cards)

Probability of favorable outcome = $4/52 = 1/13$.

Q(ps-2) When a die is thrown, list the outcomes of an event of getting

- (a) a prime number (b) not a prime number.
- (c) a number greater than 5 (d) a number not greater than 5.

Ans) List of events when a die is thrown are following

1, 2, 3, 4, 5, 6

- (a) List of Prime Numbers:- 2, 3, 5
- (b) List of Non-prime numbers:- 1, 4, 6
- (c) List of Number > 5 is 6
- (iv) List of Number Not greater than 5 are 1, 2, 3, 4, 5

Q(ps-3) List the outcomes you can see in the experiment Tossing of two coins together

Ans): There will be following combinations of Head and Tail if two coins are tossed together:



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HH, HT, TH, TT.

UNSOLVED QUESTIONS

Q(pq-1). A coin is tossed twice. Find the probability of getting both tails?

Q(pq2). A die is thrown once. Find the probability of getting a prime number.

Q(pq-3). One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting a face card.

Q(pq-4) Two coins are tossed between two teams. If the team will get tail on one coin and head on other coin. They will win the match. Find the probability of winning the match?

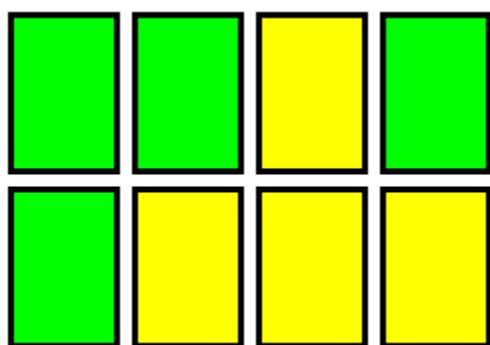
ANSWERS

1. $\frac{1}{4}$
2. $\frac{1}{2}$
3. $\frac{3}{13}$
4. $\frac{1}{2}$

Worksheet:

WS-7 PROBABILITY

Q(1) Pick a card at random.



What is PROBABILITY OF green CARD? Write as a percentage.

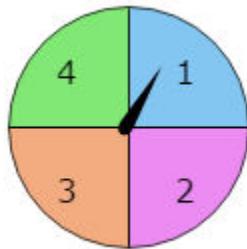
Ans)

Q(2) The basket of golf balls at a miniature golf course contains 16 golf balls, of which 4 are yellow.

What is the probability that a randomly selected golf ball will be yellow?

Ans)

Q(3) spin the spinner once.



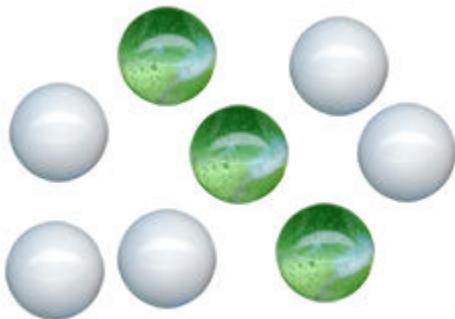
What is P(1)? Write answer as a percentage.

Ans)

Q(4) pick a marble at random.



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What is $P(\text{green})$?

Ans)

Q(5) Shool Teacher has a large collection of shoes. She has 15 pairs of shoes, and 6 of them are sneakers. Chose a pair of shoes at random, what is the probability that the shoes would be sneakers?

Ans)

Answers

- 1) 50%
- 2) $1/4$
- 3) 25%
- 4) $3/8$
- 5) $2/5$

Q(6) Complete the Table on Deck of Cards

S.No.	Questions	Answers
1)	Find the probability of drawing a	



	black card.	
2)	Find the probability of drawing a red card.	
3)	Find the probability of drawing a red or black.	
4)	Find the probability of drawing an ace.	
5)	Find the probability of drawing either a jack or queen or king.	
6)	Find the probability of drawing a heart.	
7)	Find the probability of drawing either a spade or diamond.	

Q(7) Complete the table

There are 5 white balls, 8 red balls, 7 yellow balls and 4 green balls in a container. A ball is chosen at random?

S.No.	Questions	Answers
1)	What is the probability of choosing red?	
2)	What is the probability of choosing green?	
3)	What is the probability of choosing either red or white?	
4)	What is the probability of choosing neither white nor green?	
5)	What is the probability of choosing a ball other than	



	yellow?	
6)	What is the probability of choosing black?	

Answers

6) Table- 1

- 1) $\frac{1}{2}$
- 2) $\frac{1}{2}$
- 3) 1
- 4) $\frac{1}{13}$
- 5) $\frac{3}{13}$
- 6) $\frac{1}{4}$
- 7) $\frac{1}{2}$

7)Table-2

- 1) $\frac{1}{3}$
- 2) $\frac{1}{6}$
- 3) $\frac{13}{24}$
- 4) $\frac{5}{8}$
- 5) $\frac{17}{24}$
- 6) 0

Quiz:



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Project:

- 1.Take one coin and drop on the ground, record head and tail with number of attempts.
- 2.Take one dice and count number of six received when dropped on the ground.
- 3.Basket ball placed in basket and number of attempts.
- 4.Placing a golf ball in hole and number of attempts made .
- 5.Placing kancha in hole by Finger and number of attempts.
- 6.Stopping of casino wheel, when rotated . Position of wheel at digit is question of probability.
7. These all projects can be completed with the help of customized video games.

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Chapter- 12 Logic based questions

Introduction: Visualizing an image and then identifying different characters i.e. birds , animals and other objects. Total numbers are indicated in the image. Now identify the weight to develop logic. Here, three cats have been shown equal to 12kg , hence each cat will have weight of 4kg. Similarly one bird and one cat are shown with cumulative weight of 5kg. It means bird will have weight of 1kg and sheep will have weight of 100kg, This can be seen from third line. Similar type of questions can be developed using logic for primary and secondary education students.

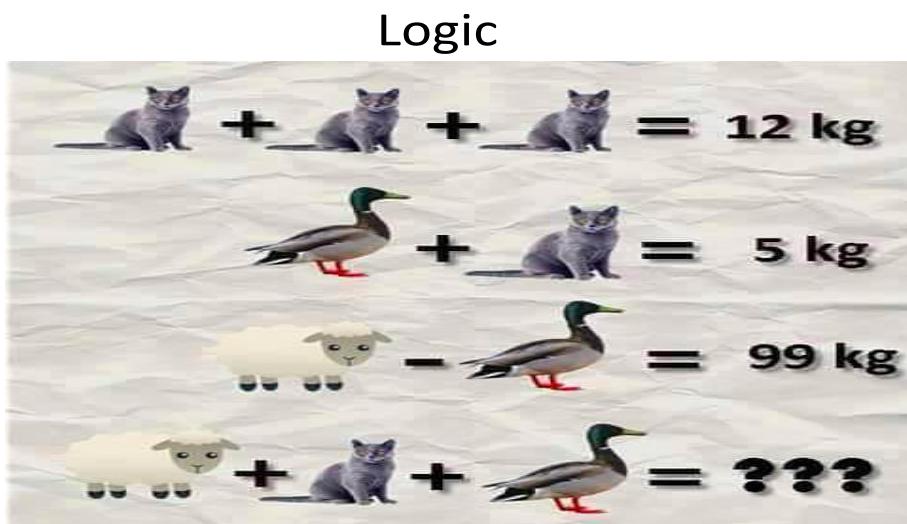


Fig p-27 three different types of variables i.e. cat, bird and sheep

Logic based solved questions:

Q(ps-1) If cat is represented by x ,bird by y and sheep by z , then formulate mathematical equations based on above figure:

Solution: $3x= 12;;$

$$x+ y= 5;$$

$$z-y= 99;$$

$$x + y + z = ?$$

NEW WAY OF EQUATION FORMATION

Algebraic Addition/ Subtraction :-

$$\begin{array}{rcl} \text{bird} + \text{rabbit} & = & 5\text{kg} \\ \text{pig} - \text{bird} & = & 99\text{kg} \\ \text{rabbit} + \text{bird} + \text{rabbit} & = & 12\text{kg} \\ \text{bird} + \text{pig} + \text{rabbit} & = & ??? \end{array}$$

Ans: B= 01, R= 04, P= 100

Fig p-29 The bird, pig and rabbit are used for equation formation

Q(ps-2) Formulate equations using above figure of bird , rabbit and pig.

Let us assume X= bird

Y= rabbit

Z= pig

Then, the equations can be formed as :

$$x+y=5;$$

$$z-x = 99 ;$$

$$x + y + z= ?$$

Unsolved questions:

Q(pq-1) formulate equations based on figure given below:



Find The Answer !

$$\begin{array}{rcl} \square + \square + \square & = & 27 \\ \triangle + \triangle + \triangle + \square & = & 24 \\ \square + \triangle + \circleddash + \circleddash & = & 96 \\ \circleddash + \square + \triangle & = & ? \end{array}$$

Fig p-29 Group of triangle,rectangle and circle with some weight is used for equation

Can you solve this?

$$\begin{array}{rcl} \text{Red flower} + \text{Red flower} + \text{Red flower} & = & 60 \\ \text{Red flower} + \text{Blue flower} + \text{Blue flower} & = & 30 \\ \text{Blue flower} - \text{Yellow flower} & = & 3 \\ \text{Yellow flower} + \text{Red flower} + \text{Blue flower} & = & ? \end{array}$$



Fig p-30 Different type of flowers forming a group with weight.(101)

$$\begin{array}{rcl} \text{Red Tulip} & + & \text{Red Tulip} & + & \text{Red Tulip} = 60 \\ \text{Red Tulip} & + & \text{Purple Flower} & + & \text{Purple Flower} = 30 \\ \text{Purple Flower} & - & \text{Yellow Sunflower} & = 3 \\ \text{Yellow Sunflower} & + & \text{Red Tulip} & \times & \text{Purple Flower} = ? \end{array}$$

if 2 = 6
 3 = 12
 4 = 20
 5 = 30
 6 = 42
then 9 = ?

Fig p-31 solve based on logic

1 = 11
2 = 22
3 = 33
4 = 44
5 = 55
6 = 66
11 = ??

Fig p-32 solve based on logic



$$1 + 4 = 5$$

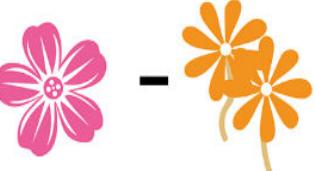
$$2 + 5 = 12$$

$$3 + 6 = 21$$

$$8 + 11 = ?$$


$$+ = 60$$


$$+ = 30$$


$$- = 3$$


$$+ \times = ?$$



$$\begin{array}{rcl} \text{Horse} + \text{Horse} + \text{Horse} & = & 30 \\ \text{Horse} + \text{Horseshoe} + \text{Horseshoe} & = & 18 \\ \text{Horseshoe} - \text{Boot} & = & 2 \\ \text{Boot} + \text{Horse} \times \text{Horseshoe} & = & ?? \end{array}$$

Chapter - 13 Angles

Introduction: Clocks have been used to form angles using needles. Angles are formed between two needles at different time. These clock needles have been used to create different angles between two needles at different times. There are three needles shown in the figure. One is hour needle, second is minute needle and third is second needle. There can be many positions of these needles. Let us take hour needle at 5 and minute needle at 3. The total angle of the clock dial is 360 degree. This 360 divided by 12 , equals to 30 degree. Hence, 5 minute is equal to 30 degree. Thus, in this given figure angle formed between minute and hour needle is $30 \times 2 = 60$.



Fig p-30a A clock and its needles, showing time and angle formed by needles or minute hands

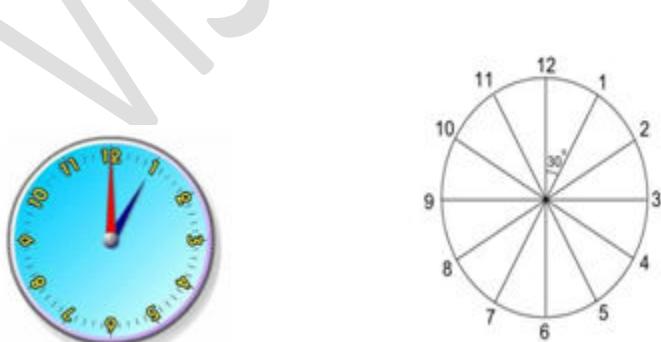
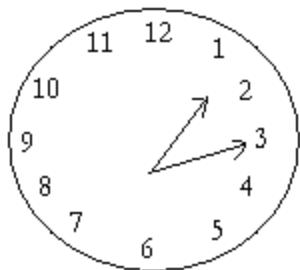


Fig p-31b Clock and angle at one pm angle formed between two hands is 30 degree

Q (ps-1a) what is angle formed by clock when hour needle is at 12 and minute hand needle at 3

Ans: $30 \times 3 = 90$ degree.

Q(ps-1b) What is the arrival time of the train as shown in the clock?



Ans 1:15 hrs, one quarter fifteen

Q (ps-2) What is Reflex angles?

Ans: An angle whose measure is more than 180° is called a reflex angle
the measure of reflex angle is more than 180° and less than 360°

Q (ps-2) What is complementary angle?

Ans : Two angles, the sum of whose measure is 90° degree, are called as complementary angles.
Angles of measure 50° and 40° are complementary angles, because
$$50^\circ + 40^\circ = 90^\circ$$

Q (ps-3) What is supplementary angle?

Ans: Two angles, the sum of whose measure is 180° are called the supplementary angles.
Angle of measure 115° and 65° is a pair of supplementary angles because
$$115^\circ + 65^\circ = 180^\circ$$

Q (ps-4) Find the measure of an angle which is complement of itself?

Ans: Let the measure of angle be x° the measure of its complement is given to be x°

Sum of the measure of an angle and its complement is 90°

$$x = 90 - x$$

$$x + x = 90$$

$$\Rightarrow 2x = 90$$

$$\Rightarrow = \frac{90}{2} = 45^\circ$$

Some more solved questions:

Unsolved questions:

Q(pq-1) If hour needle is at 6 and minute needle is at 9, what is the angle formed between these needles?

Q(pq-2) If hour needle is at 3 and minute needle is at 12, what is the angle formed between these needles ?

Q (1) what is right angle?

Q (2) what is acute angle & its range

Q (3) what is obtuse angle? Write its range

Q (4) Find the measure of angle which form a pair of supplementary angles

Q (5) two supplementary angles differ by 34° find the angles

Answer:

Ans (1) An angle whose measure is 90°

Ans (2) An angle whose measure is less than 90° is called an acute angle and its range is

Ans (3) An angle whose measure is more than 90° but less than 180° is called an obtuse angle

$90^\circ < x < 180^\circ$

Ans (4) $x = 90^\circ$

Ans (5) 73° & 107°

More unsolved questions:

Q (6) two supplementary angles are in the ratio 2 :3 . Find the angles

Q (7) An angle is equal to 8 times its complement determine its measure

Q (8) the measure of an angle is thrice the measure of its supplementary angle. Find its measure?

Q (9) if the supplement of an angle is two- third of itself Determine the angle and its supplement?

Q (10) If the angles $(2x-10)^\circ$ and $(X-5)^\circ$ are complementary angle find x

Ans (6) 72° & 107°

Ans (7) 80°

Ans (8) 135°

Ans (9) 108° & 72°

Ans (10) 35°



Work sheet:

WS-7 Angles using clock

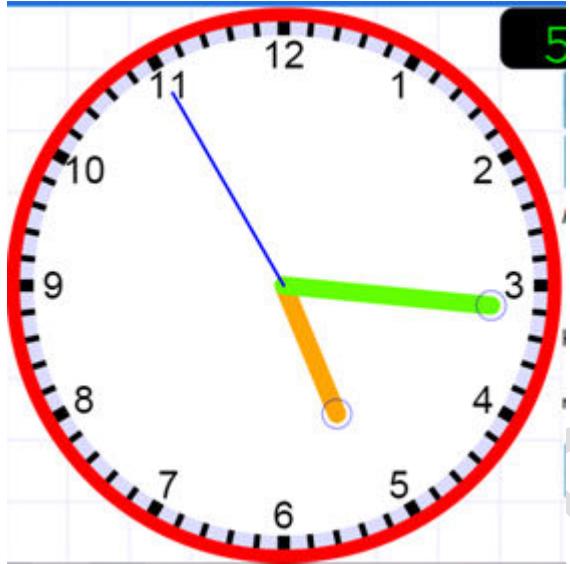


Fig ws11a clock at 5hr and 15 minutes

Find the angle formed between a pair of hands in each clock.

1)



Angle : _____

2)



Angle : _____

3)



4)



Fig WS-11b Clock showing different time



Quiz:

- 1. Triangle and its angles**
- 2. Angles in triangle**
- 3. Angles in square**
- 4. Clock and its minute hand , second had and hour hands**
- 5. Angle made in one rotation by clock hand or needle**
- 6. Angle between two marks**
- 7. When any two hands are perpendicular , what is the angle ?**
- 8. When two needle are in straight line , what is the angle?**
- 9. When two needle are overlapping what is the angle**
- 10. Between 8am to 12 noon , what is total angle covered by hour hand**
- 11. Between 5 am to 11am what is the value of angle?**
- 12. At what time between 9 and 10 o'clock will the hands of a watch be together?**
- 13. By how many degrees does the minute hand move in the same time, in which the hour hand move by 280**
- 14. The time in a clock is 20 minute past 2. Find the angle between the hands of the clock**
- 15. A clock is started at noon. By 10 minutes past 5, the hour hand has turned through**
- 16.**

Project:

1. One clock is required. Note down time taken by minute hand in each rotation. One complete rotation is 360 degree. Half rotation is 180 degree. Quarter rotation is 90 degree. Distance between two consecutive points is 30 degree. Angle between hour hand and minute hand can

be noted down at 12:05 hrs, 12:10 hrs , 12:15 hrs and 12 :20 hrs. The corresponding angles formed between minute and hour hand will be will be 30 ,60,90 and 120 degrees .

2. Observe the position of sun in morning , noon and evening from one point.
3. Take one rope and measure the length of rope, when wooden stick is lifted from ground.
4. Paper cutting with different cuts.
- 5.

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Chapter -14 Mensuration

Introduction: The following is image of school bus. The shape of school bus wheel is circular. The shape of bus roof top is rectangular. There is a red color triangle symbol mounted on the rear side. The geometry of roof and floor of bus can be defined by length and breadth in meters.



Fig p-31 School bus having circular, rectangular and triangular objects.

Solved questions

Q(ps-1) The radius of wheel of bus is 10cms , find circumference.

$$\text{Ans: } 2\pi R = 2 \times 3.14 \times 10 = 62.80 \text{ cms.}$$

Q (ps-2) The roof of bus is 6 meter length and 3 meter wide , find area of bus roof

$$\text{Ans: } L \times W = 6 \times 3 = 18 \text{ square meters}$$

Q (ps-3) the area of the rotating circular wheel of the bus is 616m^2 . Find the radius and circumference of the circular wheel?

$$\text{Ans: Area} = \pi r^2$$

$$616 = \pi r^2$$

$$\Rightarrow r^2 = \frac{616}{\pi}$$

$$\Rightarrow r^2 = 616 \times \frac{7}{22}$$

$$\Rightarrow r^2 = 196$$

$$\Rightarrow r = \sqrt{196}$$



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$$\Rightarrow r=14$$

the radius of the circular wheel is 4 m the circumference is $C = 2 \pi r$

$$C = 2 \times \frac{22}{7} \times 14$$

$$\Rightarrow C = 38 \text{ m}$$

Q (ps-4) The rectangular field have the area 2400 m^2 & the length of the rectangular field is 40m. Find the breadth of the rectangular field?

Ans Length = 40 m

Area = 2400 m^2

we know that

Area = length \times breadth

$$2400 = 40 \times b$$

$$\Rightarrow b = \frac{2400}{40}$$

$$\Rightarrow b = 60 \text{ m}$$

the length of the rectangular field is 60 m

Mensuration

In this chapter, we will study perimeter, area, different plane shape
the inter relationship between various unit of measurement

$$(1) 1 \text{ m} = 100 \text{ cm}$$

(1metre) = (100centinmeter)

$$(2) 1 \text{ dm} = 10 \text{ cm}$$

(1 decimeter) = (10 centimeter)

$$(3) 1 \text{ dan} = 10 \text{ m}$$

(1 decanmeter) = (10 meter)

$$(4) 1 \text{ hm} = 100 \text{ m}$$

(1 hectometer) = 10000 m^2

Study of various plane figures



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(1) Rectangle



A be the length & b be the breadth of the rectangle

(1) Perimeter of rectangle = $2(a + b)$

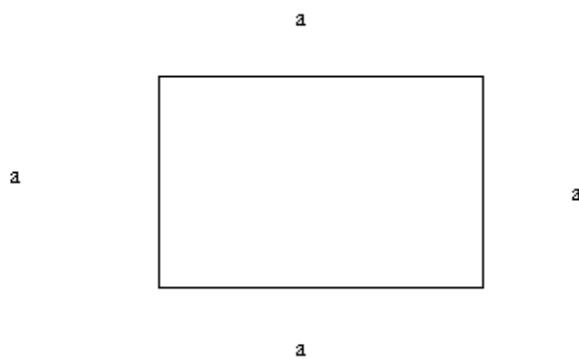
(2) Area of rectangle = $a \times b$

(3) Length = $\frac{\text{Area}}{\text{breadth}}$

(4) Breadth = $\frac{\text{Area}}{\text{Length}}$

(5) Diagonal = $\sqrt{a^2 + b^2}$

(2) Square



Let a be the length of each side of a square

(1) perimeter = $4a$

(2) Area = a^2

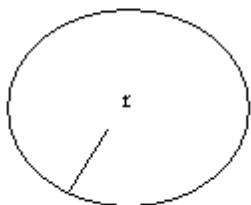
(3) Area = $\left(\frac{\text{Perimeter}}{4}\right)^2$

(4) side of the square = $\sqrt{\text{Area}}$

(4) Diagonal = $\sqrt{2} a$

(5) Area = $\frac{1}{2} (\text{Diagonal})^2$

(3) Circle



Let r be the radius of a circle – then

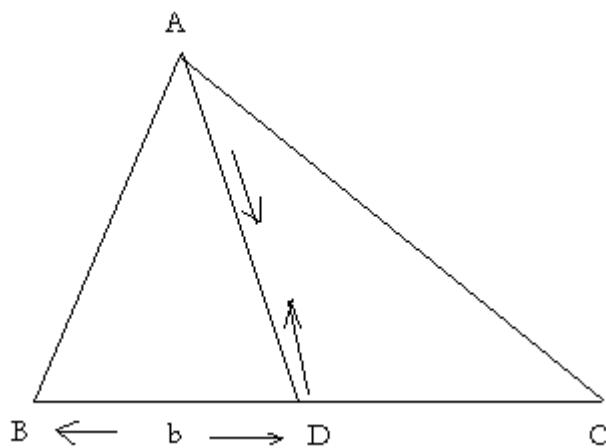
(1) Circumference (perimeter) = $2\pi r$

(2) Area = πr^2

(3) Diameter = 2π

(4) Radius = $\frac{\text{Diameter}}{2}$

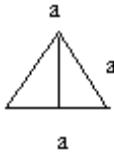
(4) Triangle



If ABC is a triangle with base b & height h, then

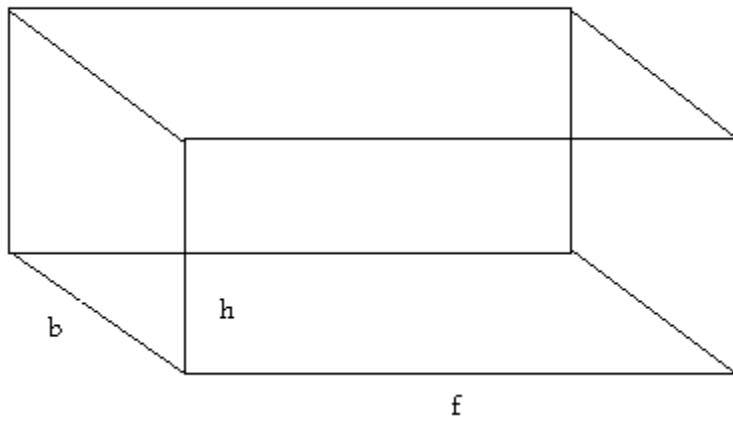
$$\text{Area of triangle} = \frac{1}{2}(\text{Base} \times \text{height})$$

$$\text{Area} = \frac{1}{2}(B \times h)$$



$$\text{Area of equilateral triangle} = \frac{\sqrt{3}}{4} a^2$$

(5) Cuboid



The area of top & bottom = length × breadth

The area of front & back = length × height

The area of left & right faces = breadth × height

Total surface area = 2 (area of top) + 2(area of front) + 2 (area of left face)

Total surface area = 2(area of top + area of front + area of left face)

Total surface area = 2 (2 length × breadth + length × height + breadth × height)

If length breadth & height be l, b, & h. Then

Total surface area = 2 (lb + lh + bh) Sq. units

If we exclude top & bottom then sum of the area (called the lateral surface area) of the side face is given by lateral surface area of the

Cuboid = 2 (lh + bh)

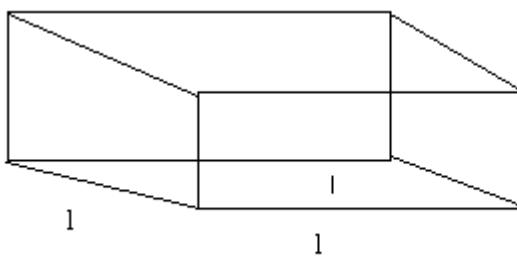
Lateral surface = 2 (l + b) × h Sq. units

Lateral surface area of cuboid = perimeter of base × height

Volume of cuboid = length × breadth × height

Volume of cuboid = l × b × h cubic units

(6) Cube



In Cube length = breadth = height

Total surface area of cube

$$= 2(l \times l + l \times l + l \times l)$$

$$= 2(l^2 + l^2 + l^2)$$

$$= 6l^2 \text{ Sq. units}$$

Lateral surface area of cube

$$= 2(l \times l + l \times l)$$

$$= 2(2l^2)$$

$$= 4l^2 \text{ Sq. units}$$

Volume of cube = $(l \times l \times l)$

$$= l^3 \text{ Cubic units}$$

The volume of the sapce inside a hollow object is callled its capacity

1000 Cm³ = 1 Litre

1 Cm³ = $\frac{1}{1000}$ Litre

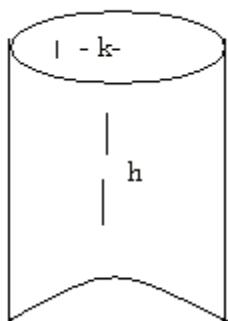
1 Cm³ = 1 mL

1000 Litre = 1 KL = 1m³

1 KL = 100 cm × 100 cm × 100 cm

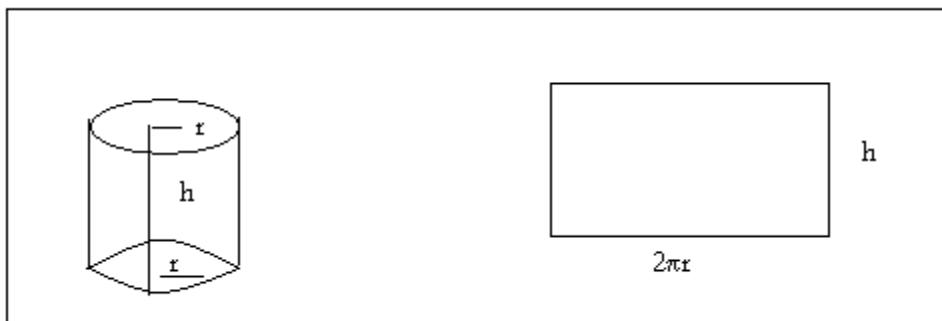
1 KL = 1000000 Cm³

(7) Cylinder



The cylinder has circular base of radius r cm and a height of h cm. Its surface area is made up of the

curved surface plus the area of circular top & base



$$\text{Area of curved surface (or latera surface)} = 2\pi rh$$

The total surface area of a cylinder is the sum of the area of its two bases and its curved surface

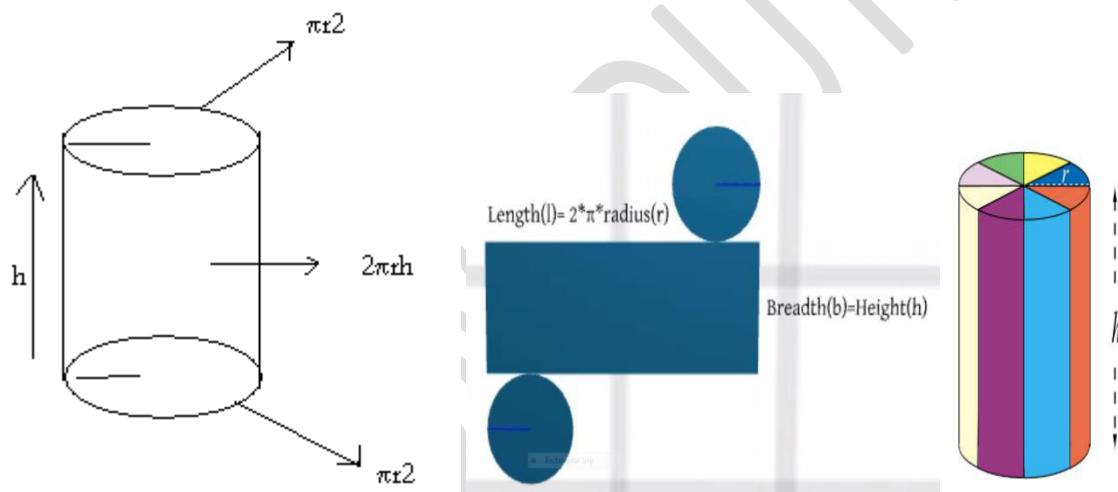


Fig 2 Surface area of right cylinder

The area of the circular base and top are both equal to πr^2

So the combined area of the base and top is $2\pi r^2$

$$\therefore \text{total surface area of a cylinder} = 2\pi rh + 2\pi r^2$$

Volume of a cylinder = area of base \times height

$$\text{volume of cylinder} = \pi r^2 \times h$$

$$\text{volume of cylinder} = \pi r^2 h$$

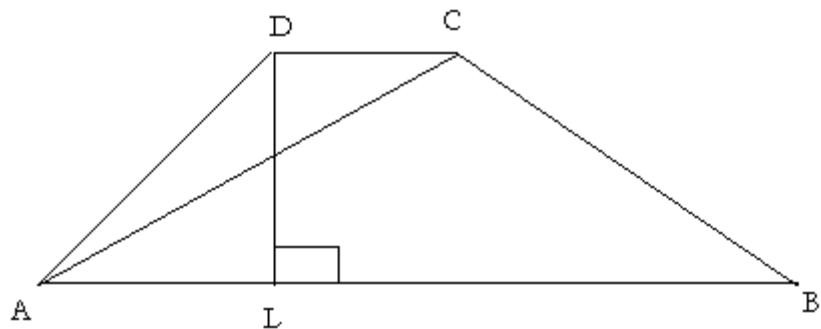
volume of the material of hollow cylinder if outer & inner radius of hollow cylinder & r & height h then

voulme of the material composing the cylinder = External volume – Internal voulme

$$= \pi R^2 h - \pi r^2 h$$

$$= \pi h(R^2 - r^2) = \pi h(R + r)(R - r)$$

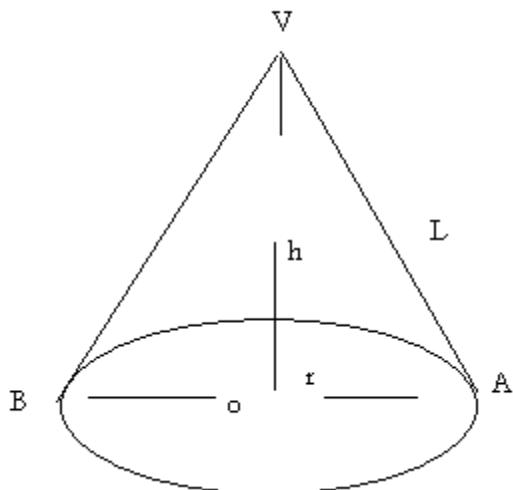
Trapezium → A trapezium is a quadrilateral whose two sides are parallel



$$\text{Area of trapezium} = \frac{1}{2} (\text{Sum of parallel side}) \times \text{height}$$

Right circular cone In our every day life, we come across objects like an icecream cone, conical tent & conical vessel, a clown's cap a tapesed end of pencil etc. these objects bring to our mind the concept of right circular cone.

A Right circular cone is solid generated by revolvingaline segment which passes through a constant angle with a fixed line



Vertex The fixed point v is called the vertex of the cone

Axis the fixed line Vo is called the axis of the cone

Base A right circular cone has a plane end, which is in circular shape. This is called the base of the cone.

Height the length of the line segment joining the vertex to the centre of base is called the height of the cone

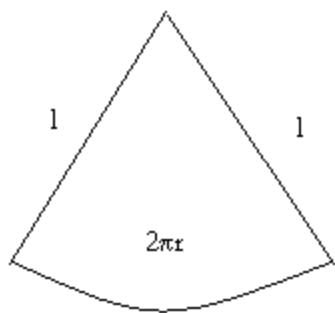
Slant height The length of the line segment joining the vertex to any point on the circular edge of the base is called the slant height of the cone

$$l^2 = l^2 + h^2$$
$$\Rightarrow = \sqrt{l^2 + h^2}$$

Surface area of right circular cone Curved surface of the cone

$$\frac{1}{2}(\text{arc length}) \times (\text{radius})$$
$$= \frac{1}{2} 2\pi r l$$
$$= \pi r l$$

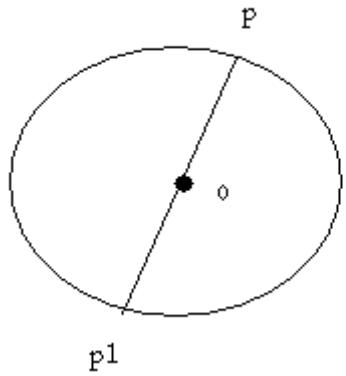
Total surface area of the cone = curved surface area + area of base



Total surface area of the cone = $\pi r l + \pi r^2$

$$\text{Volume of right circular cone} = \frac{1}{3} \times (\text{Area of base}) \times \text{height}$$
$$= \frac{1}{3} \pi r^2 h$$

Sphere



The set of all points in space which are equidistant from a fixed point is called sphere

The total surface area of a sphere of radius r is given by

$$S = 4\pi r^2$$

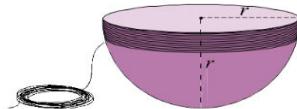
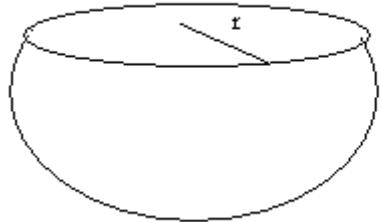
The curved surface area of a sphere of radius r is given by

$$S = 2\pi r^2$$

The volume of the sphere of radius r is given

$$V = \frac{4}{3} \pi r^3$$

Hemisphere



$$\text{The surface area of a sphere is: } A = 4\pi r^2.$$

A plane through the centre of a sphere divides the sphere into two equal parts each of which is called hemisphere

The total surface area of a hemisphere of radius r is given by

$$S = 3\pi r^2$$

The curved surface area of a Hemisphere of radius r is given by

$$S = 2\pi r^2$$

The volume of the Hemisphere of radius r is given by

$$V = \frac{2}{3} \pi r^3$$

Q (1) The roof of the bus is in the rectangular form whose length is 40 m & breadth is 80m. Find theperimeter & the area of the roof of the bus

Ans Given length = 40 m

Breadth = 80 m

Area = length \times breadth

$$\text{Area} = 40 \times 80$$

$$= 3200 \text{ m}^2$$

$$\text{perimeter} = 2(l + b)$$

$$\text{perimeter} = 2(40 + 80)$$

$$= 2(120)$$

$$= 240 \text{ m}$$

Q (2) The rectangular field have the area 2400 m^2 & the length of the rectangular field is 40 m. Find the breadth of the rectangular field?

Ans length = 40 m

Breadth = ?

$$\text{Area} = 2400 \text{ m}^2$$

we know that

Area = length \times breadth

$$2400 = 40 \times b$$

$$b = \frac{2400}{40}$$

b = 60 m The brcad th of the reactangular field is 60 m

Q (3) The length & the breadth of the bus in the ratio 3 :2 if the area of the bus is 3456 m^2 . Find the perimeter?

Ans Let length = $3x$

Breadth = $2x$

Area = length \times breadth

$$3456 = 3x \times 2x$$

$$3456 = 6x^2$$

$$\Rightarrow x^2 = \frac{3456}{6}$$

$$\Rightarrow x^2 = 576$$

$$\Rightarrow x^2 = \sqrt{576} = 24$$

$$\therefore \text{length} = 3x = 3 \times 24$$

$$= 72 \text{ m}$$

$$\text{Breadth} = 2x = 2 \times 24 = 48 \text{ m}$$

we know that

$$\text{perimeter} = 2(l + b) \therefore$$

$$\text{perimeter} = 2(72 + 48)$$

$$= 2(120)$$

$$= 240 \text{ m}$$



Q (4) A class room is 11 m long, 8 m wide & 5 m high find the sum of the area of its floor and the four walls

Ans Length of the room (l) = 11m

Breadth of the room (b) = 8 m

Height of the room (h) = 5 m

\therefore Floor area = $l \times b$

$$= 11 \times 8$$

$$= 88 \text{ m}^2$$

Area of four walls

$$= 2 h (l + b)$$

$$= 2 \times 5 (11 + 8)$$

$$= 2 \times 5 \times 18$$

$$= 190 \text{ m}^2$$

\therefore Area of the floor + area of the four walls

$$= 88 + 190$$

$$= 278 \text{ m}^2$$

Q (5) The area of the rotating circular wheel of the bus is 616 m^2 . Find the radius & circumference of the circwar wheel.

Ans Area = πr^2

$$616 = \pi r^2$$

$$\Rightarrow r^2 = \frac{616}{\pi}$$

$$r^2 = \frac{616}{\frac{22}{7}}$$

$$r^2 = 28 \times 7$$

$$r^2 = 196$$

$$r = \sqrt{196}$$

$$r = 14$$

The radius of the circular wheel is 14 m the cirucmference

$$c = 2\pi r$$

$$c = 2 \times \frac{22}{7} \times 14$$

$$c = 2 \times 22 \times 2$$

$$c = 88 \text{ m}$$

Q (6) The diameter of the lawn mover is 84 cm & length is 120cm find the lateral surface area of the lawn mover?

Ans Diameter of the lawn mover = 84

$$\text{Radius} = \frac{\text{Diameter}}{2}$$

$$\text{Radius} = \frac{84}{2}$$

Radius = 42 Cm

Length = 120 Cm

Lateral surface area of the lawn moves = $2\pi rh$

$$= 2 \times \frac{22}{7} \times 42 \times 120$$

$$= 31680 \text{ Cm}^2$$

Q(7) a cylindrical pillar is 1 m in diameter and 4.2 m in height. Find the cost of the white washing the curved surface area of pillars at the rate of Rs. 15 per m^2

Ans Diameter = 1 m

$$\text{Radius} = \frac{\text{Diameter}}{2}$$

$$R = \frac{1}{2} = 0.5$$

$$h = 4.2 \text{ m}$$

surface curved area of cylinder = $2\pi rh$

$$= 2 \times \frac{22}{7} \times \frac{5}{10} \times \frac{42}{10}$$

$$= 13.2 \text{ m}^2$$

Cost of white washing at the rate of Rs. 15 per m^2

$$\text{Total cost} = 13.2 \times 15$$

$$= \text{Rs. } 198$$

Q(8) How many tiles each measuring 2 m by 1 m are required to cover a rectangular seminar hall of school 12 m long & 8 m broad? Find the cost of tiles at Rs. 25 per tile?

Ans Length of tile = 2 m

Breadth of tile = 1 m

$$\therefore \text{Area of each tile} = 2\text{m} \times 1\text{m} = 2\text{m}^2$$

Length of rectangular seminar hall

Breadth of rectangular seminar hall = 8 m

\therefore Area of the hall = length \times breadth

$$\Rightarrow \text{Area} = 12 \text{ m} \times 8 \text{ m} = 96\text{m}^2$$

$$\text{Number of tiles required} = \frac{\text{Area of the hall}}{\text{Area of one tile}}$$

$$= \frac{96}{2} = 48$$

$$\therefore \text{Cost of tile} = 48 \times 25 = \text{Rs. } 1200$$

Q(9) The perimeter of the rectangular field is 260m. If its length is 90 m find its breadth?

Ans Perimeter of rectangle = $2(l + b)$

$$260 = 2(b + 90)$$

$$260 = 2b + 180$$

$$260 - 180 = 2b$$

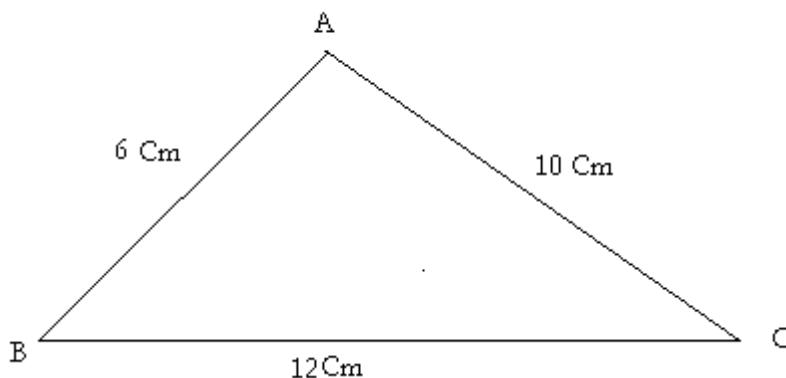
$$80 = 2b$$



$$\Rightarrow b = \frac{80}{2} = 40\text{m}$$

Hence the breadth of the rectangular field = 40 m

Q (10) A boy is playing with string. Find the length of a string used to make a triangle ABC. If the same string is used to make a square, what will be the side of the square?



Ans Perimeter of ΔABC = length of the string

Perimeter of ΔABC = $AB+BC+AC$

$$6+12+10$$

$$= 28 \text{ Cm}$$

Now, the same string is used to make a square so the perimeter of the square will be 28 Cm

Perimeter of square = $4 a$

$$28 = 4a$$

$$\Rightarrow a = \frac{28}{4} = 7\text{Cm}$$

Hence the side of the square will be 7 Cm

Q (11) AA class room is 7 m long 6.5 m wide & 4 m high find the volume of the class room

Ans Length = 7 m

breadth = 6.5 m

Height = 4 m

we know that

Volume = length \times breadth \times height

$$V = 7 \times 6.5 \times 4$$

$$V = 182 \text{ m}^3$$

Q (12) A cone is hanged at the window of the school bus. The radius of the cone is 21 Cm & height is 28 Cm. Find the total surface area of the cone

Ans $R = 21 \text{ Cm}$

$$H = 28 \text{ Cm}$$

$$P^2 = h^2 + r^2$$



$$P^2 = (28)^2 + (21)^2$$

$$P^2 = 784 + 441$$

$$P^2 = 1225$$

$$P \sqrt{1225} = 35 \text{ Cm}$$

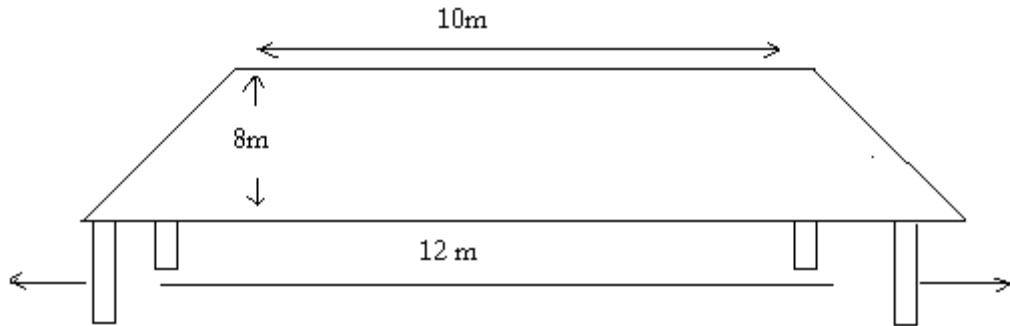
$$\text{Total surface area} = \pi rl + \pi r^2$$

$$= \pi \times 21 \times 35 + \pi (21)^2$$

$$= \frac{22}{7} \times 21 \times 35 + \frac{22}{7} 21 \times 21 \times$$

$$= 3696 \text{ m}^2$$

Q (13) There is a table in classroom & the shape of the top surface of a table. Is trapezium. Find its area if its parallel sides are 10 m & 12 m and perpendicular distance between them is 8 m?



Ans: Sum of parallel sides = $10 + 12 = 22 \text{ m}$

Distance = 8 m

$$\text{Area of the top surface of a table} = \text{Area of the trapezium} = \frac{1}{2} \times (\text{Sum of parallel sides}) \times (\text{distance between Them})$$

$$= \frac{1}{2} (22) \times 8$$

$$= 11 \times 8$$

$$= 88 \text{ m}^2$$

Q (14) The water tank of the school is in the form of cylinder whose radius is 15 m & length 7 m find the quantity of the water in litres that can be stored in the tank

Ans Quantity of water that can be stored in the tank = volume of the tank

Radius $r = 15 \text{ m}$

Length $h = 7 \text{ m}$

$$\text{Volume of cylindrical tank} = \pi r^2 h$$

$$= \frac{22}{7} \times 15 \times 15 \times 7$$

$$= 495 \text{ m}^3$$

$$1 \text{ m}^3 = \text{litre}$$

$$= 495000 \text{ litres}$$

Q (15) A solid metallic spherical ball of diameter 6 Cm. find its surface area & volume?

Ans Diameter = 6 Cm

$$\text{Radius} = \frac{D}{2}$$

$$= \frac{6}{2} = 3 \text{ Cm}$$

$$\text{Surface area} = 4\pi r^2$$

$$= 4 \times \frac{22}{7} \times (3)^2$$

$$= 113.14 \text{ m}^2$$

$$\text{Volume} = \frac{4}{3} \pi r^3$$

$$= \frac{4}{3} \times \frac{22}{7} \times (3)^3$$

$$= \frac{4}{3} \times \frac{22}{7} \times 27$$

$$= 113.13 \text{ m}^3$$

Unsolved questions

Q (pq-1) Front side of the bus is 5 meter height and 4 meter wide , find area of front side of the bus.

Q (pq-2) Radius of bus tyre is 25 cms, find its circumference?

Q (pq-3) A school field is in the form of rectangular having its sides in the ratio 2:3. The area of the rectangular field is 15000 m^2 find the length & the breadth of the rectangular field

Q(pq-4) The circumference of the rotating circular wheel of the bus is 440 m. Find the radius & area of the circular wheel?

Ans: 1) 20 m^2

1) $2\pi r$



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2) Length = 100
Breadth = 150

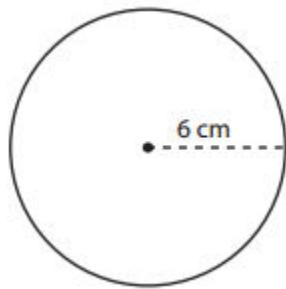
3) R = 70 m
 $A = 15400 \text{ m}^2$

Worksheet:

WS-10 Mensurations

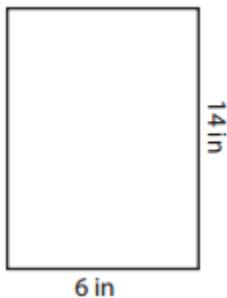
Find the area/ surface area of each Figure

1)



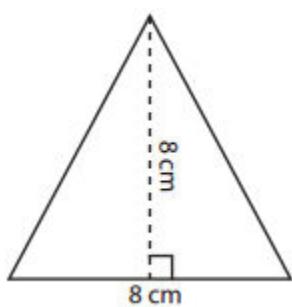
Area = -----

2)



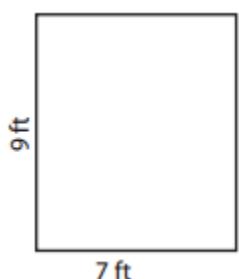
Area = -----

3)



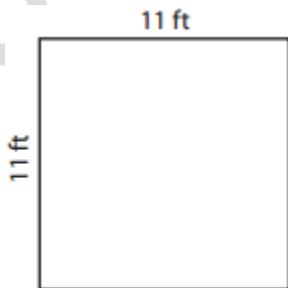
Area = -----

4)



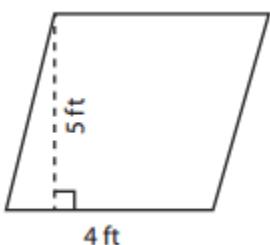
Area = -----

5)



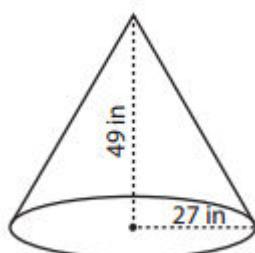
Area = -----

6)



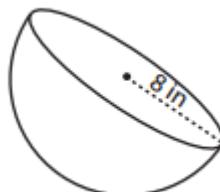
Area = -----

7)



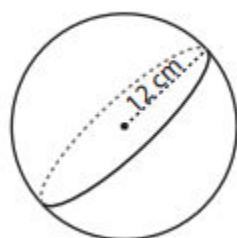
Surface Area = -----

8)



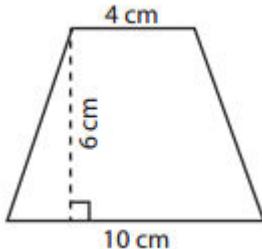
Surface Area = -----

9)



Surface Area = -----

10)



Surface Area = -----

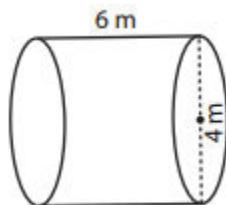
Answers

- 1) $36\pi \text{ cm}^2$
- 2) 84 in^2
- 3) 32cm^2
- 4) 32 ft^2
- 5) 121ft^2
- 6) 20 ft^2
- 7) 7032.2in^2
- 8) $192 \pi\text{in}^2$
- 9) $576 \pi \text{ cm}^2$
- 10) 42 cm^2

Sheet -2

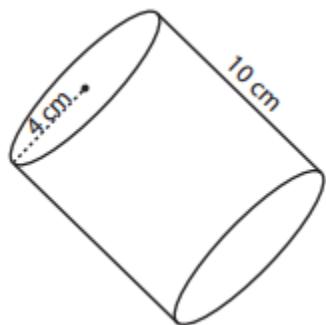
Find the Volume of Given Figures

1)



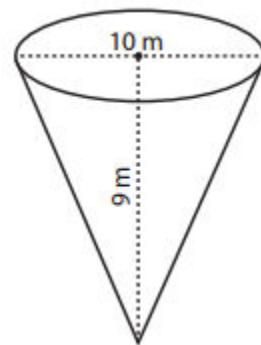
Volume = -----

2)



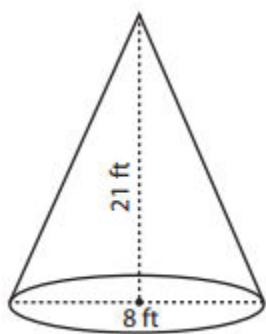
Volume = -----

3)



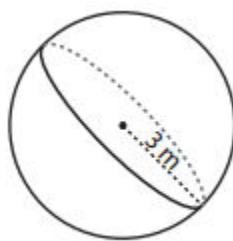
Volume = -----

4)



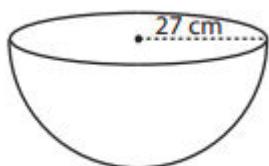
Volume = -----

5)



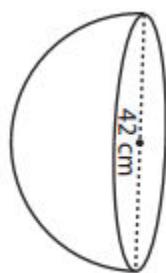
Volume = -----

6)



Volume = -----

7)

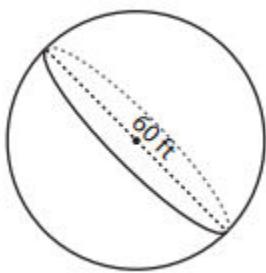


Volume = -----

8)



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Volume = -----

Answers

- 1) $24\pi \text{ m}^3$
- 2) $160 \pi \text{ cm}^3$
- 3) $75\pi \text{ m}^3$
- 4) $112\pi \text{ ft}^3$
- 5) $36\pi \text{ m}^3$
- 6) $13122\pi \text{ cm}^3$
- 7) $6174 \pi \text{ cm}^3$

$$36000\pi \text{ ft}^3$$

Quiz: Menstruation

Q. (1) one side of rectangular field of play ground is 15m and one of its diagonal is 17m find the area of the rectangular field?

- (A) $60\ m^2$
- (b) $150\ m^2$
- (c) $120\ m^2$
- (d) $100\ m^2$

Q. (2) a lawn of school in the form of rectangle having its sides in the ratio 2:3 the area of the lawn is $\frac{1}{6}$ hectars. Find the breadth of the lawn of school?

- (A) 50 m
- (b) 60 m
- (c) 70 m
- (d) 100 m

Q. (3) a rectangular grassy field of school is 112m long and 78m broad. It has a gravel path 2.5m wide all around it on the side. Find the area of the path & the cost of constricting it at Rs. 4.50 per square metre?

- (A) 925, 4162.50
- (b) 905, 4050
- (c) 978, 4320
- (d) 925, 4628

Q. (4) the length of class room is 18cm & breadth is 10 Cm and class room is in the shape of rectangle. When the length is increased to 25Cm what will be the breadth of the class room if the area remains the same?

- (A) 7Cm



- (b) 7.1Cm
- (c) 7.2Cm
- (d) 7.3Cm

Q. (5) a circular tyro of school bus is of radius 42Cm is bent in the form of rectangle whose sides are in the ratio 6:5 find the smaller side of the rectangle??

- (A) 25Cm
- (b) 50Cm
- (c) 40Cm
- (d) 60Cm

Q. (6) there is a rectangular tank in school of length 180m & breadth120m in a circular field. If the area of the land portion of field is $40000m^2$ what is the radius of the field?

- (A) 130m
- (b) 135m
- (c) 140m
- (d) 145m

Q. (7) the diameter of wheel of school bus is 126m. How far will it travel in 500 revolutions?

- (A) 1492m
- (b) 1980m
- (c) 2530m
- (d) 2880m

Q. (8) the diameter of a roller 120Cm long is 84Cm. If it takes 500 complete revolution to level a play ground. Determine the cost of leveling it at the tate of 30 paise per square metre?



- (A) 475.20
- (b) 465
- (c) 485
- (d) 495

Q. (9) the floor of a rectangular seminar hall of school has a perimeter of 250m. its height is 6m. Find the cost of painting its four walls concluding doors at rate of Rs. 6 per square metre?

- (A) 8000
- (b) 9000
- (c) 7000
- (d) 6000

Q. (10) Find the surface area of a chalk box whose length breadth & height are 16Cm, 8Cm & 6Cm respectively?

- (A) 544Cm^2
- (b) 548Cm^2
- (c) 568Cm^2
- (d) 574Cm^2

Q. (11) the wheel of an engine, $7\frac{1}{2}$ metres in circumference marks 7 revolutions in 9 second. Find the speed of the bus in Km/hr

- (A) 130
- (b) 132
- (c) 135
- (d) 150



Q. (12) a store room of school is in the form of a cuboids of measures $60m \times 40m \times 30$. how many cubical boxes can be stored in it if the volume of one box is $08m^3$?

- (A) 69,000
- (b) 50,000
- (c) 40,000
- (d) 60,000

Answers

- 1. C
- 2. A
- 3. A
- 4. A
- 5. D
- 6. C
- 7. B
- 8. A
- 9. B
- 10.A
- 11.B
- 12.D

- 1. RECTANGULAR FIELD PERIMETER
- 2. CIRCULAR FIELD PERIMETER
- 3. SQUARE FIELD PERIMETER
- 4. AREA OF CIRCULAR FIELD
- 5. AREA OF RECTANGULAR FIELD



- 6 AREA OF SQUARE FIELD**
- 7 DIFFERENCE BETWEEN 1D, 2D AND 3D OBJECTS**
- 8 VOLUME OF CUBIOD**
- 9 TRIANGULAR FIELD AREA**
- 10 SUM OF ANGLES OF A TRIANGULAR FIELD**

Projects:

1. Measure circumference of a wheel of school bus with the help of measuring tape.
2. Measure perimeter of top of table with the help of scale or ruler or with measuring tape.
3. Measure angle formed by edge or corner of table the top using D or protector.
4. Measure length and breadth of class room and find out area of floor.
5. Labs may have objects in rectangular, circular and triangular shape objects. On these objects students can be asked for measurements of perimeter , circumference etc.
6. Shapes can be drawn in software or clay based models.
7. Students can be asked to make one round on perimeter of play ground which is rectangular. And compare this with length and breadth of this field . Similarly, field can be made circular or triangular and measure their sides with measuring tape and compare perimeter in each case.
8. How these formula have been derived?
9. Paper cutting can be used to verify Pythagoras theorem , In a triangle $x^2 + y^2 = z^2$

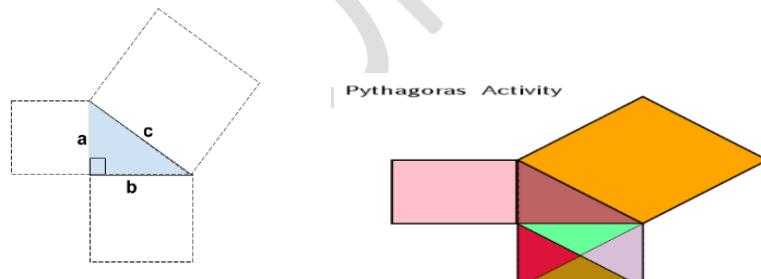


Fig 1 triangle and its sides for proving Pythagoras theorem

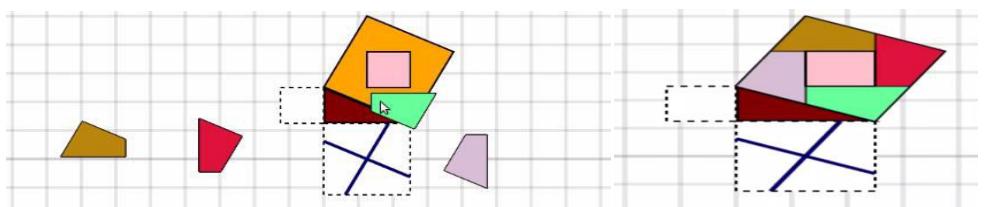


Fig 2 sides are forming triangle

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