

Grade: 8	Subject: Math	Topic: Data Handling
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SUMMARY SHEET		
Learner Previous Knowledge	Know that data collected through sources such as internet, journals, research reports etc. are secondary data whereas the data collected through sources such as interview, questionnaire, and surveys are primary data. Know the concept of raw data, array and range Learn how to organize multiple data set in a tabular form Create frequency distribution table for given data set. Know that if two data sets are given, these can be represented through a double bar graph Interpretation and construction of double bar graph	
	Organising data in a frequency distribution table. Grouped frequency distribution Different forms of data- Histogram, Circle graph or pie chart, bar graph, double bar graph Drawing and interpreting histogram and pie charts. Chance and probability Know the terms: Equally likely outcomes, events, probability Chance and probability related to real life.	
Learning Goals		Taxonomy Level
<i>More Complex Learning Goal- Students will be able to differentiate between histogram; pie chart, bar graph, double bar graph with their key features, solve problems on probability</i>		Matching
<i>Target Learning Goal- Students will be able to draw frequency distribution charts; histograms; pie charts; using the given data and answer the given questions. Make outcomes to solve questions of probability</i>		Executing
<i>Simpler Learning Goal- Students will be able to describe the terms range, frequency distribution, raw data, histogram, pie chart, grouped data, class intervals, event, equally likely outcomes, probability etc. with examples.</i>		Recalling
Period No.	Lesson Objectives	Teaching Learning Materials Required

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1 and 2 <i>Note: This lesson requires 2 days</i>	- Recapitulate the types of bar graphs and frequency distribution table. - Know about grouped data and grouped frequency distribution table. - Draw the grouped frequency distribution table.	Brainstorming: Worksheet-1 (1 per student) <u>Frequency distribution creation:</u>
3	- Study Histogram, - Organize and display single-variable data in histogram	<u>Observation:</u> Worksheet-2 (1 per student) <u>Whole class discussion:</u> Projector (1 per class)
4 and 5 <i>Note: This lesson requires 2 days</i>	Study different form of data display: Concept of Pi- Chart, Learn how to draw a pi- chart	<u>Brainstorm:</u> Worksheet-3 (1 per student); projector (1 per class) <u>Worksheet-4</u> (1 per student)
6 and 7 <i>Note: this lesson requires 2 days</i>	Collect, organize and display single-variable data in appropriate graphs and representations (e.g., histogram, circle graphs) and explain which types of graphs are appropriate for various data sets.	<u>Project:</u> A4 sheets (4 to 5 per group to collect the data) <u>Presentation:</u> Chart paper (1 Per group); markers (4 to 5 per group)
8 and 9 <i>Note: This lesson requires 2 days.</i>	- Consolidate and generalize the notion of chance in events like tossing coins, dice etc. Relating it to chance in life events. - Visually represent frequency outcomes of repeated throws of the same kind of coin or dice; - Throw a large number of identical dice/coins together and aggregate the result of the throws to get large number of individual events.	<u>Brainstorming:</u> Worksheet-5 (1 per student) <u>Discussion:</u> projector (1 per class)

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	• Definition of terms- random experiment, equally likely outcomes, event, probability. • Chance and probability related to real life.	
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Period 1 and 2

Lesson Objectives

At the end of this lesson students will be able to:

- Recapitulate the types of bar graphs and frequency distribution table.
- Know about grouped data and grouped frequency distribution table.
- Draw the grouped frequency distribution table.

Teaching Learning Materials required

- **Brainstorming: Worksheet-1** (1 per student); projector (1 per class)

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 to 6

Lesson Beginning <u>Time:</u> 30 mins <u>Purpose:</u> Activate the prior knowledge Generate interest to the topic Introduce the topic Develop conceptual understanding	<u>Brainstorming/Groups</u> • Begin the class by asking the following question: ○ What do they mean by data? ○ What is raw data? ○ What is range, array, frequency distribution, primary data, and secondary data? Differentiate between them. ○ What are these terms used for and why? • Brainstorm the ideas on the asked questions. • Then give each student Worksheet-1. • Tell them to observe the given graphs and answer the given questions. • Give them time to discuss in groups and write answers in their individual sheet. <u>Discussion/groups</u> • Project Worksheet-1 • At random ask groups to share the answers of the questions given in the sheet • In addition, ask the following questions: ○ How many kinds of graphs are there in the sheet? ○ How these graphs are different from each other? ○ How the representation of information is different in each graph? ○ How the organization of data is different in each graph? ○ In what all situations you can use these graphs?
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	○ In what form the data gets available which will be organized in charts, tables etc. ○ How the last representation of data is different from the other three? ○ Is the last image related to frequency distribution? How? <i>Note: Students may come up with incorrect answers. In this case, ask other students who may have the correct answers to explain and justify. It is important to build consensus on all answers – this will help eradicate any errors. Make sure through discussion students are able to recap the features of all kinds of graphs and frequency distribution. Also, they understand that they need raw data in order to make graphs.</i>
Lesson Middle <u>Time:</u> 20 mins. <u>Purpose:</u> Develop conceptual understanding	<u>Discussion Groups/Whole class</u> <i>Note: Through discussion let students to understand data has been grouped into classes and hence is called grouped frequency distribution. You can then introduce the term class limits, upper class interval, and lower class interval. In the class interval, 10-20, 10 is called the lower class limit and 20 is called the upper class limit. Similarly, in the class interval 20-30, 20 is the lower class limit and 30 is the upper class limit Also, bring into their focus that the difference in each class interval is 10, which is the width or size of the class interval.</i>
Lesson End <u>Time:</u> 30 mins. <u>Purpose:</u> Consolidate students learning	<u>Frequency distribution creation/pairs</u> • Tell the students that they are going to solve the questions related to frequency distribution on Pg 73-Try These of NCERT Textbook while discussing within the respective pairs. <u>Whole class- Discussion</u> • At random ask students to share the answers of the given questions along with the justification of the same. • Ask how they created the frequency distribution using the given data. • They will have to explain the steps in detail. • Build consensus on all the answers and steps to create the frequency distribution. <i>Note: Students may come up with incorrect answers. In this case, ask other students who may have the correct answers to explain and justify. It is important to build consensus on all answers – this will help eradicate any errors.</i>

	<u>Home Assignment</u> Tell the students to practice questions on Pg 76- Q2, 3- exercise 5.1 of NCERT Textbook.
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Name: _____

Worksheet-1

Skill: Procedural Fluency

 = 100 cars ← One symbol stands for 100 cars	
July	   = 250  denotes $\frac{1}{2}$ of 100
August	   = 300
September	    = ?

It is _____ graph.

Highlight the special features of this graph:

Subject	Tally Marks	Number of Students
Art		7
Mathematics		5
Science		6
English		4

It is _____ graph.

Highlight the special features of this kind of data collection:

Differentiate between the above three graphs:

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What is required in order to create these graphs and why? In what form you get that?

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Period 3

Lesson Objectives

At the end of this lesson students will be able to:

- Study Histogram,
- Organize and display single-variable data in histogram

Teaching Learning Materials required

- **Observation: Worksheet-2** (1 per student)
- **Whole class discussion:** Projector (1 per class)

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4 or 6

Lesson Beginning <u>Time:</u> 15 mins <u>Purpose:</u> Generate interest to the topic Introduce the topic Develop conceptual understanding	<u>Observation/groups</u> • Inform students that they are going to do a group work. So they need to sit in their respective groups. • Give them the Worksheet-2 and tell them to observe the images given in the sheet and then answer the given questions while discussing within their respective groups. <i>Note: Though students will be discussing the task in groups, they will record the answers in their individual sheets.</i>
Lesson Middle <u>Time:</u> 15 mins	<u>Whole Class - Discussion</u> • Project Worksheet-2.

<u>Purpose:</u> Introduce the topic Develop conceptual understanding Consolidate students learning	- At random ask students to share their observations related to the frequency distribution table and the graph given in the sheet. - Ask the following questions: - What is the relation in between the graph and the frequency distribution table? - How this graph is different from the bar graph and double bar graph. - How this graph is similar to the bar graph and double bar graph? - What is this kind of graph is known as? - Each time ask for the justification and take others consensus as well. - Build consensus on all the answers. <i>Note: Students may come up with incorrect answers. In this case, ask other students who may have the correct answers to explain and justify. It is important to build consensus on all answers – this will help eradicate any errors. Make sure they understand that this graph is known as histogram. You need to introduce this term if students don't come up with the name on their own during the discussion. Make sure they are able to summarize the following:</i> - This is considering being the grouped frequency distribution of the marks obtained by 60 students in Mathematics test. - The same is displayed in the graph given beside the frequency table. - Here we have represented the groups of observations (i.e., class intervals) on the horizontal axis. - The height of the bars shows the frequency of the class-interval. - Also, there is no gap between the bars as there is no gap between the class-intervals. - The graphical representation of data in this manner is called a histogram. - In a bar chart the height of each bars matters and not its width. It is therefore one dimensional. In a histogram, the height as well as the width of each bar matter. It is therefore two-dimensional.
Lesson End <u>Time:</u> 10 mins <u>Purpose:</u> Consolidate students learning	<u>Practice Questions/groups</u> Tell each student of the group they have to practice questions on Pg 75-Try These of NCERT Textbook. <u>Home Assignment</u> Tell the students to practice questions on Pg 76- Q1, 4, 5- Exercise 5.1 of NCERT Textbook.

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2. How the above graph is different from the bar graph and double bar graph?

3. Do you know what such graph is called? Yes/No

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Period 4 and 5

Lesson Objectives

At the end of this lesson students will be able to:

- Study different form of data display: Concept of Pie- Chart
- Learn how to draw a pie- chart

Teaching Learning Materials required

- **Brainstorm: Worksheet-3** (1 per student); projector (1 per class)
- **Worksheet: Worksheet-4** (1 per student)

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4 or 6

Lesson Beginning <u>Time:</u> 20 mins <u>Purpose:</u> Generate interest to the topic Introduce the topic Develop conceptual understanding	<u>Brainstorm/whole class</u> • Inform students today they are going to know about another form of representation of data. • Ask: ○ Have you ever come across data represented in circular form? ○ If yes, then where? ○ What information was represented in the data? • Now, give them Worksheet-3 to observe the given images and write their observations while discussing within their respective groups. <i>Note: Though students will be discussing the task in groups, they will record the answers in their individual sheets.</i> <u>Whole Class - Discussion</u> • Project Worksheet-3 • At random ask students to share their observations related to the graphs given on the sheet • Ask the following questions: ○ What these graphs are all about? ○ How do they represent the data?
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- What relation do they have with the data representation?
- How it is different from bar graphs?
- If you add up the fractions for these individual graphs. Do you get the total as one?
- Each time ask for the justification and take others consensus as well.
- Build consensus on all the answers.

Note: Students may come up with incorrect answers. In this case, ask other students who may have the correct answers to explain and justify. It is important to build consensus on all answers – this will help eradicate any errors. Make sure they understand that this graph is known as circle graph or pie chart. You need to introduce this term if students don't come up with the term on their own, during the discussion. Make sure they are able to summarize the following:

- A circle graph shows the relationship between a whole and its parts. Here, the whole circle is divided into sectors. The size of each sector is proportional to the activity or information it represents.
- For example, in the given graphs, the proportion of the sector for hours spent in sleeping

$$= \frac{\text{number of sleeping hours}}{\text{whole day}} = \frac{8 \text{ hours}}{24 \text{ hours}} = \frac{1}{3}$$
- So, this sector is drawn as $\frac{1}{3}$ rd part of the circle. Similarly, the proportion of the sector for hours spent in school

$$= \frac{\text{number of school hours}}{\text{whole day}} = \frac{6 \text{ hours}}{24 \text{ hours}} = \frac{1}{4}$$
- So this sector is drawn $\frac{1}{4}$ th of the circle. Similarly, the size of other sectors can be found.

Lesson Middle

Time: 20 mins

Purpose: Introduce the topic

Develop conceptual understanding

Consolidate students learning

Worksheet/whole class

- Now give another **Worksheet-4** to each student of the group.
- Tell them to observe the given pie chart and find out how this pie chart is different from the previous pie charts which they have seen in Worksheet-4

Note: Though students will be discussing the task in groups, they will record the answers in their individual sheets.

Whole Class - Discussion

- Project Worksheet-4.
- At random ask students to share their observations related to both of the charts given in the sheet.
- Ask the following questions:
 - How the second pie chart is different from the 1st pie chart?

- How do you find the number of pupil for each transport?

- Each time ask for the justification and take others consensus as well.
- Build consensus on all the answers.

Note: Students may come up with incorrect answers. In this case, ask other students who may have the correct answers to explain and justify. It is important to build consensus on all answers – this will help eradicate any errors. Make sure they understand the following:

- The second pie chart shows how 36 pupils usually come to the school. In the pie chart the whole group of 36 pupils is represented by the complete angle 360 degree. The angles at the center are in proportion to each category. Thus the angle of 120 degrees at the center corresponds to the walk group.
- Since angle of 360 degrees at the center corresponds to the whole group of 36 pupils.
- Therefore, 1 degree corresponds to $\frac{36}{360}$ of the whole group and 120 degree corresponds to $\frac{36}{360} \times 120 = 12$ pupils. So, 12 pupils walk to the school.
- Similarly number of pupils coming by car = $\frac{36}{360} \times 90 = 9$ and so on.
- Steps to create the pie chart:
 1. Find the total of all the components.
 2. Find the angle corresponding to different components by using the following formula: $\text{Angle} = \frac{\text{value of one component}}{\text{total of all the components}} \times 360 \text{ degree}$
 3. Draw a circle of suitable radius.
 4. Draw the angles calculated in step 2 at the center of the circle.

This explanation is given to you for your reference. It may happen students can sum up and share the steps in their own vocabulary. Accept all the logical and correct responses.

Lesson End

Time: 30 mins

Worksheet/groups

- Give students to practice questions on Pg 82- Exercise 5.2 of NCERT Textbook.

Purpose: Consolidate students learning	<u>Home Assignment</u> Practice questions on Pg 78- Try These of NCERT Textbook.
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Name: _____

Worksheet-3

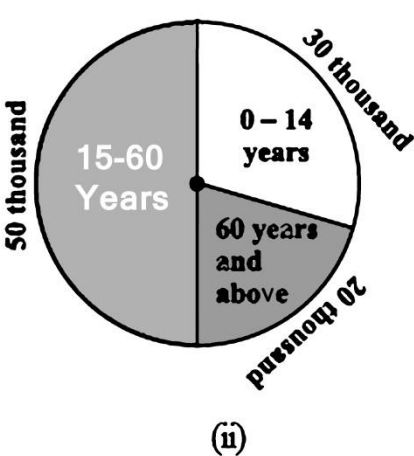
Topic: Circle graph

1. Have you ever come across data represented in circular form as shown in the images below?
 Yes/No

The time spent by a child during a day



Age groups of people in a town



2. What do they think these graphs are called?

3. What kind of relationship this graph shows?

Name: _____

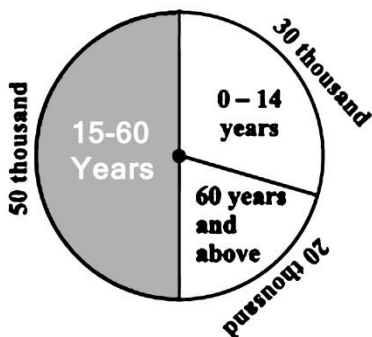
Worksheet-4

Topic: Circle graph

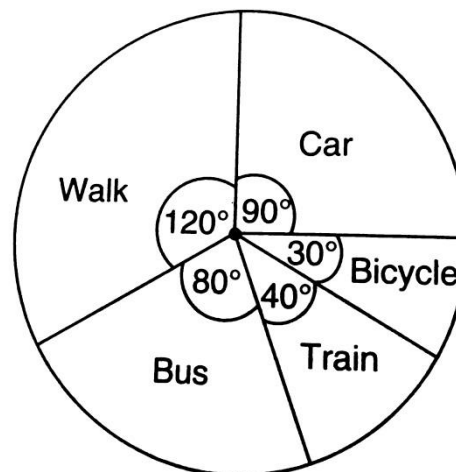
Observe the given pie chart and write how these 2 are different from each other. Focus how the information is presented.

ways of transport used by 36 pupils to come to the school

Age groups of people in a town



(I)



(II)

[illegible]

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How do you find out the number of pupil comes to the school using each way of transport?

Elaborate the steps using which the above pie chart has been created?

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Period 6 and 7

Lesson Objectives

At the end of this lesson students will be able to:

- Collect, organize and display single-variable data in appropriate graphs and representations (e.g., histogram, circle graphs) and explain which types of graphs are appropriate for various data sets.

Teaching Learning Materials required

- **Project:** A4 sheets (4 to 5 per group to collect the data)
- **Presentation:** Chart paper (1 per group); markers (4 to 5 per group)

Details of Teaching Learning Experience

Seating Arrangement: In groups of 4 or 6

Lesson Beginning <u>Time:</u> 15 mins	<u>Home assignment review/Whole class</u> ○ Tell students to take out their respective home assignment sheet. ○ Tell them to check their answers.
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<u>Purpose:</u> Activate prior knowledge	○ Once all of them done with the self-correction, ask is there anybody who got the different answers and steps to create the pie chart? ○ Then take up a discussion for the better clarity in which discuss their doubts and errors along with the reasons behind it. <i>Note: It is important to build consensus on all answers – this will help eradicate any errors.</i>
Lesson Middle <u>Time:</u> 20 mins <u>Purpose:</u> Develop conceptual understanding Consolidate students learning	<u>Project/groups</u> • Tell each group now; they are going to do a project work in groups. • Allot one area or situation for which the groups will have to collect the raw data and then they will have to present the data using the best representation. • They will have to write the questions to ask from other group members. • Example of situations are given to you: ○ Choice of favorite kind of food. North Indian, south Indian, Italian, Chinese etc. ○ Marks obtained in one subject. ○ Methods of travelling to school by teachers, students, principles peons etc. ○ Sales per month of the canteen. Etc. • You can think and give more challenging situations to groups so that they can collate the data and represent them using various graphs and tables. • Give them time to collect the data.
Lesson End <u>Time:</u> 45 mins <u>Purpose:</u> Consolidate students learning	<u>Presentation/groups</u> • Once all the groups collect the respective data tell them to represent the data using appropriate graph or tables. • Give them chart papers to represent the data and markers. • They will have to write the questions to ask from other groups while presenting their graphs. <i>Note: while students are working in their groups to represent the data. Go to each group and ask them to sort out their data first and then help them in arranging and representing their data. Ask them why they want to choose a particular graph or table to represent the data etc.</i> • Once all the groups are done with the representation call groups one by one to present their data and graphs with others. • Ask the following questions from the representative groups:

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	○ On which situation you have collected the data? ○ What have you done with your data? You grouped it or arranged it in ascending or descending order etc. and why? ○ Using which graph or table you represented your data and why? ○ What questions do they want to ask others to answer related to their graphs? <u>Home Assignment</u> Tell students to practice questions on Pg 81-Think, Discuss and Write of NCERT Textbook.
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Period 8 and 9

Lesson Objectives

At the end of this lesson students will be able to:

- Consolidate and generalize the notion of chance in events like tossing coins, dice etc. Relating it to chance in life events.
- Visually represent frequency outcomes of repeated throws of the same kind of coin or dice;
- Throw a large number of identical dice/coins together and aggregate the result of the throws to get large number of individual events.
- Observe the aggregate numbers over a large number of repeated events. Comparing with the data for a coin;
- Represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.
- Definition of terms-random experiment, equally likely outcomes, event, probability.
- Chance and probability related to real life.

Teaching Learning Materials required

- **Brainstorming:** Worksheet-5 (1 per student)
- **Discussion:** projector (1 per class)

Details of Teaching Learning Experience

Seating Arrangement: - In groups of 4 to 6

Lesson Beginning <u>Time:</u> 25 mins <u>Purpose:</u> Activate the prior knowledge Generate interest to the topic Introduce the topic	<u>Brainstorming/whole class</u> • Ask, do they remember what they have covered in probability in grade 7? • Tell them to share whatever they can recall and write the points on the board. • Quickly review and recap about probability and chance, which they have covered in grade 7. • Now, give them Worksheet-5 and tell them to complete it while discussing with their group members. • Give them a dice as well. • Give them 15 mins to complete the task.
Lesson Middle <u>Time:</u> 25 mins. <u>Purpose:</u> Develop conceptual understanding	<u>Whole Class - Discussion</u> • Project Worksheet-5. • At random ask students to share the data, they have figured out using the dice activity and the missing data which they have filled in the given table. • Ask: ○ What do they conclude with this activity? <i>Note: Students may come up with incorrect answers. In this case, take consensus from others. It is important to build consensus on all answers – this will help eradicate any errors. Through discussion let students understand that when you increase the number of tosses more and more, the number of heads and the number of tails come closer and closer to each other. This could also be done with a die, when tossed a large number of times. Number of each of the six outcomes become almost equal to each other. In such cases, we may say that the different outcomes of the experiment are equally likely. This means that each of the outcomes has the same chance of occurring.</i> After making the observations, define probability.
Lesson End <u>Time:</u> 30 mins. <u>Purpose:</u> Develop conceptual understanding Consolidate students learning	<u>NCERT Exercise/pairs</u> • Tell students to attempt the questions on Pg 87-Exercise 5.3 of NCERT Textbook while discussing in pairs. • Give them 15 mins time to complete the task. <u>Whole Class - Discussion</u> • At random ask students to share the answers of the questions given in the sheet with justification. • Build consensus on all the answers.

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Note: Students may come up with incorrect answers. In this case, take consensus from others. It is important to build consensus on all answers – this will help eradicate any errors.

Home Assignment

Tell students to practice questions on Pg 86-Try These of NCERT Textbook

Name: _____

Worksheet-5

Skill: Problem Solving

Topic: Chance and probability

A coin is tossed several times and the number of times we get head or tail is noted. Let us look at the result sheet where we keep on increasing the tosses: fill in the tally marks.

Number of tosses	Tally marks (H)	Number of heads	Tally mark (T)	Number of tails
50		27		23
60		28		32
70	...	33	...	37
80	...	38	...	42
90	...	44	...	46
100	...	48	...	52

What do you observe in the table related to the number of the possibilities of heads and tails in the end?

Try doing the same with a die, when tossed a large number of times. Find out what happens to the Number of each of the six outcomes.

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What can you conclude with the activities?
