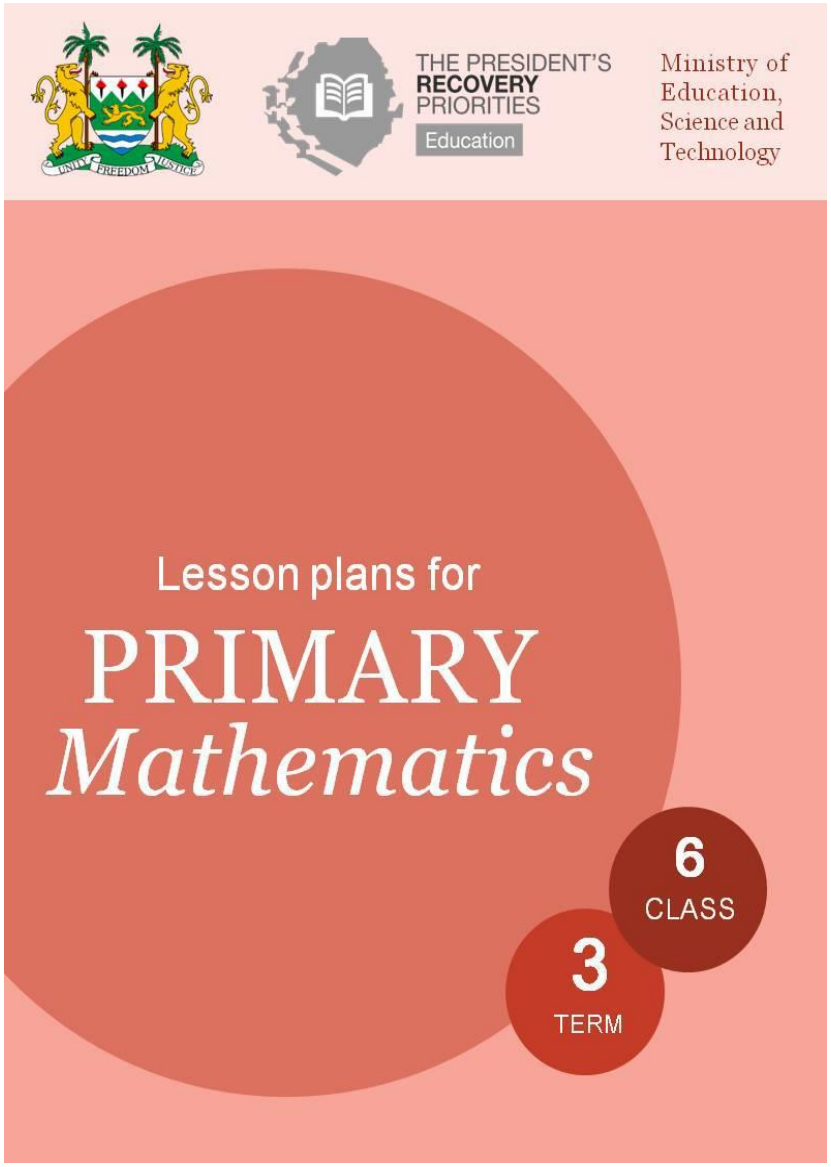

Sierra Leone
WINNING TEAMS: Mathematics

Topic Concept Charts

Primary 6 (Term 3) to support JSS1 Term 3

Leh Wi Lan
November 2022

(Amended March 2023)

WINNING TEAMS: Mathematics

Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

JSS1 Term 3	Primary 6
M-07-106 to M-07-110: Number patterns, variables	**TOPIC 16** **Term 1 M-06-046 to M-06-055** Increasing, decreasing number patterns; multiplication and division in number patterns
M-07-111 to M-07-115: Coefficients, like terms, simplifying expressions **M-07-116 to M-07-120:** Multiply, divide, factorise algebraic expressions, linear equations	*Not done*
M-07-121 to M-07-125: Cartesian Plane	*Not done*
M-07-126 to M-07-131: Data collection, tables, bar charts, line graphs	**TOPIC 17** **Term 2 M-06-061 to M-06-070** Data collection, reports, line charts **TOPIC 18** **Term 3 M-06-121 to M-06-124** Discrete and continuous data, bar charts, histograms **TOPIC 19** **Term 3 M-06-125 to M-06-126** Reading pie charts **TOPIC 20** **Term 3 M-06-127 to M-06-130** Mean, median, mode
M-07-132 to M-07-140: Pie charts, comparing graphs, community survey, mean, median, mode, range, calculations, problem solving.	
M-07-141 to M-07-150: Probability	*Not done*

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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

Topic 16: Number patterns (Term 1 M-06-046, 048, 050, 054 and 055)

Check that you know how to recognise and describe a number pattern	**Do you understand these words?** Sequence, common difference, common ratio, term, general formula	*Refer to Primary Maths Class 6 Term 1*

CONCEPTS:

When a list of numbers follows a pattern, or a sequence, we call it a number pattern.

Common difference

Example 1: 1, 3, 5, 7 is a number pattern or sequence.

* We can use the pattern to extend the pattern by two more terms (9, 11)
* We started at 1 and added 2 each time to get the next term.
* The **common difference** between the terms is 2. This tells us that the general rule will include **2n**. We can use a table to work out the general rule of the sequence.

Position of each number	1	2	3	4	n
Number	**1**	**3**	**5**	**7**	**?**
1. Common difference	2	2	2	2	
2. Multiply n by 2	1 × 2 = 2	2 × 2 = 4	3 × 2 = 6	4 × 2 = 8	n × 2
3. Answer wrong by –1	–1	–1	–1	–1	–1
General formula or rule	1 × 2 – 1 = **1**	2 × 2 – 1 = **3**	3 × 2 – 1 = **5**	4 × 2 – 1 = **7**	**2n – 1**

This gives us the rule: **2n – 1**

*** Common ratio**

Some patterns have a **common ratio** (we can multiply or divide by the same number to get the next term).

Example: 2, 4, 8, 16, 32. Common multiple of 2 (a common ratio of 1 **:** 2) to get the next term.

81, 27, 9, 3, 1. Common divisor of 3 (a common ratio of 3 **:** 1) to get the next term.

Some patterns do not have a common difference or a common ratio.

Example: 1, 1, 2, 3, 5, 8, 13, 21, … Each term is the sum of the previous two terms.

Example 2: 26, 21, 16, 11 is a sequence. We subtract 5 each time, so the next two terms will be 6 and 1. The common difference is –5. The rule will include –5n. Use a table to find the whole rule:

Position of each number	1	2	3	4	n
Number	**26**	**21**	**16**	**11**	**?**
1. Common difference	–5	–5	–5	–5	
2. Multiply n by –5	1 × –5 = –5	2 × –5 = –10	3 × –5 = –15	4 × –5 = –20	n × –5 = –5n
3. Answer wrong by + 31	+ 31	+ 31	+ 31	+ 31	+ 31
General formula or rule	1 × –5 + 31 = 26	2 × –5 + 31 = 21	3 × –5 + 31 = 16	4 × –5 + 31 = 11	–5n + 31

Word problems using sequences

Example: At the market, there is a pile of 300 oranges. Each customer buys 4 oranges. During the day, 72 customers buy oranges. How many oranges are left at the end of the day? Write the first 4 terms of the sequence and create a rule that describes the sequence to help you answer the question.

Solution: 296, 292, 288, 284, … Common difference of –4.

General rule: –4n + 300

If n = 72, then –4(72) + 300 = 12

Topic 16: Number patterns

Exercise:

1. Which of the following sequences have a common difference? What is the common difference?

   A. 11, 26, 41, 56, 71

   B. 8, 15, 23, 32, 42

   C. 55, 44, 33, 22, 11

   D. 240, 190, 140, 90, 40

2. The number sequences below all have a common difference. Find the missing terms:

   a. 73, 69, _____, _____, _____, 53, 49.

   b. _____, _____, _____, 26, 30, 34.

   c.–1, –8, _____, –22, –29, _____,–43.

   d. 620, 640, 660, _____, _____, _____.

3. Given the number pattern 5, 7, 9, 11, …. Use the table to help you find the general rule.

Position of each number	1	2	3	4	n
Number	**5**	**7**	**9**	**11**	**?**
1. Common difference					
2. Multiply n by _____					
3. Answer wrong by ____					
General formula or rule	1 × ___ + ___ = 5	2 × ___+ ___ = 7	3 × ___ + ___ = 9	4 × ___ + ___ = 11	

4. a. Write the next 4 terms of the pattern: 11, 14, 17, _____, _____, _____, _____.

   b. Use a table or any other method to find the general rule for the pattern.

5. Given the number sequence 45, 39, 33, 27.

   a. What is the common difference between the terms?

   b. What are the next two terms in this sequence?

   c. Write a general rule for the number sequence.

Check your answers:

1. A has a common difference of 15.
   B does not have a common difference.
   C has a common difference of –11.
   D has a common difference of –50.

2a. 73, 69, 65, 61, 57, 53, 49.
b. 14, 18, 22, 26, 30, 34.
c. .–1, –8, –15, –22, –29, –36, – 43.
d. 620, 640, 660, 680, 700, 720.

3. common difference: 2; multiply n by 2; answer wrong by +3.
General rule: 2n + 3

4. 11, 14, 17, 20, 23, 26, 29.
Common difference: 3; multiply by 3; answer wrong by 8.
General rule: 3n + 8
Remember that n is the position of the term!

5. a. Common difference of –6
b. 21 and 15
c. multiply by –6; answer wrong by +51.
General rule: –6n + 51

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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

Topic 17: Statistics (Term 2 M-06-061 to M-06-070)

Check that you know:	**Do you understand these words?**
What data is and how you can collect data from people with a survey or questionnaire	Data, survey, sample size, line graph, mean, median, mode, range, maximum, minimum, research, conclusion.

Refer to Primary Maths Class 6, Term 2.

CONCEPTS:

* Data is used to collect information about the things that we want to find out about. When you have a question you want answered, then you need to write a list of possible questions and answers and conduct a survey.

Then you need to:

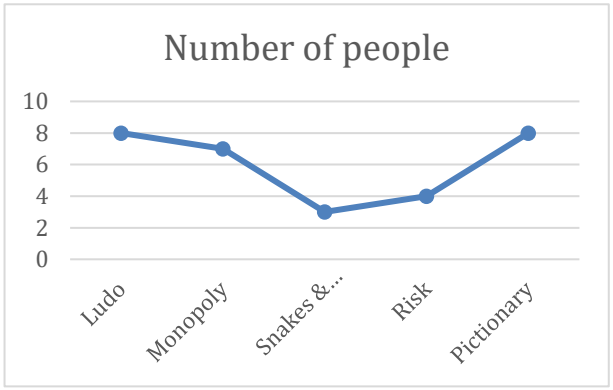
* decide who should answer your questions, what sample size you want to use and how you will collect the data
* collect data from the type of people you have chosen to question
* record and organise the data
* use tables and graphs to represent the data
* analyse and interpret what you notice about the data using the mean, median or mode, the range, the maximum or minimum values etc
* draw conclusions about the question that your research is about.

Example:

Research question: What types of board games will sell best in Sierra Leone?
Let people interviewed choose between 5 possible board games.
We interviewed 30 students from our school.
We collected data by asking students to choose one game and recorded their answers in a table.
We made a line graph of the results and drew conclusions.
We will write up a report on the whole process and out conclusion.

Board Game	Number of people
Ludo	8
Monopoly	7
Snakes & ladders	3
Risk	4
Pictionary	8

Ludo and Pictionary are the most popular games and Snakes & Ladders are the least popular. We used the mode.



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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

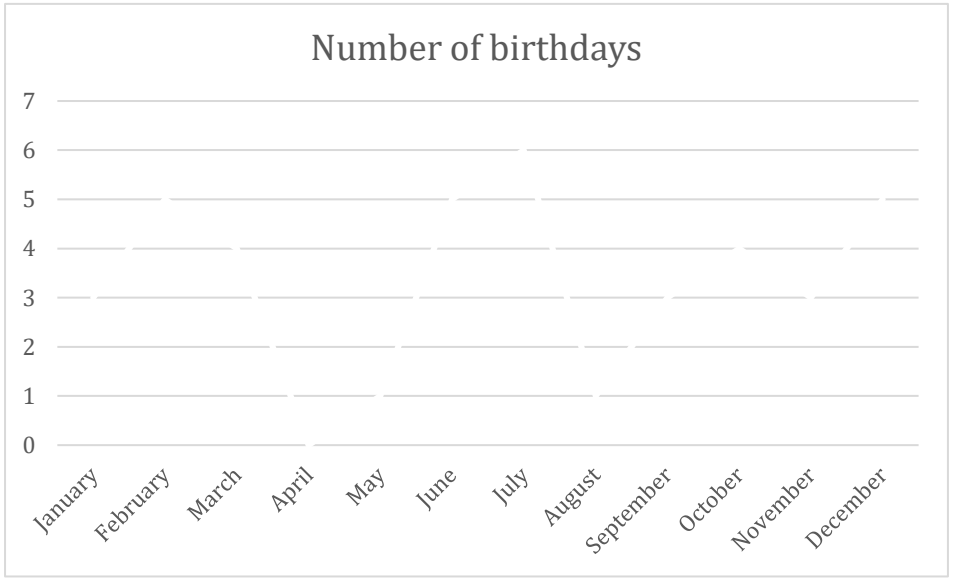
Topic 17: Statistics

Exercise

1. There are many steps to the research process in statistics. Put these steps into the correct order:
   - A. record and organise the data
   - B. collect data from the type of people you have chosen to question
   - C. analyse and interpret what you notice about the data using the mean, median or mode
   - D. decide who should answer your questions, what sample size you want to use and how you will collect the data
   - E. draw conclusions about the question that your research
   - F. use tables and graphs to represent the data

2. Sulaiman wants to know about the favourite sports of the children in his class. What question should he ask them?
3. Sulaiman lets his sample of children choose between 5 different team sports. Which of these activities are *not* good for his list? soccer, pool, netball, cards, Ludo, swimming, dancing, playing, tennis, athletics, gymnastics.
4. Use the table of values to draw a line graph to represent the number of birthdays in each month of the year.

January	3
February	5
March	4
April	0
May	1
June	5
July	6
August	1
September	3
October	4
November	3
December	5



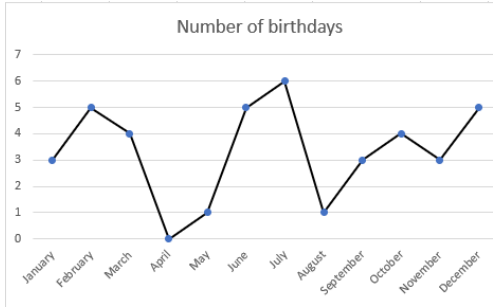
Check your answers:

1. D – B – A – F – C – E

2. What is your favourite sport?

3. pool (snooker), cards, Ludo, dancing, playing

4.



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Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

Topic 18: Drawing and reading graphs (Term 3 M-06-121 to M-06-124)

Check that you can: read values from a bar graph; read a table of values	**Do you understand these words?** Discrete data; continuous data; frequency; bar chart (bar graph); pictograph (pictogram)	*Refer to Primary Maths Class 6, Term 3.*

CONCEPTS:

There are two types of numerical data – discrete and continuous

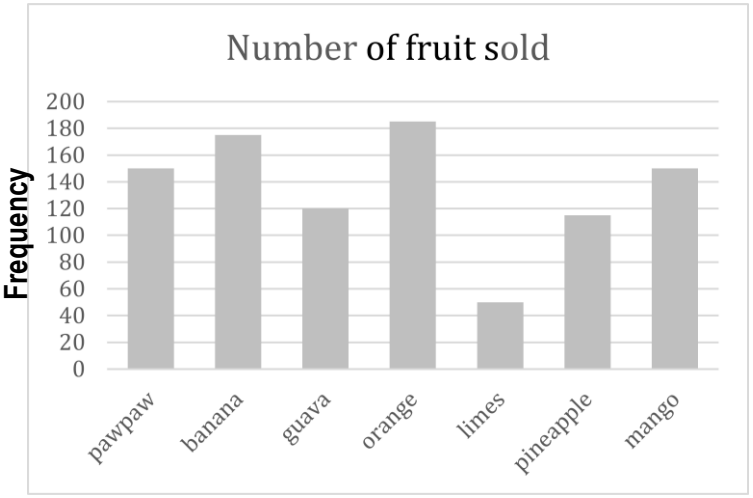
* **Discrete** data is data that can be counted in whole numbers e.g. number of fruit, number of children
* **Continuous** data cannot be counted eg height in metres, mass in kg, volume in litres

Example of discrete data on a bar chart:

A fruit seller uses a table to record the fruit that he sells in one week. We can use this table of data to draw a bar graph of the numbers of fruit sold.

Drawing a Bar chart

Favourite Fruit	Frequency
pawpaw	150
banana	175
guava	120
orange	185
limes	50
pineapple	115
mango	150



We count the number (or **frequency**) of each fruit on a **scale** on the left of the graph. The biggest number is 185, so the scale must go to at least 185. We can count up in 20s to 200.

Each category of fruit is labelled at the bottom of the graph. Make bars for each fruit using the numbers from the table. The bars do not touch.

Note: The top of the bar for pawpaws (150) lies halfway between 140 and 160; the top of the bar for bananas (175) lies closer to 180 than to 160.

Topic 18 continued: Drawing and reading graphs

CONCEPTS:

Example of discrete data on a pictogram:

Day of the Week	Number of Onions sold at Market (= 10 onions)
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Drawing a pictogram

We can also draw a pictogram to represent numerical discrete data. This pictogram uses days of the week as the categories on the left. One picture of an onion represents 10 onions. A picture of half an onion (see Tuesday) represents 5 onions. There are 9 pictures of onions to represent 90 onions sold on Monday.

There are 12½ pictures of onions to represent 125 onions sold on Tuesday.

Reading a pictogram

Total number of onions sold: 90 + 125 + 80 + 150 + 115 = 560 onions

The day most onions were sold: Thursday (150 onions)

Example of continuous data on a histogram

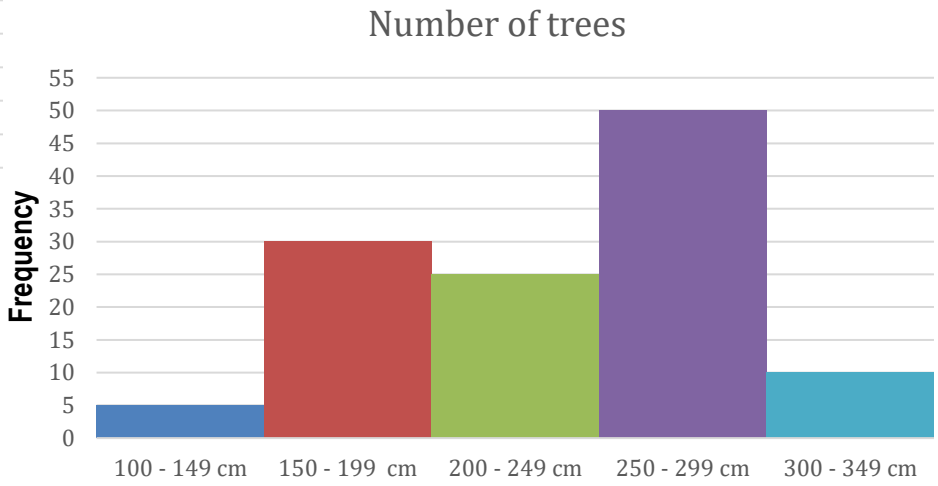
Drawing a histogram

The table gives us data about the heights of trees. The heights are grouped in intervals of the same size in centimetres.

Height of tree (cm)	Number of trees
100 - 149 cm	5
150 - 199 cm	30
200 - 249 cm	25
250 - 299 cm	50
300 - 349 cm	10

The bottom of the histogram shows the intervals or height ranges, we defined on the table.

On the left side of the histogram, the number of trees (frequency) is shown. The scale goes up in 5s up to 55. Each bar of the histogram shows the number of trees in that height range. The bars have no spaces between them to show that the data is continuous.



Reading a histogram

The most common height of the trees was 250 – 299 cm (50 trees). The total number of trees represented in the histogram is 120 trees. Only 5 trees are in the shortest range and 10 are in the tallest range.

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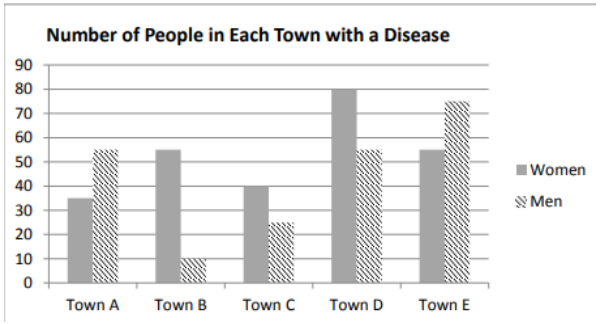
Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

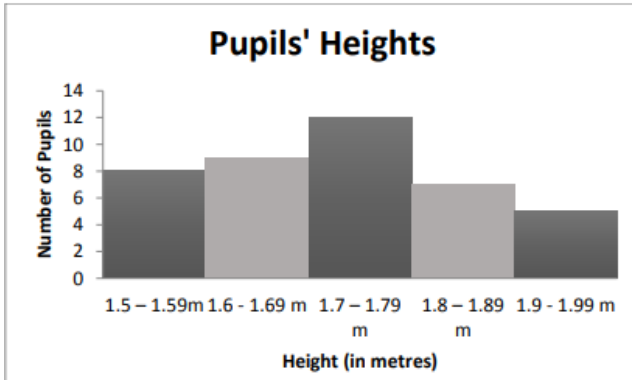
Topic 18: Drawing and reading graphs

Exercise

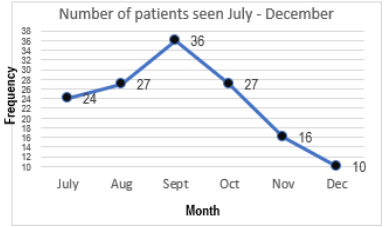
1. What kind of graphs are the graphs below?



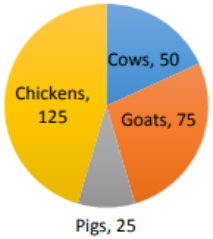
Graph A



Graph B



Graph C



Graph D

Graph E [key: one block = 2 students]

2. For Graphs A and B above, say if the data is discrete or continuous. Explain your answer.
3. What is another word for frequency?
4. Look at Graph A. How many men and how many women in Town D have the disease recorded?
5. Look at Graph B.
   a. How many pupils have a height of 1.9 to 1.99 metres? b. How many pupils' heights are shown altogether?
6. Graph E shows the number of students who take each subject. How many students take a) Mathematics? b) French?

Check your answers:

1. Graph A – bar graph
Graph B – histogram
Graph C – line graph
Graph D – pie chart
Graph E – pictogram
2. Number of people in Graph A is discrete data because we can count each whole person.
Pupils' heights in Graph B is continuous data because the heights are measurements in decimal numbers.
3. Frequency of data is the **number** of data.
4. In Town D, there are 80 women and 55 men with the disease.
5a. 5 pupils
b. 8 + 9 + 12 + 7 + 5 = 41 pupils
6a. 14 students take Maths.
b. 19 students take French.

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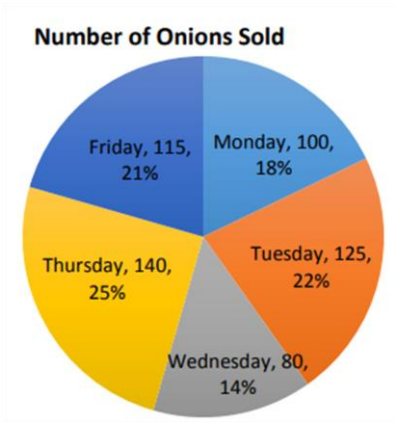
Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

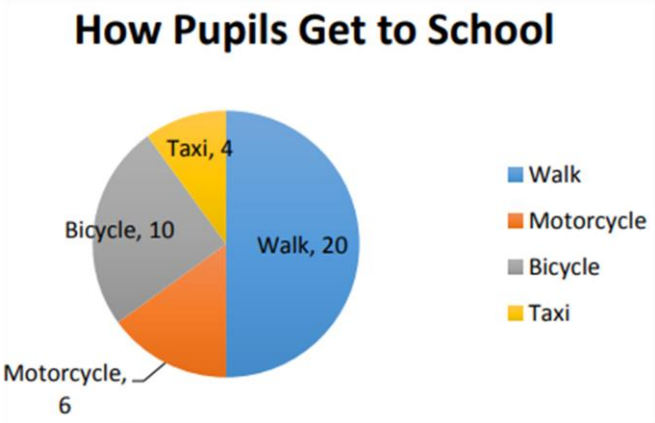
Topic 19: Pie charts (Term 3 M-06-125 to M-06-126)

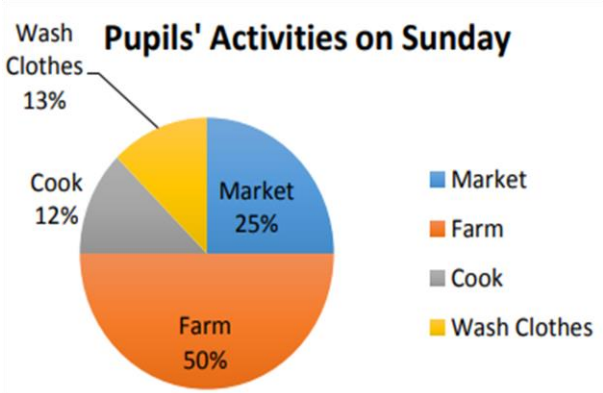
Check that you can:	**Do you understand these words?**	*Refer to Primary Maths Class 6, Term 2*
Work with fractions and percentages	.pie chart, pie graph, portion/ segment/ slice, percentage	

CONCEPTS:

* A pie chart uses portions (or slices, or segments) of a circle to represent the data. A circle has 360° and each portion of the circle represents a specific number of degrees. The portions represent the data in numbers or as a percentage of the whole pie.







Number of onions sold

The number of onions sold on each day of the week is also shown as a percentage of the total number of onions (560).

For example, on Monday, $\frac{100}{560} \times 100 = 18\%$

How pupils get to school

The pie chart represents how 40 pupils get to school.
20 out of 40 pupils walk, so ½ or 50% of the pupils walk.

Pupils' activities on Sunday

The pie chart represents the activities of 96 pupils on Sunday.
So 50% of 96 is 48 pupils who farm and
12% of 96 is 11,5 (rounded to 12) pupils who cook.

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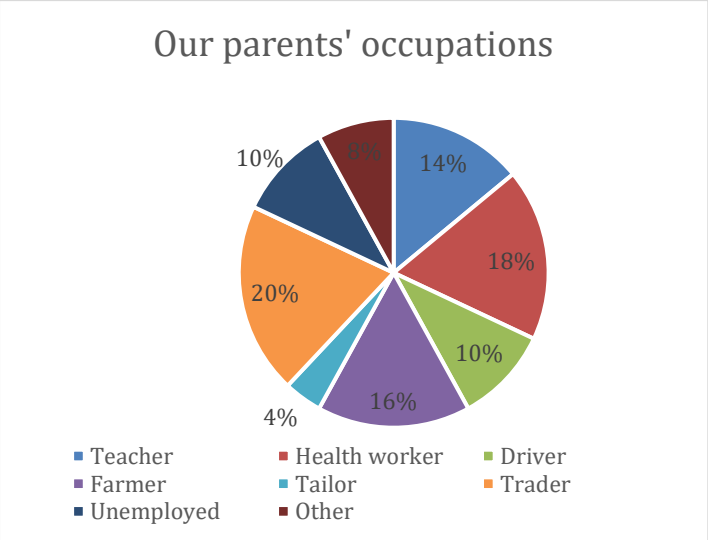
Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

Topic 19: Pie charts

Exercise

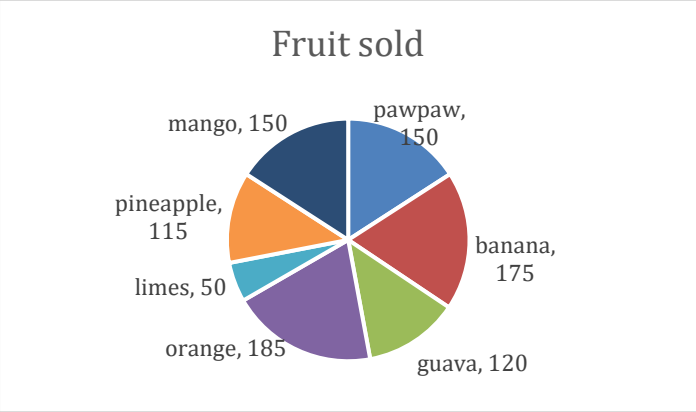


1. Pupils at school were asked what work their parents do. The pie chart shows the results in percentages.

a. Work out the percentage for "other" which is missing.

b. If the pie chart represent 50 parents, how many of them are farmers?
c. Which occupation has the most parents in it? How many parents have this occupation?
d. Which two occupations have the same number of parents in them?

2.



2. The pie chart represents the fruit sold at the market in a week.
a. How many fruit were sold altogether?
b. Which two fruits have equal numbers sold?
c. Which fruit had the most sold?
d. What percentage of the fruit sold are guavas?

Check your answers:

1a. 10 + 20 + 4 + 16 + 10 + 18 + 14 = 92
So the missing percentage is 8%.
b. 16% are farmers. 16% of 50 = 8.

c. The most parents are traders.
20% of 50 = 10 traders
d. The unemployed and the drivers both have 10% of the parents in them.

2a. 150 + 150 + 175 + 120 + 185 + 50 + 115 = 945 fruit sold
b. mangoes and pawpaws
c. oranges had 185 sold
d. $\frac{120}{945} = 12.7\%$ guavas

WINNING TEAMS: Mathematics

Primary 6 Topic Concept Charts (to support JSS1 pupils) TERM 3

Topic 20: Mean, median and mode (Term 3 M-06-127 to M-06-130)

Check that you can: Organise numerical data, use adding, subtracting, multiplying, dividing.	**Do you understand these words?** Average, mean, median, mode,	*Refer to Primary Maths Class 6, Term 2*

CONCEPTS:

* We can find three different kinds of average for a set of data.
Example: Here is a set of data
31, 16, 16, 54, 13, 93, 41, 49, 95

* **Mean** = $\frac{\text{sum of all data values}}{\text{number of data values}} = \frac{31+16+16+54+13+93+41+49+95}{9} = 408 \div 9 = 45.3$
The mean average of the set of data is 45.3.

* **Median**: the middle value or values (in the middle place) when the data is ordered.

13; 16; 16; 31; **41;** 49; 54; 93; 95. The median is 41 because it is in the middle.

If there are **two middle values** in a set of data, we add them and divide by 2 to find the median. If we put an extra value, say 100, in the set given above:

13; 16; 16; 31; **41; 49;** 54; 93; 95; 100.
Then $\frac{41+49}{2} = \frac{90}{2} = 45$ is the median.

* **Mode**: the value that appears most often.
13; **16; 16;** 31; 41; 49; 54; 93; 95.
16 is the mode.

We mostly use the mean as the average of data, but there are some situations where the median or the mode are more useful to us.

* We use the **median** when a set of data has some very high or very low numbers that make the mean average too high or too low.

Example: If a set of ordered data of children's ages is
2, 6, 7, **8,** 9, 10, 10, then the median is 8 and it is not affected by the low numbers or the high numbers.
The **mean** is 52 ÷ 6 = 8.7.
The median is a better "average" of this data.

* We use the **mode** to find the most popular, the favourite or the most of a number.
Example: If the shoe sizes of 6 children are 2, 4, 5, 5, 5 and 7, the mode of the data is 5. Shoe size 5 is the most popular size.

Topic 20: Mean, median and mode (Term 3 M-06-127 to M-06-130)

Exercise

1. The ages of 9 friends are: 9 10 10 11 12 12 14 15 18.
   Find the mean, median and mode of their ages.

2. The table shows the number of rainy days in Freetown, Sierra Leone every month of 2019.

Month	January	February	March	April	May	June	July	August	September	October	November	December
Number of days when it rained	4	1	7	11	21	30	30	31	27	29	18	3

   a. Find the mean number of days of rainfall in a month over 2018.
   b. Find the median number of days of rainfall in a month over 2018.
   c. What is the mode of this data?
   d. What is the most appropriate measure of the middle of this data – mean, median or mode?

3. The table below shows average daily temperatures for Freetown City, recorded for a week in degrees Celsius.
   Temperature in Freetown City

Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Temperature in °C	15	18	19	17	22	17	20

   a. Find the mean temperature for the week.
   b. Find the median temperature for the week.
   c. What is the mode of these temperatures?

Check your answers:

1. mean = $\frac{9+10+10+11+12+12+14+15+18}{9}$

$= \frac{111}{9} = 12.3 \text{ years}$

Median: 12

Two modes (bimodal): 10 and 12

2a. Mean = $\frac{212}{12} = 17.7 \text{ days}$

b. Median:

ordered data:

1; 3; 4; 7; 11; **18; 21;** 27; 29; 30; 30; 31

$\frac{18+21}{2} = 19.5$ days

c. Mode: 30 days

d. The median is the best to use, because it is not skewed by the high values or the low values.

3a. mean: $\frac{128}{7} = 18.3°$

b. ordered data:

15; 17; 17; 18; 19; 20; 22

Median is 18°C

Mode is 17°C