



THE PRESIDENT'S  
**RECOVERY**  
PRIORITIES

Education

Ministry of  
Education,  
Science and  
Technology

Lesson plans for  
**PRIMARY**  
*Mathematics*

**6**  
CLASS

**3**  
TERM

NOT FOR SALE



## Foreword

Our country's future lies in the education of our children. The Government of Sierra Leone is committed to doing whatever it takes to secure this future.

As Minister of Education, Science and Technology since 2007, I have worked every day to improve our country's education. We have faced challenges, not least the Ebola epidemic which as we all know hit our sector hard. The Government's response to this crisis – led by our President – showed first-hand how we acted decisively in the face of those challenges, to make things better than they were in the first place.

One great success in our response was the publication of the Accelerated Teaching Syllabi in August 2015. This gave teachers the tools they needed to make up for lost time whilst ensuring pupils received an adequate level of knowledge across each part of the curriculum. The Accelerated Teaching syllabi also provided the pedagogical resource and impetus for the successful national radio and TV teaching programs during the Ebola epidemic.

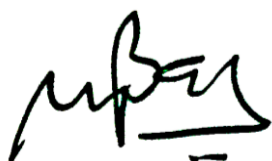
It is now time to build on this success. I am pleased to issue new lesson plans across all primary and JSS school grades in Language Arts and Mathematics. These plans give teachers the support they need to cover each element of the national curriculum. In total, we are producing 2,700 lesson plans – one for each lesson, in each term, in each year for each class. This is a remarkable achievement in a matter of months.

These plans have been written by experienced Sierra Leonean educators together with international experts. They have been reviewed by officials of my Ministry to ensure they meet the specific needs of the Sierra Leonean population. They provide step-by-step guidance for each learning outcome, using a range of recognised techniques to deliver the best teaching.

I call on all teachers and heads of schools across the country to make best use of these materials. We are supporting our teachers through a detailed training programme designed specifically for these new plans. It is really important that these Lesson Plans are used, together with any other materials you may have.

This is just the start of education transformation in Sierra Leone. I am committed to continue to strive for the changes that will make our country stronger.

I want to thank our partners for their continued support. Finally, I also want to thank you – the teachers of our country – for your hard work in securing our future.



Dr. Minkailu Bah

Minister of Education, Science and Technology











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# Introduction to the Lesson Plan Manual

These lesson plans are based on the National Curriculum and meet the requirements established by the Ministry of Education, Science and Technology.

- 1  The lesson plans will not take the whole term, so use spare time to review material or prepare for exams
- 2  Teachers can use other textbooks alongside or instead of these lesson plans.
- 3  Read the lesson plan before you start the lesson. Look ahead to the next lesson, and see if you need to tell pupils to bring materials for next time.
- 4  Make sure you understand the learning outcomes, and have teaching aids and other preparation ready – each lesson plan shows these using the symbols on the right.
- 5  Quickly review what you taught last time before starting each lesson.
- 6  Follow the suggested time allocations for each part of the lesson. If time permits, extend practice with additional work.
- 7  Lesson plans have a mix of activities for the whole class and for individuals or in pairs.
- 8  Use the board and other visual aids as you teach.
- 9  Interact with all students in the class – including the quiet ones.
- 10  Congratulate pupils when they get questions right! Offer solutions when they don't, and thank them for trying.



Learning outcomes






Teaching aids



Preparation

<b>Lesson Title:</b> Representing Discrete Data	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-121	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <p><b>Learning Outcomes</b> By the end of the lesson, pupils will be able to draw bar charts and pictograms from tables of data.</p>	 <p><b>Teaching Aids</b> None</p>	 <p><b>Preparation</b> Draw or copy the charts and tables from the lesson on the board.</p>
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**Opening (3 minutes)**

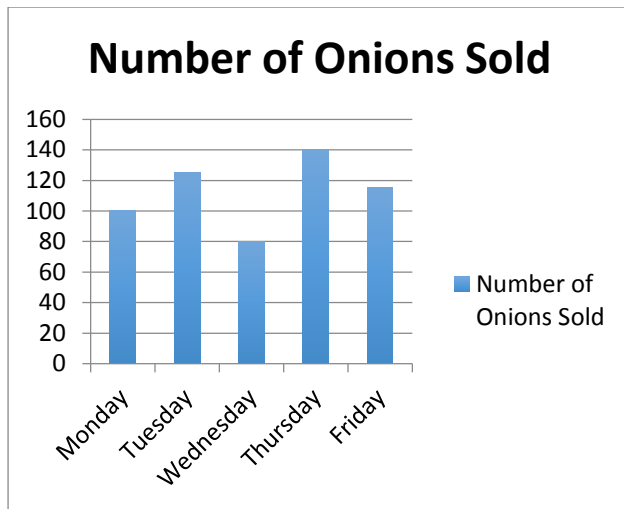
1. **Say:** Today we are going to work with data again. This time we will be working on drawing bar charts and pictograms from tables of data. There are two types of data, discrete and continuous. Today's data will be discrete.
2. **Ask:** What is discrete data? (Example answer: Discrete data is data that can be organised into a category and is based on counts. It does not include decimals.)
3. Have pupils raise their hands to offer answers. Call on 2 or 3 pupils to answer the question. If no one provides a correct response, please explain to pupils what discrete data is.
4. **Say:** Some examples of discrete data are how many fruits and vegetables are sold each day at market or how many pupils are present in class each day. These are countable sources of data and cannot be represented in parts.

**Introduction to the New Material (10 minutes)**

1. **Say:** Since discrete data has a finite number for each portion of the data, it is best represented using either bar charts or pictograms. Bar charts are graphs that represent quantity with vertical bars with spaces beneath them. Pictograms are graphs that use pictures to represent a certain set of data. One picture could represent 10 or 100 of the data. Let's see how we can use these graphical representations to represent data.
2. **Draw** a table of data on the board.

Day of the Week	Number of Onions sold at Market
Monday	100
Tuesday	125
Wednesday	80
Thursday	140
Friday	115

3. **Say:** Now we are going to draw a bar chart and pictograph for this data. First we create a chart that has the labels for the columns in the table. The bottom of our chart has the days of the week and the left side of our chart gives the number of onions sold at the market each day. You can see that the visual gives an exact count of our data or for Monday, the bar reaches to 100 on the bar chart. You can see that on the left side, each space is separated by 20s but sometimes our data doesn't reach the exact line.



4. **Draw** the bar graph on the board and explain to pupils how to create it. Then do the same thing for a pictograph. You can use whatever symbol you want to represent the onions. You can see that one onion represents 10 onions in real life. On Tuesday, there are 12 full onions and one half onion which represents 5 onions for a total of 125 onions sold at the market on Tuesday.

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

**Guided Practice (10 minutes)**

- Say:** Now you will create a bar chart and pictograph of your own from data provided.
- Write** the data on the board. Have pupils copy the data in their exercise books and work independently to create a bar chart and pictograph of the data.

Number of siblings	Number of pupils with that many siblings
1	5
2	15
3	20
4	25
5+	10



3. Walk around the room and assist pupils as they work. Answer questions if they arise. After seven minutes, call attention to the front of the room and provide pupils with the bar chart and a possible pictograph of the data. Tell pupils that their pictograph might be different depending on how many they had their picture represent.

**Independent Practice** (10 minutes)

1. **Say:** Now you will practise on your own. I want each of you to come up with a bar graph and pictograph for the provided data. After five minutes, you will compare graphs with a partner.
2. **Write** the data on the board.




<b>Favourite Fruit</b>	<b>Frequency</b>
Paw-paw	150
Banana	175
Guava	120
Orange	185
Limes	50
Pineapple	115
Mango	150

3. As pupils are working, walk around and assist as needed. Answer questions if they arise.
4. Once the five minutes is up, call attention and have pupils compare graphs with partners. Give them three minutes to discuss the similarities and differences in their graphs.
5. **Ask:** Does anyone want to share the graphs they created on the board?
6. Have pupils raise their hands to volunteer. Call on 1 or 2 pupils to share their work on the board.

**Closing** (2 minutes)

1. **Say:** Tomorrow we will continue our work with representing data.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any questions that pupils have.

<b>Lesson Title:</b> Representing Continuous Data	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-122	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<p><b>Learning Outcomes</b> By the end of the lesson, pupils will be able to draw histograms from tables of data.</p>		<p><b>Teaching Aids</b> None</p>		<p><b>Preparation</b> None</p>
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### Opening (3 minutes)

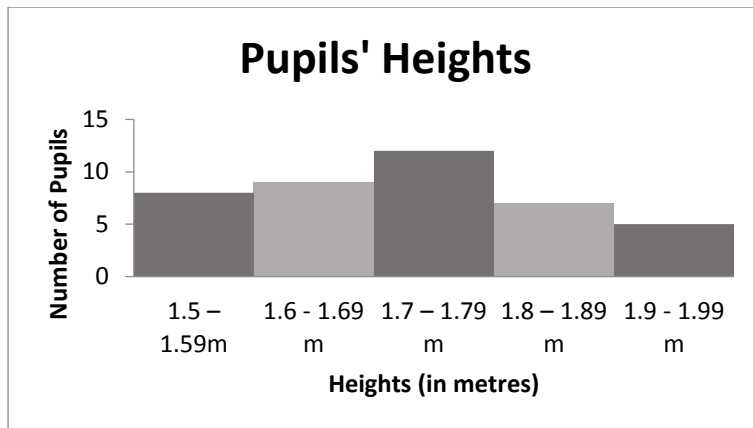
1. **Say:** Today we are going to work with data again. But rather than working with discrete data, we will be making histograms with continuous data.
2. **Ask:** What is continuous data? (Example answer: Continuous data is not restricted to defined and specific values. It can have any value over a range, including decimals.)
3. Have pupils raise their hands to offer answers. Call on 2 or 3 pupils to answer the question. If no one provides a correct response, please explain to pupils what continuous data is.
4. **Say:** Some examples of continuous data are pupils' heights or the weight of an animal.

### Introduction to the New Material (10 minutes)

1. **Say:** Since continuous data has a range of values that we work with, we organise the data in intervals of the same size. These intervals tell us the intervals of our histograms. Let's see what this looks like
2. **Draw** a table of data on the board.

Heights	Number of Pupils
1.5 – 1.59m	8
1.6 - 1.69 m	9
1.7 – 1.79 m	12
1.8 – 1.89 m	7
1.9 – 1.99 m	5

3. **Say:** Now we are going to draw a histogram for this data.
4. **Draw** the histogram on the board and explain to pupils how to create it:



5. **Say:** We can see that the bottom of the histogram has the height in the intervals, or height ranges, we defined on our table. On the left side of the histogram we can see that number of pupils who are in that height range. Notice that the bars on the histogram are next to each other without spaces. This is different from the bar charts we learned about yesterday because there is an interval or range.

**Guided Practice (10 minutes)**

- Say:** The big difference between a histogram and a bar graph is that the bars are touching to represent that all possible values are represented in the range. Now you will create a histogram of your own from data provided.
- Write** the data on the board. Have pupils copy the data in their exercise books and work independently to create a histogram of the data.

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

- Walk around the room and assist pupils as they work. Answer questions if they arise.
- After seven minutes, call attention to the front of the room and provide pupils with the bar chart and a possible pictograph of the data. Tell pupils that their pictograph might be different depending on how many they had their picture represent.

**Independent Practice** (10 minutes)

1. **Say:** Now you will practise on your own. I want each of you to come up with histogram for the provided data. After five minutes, you will compare graphs with a partner. The data in this tells us the fuel efficiency of various cars. The data is measured in miles per gallon.
2. **Write** the data on the board:




Fuel Efficiency (miles/gallon)	Number of Cars
5-9	15
10-14	20
15-19	35
20-24	25
25-29	15

3. As pupils are working, walk around and assist as needed. Answer questions if they arise.
4. Once the five minutes is up, call attention and have pupils compare graphs with partners. Give them three minutes to discuss the similarities and differences in their graphs.
5. **Ask:** Does anyone want to share the graphs they created on the board?
6. Have pupils raise their hands to volunteer. Call on 1 or 2 pupils to share their work on the board.

**Closing** (2 minutes)

1. **Say:** Tomorrow we will be working with data and graphs but we will interpret bar charts.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Interpreting Bar Charts	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-123	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

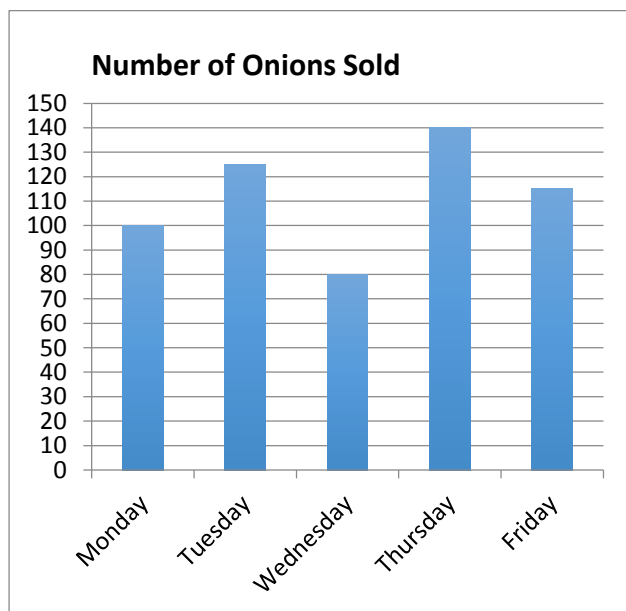
	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to read and interpret bar charts.		<b>Teaching Aids</b> None		<b>Preparation</b> Draw the bar graphs for the lesson on the board.
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**Opening** (3 minutes)

1. **Say:** Today we are going to continue our work with data but today we will focus on interpreting bar charts. We have created bar charts in previous lessons, now we will learn how to read them and answer questions about them.
2. **Ask:** What type of data is represented by bar charts? (Answer: Discrete data)
3. Have pupils raise their hands to provide answers. Call on 2 or 3 pupils until one provides the correct answer.
4. **Say:** Very good. Bar charts are used to display discrete data because it can be categorised and represented by category. Today we are going to answer questions related to bar graphs that require us to read the data represented in the graph.

**Introduction to the New Material** (10 minutes)

1. **Say:** Let's start with our first bar graph from earlier this week.
2. Draw the bar graph on the board.

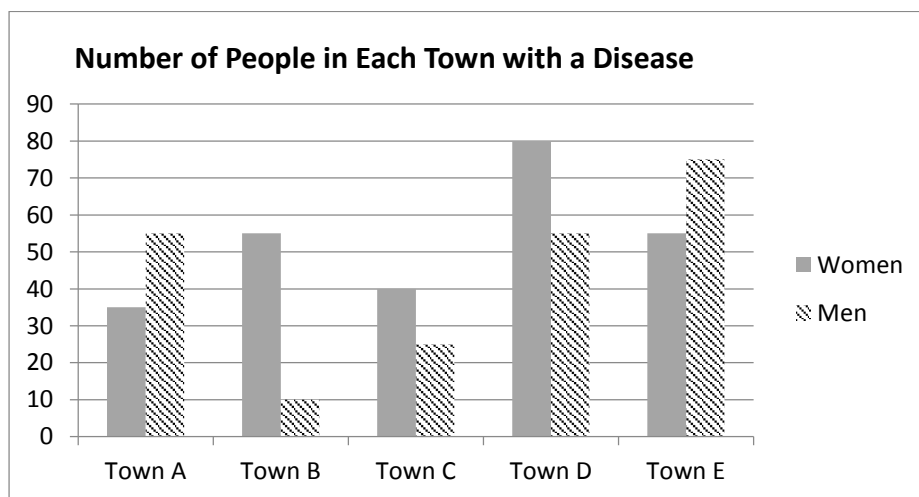


3. **Say:** If you remember this bar graph, it told us how many onions were sold each day at the market. Using the information in the graph, we can answer questions about the selling of onions.

4. **Ask:** Looking at this graph, which day were the most onions sold and how many onions were sold on that day? (Answer: The most onions were sold on Thursday when 140 onions were sold.)
5. Show pupils that in order to answer this question, you must look for the tallest bar. That bar tells us which day had the most sales. Then you read the value on the left that corresponds with the top of the tallest bar to see how many were sold that day. Have pupils raise their hands to provide answers. Call on 2 or 3 pupils until the correct response is given.
6. **Ask:** How many onions were sold during the week total?  
(Answer: 560 onions were sold all week.)
7. Show pupils that in order to answer this question, you must read how many onions were sold each day and add them together. Show them the math to find the answer:  
 $100+125+80+140+115=560$ .

**Guided Practice (10 minutes)**

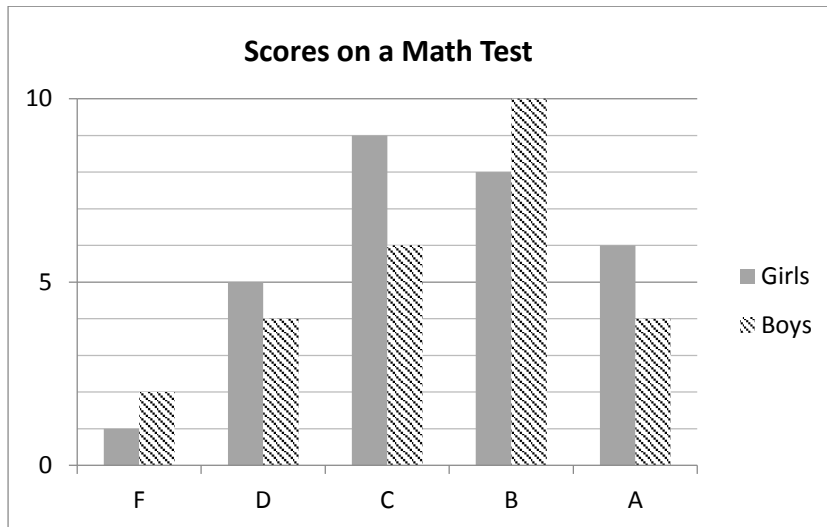
1. **Say:** Now you are going to answer some questions about another bar graph. Please copy the bar graph and questions into your exercise book in order to answer the questions.
2. Copy the bar graph on the board:



3. Write the following questions on the board:
  - a. Which town has the most instances of the disease? (Answer: Town D)
  - b. Which town has the biggest difference in diseases in men and women?  
(Answer: Town B)
  - c. How many people, in total, have the disease?  
(Answer: 485 people in total have the disease)
4. Have pupils work for 7 minute on this problem. Walk around the room and assist as needed. After seven minutes is up, call attention to the board. Show pupils how to find the answers to each of the questions.
5. **Say:** This bar graph is a little more difficult because it shows two different sets of information on one graph. We have to be careful to distinguish between the different sets of data. In this graph, the two sets of data are men and women.

### Independent Practice (10 minutes)

1. **Say:** Now you will practise on your own. You will have 6 minutes to answer the questions in your exercise book that corresponds with the given bar graph.
2. **Write** the data and questions on the board.
  - a. How many pupils received a score of an A on the test? (Answer: 10 scored an A)
  - b. How many more boys failed the test than girls? (Answer: 1 more boy failed the test)
  - c. How many more girls than boys scored an A on the test? (Answer: 2 more girls scored an A on the test)






3. As pupils are working, walk around and assist as needed. Answer questions if they arise.
4. Once the six minutes is up, call attention and have pupils compare answers with partners. Give them time to discuss their answers. Once they are done discussing, share the correct answers with pupils.

### Closing (2 minutes)

1. **Say:** Tomorrow we will be interpreting histograms.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Interpreting Histograms	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-124	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

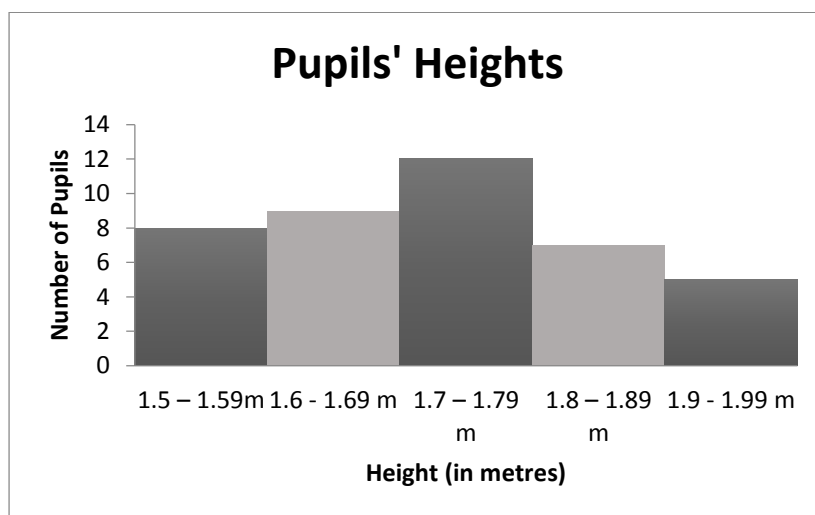
	<p><b>Learning Outcomes</b> By the end of the lesson, pupils will be able to read and interpret histograms.</p>		<p><b>Teaching Aids</b> None</p>		<p><b>Preparation</b> Draw the histograms for the lesson on the board.</p>
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**Opening (3 minutes)**

1. **Say:** Today we are going to continue our work with data but today we will focus on interpreting histograms.
2. **Ask:** What type of data is represented by histograms? (Answer: Continuous data)
3. Have pupils raise their hands to provide answers. Call on 2 or 3 pupils until one provides the correct answer.
4. **Say:** Very good. Histograms are used to display continuous data because there are no separations between the data being represented. Today we are going to answer questions related to histograms that require us to read and interpret the data represented in the graph.

**Introduction to the New Material (10 minutes)**

1. **Say:** Let's start with our first histogram from earlier this week.
2. **Draw** the histogram on the board:



3. **Say:** If you remember this histogram, it told us how many pupils were in each height range. Using the information in the graph, we can answer questions about the height of pupils.
4. **Ask:** Looking at this graph, which range of heights has the most pupils? How many pupils fell in that height range? (Answer: The most pupils are between 1.7 and 1.79 metres tall. There are twelve pupils that are in that height range.)
5. Show pupils that in order to answer this question, you must look for the tallest bar. That bar tells us which range has the most pupils. Then you read the value on the left that corresponds with



the top of the tallest bar to see how many pupils are in that range. Have pupils raise their hands to provide answers. Call on 2 or 3 pupils until the correct response is given.

6. **Ask:** How many pupils are represented on the histogram?  
(Answer: 41 pupils are represented in the histogram.)
7. Show pupils that in order to answer this question, you must read how many pupils are in each range and add those values together. Show them the math to find the answer:  
 $8+9+12+7+5=41$

### **Guided Practice** (10 minutes)

1. **Say:** Today we are going to collect continuous data about ourselves and then create a histogram. We will then answer questions about the data in the histogram. For our data collection, we want to know how far you travel to get to school each day. This will be measured in minutes. I will call on each of you to tell me how long it takes you to get to school each day.
2. Call on each pupil to tell how long it takes to get to school each day. Write the answers on the board. Then show pupils how to break the data up into intervals. Suggested intervals could be 1-5 minutes, 6-10 minutes. Be sure there are at least three intervals with data. You may have to make smaller or bigger intervals depending on how far pupils travel to school.
3. **Say:** Now that we have our data and our intervals, we need to find out how many pupils travel the time in each of those intervals.
4. Write the intervals and how many pupils fall in those intervals on the board. Have pupils help you count the values.




### **Independent Practice** (10 minutes)

1. **Say:** Now that we have our class data, you will create a histogram with the data and answer some questions. You will then answer some questions about the data.
2. **Write** the questions on the board and read them as you write.
  - a. How many pupils take more than 15 minutes to get to school? What time interval has the most pupils?
  - b. How many other classmates take the same amount of time to get to school as you do?  
(Answers will vary depending on class data.)
3. As pupils are working, walk around and assist as needed. Answer questions if they arise.
4. Once the seven minutes is up, call attention and have pupils compare answers with partners. Give them time to discuss their answers. Once they are done discussing, share the correct answers with pupils.

### **Closing** (2 minutes)

1. **Say:** Tomorrow we will be interpreting pie charts.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Interpreting Data from Pie Charts	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-125	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

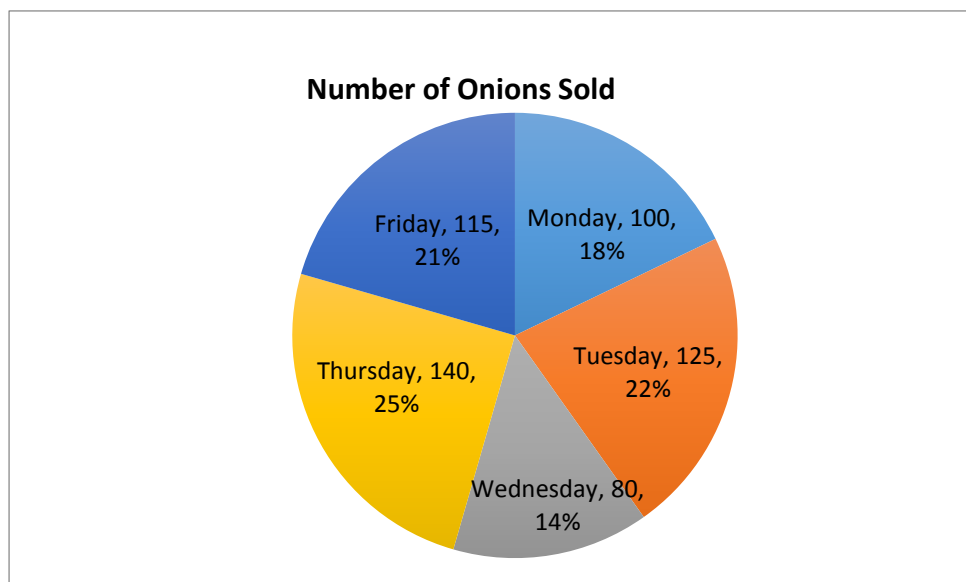
	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to read and interpret pie charts.		<b>Teaching Aids</b> None		<b>Preparation</b> Draw the pie charts for the lesson on the board.
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**Opening (3 minutes)**

1. **Say:** Today we are going to continue our work with data but today we will focus on interpreting pie charts.
2. **Ask:** How do pie charts represent data? (Answer: Through portions of a circle.)
3. Have pupils raise their hands to provide answers. Call on 2 or 3 pupils until one provides the correct answer. If no one provides the correct response, please explain the answer.
4. **Say:** Since pie charts use circles to represent the data, we must remember to use the portions of a circle. A circle has 360° and each portion of the circle represents a specific number of degrees. We use this information to figure out how much data is represented in a particular portion of the pie chart. We will need to combine what we know about converting percentages to decimals and multiplying decimals to answer some of the questions.

**Introduction to the New Material (10 minutes)**

1. **Say:** Let's look at a pie chart to see what this all means.
2. **Draw** the pie chart on the board.



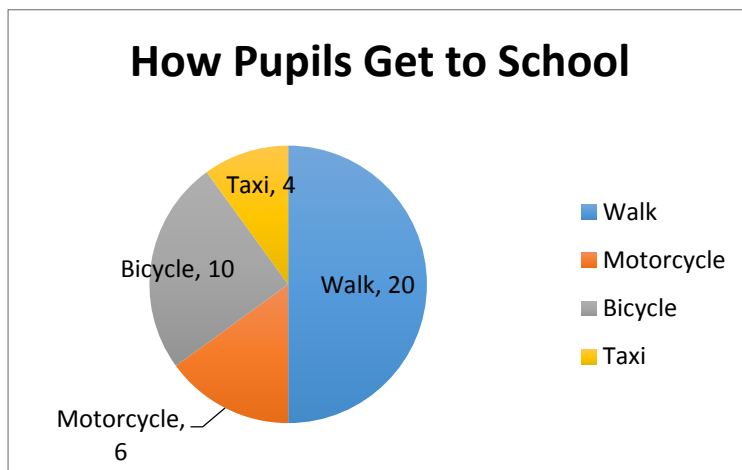
3. **Say:** If you remember our data about onions from our bar graphs, this pie chart represents the same information. In each section, we are told what day of the week the onions were sold, how many onions were sold and the percentage of the total number of onions sold that particular

day was. In other words, on Monday, one hundred onions were sold and that represented eighteen percent of the total onions sold in the week. Now that we have this information, we can answer questions about the data.

4. **Ask:** What fraction of the total number of onions sold was sold on Thursday? (Answer:  $\frac{1}{5}$ )
5. Have pupils think about the answer to the question for a minute. Once they have had plenty of time to think about the problem, explain to them that all they have to do is convert the 20% for the Thursday sales percentage to a fraction. Since 20% is equal to  $\frac{1}{5}$  then that is the fraction.

**Guided Practice (10 minutes)**

1. **Say:** The last pie chart gave us data in both numbers and percentages, but it is possible to have a pie graph that only gives us the number of responses. The next pie chart will not have percentages, but you will need to answer questions about it.
2. **Draw** the pie chart below on the board:

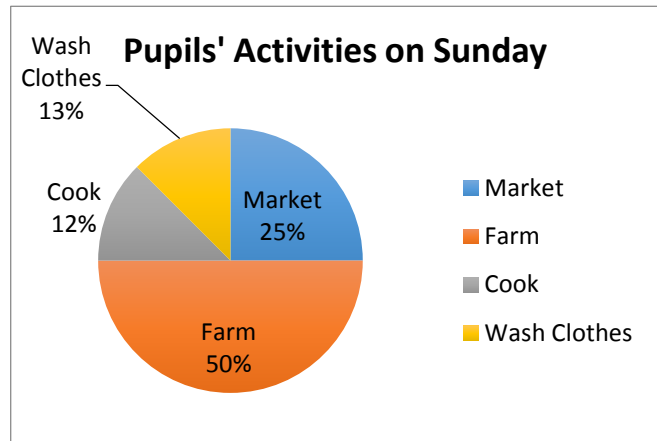


3. **Say:** You will have some questions to answer using the data in the pie chart. You will have seven minutes to answer the questions. Please answer the questions in your exercise books and work independently.
4. **Write** the questions on the board.
  - a. How many pupils are represented in the data? (Answer: 40 pupils)
  - b. What percentage of the pupils walk to school? (Answer: 50% of the pupils walk to school.)
  - c. Which method do 25% of the pupils use to go to school? (Answer: Bicycle)
  - d. When considered together, two methods of transportation used represent  $\frac{1}{4}$  of the pupils.  
What are those two methods? (Answer: Taxi and motorcycle)
5. Pupils will work for seven minutes. When seven minutes is up, call attention to the front of the room. Then show pupils the solutions on the board. Answer any questions that may arise.

### Independent Practice (10 minutes)

1. **Say:** Now you will try working with another pie chart. Please work independently for six minutes to answer the questions. This pie chart represents the responses that 96 pupils gave when asked what they do on Sunday.
2. **Draw** another pie chart on the board (see the next page).
3. **Write** the questions on the board and read them as you write.

- a. How many pupils wash clothes on Sunday?  
(Answer: 12 pupils wash clothes on Sunday.)
- b. How many pupils do not go to market?  
(Answer: 72 pupils do not go to market.)
- c. What activity has the same number of pupils as the pupils who wash clothes and cook together?  
(Answer: Going to the market.)






4. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the six minutes is up, call attention and have pupils compare answers in pairs. Give them time to discuss their answers. Once they are done discussing, ask pupils to raise their hands to provide answers to the questions.

### Closing (2 minutes)

1. **Say:** Tomorrow we will solve word problems involving pie charts.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Word Problems Involving Pie Charts	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-126	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

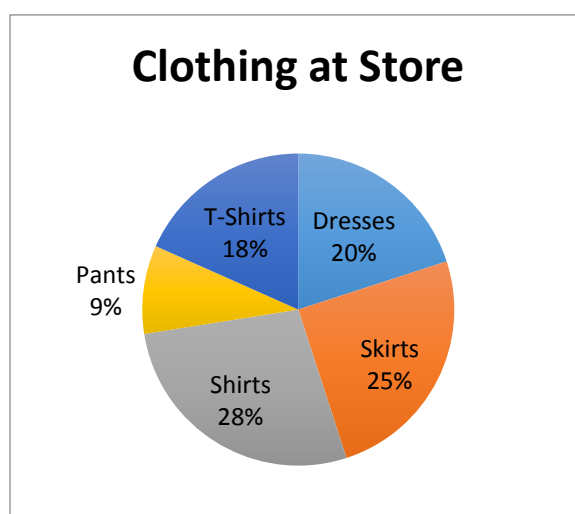
	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to solve word problems involving pie charts.		<b>Teaching Aids</b> None		<b>Preparation</b> Draw the pie charts for the lesson on the board.
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### Opening (3 minutes)

- Say:** Today we are going to continue our work with pie charts, most specifically by solving word problems.

### Introduction to the New Material (10 minutes)

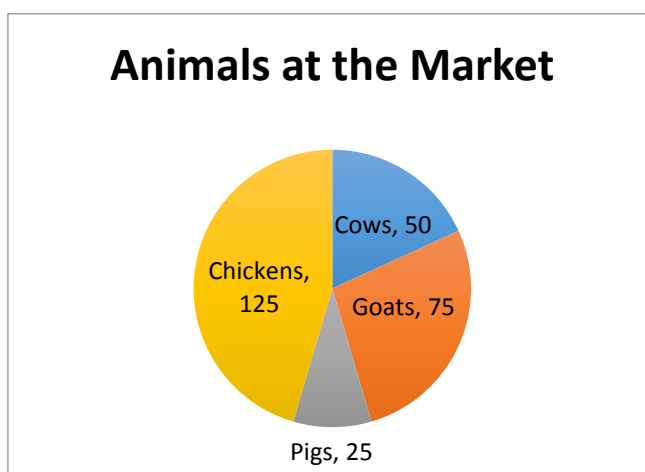
- Write** the word problems and the pie chart on the board: A clothing store has 1920 pieces of clothing. They carry five different types of clothing. The pie chart shows what percent of the clothing is of each type.



- Read the problem to the class. Then write the questions on the board:
  - How many of each item does the store carry? (Answer: 384 dresses; 480 skirts; 538 shirts; 173 pants; 345 t-shirts)
  - Does the store carry more dresses or skirts? How many more? (Answer: Skirts; 96 more skirts than dresses)
  - How many more shirts than skirts does the store have? (Answer: 58 more shirts.)
- Say:** We need to work with the data and think about the questions carefully. As we learned earlier this year we found that finding the percentage of a number, we multiply the number by the decimal representation of the percentage. This is the best way to find each of the answers. The first question helps us answer the second two.
- Solve the problem on the board for pupils to see the process. Have pupils copy the problem and the solution in their exercise books.

### Guided Practice (10 minutes)

- Write** the word problem on the board: There are 275 animals for sale at the weekly market. The pie chart shows the types of animals at the market.
- Draw the pie chart below on the board.
- Read the problem to the class.



4. **Write** the questions on the board:
  - a. What percentage of the animals are the chickens? (Answer: The chickens represent 45.5% of the animals at the market.)
  - b. Which animal represents 18.2% of the animals at the market? (Answer: The cows represent 18.2% of the animals at the market.)
  - c. If 142 animals were sold at the market, what percentage of the animals were sold? (Answer: 51.6% of the animals were sold at the market.)
5. Pupils will work for seven minutes. When seven minutes is up, call attention to the front of the room. Then show pupils the solutions on the board. Answer any questions that may arise.

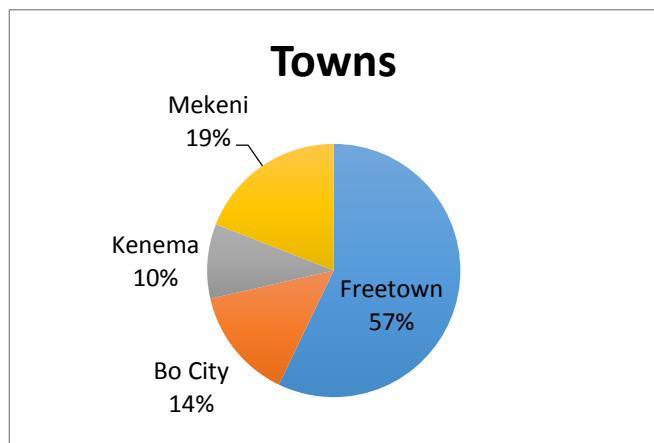
**Independent Practice** (10 minutes)

1. **Say:** Now you will try working with another pie chart. Please work independently for six minutes to answer the questions.
2. Read the word problem as you write it on the board:  
At a conference in Freetown, there were 120 people. The people came from Freetown, Bo City, Kenema, and Makeni. Use the pie chart to answer the questions.

3. Draw another pie chart on the board.

4. **Write** the questions on the board and read them as you write:

- a. How many people came from Bo City? (Answer: 17 people)
- b. How many more people came from Freetown than the other cities? (Answer: 52 more people came from Freetown than the other cities combined.)
- c. Which city had 23 people go to the conference? (Answer: Makeni)






5. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the six minutes is up, call attention and have pupils compare answers in pairs. Give them time to discuss their answers. Once they are done discussing, ask pupils to raise their hands to provide answers to the questions.

**Closing** (2 minutes)

1. **Say:** Tomorrow we will learn how to find the mode of discrete data.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Mode of Discrete Data	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-127	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate the mode of discrete data.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

1. **Ask:** What is the mode of a set of data? (Answer: The mode is the most frequently occurring value.)
2. Have pupils raise their hands to offer answers to the question. If they don't raise their hands, they might need to be reminded that it is one of the things we can measure in a set of data and they needed to find the mode of their data in the statistics report to Ludo Game Factory. Call on 2 or 3 pupils to answer the question. Tell pupils what the mode is if no one can give you the correct answer.
3. **Say:** The mode is the most frequently occurring value in a set of data. It is the number we see most often occurring. Today we are going to work with discrete data to find the mode.

### Introduction to the New Material (10 minutes)

1. **Write** 7, 13, 18, 24, 9, 3, 18 on the board.
2. **Say:** Now we need to find the mode of this data. In order to do this, we must put the numbers in ascending order, from least to greatest, and then see which number appears most frequently.
3. **Write** the dataset in ascending order on the board. (Answer: 3, 7, 9, 13, 18, 18, 24)
4. Show pupils that since 18 is written twice, that 18 is the mode of the data.
5. **Say:** When we looked at our graphical representations of discrete data over the past few days, we were sometimes identifying the mode without realising it. When we answered the question of which one had the most, we were identifying the mode. In bar graphs, the longest bar represents the mode of the data. So we can identify the mode even if we don't have the data values written out to order them.
6. **Say:** Which number occurs most frequently in this data set? Raise your hand to answer. (Answer: 18)

### Guided Practice (10 minutes)

1. **Say:** Now you will practice finding the mode of various sets of data. At times this data could be graphical, but for finding the mode today, we will just work with lists of data. For each example, first list the data in ascending order and then tell the mode. The last example will be a word problem, but please do the same thing with the information.
2. **Write** four sets of data on the board for pupils:

- a. 24, 15, 18, 20, 18, 22, 24, 26, 18, 26, 24 (Answer: 15, 18, 18, 18, 20, 22, 24, 24, 24, 26, 26; This data set is bimodal with modes at 18 and 24.)
  - b. 3, 7, 5, 13, 20, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29 (Answer: 3, 5, 7, 12, 13, 14, 20, 23, 23, 23, 23, 29, 39, 40, 56; The mode is 23.)
  - c. 60, 55, 59, 56, 61, 62, 62, 62, 57, 61 (Answer: 55, 56, 57, 59, 60, 61, 61, 62, 62, 62; The mode is 62.)
  - d. The data shown below are the weights (in kg) of different vegetables that Musa bought. 8, 5, 7, 8, 3, 8, 7, 5, 8. What was the most common weight of any one vegetable that Musa bought? (Answer: 3, 5, 5, 7, 7, 8, 8, 8, 8. The most common weight of any one vegetable that Musa bought was 8 kilograms.)
3. Pupils will work on these four examples for 7 minutes. Walk around the room and answer questions as they arise. Assist pupils as needed.
  4. Once the seven minutes is up, call attention to the front of the room and review the answers with the pupils. Answer any questions they may have.

### **Independent Practice** (10 minutes)




1. **Say:** Now you are going to practice finding the mode of data on your own. You will have six minutes to find your own solutions independently and then you will share your solution in pairs. Be sure to list the data in ascending order and then find the mode.
2. **Write** three examples on the board.
  - a. During the first 6 hours at the market, Ismael had the following number of customers: 58, 62, 58, 55, 49, and 48. Determine the mode of the numbers of customers. (Answer: 48, 49, 62, 55, 58, 58. The mode is 58.)
  - b. Kumba counted the number of times a pupil got out of their seat during math class for a week. She counted: 4, 13, 4, 1, 14, and 11. Determine the mode of the set of data. (Answer: 1, 4, 4, 11, 13, 14. The mode is 4.)
  - c. Over the past month, Jusu has had to wait for the taxi many times. The amount of time he waited for the taxi varied each day. The length of time he waited on each day, in minutes, is: 50, 44, 91, 55, 39, 44, 49, 46, 57, and 95. What is the mode of the times he waited? (Answer: 39, 44, 44, 46, 49, 50, 55, 57, 91, 95. The mode is 44 minutes.)
3. Pupils will work independently on the three examples for six minutes.
4. Once the six minutes is up, ask pupils to work in pairs to compare their solutions.
5. After pupils work in pairs for two minutes, provide pupils with the correct solutions to the questions. Ask pupils if they have any questions.

### **Closing** (2 minutes)

1. **Say:** Tomorrow we will review finding the median of discrete data.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.



<b>Lesson Title:</b> Median of Discrete Data	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-128	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate the median of discrete data.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

1. **Ask:** What is the median of a set of data? (Answer: The median is the middle number when the data is written in ascending order.)
2. Have pupils raise their hands to offer answers to the question. If they don't raise their hands, they might need to be reminded that it is the middle number when data is written in ascending order and they need to find the median of their data in the statistics report to Ludo Game Factory. Call on 2 or 3 pupils to answer. Tell pupils what the median is if no one can give you the correct answer.
3. **Say:** The median is the middle number when the data is written in ascending order. Today we are going to work with discrete data to find the median.

### Introduction to the New Material (10 minutes)

1. **Write** 7, 13, 18, 24, 9, 3, 18 on the board.
2. **Say:** Now we need to find the median of this data. In order to do this, we must put the numbers in ascending order, from least to greatest, and then see which number appears in the middle of the set.
3. **Write** the dataset in ascending order on the board. (Answer: 3, 7, 9, 13, 18, 18, 24) Then show pupils that 13 is in the middle of the data by tracing your fingers from the outside to the inside until they meet at one data point, and that 13 is the median of the data.
4. **Say:** When we count in from both sides, moving inwards by one number at a time and crossing out the numbers until our fingers meet at one data point.
5. **Say:** It is easy to find the median of a set with an odd number of data points. Let's try one that has an even number of points.
6. **Write** 7, 13, 18, 24, 9, 3 on the board.
7. Tell pupils that this set has six numbers in it. Write the set in ascending order on the board. (Answer: 3, 7, 9, 13, 18, 24.) Show pupils that when you cross off one number from each end there is no middle number. To find the median of even numbered sets, we find the value half way between the two numbers in the middle.
8. **Say:** In this example, the middle two numbers are nine and thirteen. We know that eleven is half way between nine and thirteen. This means that the median of this set of data is eleven.

### Guided Practice (10 minutes)

1. **Say:** Now you will practice finding the median of various sets of data. For each example, first list the data in ascending order and then tell the median. The last example will be a word problem, but please do the same thing with the information.
2. **Write** four sets of data on the board for pupils.
  - a. 24, 15, 18, 20, 18, 22, 24, 26, 18, 26, 24  
(Answer: 15, 18, 18, 18, 20, 22, 24, 24, 24, 26, 26; The median is 22.)
  - b. 3, 7, 5, 13, 20, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29  
(Answer: 3, 5, 7, 12, 13, 14, 20, 23, 23, 23, 23, 29, 39, 40, 56; The median is 23.)
  - c. 60, 55, 59, 56, 61, 62, 62, 62, 57, 61  
(Answer: 55, 56, 57, 59, 60, 61, 61, 62, 62, 62; The median is 60.5.)
  - d. The data shown below are the weights (in kg) of different vegetables that Musa bought. 8, 5, 7, 8, 3, 8, 7, 5, 8. What was the median weight of any one vegetable that Musa bought?  
(Answer: 3, 5, 5, 7, 7, 8, 8, 8, 8; The median weight of the vegetables that Musa bought was 7 kilograms.)
3. Pupils will work on these four examples for 7 minutes. Walk around the room and answer questions as they arise. Assist pupils as needed.
4. Once the seven minutes is up, call attention to the front of the room and review the answers with the pupils. Answer any questions they may have.




### Independent Practice (10 minutes)

1. **Say:** Now you are going to practice finding the median of data on your own. You will have six minutes to find your own solutions independently and then you will share your solution in pairs. Be sure to list the data in ascending order and then find the median.
2. **Write** three examples on the board.
  - a. During the first 6 hours at the market, Ismael had the following number of customers: 58, 62, 58, 55, 49, and 48. Determine the median of the numbers of customers.  
(Answer: 48, 49, 55, 58, 58, 62; The median is 56.5)
  - b. Kumba counted the number of times a pupil got out of their seat during math class for a week. She counted: 4, 13, 4, 1, 14, and 11. Determine the median of the set of data.  
(Answer: 1, 4, 4, 11, 13, 14; The median is 7.5)
  - c. Over the past month, Jusu has had to wait for the taxi many times. The amount of time he waited for the taxi varied each day. The length of time he waited on each day, in minutes, is: 50, 44, 91, 55, 39, 44, 49, 46, 57, and 95. What is the median times he waited?  
(Answer: 39, 44, 44, 46, 49, 50, 55, 57, 91, 95; The median is 49.5 minutes.)
3. Pupils will work independently on the three examples for six minutes. Once the six minutes is up, ask pupils to work in pairs to compare their solutions. After pupils work in pairs for two minutes, provide pupils with the correct solutions to the questions. Ask pupils if they have any questions.

**Closing** (2 minutes)

1. **Say:** Tomorrow we will review finding the mean of discrete data.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Mean of Discrete Data	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-129	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate the mean of discrete data.		<b>Teaching Aids</b> None		<b>Preparation</b> None
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### Opening (3 minutes)

- Ask:** What is the mean of a set of data? (Answer: The mean is the same thing as the average. We find it by adding all the numbers together and dividing the sum by how many numbers there are in the set.)
- Have pupils raise their hands to offer answers to the question. If they don't raise their hands, they might need to be reminded that it is the average of the data and they found the mean of their data in the statistics report to Ludo Game Factory. Call on 2 or 3 pupils to answer the question. Tell pupils what the mean is, if no one can give you the correct answer.
- Say:** The mean is the average of the data. We do not need to order the data in ascending order to find the mean. Today we are going to work with discrete data to find the mean.

### Introduction to the New Material (10 minutes)

- Write** 7, 13, 18, 24, 9, 3, 18 on the board.
- Say:** Now we need to find the mean of this data. In order to do this, we must add the numbers together and divide by 7 because there are seven numbers in the list.
- Write** the maths on the board:

$$\frac{7+13+18+24+9+3+18}{7} = \frac{92}{7} = 13\frac{1}{7} = 13.14$$

Then show pupils that 13.14 is the mean of the data. Show pupils the long division to get the decimal portion of the answer.

- Say:** Finding the mean takes work, but if we are careful we can find the mean. It is possible to find the mean of any set of values, no matter how big or small the data set. Let's try another one.
- Write** 8, 19, 22, 7, 43, 14, 18, 5 on the board.
- Say:** I will show you again how to find the mean with this set of data.
- Write the solution on the board and explain the steps to the pupils.

$$\frac{8+19+22+7+43+14+18+5}{8} = \frac{136}{8} = 17$$

- Say:** As the last examples show, your mean can be either a whole number or a decimal.

### Guided Practice (10 minutes)

- Say:** Now you will practice finding the mean of various sets of data. The last example will be a word problem, but please do the same thing with the information.
- Write** four sets of data on the board for pupils.
  - 24, 15, 18, 20, 18, 22, 24, 26, 18, 26, 24 (Answer:  $\frac{235}{11} = 21.36$  )
  - 3, 7, 5, 13, 20, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29 (Answer:  $\frac{330}{15} = 22$ )
  - 60, 55, 59, 56, 61, 62, 62, 62, 57, 61 (Answer:  $\frac{595}{10} = 59.5$ )
  - The data shown below are the weights (in kg) of different vegetables that Musa bought. 8, 5, 7, 8, 3, 8, 7, 5, 8. What was the mean weight of the vegetables that Musa bought? (Answer: The mean weight of the vegetables that Musa bought was 6.56 kilograms; 59 divided by 9)
- Pupils will work on these four examples for 7 minutes. Walk around the room and answer questions as they arise. Assist pupils as needed. Once the seven minutes is up, call attention to the front of the room and review the answers with the pupils. Answer any questions they may have.




### Independent Practice (10 minutes)

- Say:** Now you are going to practice finding the mean of data on your own. You will have six minutes to find your own solutions independently and then you will share your solution in pairs. Be sure to list the data in ascending order and then find the mean.
- Write** three examples on the board:
  - During the first 6 hours at the market, Ismael had the following number of customers: 58, 62, 58, 55, 49, and 48. Determine the mean of the numbers of customers.  
(Answer: 55 customers; 330 divided by 6)
  - Kumba counted the number of times a pupil got out of their seat during maths class for a week. She counted: 4, 13, 4, 1, 14, and 11. Determine the mean of the set of data.  
(Answer: 7.83 times the pupils got out of their seats; 47 divided by 6)
  - Over the past month, Jusu has had to wait for the taxi many times. The amount of time he waited for the taxi varied each day. The length of time he waited on each day, in minutes, is: 50, 44, 91, 55, 39, 44, 49, 46, 57, and 95. What is the mean time he waited?  
(Answer: 57 minutes; 570 divided by 10)
- Pupils will work independently on the three examples for six minutes. Once the six minutes is up, ask pupils to work in pairs to compare their solutions. After pupils work in pairs for two minutes, provide pupils with the correct solutions to the questions. Ask pupils if they have any questions.

### Closing (2 minutes)

- Say:** Tomorrow we will learn how to decide which number represents our data best.
- Ask:** Does anyone have any questions about today's lesson?
- Answer any question that pupils have.

<b>Lesson Title:</b> Appropriate Average	<b>Theme:</b> Statistics and Probability; Data Handling	
<b>Lesson Number:</b> M-06-130	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <p><b>Learning Outcomes</b> By the end of the lesson, pupils will be able to:</p> <ol style="list-style-type: none"> <li>1. Decide which average (mean, mode, median) is the most appropriate in the context of the data.</li> <li>2. Calculate the mean, mode and median of discrete data.</li> </ol>	 <p><b>Teaching Aids</b> None</p>	 <p><b>Preparation</b> None</p>
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### Opening (3 minutes)

1. **Say:** Today we are going to figure out when it is best to use mean, median and mode for a set of data. We will also practice finding each of those things for more sets of data.
2. **Ask:** How do we find the mode? How do we find the median? How do we find the mean?  
(Answers: The mode is the most frequently appearing value in the data; the median is the middle value when the data is written in ascending order; the mean is the same as the average and is found by dividing the sum of all the numbers by the number of data points.)
3. Have pupils raise their hands to offer answers. Call on pupils until the correct answers are given. If pupils are not providing the correct answers, provide them with the correct answers.
4. **Say:** Today we are going to work with these values even more.

### Introduction to the New Material (10 minutes)

1. **Say:** In general, the mean is the most appropriate figure to use to describe the data. The median, however, is not as affected by outliers, or values that are far away from the rest of them. The mode is only useful for categorical discrete data. Some examples of categorical discrete data are colours, or gender, or types of fruit. This type of data is data that does not go in order and that you are interested in the frequency of occurrence. In general, it is important to read what the question is asking of you and decide which average is most appropriate. If you cannot tell, the mean is always a good place to start for numerical data. Let's practice finding all three averages for different sets of data.
2. **Write** 19, 15, 7, 14, 11, 7, 15, 16 on the board. Show pupils how to find the mean, median, and mode of this data. Order the data from least to greatest first, (Answer: 7, 7, 11, 14, 15, 15, 16, 19) and solve (Answers: Mode is 7 and 15; Median is 14.5; Mean is 13) as you explain the steps.
3. **Say:** Using this data set, we will find the mean, median, and mode. First we must order the numbers in ascending order. Then we can easily find the mode and median. Notice that this dataset is bimodal, meaning that there are two modes. Then we can add the numbers together and divide by eight to find the mean. If we look at the answers for mean, median and mode, we see that their values vary. The bimodal nature of this dataset shows that the mode is relatively unreliable here because it includes the lowest value in the dataset. Then we have the median

and the mean. The mean is useful because it is drawn downwards due to two sevens at the lower end of the data set. The median, however, is the more appropriate average because it tells us the middle point of the dataset. The two sevens at the lower end make the data skewed. Skewed data is best represented by the median.

### **Guided Practice** (10 minutes)

1. **Say:** Now you will practice finding the mean, median and mode of four sets of data. Please indicate which average is most appropriate for the data provided.
2. **Write** four sets of data on the board for pupils:
  - a. 14, 11, 6, 11, 11, 7 (Answer: Mean = 10; Median = 11; Mode = 11; The most appropriate average is the mean.)
  - b. 20, 6, 19, 19 (Answer: Mean = 16; Median = 19; Mode = 19; The most appropriate average is the median.)
  - c. 20, 10, 19, 7, 14, 8 (Answer: Mean = 13; Median = 12; Mode = none; The most appropriate average is the mean.)
  - d. 20, 11, 15, 20, 20, 10 (Answer: Mean = 16; Median = 17.5; Mode = 20; The most appropriate average is the mean.)
3. Pupils will work on these four examples for 7 minutes. Walk around the room and answer questions as they arise. Assist pupils as needed. Once the seven minutes is up, call attention to the front of the room and review the answers with the pupils. Answer any questions they may have.




### **Independent Practice** (10 minutes)

1. **Say:** Now you are going to practice finding the mean, median and mode of data on your own. Then tell which average is most appropriate to describe your data. You will have six minutes to find your own solutions independently and then you will share your solution in pairs.
2. **Write** three examples on the board:
  - a. 31, 16, 54, 13, 93, 41, 41, 95 (Answer: Mean = 48; Median = 41; Mode = 41; The most appropriate average is the mean.)
  - b. 32, 43, 81, 37, 48, 43, 32, 92 (Answer: Mean = 51; Median = 43; Mode = 32, 43; The most appropriate average is the median.)
  - c. 20, 12, 95, 78, 22, 31 (Answer: Mean = 43; Median = 26.5; Mode = none; The most appropriate average is the median.)
3. Pupils will work independently on the three examples for six minutes. Once the six minutes is up, ask pupils to work in pairs to compare their solutions. After pupils work in pairs for two minutes, provide pupils with the correct solutions to the questions. Ask pupils if they have any questions.

### **Closing** (2 minutes)

1. **Say:** Next week we are going to shift from statistics to revisit angles.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Finding Unknown Angles in a Triangle	<b>Theme:</b> Geometry; Angles Revision	
<b>Lesson Number:</b> M-06-131	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate missing angles in triangles.	 <b>Teaching Aids</b> None	 <b>Preparation</b> Draw the triangles for the lesson on the board.
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### Opening (3 minutes)

- Say:** Today we are going to review our prior lesson on finding missing angles in triangles.
- Ask:** How do we find missing angles in a triangle? (Answer: We subtract the given angles from  $180^\circ$ . The result is the size of the missing angle.)
- Have pupils raise their hands to volunteer answers. Call on two or three pupils to share their responses until someone gives the correct answer.

### Introduction to the New Material (10 minutes)

- Draw a triangle on the board. Label the angles  $65^\circ$ ,  $57^\circ$ , and  $x$ . (Answer:  $58^\circ$ )
- Say:** Looking at this triangle, we see that we don't know the size of one of the angles. We do know, however, that the sum of all the angles equals  $180^\circ$ . To solve this problem we would subtract the two given angles from  $180^\circ$ .
- Write** the solution on the board while explaining the steps for pupils to see how to solve.  $180^\circ - 65^\circ - 57^\circ = 58^\circ$ . You can write the solution either vertically or horizontally.
- Say:** This tells us that the missing angle equals  $58^\circ$ . We can check our solution to make sure we solved the problem correctly. Since we know that the sum of the angles of a triangle equals  $180^\circ$ , we can add all of our angles up to see if they equal that amount.
- Write the work to check the answer on the board. ( $65 + 57 + 58 = 180$ )
- Say:** Since we checked our solution and we see that the angles sum to  $180^\circ$ , we know that we solved the problem correctly.

### Guided Practice (10 minutes)

- Write** two examples on the board. Be sure to write the angles into triangles.
  - $55^\circ$ ,  $54^\circ$ ,  $x + 69$  (Answer:  $x = 2$ ;  $x + 69 = 71$ ;  
 $180^\circ - 54^\circ - 55^\circ = 71^\circ$   
 $x + 69 = 71^\circ$  )  
 $x = 2$
  - $70^\circ$ ,  $60^\circ$ ,  $8x + 2$  (Answer:  $x = 6$ ;  $8x + 2 = 50^\circ$ ;  
 $180^\circ - 70^\circ - 60^\circ = 50^\circ$   
 $8x + 2 = 50^\circ$   
 $8x = 48$   
 $x = 6$



2. **Say:** Please copy these examples into your exercise books. Then take your time to find your solutions. Remember to draw your triangles and write out the work to solve the problems. Be sure to check your work.
3. Have pupils work for 7 minutes. Walk around the room and assist pupils as needed.
4. **Say:** Now that you have had time to work on the problems, we will go over the solutions. For the second example we had to use two steps to figure out what  $x$  equaled. This is the beginnings of solving equations, but we can use what we know about number facts to find the answer without using algebra.
5. Write the solutions on the board and show pupils how to get each answer.




### Independent Practice (10 minutes)

1. **Say:** Now you will practise on your own. Please copy the problems in your exercise books and work independently. You will have five minutes to work. When you finish with your work, check your answers with a partner. Remember that you must write in the degrees sign ( $^{\circ}$ ) after all of the responses to tell me that your answer is in degrees and check your solutions to make sure you got the correct answer.
2. **Write** some problems on the board:
  - a.  $80^{\circ}$ ,  $60^{\circ}$ ,  $x + 31$  (Answer:  $x = 9$ ;  $x + 31 = 40^{\circ}$ ;  
 $180^{\circ} - 80^{\circ} - 60^{\circ} = 40^{\circ}$   
 $x + 31 = 40^{\circ}$  )  
 $x = 9$
  - b.  $80^{\circ}$ ,  $35^{\circ}$ ,  $4x + 17$  (Answer:  $x = 12$ ;  $4x + 17 = 65^{\circ}$ ;  
 $180^{\circ} - 80^{\circ} - 35^{\circ} = 65^{\circ}$   
 $4x + 17 = 65^{\circ}$  )  
 $4x = 48^{\circ}$   
 $x = 12$
  - c.  $84^{\circ}$ ,  $44^{\circ}$ ,  $13x$  (Answer:  $x = 4$ ;  $13x = 52^{\circ}$ ;  
 $180^{\circ} - 84^{\circ} - 44^{\circ} = 52^{\circ}$   
 $13x = 52^{\circ}$   
 $x = 4$
3. As pupils are working, walk around and assist as needed. Answer questions if they arise.
4. Once the five minutes is up, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers.

### Closing (2 minutes)

1. **Say:** Tomorrow we will review finding missing angles in quadrilaterals.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Angles in Quadrilaterals	<b>Theme:</b> Geometry; Angles Revision	
<b>Lesson Number:</b> M-06-132	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate missing angles in quadrilaterals.		<b>Teaching Aids</b> None		<b>Preparation</b> Draw the quadrilaterals for the lesson on the board.
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### Opening (3 minutes)

- Ask:** How many degrees does a quadrilateral have? (Answer:  $360^\circ$ )
- Have pupils raise their hands to offer their solutions. Call on two or three pupils to provide their answer until one gives the correct answer. If no one knows the right answer, remind pupils that quadrilaterals have  $360^\circ$ .
- Say:** Today we are going to review how to missing angles in quadrilaterals. We must use the fact that the sum of the angles in a quadrilateral equals  $360^\circ$ .

### Introduction to the New Material (10 minutes)

- Draw** a quadrilateral on the board. Label the angles  $86^\circ$ ,  $94^\circ$ ,  $94^\circ$ ,  $11x - 2$ . (Answer:  $x = 8$ ;  $11x - 2 = 86^\circ$ )
- Say:** In this problem, we are looking for the missing angle. We know that the sum of the angles in a quadrilateral equals  $360^\circ$ , so we can subtract the angles that we know to find the missing angle. If you are having difficulty finding  $x$ , you can stop your maths with just the expression that represents the angle measurement. In this example, you could stop when you get  $11x - 2$  equals  $86^\circ$  because that is the measurement of the missing angle.
- Show the work on the board for pupils.

$$360^\circ - 86^\circ - 94^\circ - 94^\circ = 86^\circ$$

$$11x - 2 = 86^\circ$$

$$11x = 88^\circ$$

$$x = 8$$

- Draw another quadrilateral on the board. Label the angles  $86^\circ$ ,  $94^\circ$ ,  $72^\circ$ ,  $x$ . (Answer:  $108^\circ$ )
- Say:** We need to find the missing angle by subtracting the known angles from  $360^\circ$ .
- Show the work on the board for pupils. ( $360 - 86 - 94 - 72 = 108$ )
- Say:** As we can see, the missing angle is  $108^\circ$ . This example was more straight forward, but we must know how to solve both types of problems.

### Guided Practice (10 minutes)

- Write** two examples on the board. Be sure to write the angles in the sample quadrilaterals.
  - $95^\circ$ ,  $121^\circ$ ,  $59^\circ$ ,  $x$  (Answer:  $x = 85^\circ$ )
  - $92^\circ$ ,  $100^\circ$ ,  $102^\circ$ ,  $5x + 16$  (Answer:  $x = 10$ ;  $5x + 16 = 66^\circ$ )

2. **Say:** Please copy these examples into your exercise books. Then take your time to find your solutions. Remember to draw your quadrilaterals and write out the work to solve the problems. Be sure to check your work.
3. Have pupils work for 7 minutes. Walk around the room and assist pupils as needed.
4. **Say:** Now that you have had time to work on the problems, we will go over the solutions.
5. Write the solutions on the board and show pupils how to get each answer.




### **Independent Practice** (10 minutes)

1. **Say:** Now you will practise on your own. Please copy the problems in your exercise books and work independently. You will have five minutes to work. When you finish with your work, check your answers with a partner. Remember that you must write in the degrees sign ( $^{\circ}$ ) after all of the responses to tell me that your answer is in degrees and check your solutions to make sure you got the correct answer.
2. **Write** the following problems on the board:
  - a.  $103^{\circ}, 97^{\circ}, 77^{\circ}, x$  (Answer:  $x = 83^{\circ}$ )
  - b.  $105^{\circ}, 90^{\circ}, 75^{\circ}, 10x$  (Answer:  $x = 9; 10x = 90^{\circ}$ )
  - c.  $104^{\circ}, 76^{\circ}, 104^{\circ}, 10x - 4$  (Answer:  $x = 8; 10x - 4 = 76^{\circ}$ )
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the five minutes is up, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers.

### **Closing** (2 minutes)

1. **Say:** Next class we are going to review the different types of angles we learned about earlier in the year and we will classify angles by their size.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Types of Angles	<b>Theme:</b> Geometry; Angles Revision	
<b>Lesson Number:</b> M-06-133	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes


	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to classify angles as right, obtuse, or acute angles.		<b>Teaching Aids</b> None		<b>Preparation</b> None
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
### Opening (3 minutes)

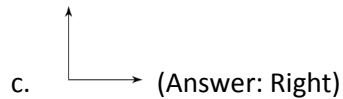
- Ask:** What are the three classifications or types of angles? (Answer: Acute, right and obtuse)
- Have pupils raise their hands to offer their solutions. Call on two or three pupils to provide their answer until one gives the correct answer. If no one knows the correct answer, remind pupils that the three types of angles are acute, right and obtuse angles.
- Ask:** What are acute angles? (Answer: Angles smaller than  $90^\circ$ ) What are right angles? (Answer: Angles exactly equal to  $90^\circ$ ) What are obtuse angles? (Answer: Angles larger than  $90^\circ$ )
- Have pupils raise their hands to offer their solutions. Call on two or three pupils to provide their answer until one gives the correct answer. If no one knows the correct answer, tell pupils the correct answer.
- Say:** Today we are going to classify angles by their angle measurements.

### Introduction to the New Material (10 minutes)

- Say:** To classify angles by their angle measurements, we must look and see if their angles are bigger, smaller or equal to  $90^\circ$ . If the angle measurement is less than  $90^\circ$ , we say that the angle is acute. If the angle measurement is greater than  $90^\circ$ , we say that the angle is obtuse. If the angle measurement is equal to  $90^\circ$ , we say that the angle is a right angle.
- Write** on the board:
  - $16^\circ$  (Answer: Acute)
  - $97^\circ$  (Answer: Obtuse)
  - $91^\circ$  (Answer: Obtuse)
- Say:** We now have three angle measurements to think about. To classify the angles, we would ask ourselves if the angle is bigger, smaller, or equal to  $90^\circ$ . By using that logic, we know that  $16^\circ$  is acute,  $97^\circ$  is obtuse, and  $91^\circ$  is obtuse.
- Write the classification next to the angle measurement on the board.
- Say:** We can also classify angles by looking at them. If the angle makes a perfect L then we know that it is right. If the angle is smaller, or closer together, the angle is acute. If it is larger, or farther apart, then the angle is obtuse. Let's look at a few angles and classify them.
- Draw three angles on the board.


a.  (Answer: Obtuse)

b.  (Answer: Acute)



7. **Say:** By looking at the shapes of the angles, we can see that the first example is obtuse, the second is acute and the third is right. The third example forms a perfect 'L' so we know that it is right. We know that the lines are perpendicular and therefore the angle is a right angle.

### Guided Practice (10 minutes)

1. **Write** some examples on the board.  $162^\circ$ ;  $72^\circ$ ;  $11^\circ$ ;  $179^\circ$ ;  $105^\circ$ ;  $90^\circ$ ;  $40^\circ$ ;  $120^\circ$  (Answers: obtuse; acute; acute; obtuse; obtuse; right; acute; obtuse)
2. **Say:** Please copy these examples into your exercise books. Then take your time to classify them as acute, obtuse or right angles and draw a sketch of each. 
3. Have pupils work for 7 minutes. Walk around the room and assist pupils as needed. Assist pupils as needed.
4. **Say:** Now that you have had time to work on the problems, we will go over the solutions.
5. Write the solutions on the board and show pupils how to get each answer.




### Independent Practice (10 minutes)

1. **Say:** Now you will practise on your own. Please copy the problems in your exercise books and work independently. You will have five minutes to work. When you finish with your work, check your answers with a partner.
2. **Write** some problems on the board:
  - a.  $103^\circ$  (Answer: Obtuse)
  - b.  $97^\circ$  (Answer: Obtuse)
  - c.  $77^\circ$  (Answer: Acute)
  - d.  $83^\circ$  (Answer: Acute)
  - e.  $162^\circ$  (Answer: Acute)
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the five minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers.

### Closing (2 minutes)

1. **Say:** Tomorrow we are going to continue working with angles but we will work with angles that make a straight line.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

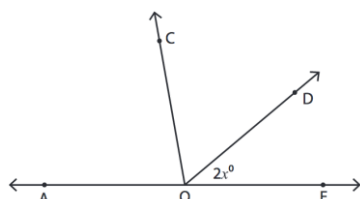
<b>Lesson Title:</b> Angles on a Straight Line	<b>Theme:</b> Geometry; Angles Revision	
<b>Lesson Number:</b> M-06-134	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate angles on a straight line.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

- Say:** There is another special type of angle that is actually a straight line. The name of that angle is a straight angle to express that there is no bend at the vertex. A straight line has  $180^\circ$ . Just like we can add angles together to create triangles and quadrilaterals, we can form a straight line by putting different angles together. When we have multiple angles whose sum equals  $180^\circ$ , we say they are supplementary angles. Today we are going to use the fact that a straight line has  $180^\circ$  to find missing angles on a straight line.

### Introduction to the New Material (10 minutes)



- Draw** on the board. (Note: All of the future straight lines will look like this, but drawn examples won't be in the lesson plans.)
- Say:** This image shows three angles that form a straight line. This means that the sum of the three angles equals  $180^\circ$ . If we say that  $\angle AOC = 80^\circ$  and  $\angle COD = 60^\circ$ , we can find the measure of  $\angle DOE$  (Answer:  $40^\circ$ ). This means that when we add the three angles, the sum will be  $180^\circ$ . We can then solve for the missing angle.
- Write in  $80^\circ$  in the left most angle and  $60^\circ$  in the middle angle to show the known angle measurements. Show pupils that the sum of the three angles is  $180^\circ$ , and we can solve for  $x$ .  

$$80^\circ + 60^\circ + 2x = 180$$

$$2x = 40^\circ$$

$$x = 20$$
- Say:** This means that  $x = 20$  and  $\angle DOE$  equals  $40^\circ$ . You may notice that the process is the same for finding missing angles no matter if we are working with triangles, quadrilaterals, or straight lines. We set the sum of all the angle measurements equal to the total measurement for that shape and solve for our missing angle. The process is the same all the time.

### Guided Practice (10 minutes)

- Write** some examples on the board.
  - $60^\circ, 75^\circ, x + 2$  (Answer:  $x = 43; x + 2 = 45^\circ$ )

- b.  $40^\circ, 35^\circ, x - 5$  (Answer:  $x = 110$ ;  $x - 5 = 105^\circ$ )
  - c.  $15^\circ, 75^\circ, 5x$  (Answer:  $x = 18$ ;  $5x = 90^\circ$ )
2. **Say:** Please copy these examples into your exercise books. Draw the straight line with the angles drawn in to help you see the problem. Then take your time to solve for  $x$  and for the missing angle measurement.
  3. Have pupils work for 7 minutes. Walk around the room and assist pupils as needed.
  4. **Say:** Now that you have had time to work on the problems, we will go over the solutions.
  5. Write the solutions on the board and show pupils how to get each answer.




### Independent Practice (10 minutes)

1. **Say:** Now you will practise on your own. Please copy the problems in your exercise books and work independently. Draw the straight line with the angles drawn in to help you visualise the problem. Then take your time and solve for  $x$  and the missing angle measurement. You will have five minutes to work. When you finish with your work, check your answers with a partner. Some of these examples will have four angles to make up the straight line.
2. **Write** some problems on the board:
  - a.  $100^\circ, 30^\circ, x-1$  (Answer:  $x = 51$ ;  $x-1 = 50^\circ$ )
  - b.  $110^\circ, 20^\circ, 14^\circ, 4x$  (Answer:  $x = 9$ ;  $4x = 36^\circ$ )
  - c.  $2x - 8, 28^\circ, 64^\circ$  (Answer:  $x = 48$ ;  $2x - 8 = 88^\circ$ )
  - d.  $70^\circ, 17^\circ, 28^\circ, x - 10$  (Answer:  $x = 75$ ;  $x - 10 = 65^\circ$ )
  - e.  $21^\circ, 45^\circ, 70^\circ, 2 + x$  (Answer:  $x = 42$ ;  $2 + x = 44^\circ$ )
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the five minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers.

### Closing (2 minutes)

1. **Say:** Tomorrow we are going to continue working with angles but we will find missing angles in composite shapes.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

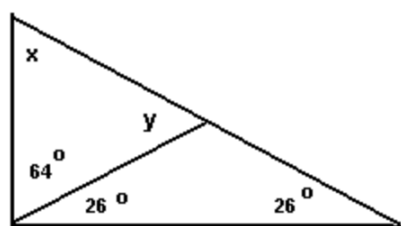
<b>Lesson Title:</b> Angles in Composite Shapes	<b>Theme:</b> Geometry; Angles Revision	
<b>Lesson Number:</b> M-06-135	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate missing angles in composite shapes.		<b>Teaching Aids</b> None		<b>Preparation</b> None
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### Opening (3 minutes)

- Say:** Today we are going to review finding angles in composite shapes. The most important thing for us to remember when solving these problems is to break the figures up into smaller triangles and quadrilaterals. When we draw our lines in to divide the shapes, it is very important to draw our lines in at  $90^\circ$  angles when making quadrilaterals. This helps us see exactly how much is left.

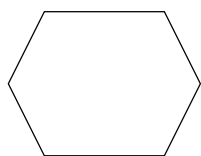
### Introduction to the New Material (10 minutes)

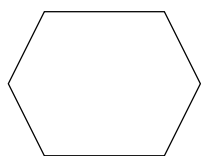


- Draw** on the board.
- Say:** In this shape we are looking for both  $x$  and  $y$ . This composite figure is already broken up into two pieces to help us see what angle  $y$  is. In order to solve this problem, we have to find the missing angle in the bottom triangle first. Then we will use what we know about straight angles to find  $y$ . Once we have  $y$ , we are able to solve for  $x$ .
- Ask:** How many degrees are in a straight angle? (Answer:  $180^\circ$ )
- Have pupils raise their hands to answer the question. Call on one or two pupils to give responses. Call on pupils until the correct answer is provided. If no one gives the correct answer, remind pupils that a straight line has  $180^\circ$ .
- Say:** Let's start by looking at the bottom triangle. We see that two of the angles are equal to  $26^\circ$  each. We can use the fact that a triangle has  $180^\circ$  to find the third and missing angle.
- Subtract  $180^\circ - 26^\circ - 26^\circ = 128^\circ$  on the board for pupils to see. Write  $128^\circ$  for the missing angle in the figure.
- Say:** We now know that the unknown angle in the bottom triangle is equal to  $128^\circ$ . This information helps us solve for  $y$ . Since  $y + 128^\circ = 180^\circ$  because they make a straight angle, we can see that  $y = 52^\circ$ .
- Write** in  $52^\circ$  on the diagram for  $y$ .
- Say:** Since  $x$  is the only unknown left, we can use our knowledge of triangles to solve for  $x$ .
- Subtract  $180^\circ - 64^\circ - 52^\circ = 62^\circ$ .
- Say:** Now we can see that angle  $x = 62^\circ$ . You will now try one on your own.



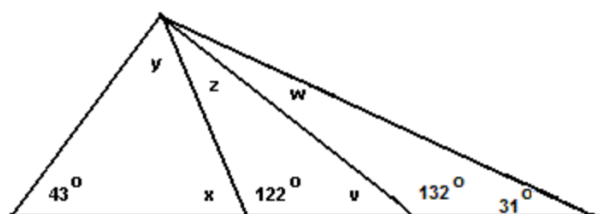
**Guided Practice (10 minutes)**

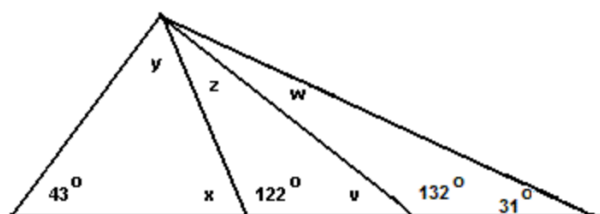


1. **Draw**  on the board. Write in angle measures clockwise starting with the bottom left:  $140^\circ$ ,  $x$ ,  $140^\circ$ ,  $140^\circ$ ,  $x$ ,  $140^\circ$
2. **Say:** In this composite figure, the left and right angles are the same, but we don't know what they are. We can break this figure up into three parts to find the angles. Copy the figure and the angles into your exercise books. Then try to solve for  $x$  to find the missing angle measurements.
3. Let pupils work for five minutes. Walk around the room and assist as needed. When five minutes is up, call attention to the front of the room. Draw in two vertical lines connecting the top and bottom  $140^\circ$  angles on each side. The left and right sides should be triangles. Show pupils that the top and bottom angles in each triangle are equal to  $50^\circ$  because  $90^\circ$  of the angles are in the rectangle. Label the  $50^\circ$  angles in the triangles.
4. **Say:** Now that we have our angles in our triangles labeled, we can now solve for  $x$ . We know that  $50^\circ + 50^\circ + x = 180^\circ$ . By solving this equation, we see that  $x = 80^\circ$  in each triangle.

**Independent Practice (10 minutes)**

1. **Say:** Now you will practise on your own. Please copy the figure in your exercise books and work independently. Then take your time and solve for each of the missing angle measurements. You have to use the properties of triangles and the properties of straight angles to solve this problem. You will have five minutes to work. When you finish with your work, check your answer with a partner.






2. **Draw**  on the board. (Answer:  $v = 48^\circ$ ;  $w = 17^\circ$ ;  $x = 58^\circ$ ;  $y = 79^\circ$ ;  $z = 10^\circ$ )
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the seven minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers. If no pupils have the correct answer, show them how to find the answer on the board.

**Closing (2 minutes)**

1. **Say:** Next class we are going to talk about proportions.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Proportion and Fractions	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-136	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to express fractions as proportions.		<b>Teaching Aids</b> None		<b>Preparation</b> None
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**Opening (3 minutes)**

- Say:** Today we are going to work with fractions and proportions. The most important thing for us to understand for this lesson is what a proportion is. Proportions are mathematical statements where you equate two fractions. Whenever you have two fractions equal to each other, you have a proportion. Without realising it, we were solving proportions when we found equivalent fractions earlier this school year. Let's take some time to see what this looks like.

**Introduction to the New Material (10 minutes)**

- Write**  $\frac{2}{3} = \frac{x}{6}$  on the board.
- Say:** This equivalence of two fractions is an example of a proportion. This example is showing us how to use proportions to find equivalent fractions. If we were going to find the equivalent fraction using proportions, we would cross-multiply.

$$2 \times 6 = 3x$$

- Write** this on the board to show cross multiplication and how to find the answer:  $12 = 3x$   
 $4 = x$

Explain to pupils how you multiplied the 6 in the denominator by the two in the numerator of the other fraction to get 12 and then you multiplied 3 in the denominator by the x in the opposite numerator to get 3x. We then solved the basic equation to see that  $x = 4$

- Say:** We know that we could have also found this answer by multiplying both the numerator and the denominator by two to find the equivalent fraction. By using proportions it shows us another way to find equivalent fractions. It is important to note that it cannot be considered a proportion if we do not have the equivalence of two fractions. Proportions show us that the amount of each thing is the same in each fraction, even if the numbers do not look alike. Proportions can also help us find equivalent fractions even when it is difficult to find something to multiply by to find equivalent fractions.

- Write**  $\frac{3}{9} = \frac{x}{15}$  on the board.

- Say:** This new example is much harder to find a multiple of nine to give us fifteen. This type of situation makes solving via cross multiplication much more efficient.

$$3 \times 15 = 9x$$

- Write the solution on the board and explain the steps as you solve it.  $45 = 9x$   
 $5 = x$

### Guided Practice (10 minutes)

1. **Say:** Now you will solve for equivalent fractions by solving the proportion. Take care when solving the proportion because sometimes the values will not be whole numbers. Be sure to write the proportion and your work in your exercise book.
2. **Write** three examples on the board:
  - a.  $\frac{3}{5} = \frac{60}{x}$  (Answer:  $x = 100$ )
  - b.  $\frac{7}{8} = \frac{x}{56}$  (Answer:  $x = 49$ )
  - c.  $\frac{4}{9} = \frac{2}{x}$  (Answer:  $x = 4.5$ )
3. Pupils will work on solving the proportions for seven minutes. Walk around the room as pupils work and assist as needed. When the seven minutes is up, call attention to the front board. Solve the proportions for pupils. Answer any questions that pupils may have.




### Independent Practice (10 minutes)

1. **Say:** Now you will practise on your own. Please copy the proportions in your exercise books and take your time to solve them.
2. **Write** four examples on the board for pupils to copy:
  - a.  $\frac{x}{8} = \frac{13}{2}$  (Answer:  $x = 52$ )
  - b.  $\frac{10}{12} = \frac{2}{x}$  (Answer:  $x = 2.4$ )
  - c.  $\frac{11}{10} = \frac{x}{11}$  (Answer:  $x = 12.1$ )
  - d.  $\frac{x}{12} = \frac{10}{2}$  (Answer:  $x = 60$ )
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the seven minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers. If no pupils have the correct answer, show them how to find the answer on the board.

### Closing (2 minutes)

1. **Say:** Next class we are going to continue working with proportions.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Proportion and Ratio	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-137	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to convert proportion into ratio.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

- Say:** Today we are going to continue our work with proportions. We are going to talk about ratios, though, to make our information more accurate. Ratios are fractions that relate two amounts to one another. One easy example of a ratio is how many boys to girls there are in the class. We can write ratios in three forms. Ratios can be written as a fraction, in words, and using a colon.
- Write** the three forms of a ratio on the board.  $\frac{\text{boys}}{\text{girls}}$ , boys to girls, boys: girls.
- Say:** When we work with ratios it doesn't matter which form we choose, but since we are working with proportions, we must use the fractional form of the ratio. When we solve proportions with ratios, we must remember what the units are for each thing being compared in the ratio.

### Introduction to the New Material (10 minutes)

- Say:** The ratio of boys to girls in a school is  $\frac{5\text{boys}}{3\text{girls}}$ . If there are 210 girls at the school, how many boys are at the school? (Answer: 350 boys are at the school.) First we have to write out what we are comparing and set up the proportion.
- Write the proportion on the board. Emphasise that pupils should write down the ratio in units first to ensure that the information is in the right part of the proportion.  $\frac{\text{boys}}{\text{girls}} = \frac{5}{3} = \frac{x}{210}$
- Say:** To solve this problem we multiply five by two hundred and ten and then divide by three to find the value of x. When we do this we see that x equals three hundred and fifty. This means that there are three hundred and fifty boys at the school.

$$\frac{5 \times 210}{3} = x$$

- Write** the maths out on the board for pupils to see.  $\frac{1050}{3} = x$   
350 = x

- Say:** This way of solving the proportion only has us cross multiply the part of the proportion that is with our variable. If you prefer to multiply the three by the x and then divide, that is okay as well. You will get the same answer.

### Guided Practice (10 minutes)

1. **Say:** Now you will solve proportions using ratios. Be sure to write the proportion and your work in your exercise book.
2. **Write** three examples on the board:
  - a.  $\frac{5}{8} = \frac{x}{56}$  (Answer:  $x = 35$ )
  - b.  $\frac{6}{14} = \frac{15}{x}$  (Answer:  $x = 35$ )
  - c.  $\frac{7}{9} = \frac{x}{5}$  (Answer:  $x = 3.88$ )
3. Pupils will work on solving the proportions for seven minutes. Walk around the room as pupils work and assist as needed. When the seven minutes is up, call attention to the front board. Solve the proportions for pupils. Answer any questions that pupils may have.




### Independent Practice (10 minutes)

1. **Say:** Now you will practise on your own. Please copy the proportions in your exercise books and take your time to solve them.
2. **Write** four examples on the board for pupils to copy.
  - a.  $\frac{10}{8} = \frac{x}{10}$  (Answer:  $x = 12.5$ )
  - b.  $\frac{7}{5} = \frac{x}{3}$  (Answer:  $x = 4.2$ )
  - c.  $\frac{9}{6} = \frac{x}{10}$  (Answer:  $x = 15$ )
  - d.  $\frac{4}{3} = \frac{8}{x}$  (Answer:  $x = 6$ )
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the seven minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers. If no pupils have the correct answer, show them how to find the answer on the board.

### Closing (2 minutes)

1. **Say:** Next class we are going to continue working with proportions.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Ratio and Proportion	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-138	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<b>Learning Outcomes</b> By the end of the lesson, pupils will be able to convert ratios into proportions.		<b>Teaching Aids</b> None		<b>Preparation</b> None
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### Opening (3 minutes)

1. **Say:** Today we are going to continue our work with ratios. Ratios are a set comparison between two things. For example, if the ratio of water to rice is 2 cups of water to 1 cup of rice, that is true no matter how many cups of rice you want to cook. Ratios can be scaled larger or smaller, but they are always constant. This is why we can use ratios to find different values of things and keep them proportional. Ratios and proportions are similar to finding equivalent fractions, as we discussed the other day. As with equivalent fractions, it is the same quantity that is represented in the different ratios, but we are just using bigger, or smaller, numbers to represent that amount.

### Introduction to the New Material (10 minutes)

1. **Say:** Today we are going to continue with ratios, but I want you to brainstorm different ratios that you use or see in your life. We have already talked about two examples. One is the ratio of water to rice when making rice. Another is the ratio of boys to girls in class or a school. Today we will first brainstorm different ratios that you know of in your life. Then we will solve proportions that are realistic. For the first ten minutes of class, I want you to think about ratios that you see. Write them down in your exercise book. I want you to write at least five ratios that you are familiar with. Remember, ratios are just the comparison of one thing to another. We are not creating proportions at this point in time. Just write the ratio in words so you remember what you have thought of.
2. Have pupils work independently for ten minutes writing down different ratios that they are familiar with. Walk around the room to help pupils if they are having trouble coming up with ratios.

### Guided Practice (10 minutes)

1. When the ten minutes of individual work is up, call attention to the front of the room.
2. **Say:** Now I want you to think about each ratio and I want you to create a realistic proportion that you might need to use your ratio for. Write the proportion with an unknown because we will be solving our proportions later. You will have ten minutes to create your proportions.
3. Have pupils work independently for ten minutes writing down different ratios that they are familiar with. Walk around the room to assist pupils if they are having trouble coming up with ratios.




**Independent Practice** (10 minutes)

1. When the ten minutes of individual work is up, call attention to the front of the room.
2. **Say:** Now you will work in pairs to switch papers. You will solve the proportions that your partner created. You will have seven minutes to solve your partner's proportions. When the seven minutes has passed, you will discuss the solutions with your partner. Please switch exercise books now and solve your partner's proportions.
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the seven minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board. Have pupils raise their hands to offer proportions and ratios that were created during the class.

**Closing** (2 minutes)

1. **Say:** Next class we are going to continue working with ratios and proportions.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Equivalent Ratio	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-139	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to: 1. Calculate equivalent ratios. 2. Solve problems involving equivalent ratios.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

- Say:** Today we are going to continue our work with ratios. As we solve the proportions we are looking to find equivalence between two ratios. Whenever we solve a proportion we are ensuring that we have equivalent ratios. Today we are going to continue solving proportions to find equivalent ratios.

### Introduction to the New Material (10 minutes)

- Say:** In today's class you will practice solving for equivalent ratios. I will give you 20 examples to solve in the first 25 minutes of class. Then we will have pupils volunteer to come to the board to solve the problems for the class. For the examples today, many of the answers will have decimals. Divide to get your answer to the nearest hundredths place. You do not need to find more than two decimal places.

- Write** the questions on the board:

a.  $\frac{2}{x} = \frac{3}{28}$  (Answer:  $x = 18.67$ )

b.  $\frac{x}{4} = \frac{3}{29}$  (Answer:  $x = 0.41$ )

c.  $\frac{x}{4} = \frac{1}{13}$  (Answer:  $x = 0.31$ )

d.  $\frac{x}{7} = \frac{3}{29}$  (Answer:  $x = 0.72$ )

e.  $\frac{4}{x} = \frac{9}{14}$  (Answer:  $x = 6.22$ )

f.  $\frac{1}{x} = \frac{7}{8}$  (Answer:  $x = 1.44$ )

g.  $\frac{23}{7} = \frac{4}{h}$  (Answer:  $h = 1.22$ )

h.  $\frac{5}{8} = \frac{x}{12}$  (Answer:  $x = 7.50$ )

k.  $\frac{n}{7} = \frac{6}{6}$  (Answer:  $n = 7.00$ )

l.  $\frac{s}{8} = \frac{1}{12}$  (Answer:  $s = 0.67$ )

m.  $\frac{5}{y} = \frac{6}{27}$  (Answer:  $y = 22.50$ )

n.  $\frac{4}{r} = \frac{9}{13}$  (Answer:  $r = 5.78$ )

o.  $\frac{5}{d} = \frac{9}{21}$  (Answer:  $d = 11.67$ )

p.  $\frac{15}{8} = \frac{7}{k}$  (Answer:  $k = 3.73$ )

q.  $\frac{5}{7} = \frac{1}{c}$  (Answer:  $c = 1.40$ )

r.  $\frac{3}{8} = \frac{x}{28}$  (Answer:  $x = 10.50$ )



i.  $\frac{5}{6} = \frac{n}{3}$  (Answer:  $n = 2.50$ )

s.  $\frac{24}{6} = \frac{1}{a}$  (Answer:  $a = 0.25$ )

j.  $\frac{5}{8} = \frac{v}{22}$  (Answer:  $v = 13.75$ )

t.  $\frac{3}{4} = \frac{z}{9}$  (Answer:  $z = 6.75$ )

**Guided Practice** (10 minutes)

1. Pupils will be working on solving the examples. Walk around the room and assist as needed. Remind pupils to write all their work in exercise books and divide to the hundredths place. Answer any questions as they arise.




**Independent Practice** (10 minutes)

1. When the individual work is up, call attention to the front of the room.
2. **Say:** If you would like to write a solution on the board, please raise your hand.
3. Have pupils raise their hands to volunteer to write their work on the board. Call on one pupil per question to share their work. Assist at the board if pupils are struggling to get the correct solution. Once all the problems are solved on the board, confirm that pupils' work is correct.

**Closing** (2 minutes)

1. **Say:** Next class we are going to continue working with ratios and proportions.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Writing Ratio in its Simplest Form	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-140	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to write ratio in its simplest form.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

- Say:** We are still working with ratios today, but instead of using them to solve proportions, we will be writing ratios in their simplest form. The process for doing is the same as finding the simplest form of a fraction. We have to divide both parts of the ratio by the same amount until there is no longer a number that can evenly divide into both.

### Introduction to the New Material (10 minutes)

- Say:** Today we are going to work with ratios in words and write them as fractions in the simplest form.
- Write** '6 inches to 72 inches' on the board.
- Say:** We can write this as a ratio of inches to inches.
- Write**  $\frac{6}{72}$  on the board. Show pupils that this is the ratio written as a fraction. Then tell them that we need to reduce the fraction as we have already learned to get the ratio in simplest form. Show pupils that you can divide both the numerator and denominator by six to reduce the fraction to  $\frac{1}{12}$ ;  $\frac{6}{72} \div \frac{6}{6} = \frac{1}{12}$
- Say:** This ratio when reduced to simplest form is written as  $\frac{1}{12}$ . This fraction means that one inch to 12 inches is a reduced form of the ratio six inches to seventy-two inches.
- Write** "24 feet out of 72 feet" on the board.
- Say:** Using the same process as we did for the last example, we are going to write this ratio as a fraction and then reduce it to write the ratio in simplest form.
- Write**  $\frac{24}{72}$  on the board. Then show pupils that they can divide both the numerator and the denominator by 24 to get the ratio in simplest form as  $\frac{1}{3}$
- Say:** This means that when we reduce 24 feet out of 72 feet, we are left with one foot out of every three.

### Guided Practice (10 minutes)

- Write** these examples on the board:

- a. 10 rainy days out of 12 day (Answer:  $\frac{5}{6}$ )
  - b. 10 red bikes out of 60 bikes (Answer:  $\frac{1}{6}$ )
  - c. 48 blue cars out of 60 cars (Answer:  $\frac{4}{5}$ )
2. **Say:** Please write each of these ratios as a fraction in simplest form to find the simplest form of the ratio.
  3. Have pupils work for 7 minutes. Walk around the room and assist pupils as needed.
  4. **Say:** Now that you have had time to work on the problems, we will go over the solutions. Write the solutions on the board to show pupils how to get each answer.




### Independent Practice (10 minutes)

1. **Say:** Now you will practice on your own. Write each of the ratios as fractions in simplest form to find the simplest form of the ratio. Please copy the problems in your exercise book and work independently. You will have five minutes to work. When you finish with your work, check your answers in pairs.
2. **Write** these problems on the board:
  - a. 24 white cars out of 66 cars (Answer:  $\frac{4}{11}$ )
  - b. 6 points out of 8 points (Answer:  $\frac{3}{4}$ )
  - c. 6 cakes out of 21 cakes (Answer:  $\frac{2}{7}$ )
  - d. 15 footballs to 24 footballs (Answer:  $\frac{5}{8}$ )
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the five minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers.

### Closing (2 minutes)

1. **Say:** We will continue working with ratios and proportions for one more week.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Sharing Quantities Using Ratio	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-141	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate shared quantities using ratio.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

- Say:** Today we are going to use ratios to share quantities. We know that ratios tell us how much of certain things are, but we can also use ratios to figure out how much to put in specific groups. Ratios tell us the parts of a larger group. If we have a ratio of five boys to three girls in the school, we have eight parts in total in the school. Five of the parts are boys and three of the parts are girls. Today we are going to work with the total and break amounts into parts. This is called sharing quantities.

### Introduction to the New Material (10 minutes)

- Write** the following on the board and then read it to the class:  
30 mangoes are shared between Zinab and Musa in a ratio of 1:5. How many mangoes does each person get? (Answer: Zinab got 5 mangoes and Musa got 25 mangoes.)
- Say:** Let's think about this scenario. Since the ratio is 1:5, then we know that there are six equal parts. This means that Zinab gets one part out of six and Musa gets five parts out of six. We can represent these using fractions to say that Zinab will get  $\frac{1}{6}$  of the mangoes and Musa will get  $\frac{5}{6}$  of the mangoes. We can use this information to multiply the fractions by the total number of mangoes to find how many each got.
- Write** the solution on the board:  
Zinab:  $\frac{1}{6} \times 30 = 5$  and Musa:  $\frac{5}{6} \times 30 = 25$ .
- Say:** We can see that Zinab got five mangoes and Musa got twenty-five mangoes. We know that the sum of their mangoes equals the total of thirty. We could check our solution by writing the ratio of five to twenty five in simplest form. We see that 5:25 reduces to 1:5 which was the original ratio of the mangoes shared between Zinab and Musa.

### Guided Practice (10 minutes)

- Write** the following examples on the board:
  - Divide Le 560,000 into a ratio of 3:4. (Answer: Le 240,000 and Le 320,000)
  - Divide 42 plantains into a ratio of 5:9 (Answer: 15 plantains and 27 plantains)
  - Divide 25 kg of beans into a ratio of 2:3. (Answer: 10 kg and 15 kg)

2. **Say:** Please copy these examples in your exercise books and find how many of each are in each part.
3. Have pupils work for 7 minutes. Walk around the room and assist pupils as needed.
4. **Say:** Now that you have had time to work on the problems, we will go over the solutions.
5. Write the solutions on the board to show pupils how to get each answer.




### **Independent Practice** (10 minutes)

1. **Say:** Now you will practice on your own. Find how many are in each part. Please copy the problems in your exercise book and work independently. You will have five minutes to work. When you finish with your work, check your answers in pairs.
2. **Write** the following problems on the board:
  - a. Divide 60 cars into a ratio of 4 red to 11 blue cars. (Answer: 16 red cars and 44 blue cars)
  - b. Divide 27 cakes into a ratio of 5 chocolate to 4 vanilla.  
(Answer: 15 chocolate cakes and 12 vanilla cakes)
  - c. Divide 40 pens into a ratio of 1 red to 3 blue. (Answer: 10 red pens and 30 blue pens)
  - d. Divide 12 school uniforms into a ratio of 1 purple to 1 yellow.  
(Answer: 6 purple uniforms and 6 yellow uniforms)
3. As pupils are working, walk around and assist as needed. Answer questions if they arise.
4. Once the five minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers.

### **Closing** (2 minutes)

1. **Say:** We will explore word problems involving ratios tomorrow.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Word Problems with Ratio	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-142	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<p><b>Learning Outcomes</b> By the end of the lesson, pupils will be able to solve simple word problems involving ratio.</p>		<p><b>Teaching Aids</b> None</p>		<p><b>Preparation</b> Write the word problems for the lesson on the board.</p>
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### Opening (3 minutes)

- Say:** Today we are going to solve word problems involving ratios. We know that ratios are fractions that compare two things. We also know that ratios show us parts of things and that we can find the total number of parts by adding the parts together. These things are important when we solve word problems because they assist us in finding the solution.

### Introduction to the New Material (10 minutes)

- Write** the following on the board and then read the problem to the class:  
Kumba reduced the size of a rectangle to a height of 2 inches. If the original rectangle was 24 inches wide and 12 inches high, what is the new width of the rectangle?  
(Answer: The new width of the rectangle is 4 inches.)
- Say:** To start solving this problem we need to create a ratio of height to width of the original rectangle. We see that the height 12 inches high and 24 inches wide, so the ratio is 12:24. We can then use this to set up a proportion and solve. Remember, a proportion is the equality of two ratios, so we will have to cross-multiply to solve this problem.
- Write** the proportion on the board, explain each step as you write it:  

$$\frac{\text{height}}{\text{width}} = \frac{12}{24} = \frac{2}{x}$$

$$12x = 48$$

$$x = 4$$
- Say:** By solving this proportion, we see that the new width of the rectangle is 4 inches. Let's try another word problem example.
- Write** the following on the board:  
15 kg of beans cost Le 26,400. How much would 45 kg of beans cost? (Answer:  $\frac{15}{26400} = \frac{45}{x}$  it will cost Le 79,200 for 45 kg of beans.)
- Say:** We can write the proportion using ratios of kg to cost. Then we can solve the problem using what we know about ratios and solving for equivalent fractions.
- Write the solution on the board. You can show pupils that using equivalent fractions to solve this proportion is easier than cross multiplication because  $15 \times 3 = 45$ , so we can multiply  $26,400 \times 3$  to get the cost for 45 kg of beans. Emphasize that there are multiple ways to solve these problems and pupils need to look for the best way to solve them. All solution paths will give the same correct answer, so it does not matter which path pupils choose.

### Guided Practice (10 minutes)

- Write** the following examples on the board:
  - Jusu drives 125 km in  $2\frac{1}{2}$  hours. At the same rate, how far will he be able to travel in 6 hours? (Answer:  $\frac{125}{2.5} = \frac{x}{6}$ ; Jusu will drive 300 km in six hours.)
  - A rainstorm produced rainfall of 1.5 inches per hour. How many hours would it take to get a rainfall amount of one foot (Remember there are 12 inches in one foot? (Answer:  $\frac{1.5}{1} = \frac{12}{x}$ ; It will take 8 hours to get a rainfall amount of one foot.)
  - Marrah can read 22 pages in 30 minutes. How long would it take her to read a 100 page book? Write your answer in hours and minutes and round to the nearest minute, if needed. (Answer:  $\frac{22}{30} = \frac{100}{x}$ ;  $x = 136$  minutes = 2 hours and 16 minutes. It will take Marrah 2 hours and 16 minutes to read a 100 page book.)
- Say:** Please copy these examples in your exercise books. Write the proportion and solve the problem.
- Have pupils work for 7 minutes. Walk around the room and assist pupils as needed.
- Say:** Now that you have had time to work on the problems, we will go over the solutions. The last two examples requires us to know that one foot is equal to 12 inches and that there are 60 minutes in 1 hour. Remember, when we solve proportions our units must be the same: to have true proportions.
- Write the solutions on the board to show pupils how to get each answer.

### Independent Practice (10 minutes)

- Say:** Now you will practice on your own. Find the answer to the question. Make sure you set up the proportion correctly. Please copy the problems in your exercise book and work independently. You will have five minutes to work. When you finish with your work, check your answers in pairs.
- Write** the following problems on the board:
  - The ratio of boys to girls at a school is 6 to 5. How many girls are there if there are 360 boys. (Answer:  $\frac{6}{11} = \frac{360}{x}$ ;  $x$  or the total = 660.  $660 - 360 = 300$  girls at the school.)
  - If the walk between school and work takes 15 minutes each way, how much time will be spent in a 5-day school week travelling back and forth to school? Write your answer in hours and minutes. (Answer:  $\frac{1}{15} = \frac{10}{x}$ ; You will spend 2 hours and 30 minutes walking back and forth to school during the week.)
- As pupils are working, walk around and assist as needed. Answer questions if they arise.
- Once the five minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers. If




pupils have trouble with the second problem, remind them that they walk for 15 minutes twice a day. Once to school and once on the way home from school.

**Closing** (2 minutes)

1. **Say:** We will explore direct proportions tomorrow.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.



<b>Lesson Title:</b> Direct Proportion	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-143	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<p><b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate increasing quantities using direct proportion.</p>		<p><b>Teaching Aids</b> None</p>		<p><b>Preparation</b> Write the word problems for the lesson on the board.</p>
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### Opening (3 minutes)

- Say:** When something increases using direct proportion we say that both things being compared increase at the same rate. Another way to say this is that if two quantities are in direct proportion, both quantities increase by the same percentage. The easiest example of direct proportion is the connection between cost and amount. If 1 kg of beans cost Le 1760, using direct proportion we know that we can multiply both amounts by 5 to find the cost of 5 kg of beans. This would tell us that 5 kg of beans cost Le 8800. We are going to solve problems of this type today.

### Introduction to the New Material (10 minutes)

- Write** the following on the board and then read the problem to the class:  
Kumba wants to buy 10 kg of potatoes at the market. When she asks how much they cost, the vendor tells her that potatoes cost Le 30,000 per kg. How much will she spend on 10 kg of potatoes? (Answer: Ten kg of potatoes costs Le 300,000.)
- Say:** To start solving this problem we need to create a proportion of cost to amount. Then we can find equivalent fractions of cross-multiply to solve.
- Write** the proportion on the board, explain each step as you write it:  

$$\frac{\text{cost}}{\text{amount}} = \frac{30000}{1} = \frac{x}{10}$$

$$x = 300,000$$
- Say:** By solving this proportion, we see that the cost of 10 kg of potatoes costs Le 300,000. Let's try another example.
- Write** the following example on the board:  
12 large eggs costs Le 10,333. To prepare for the party, Ester needs 36 eggs. How much will she spend on eggs for the party? (Answer:  $\frac{12}{10333} = \frac{36}{x}$ ; it will cost Le 30,999 for 36 eggs.)
- Say:** We can write the proportion using ratios of number of eggs to cost. Then we can solve the problem using what we know about ratios and solving for equivalent fractions.
- Write the solution on the board. You can show pupils that using equivalent fractions to solve this proportion is easier than cross multiplication because  $12 \times 3 = 36$ , so we can multiply  $10,333 \times 3$  to get the cost for 36 eggs. Emphasize that there are multiple ways to solve these problems and

pupils need to look for the best way to solve them. All solution paths will give the same correct answer, so it does not matter which path pupils choose.

### Guided Practice (10 minutes)

1. **Write** the following examples on the board:
  - a. Jusu talked to his friend for 15 minutes on his prepaid mobile. The call cost Le 7,155. How much does it cost per minute to make a call? (Answer:  $\frac{x}{1} = \frac{7155}{15}$ ; it costs Le 477 per minute.)
  - b. At a restaurant, a rice and sauce lunch costs Le 11,100. You and three friends are going to lunch. How much does lunch cost in total? (Answer:  $\frac{11,100}{1} = \frac{x}{4}$ ; it will cost Le 44,400 for lunch.)
  - c. Marrah gets paid Le 20,000 for each hour she works. If she works 30 hours per week, how much does she earn each week? (Answer:  $\frac{20,000}{1} = \frac{x}{30}$ ; Marrah earns Le 600,000 each week for working.)
2. **Say:** Please copy these examples in your exercise books. Write the proportion and solve the problem.
3. Have pupils work for 7 minutes. Walk around the room and assist pupils as needed.
4. **Say:** Now that you have had time to work on the problems, we will go over the solutions.
5. Write the solutions on the board to show pupils how to get each answer.




### Independent Practice (10 minutes)

1. **Say:** Now you will practice on your own. Find the answer to the question. Make sure you set up the proportion correctly. Please copy the problems in your exercise book and work independently. You will have five minutes to work. When you finish with your work, check your answers in pairs.
2. **Write** the following problems on the board:
  - a. Each tray holds 36 eggs. If your chickens lay 24 eggs per day, how many days will it take to fill two trays of eggs? (Answer:  $\frac{1}{24} = \frac{x}{36 \times 2}$ ; it will take 3 days to fill two trays with eggs.)
  - b. The cost of entrance to the museum is Le 10,000 per person. How much will it cost if seven people want to go to the museum? (Answer:  $\frac{1}{10,000} = \frac{7}{x}$ ; it will cost Le 70,000 for seven people to visit the museum.)
3. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once the five minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses. Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers.

**Closing** (2 minutes)

1. **Say:** We will explore direct proportions tomorrow.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Direct Proportion	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-144	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to calculate decreasing quantities using direct proportion.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

- Say:** Just as we looked at how things increase proportionally yesterday, today we are going to look at how things decrease using direct proportion. Another way to say this is that things are inversely proportional. This means that as one thing increases, the other decreases. An example of this is by finding out how long it takes for multiple people to do a job rather than just one person.

### Introduction to the New Material (10 minutes)

- Write** the following on the board and then read the problem to the class:  
If 5 men can build a fence in 14 days, how long would it take 7 men to build the fence, if they work at the same rate? (Answer: It will take seven men ten days to build the fence.)
- Say:** To start solving this problem we need to think about what happens in a problem like this.
- Ask:** Does the amount of time increase or decrease as more men work to build the fence? (Answer: The amount of time decreases as more men work on the fence.)
- Have pupils raise their hands to offer their solution. Call on one or two pupils until they say that it will take less time with more people working on the fence.
- Say:** Because it takes less time with more men, we know that the number of men and the amount of time are inversely proportional. This means that when we set up our proportion, we have to be careful with how we write it. Instead of comparing men and hours in this example, we are going to have one ratio of men to men and the other with hours and hours. We then have to flip the ratio of the hours to show that it is inversely proportional. Let's see what this looks like mathematically.
- Write**  $\frac{5}{7} = \frac{x}{14}$  on the board. Show pupils that while the 5 men take 14 hours to do the work, they are opposite one another in the proportion. Then show pupils that when we solve we get that seven men take 10 hours to build the fence.
- Say:** By solving this inverse proportion, we see that it takes seven men ten hours to build the fence. Let's try another example.
- Write** the following on the board:  
If a pile of grass lasted 3 goats five days, how long would the same pile of grass last 15 goats?  
(Answer:  $\frac{3}{15} = \frac{x}{5}$ ; The pile of grass will only last 1 day with fifteen goats.)

9. **Say:** Because the grass and the number of goats are inversely proportional, we have to be careful when writing our proportion. Then we can solve the problem using what we know about ratios to see that the pile of grass will last fifteen goats only one day.
10. Write the solution on the board for pupils to see the process.

### Guided Practice (10 minutes)

1. **Write** the following examples on the board:
  - a. It takes ten hours for three people to harvest beans. How long will it take eight people to harvest the same amount of beans? (Answer:  $\frac{3}{8} = \frac{x}{10}$ ; It will take 3.75 hours for eight people to harvest the same amount of beans.)
  - b. Peter takes eight days to finish a job if he works 6 hours per day. How long will it take Peter to finish the job if he works 10 hours per day? (Answer:  $\frac{6}{10} = \frac{x}{8}$ ; it will take Peter 4.8 days to finish the job if he works 10 hours per day.)
  - c. Six lorries can transport a quantity of plantains in five trips. How many trips would two lorries need to make to transport the same amount of plantains? (Answer:  $\frac{6}{2} = \frac{x}{5}$ ; it will take two lorries fifteen trips to transport the same amount of plantains.)
2. **Say:** Please copy these examples in your exercise books. Write the inverse proportion and solve the problem. Be sure to answer the question in a complete sentence
3. Have pupils work for 7 minutes. Walk around the room and assist pupils as needed.
4. **Say:** Now that you have had time to work on the problems, we will go over the solutions.
5. Write the solutions on the board to show pupils how to get each answer.

### Independent Practice (10 minutes)




1. **Say:** Now you will practice on your own. Find the answer to the question. Make sure you set up the proportion correctly. Please copy the problems in your exercise book and work independently. You will have five minutes to work. When you finish with your work, check your answers in pairs.
2. **Write** the following problems on the board:
  - a. It takes one tailor 45 days to make all of the school uniforms for a particular school. How long will it take six tailors to make the same number of school uniforms? (Answer:  $\frac{1}{6} = \frac{x}{45}$ ; it will take six tailors 7.5 days to make the school uniforms.)
  - b. It takes five days for eight people to prepare the land to plant maize. If only two people are able to work, how long would it take to prepare the land? (Answer:  $\frac{8}{2} = \frac{x}{5}$ ; it would take two people 20 days to prepare the land.)
3. As pupils are working, walk around and assist as needed. Answer questions if they arise.
4. When the five minutes is up, have pupils share their answers with partners. After two more minutes, call attention to the board and have pupils raise their hands to offer their responses.

Call on pupils until the correct answer is provided, but no more than three pupils per question. Have the pupil with the correct answer come to the board to show their work to their peers.

**Closing** (2 minutes)

1. **Say:** We will finish up working with proportions by solving more word problems.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Word Problems with Ratio	<b>Theme:</b> Number and Numeration; Everyday Arithmetic; Ratio and Proportion	
<b>Lesson Number:</b> M-06-145	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

	<p><b>Learning Outcomes</b> By the end of the lesson, pupils will be able to solve simple word problems involving ratio.</p>		<p><b>Teaching Aids</b> None</p>		<p><b>Preparation</b> Write the word problems for the lesson on the board.</p>
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### Opening (3 minutes)

- Say:** We are going to finish up this section on ratios and proportions by solving more word problems. These word problems will be standard proportions as well as direct and inverse proportions. It is important that you read the questions carefully to make sure you answer the question. Do not just plug things into a proportion without thinking about what the question is asking for.

### Introduction to the New Material (10 minutes)

- Ask:** How can you tell the difference between a direct and inverse proportion?  
(Answer: In direct proportion the quantities increase by the same percent. With inverse proportion, as one amount increases the other amount decreases.)
- Have pupils raise their hands to offer their answer. Call pupils until the right answer is given.
- Say:** This is important to remember because even though direct proportions are written like a basic proportion we have to change things for inverse proportions. As a reminder, with inverse proportions you create ratios by comparing the same thing in each ratio. Then to make the proportion to equate the two ratios, you flip the second ratio to show that it changes in the opposite direction from the first ratio. Today I am going to write some word problems on the board for you to spend 15 minutes solving independently. Then once 15 minutes is up, you will work in pairs to discuss the solutions. Then volunteers will put solutions on the board.
- Write** word problems on the board on the board. Remind pupils to copy the word problems in their exercise books and to work independently.
  - In 3 hours, David can ride his bicycle 27 miles. How far can he ride his bike in 6 hours?  
(Answer:  $\frac{3}{27} = \frac{6}{x}$ ; David can ride his bike 54 miles in six hours.)
  - 32 women did a job in 4 days. How long would it take 8 women to do the same job?  
(Answer:  $\frac{32}{8} = \frac{x}{4}$ ; it would take 8 women 16 days to do the same job.)
  - Three taps fill a tank in 45 minutes. How long would it take for 9 taps to fill the same tank?  
(Answer:  $\frac{3}{9} = \frac{x}{45}$ ; it would take 9 taps 15 minutes to fill the same tank.)

- d. Driving to a nearby town, Musa drove 20 mph for 50 minutes on a bad road. How long would the journey have taken if he drove at 60 mph? (Answer:  $\frac{20}{50} = \frac{x}{60}$ ; it would have taken Musa 24 minutes if he went 60 mph.)
- e. Hawanatu is a dress maker who uses 8 yd of fabric to make four dresses. How many yards of fabric would she need to make 18 dresses? (Answer:  $\frac{8}{4} = \frac{x}{18}$ ; Hawanatu would use 36 yds of fabric to make 18 dresses.)
- f. The school needs 500 desks. If two carpenters can make the desks in 50 days, how long would it take 10 carpenters to make the desks? (Answer:  $\frac{2}{10} = \frac{x}{50}$ ; it will take ten carpenters ten days to make the desks.)

**Guided Practice** (10 minutes)

1. Pupils will work independently during this time. Walk around the room and assist pupils as they work. Answer questions if they arise.

**Independent Practice** (10 minutes)




1. **Say:** Now that you have had time to solve each of the word problems, please work in pairs to compare your solutions.
2. Pupils will share solutions in pairs for five minutes. Once five minutes is up, have pupils raise their hands to put solutions on the board. Call on one pupil per question. Assist pupils with their solutions if needed.

**Closing** (2 minutes)

1. **Say:** We will continue working with word problems over the next week.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.



<b>Lesson Title:</b> Solving Word Problems Involving Fractions	<b>Theme:</b> Everyday Arithmetic; Word Problems	
<b>Lesson Number:</b> M-06-146	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to solve word problems involving fractions with denominator up to 12.	 <b>Teaching Aids</b> None	 <b>Preparation</b> Write the word problems for the lesson on the board.
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### Opening (3 minutes)

- Say:** Today we are going to solve word problems involving fractions. For some of these problems, we will need to add or subtract and for others we will need to multiply.
- Ask:** What do fractions have to have in order to add or subtract them?  
(Answer: The same denominator)
- Have pupils raise their hands to offer their answer. Call on 2 or 3 pupils for their responses. If none of the pupils give the correct answer, explain it to them.
- Ask:** Are there any specific rules for multiplying fractions?  
(Answer: No, but they have to be simplified after multiplying.)
- Have pupils raise their hands to offer their answer. Call on 2 or 3 pupils for their responses. If none of the pupils give the correct answer, explain it to them.

### Introduction to the New Material (10 minutes)

- Say:** To solve word problems that use fractions, you have to follow these steps. Write the steps in your exercise book.
- Write** down the steps on the board as you say them.
- Say:**  
 Step 1: Read the problem.  
 Step 2: Write the problem as addition, subtraction, or multiplication of two fractions.  
 Step 3: Add, subtract, or multiply. Reduce your answer if needed.  
 Step 4: State your answer in a sentence.
- Wait for the pupils to finish writing before continuing.
- Say:** I will lead you through three types of problems. Please write down the word problems in your exercise books. Leave space between problems so that you can solve them.
- Write** down the problems on the board as you say them.
  - Mamie got a job picking fruit. She has to fill a basket by the end of the day. She filled  $\frac{1}{3}$  of the basket then took a break. She filled another  $\frac{1}{4}$  of the basket before taking another break. What fraction of the basket did Mamie fill?

- b. Musa had  $\frac{3}{4}$  of a water container filled. After taking a drink, the container was  $\frac{1}{4}$  full. How much water did Musa drink?
- c. Jeneba made  $\frac{3}{4}$  of a pot of stew. She gave Abdul  $\frac{1}{3}$  of the stew. How much of the pot did Abdul get?
7. **Ask:** What is the important information in the first problem? (Answer: Mamie filled  $\frac{1}{3}$  of the basket then filled another  $\frac{1}{4}$  of the basket. We want to know how much of the basket is full.)
8. Have pupils raise their hands to offer their answer. Call on 2 or 3 pupils for their responses. If none of the pupils give the correct answer, explain it to them. Write down the information on the board for pupils to write in their exercise books.
9. **Ask:** What is the important information in the second problem? (Answer: Musa had  $\frac{3}{4}$  of a water container filled then it was  $\frac{1}{4}$  full. We want to know how much he drank.)
10. Have pupils raise their hands to offer their answer. Call on 2 or 3 pupils for their responses. If none of the pupils give the correct answer, explain it to them. Write down the information on the board for pupils to write in their exercise books.
11. **Ask:** What is the important information in the third problem? (Answer: Jeneba made  $\frac{3}{4}$  of a pot of stew and gave Abdul  $\frac{1}{3}$  of the stew. We want to know how much of a pot Abdul has.)
12. Have pupils raise their hands to offer their answer. Call on 2 or 3 pupils for their responses. If none of the pupils give the correct answer, explain it to them. Write down the information on the board for pupils to write in their exercise books.

### Guided Practice (10 minutes)

1. **Ask:** Will we add, subtract, or multiply for each problem? How do you know? (Answers: For the first problem we will add because we want to know a total sum. For the second we will subtract because we want to know the total loss. For the third we will multiply because of the word 'of'.)
2. Have pupils raise their hands to offer their answer. Call on 2 or 3 pupils for their responses. If none of the pupils give the correct answers, give the answers.
3. **Say:** Now we will set up the problems. Please write the problems in your exercise books under each word problem.
4. Write down the following on the board for pupils to copy into their exercise books as you say them out loud:
- a.  $\frac{1}{3} + \frac{1}{4}$

b.  $\frac{3}{4} - \frac{1}{4}$

c.  $\frac{3}{4} \times \frac{1}{3}$

5. **Say:** You will now have four minutes to solve the problems. Make sure to write the answers in complete sentences.
6. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once five minutes is up, call attention to the board and work out the problems.

a.  $\frac{1}{3} + \frac{1}{4} \rightarrow \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$  (Answer: Mamie filled  $\frac{7}{12}$  of her basket.)

b.  $\frac{3}{4} - \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$  (Answer: Musa drank  $\frac{1}{2}$  a container of water.)

c.  $\frac{3}{4} \times \frac{1}{3} = \frac{3}{12} = \frac{1}{4}$  (Answer: Abdul got  $\frac{1}{4}$  of a pot of stew.)

### Independent Practice (10 minutes)

1. **Say:** You will do some work on your own now. Please copy the word problems in your exercise books as I write them on the board.

2. **Write** the following on the board:

- a. Zinab was on a lunch break. She spent  $\frac{1}{2}$  an hour talking with friends and  $\frac{1}{3}$  of an hour eating. What fraction of an hour was her break? (Answer: Zinab had  $\frac{5}{6}$  of an hour for her

break.  $\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$ )

- b. Sao finished a test in  $\frac{3}{4}$  of an hour finishing a test. Esther finished it in  $\frac{2}{3}$  of that time. How long did it take Esther to finish the test? (Answer: It took Esther  $\frac{1}{2}$  an hour to finish the test.

$\frac{3}{4} \times \frac{2}{3} = \frac{6}{12} = \frac{1}{2}$ )

- c. Abdul had  $\frac{1}{2}$  of a liter of palm oil. After a week, he had  $\frac{1}{5}$  of a liter left. How much palm oil did Abdul use in a week? (Answer: Abdul had  $\frac{3}{10}$  of a liter of palm oil after a week.  $\frac{1}{2} - \frac{1}{5} =$

$\frac{5}{10} - \frac{2}{10} = \frac{3}{10}$ )




3. **Say:** You will have seven minutes to solve the problems. When you are done, check your answers with a peer.
4. As pupils are working, walk around and assist as needed. Answer questions if they arise. Once eight minutes is up, call attention to the board and have pupils raise their hands to offer their

responses. Call on pupils until the correct answer is provided. Have the pupil with the correct answer come to the board to show their work and procedures to their peers.

**Closing** (2 minutes)

1. **Say:** Good job today. Sometimes reading word problems can be difficult. Tomorrow we will work on creating word problems.
2. **Ask:** Does anyone have any questions about solving word problems with fractions?
3. Answer any questions that pupils may ask about solving word problems with fractions.

<b>Lesson Title:</b> Devising Word Problems Involving Fractions	<b>Theme:</b> Everyday Arithmetic; Word Problems	
<b>Lesson Number:</b> M-06-147	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to devise word problems involving fractions with denominator up to 12.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

1. **Say:** Today we are going to work with word problems with fractions. The goal for today, though, is for you to create your own word problems that work with fractions. First, let's make a list of some things that commonly use fractions. One example is the weights of things when we buy food.

### Introduction to the New Material (10 minutes)

1. **Ask:** What other things do we commonly use fractions to describe?  
(Possible answers: Distances, cooking, measuring fabric)
2. Have pupils raise their hands to offer answers to the questions. Write all of the answers on the board for them to reference for the class activity.
3. **Say:** Today you will create your own word problems that model situations that we listed on the board. I want each of you to create two word problems. After about 15 minutes, you will share your word problems with another pupil. That pupil will solve the problem and you will solve theirs. Then you will discuss the solutions.
4. Pupils will work on creating their own word problems using fractions. Walk around the room and assist if pupils are struggling.

### Guided Practice (10 minutes)

1. Pupils will work independently during this time. Walk around the room and assist pupils as they work. Answer questions if they arise.




### Independent Practice (10 minutes)

1. **Say:** Switch papers with a partner. Spend five minutes solving the word problems you are given. Once you are both finished, discuss the solutions in pairs.
2. Pupils will solve the problems they are given and discuss solutions in pairs. When all pairs are done, ask if anyone wants to share a word problem. If they do, have them come to the board to share the word problem and the solution.

**Closing** (2 minutes)

1. **Say:** We will continue working with word problems tomorrow, but tomorrow the word problems will involve decimals and percentages.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Solving Word Problems Involving Decimals and Percentages	<b>Theme:</b> Everyday Arithmetic; Word Problems	
<b>Lesson Number:</b> M-06-148	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to solve word problems involving decimals and percentages.	 <b>Teaching Aids</b> None	 <b>Preparation</b> Write the word problems for the lesson on the board.
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### Opening (3 minutes)

- Say:** Today we are going to work with word problems with fractions. The goal for today, though, is for you to create your own word problems that work with fractions. First, let's make a list of some things that commonly use fractions. One example is the weights of things when we buy food.

### Introduction to the New Material (10 minutes)

- Write** the following on the board and read it out loud to the class:  
Out of 600 pupils who took the school fitness test, 48 achieved highest marks. What percentage of the pupils achieved highest marks? (Answer: 8% of the pupils achieved highest marks.)
- Say:** This problem is asking us to find a percentage. Since we know that percentages can be written as either fractions, decimals, or using the percent sign, we have options to figure out the answer. Today I want you to divide to get percentages.

- Write out the long division on the board to show the solution.  $600 \overline{)48.00}^{0.08}$
- Say:** Since the division gives us 0.08, we can convert from decimals to percentages and say that 8 percent of the pupils achieved highest marks. For every one of the word problems in today's lesson, please find the answer as a decimal and convert to percentages. Let's try another one.

- Write** the following on the board and read the problem out loud to the class:  
In a school, there are 420 boys and 280 girls in Grade Six. What percentage of the Grade Six pupils are girls? (Answer: 40% of the pupils in Grade Six are girls.)
- Say:** This problem has us find the percentage of the class that are girls. The problem does not, however, tell us how many total pupils there are in Grade Six. We must find the total number of pupils before we can solve the problem. The total number of pupils in Grade Six is the sum of the boys and girls, which equal 700 pupils. Then we can divide the number of girls by the total number to find the percentage as a decimal.

- Write out the long division on the board to show the solution.  $700 \overline{)280}^{0.4}$
- Say:** Since the division gives us 0.4, we can convert from decimals to percentages to say that forty percent of the pupils in Grade Six are girls.

### Guided Practice (10 minutes)

1. **Say:** Now you will try two word problems on your own. Please remember to first find your answer as a decimal and then convert to percentages and to write your answer as a complete sentence. You will have seven minutes to work on solving the word problems. Then we will review the answers together as a class.
2. **Write** the following two word problems on the board:
  - a. Out of 1200 pupils in a school, 300 do not have a sister. What percent of pupils do not have a sister? (Answer:  $1200 \overline{)300}^{0.25}$ ; twenty-five percent of pupils do not have a sister.)
  - b. Out of 300 Grade Six pupils, 60 pupils do athletics. What percent of Grade Six pupils do athletics? (Answer:  $300 \overline{)60}^{0.2}$ ; twenty percent of Class Six pupils do athletics.)
3. Pupils will work independently for seven minutes. Walk around the room and assist pupils as needed. Answer questions if they arise. When seven minutes is up, call attention to the front of the room. Show pupils the correct solutions to the problems.

### Independent Practice (10 minutes)




1. **Say:** You will now have five minutes to try two more word problems. Please divide to get each answer as a decimal and then convert to the percentage and write each answer as a complete sentence. When the five minutes is up, you will discuss your solutions in pairs.
2. **Write** the following two word problems on the board:
  - a. 200 teachers attended a workshop. 120 of the teachers were female. What percent of the teachers were female? (Answer:  $200 \overline{)120}^{0.6}$ ; sixty percent of the teachers at the workshop were female.)
  - b. In a school of 760 pupils, 38 of them wear glasses. What percent of the pupils wear glasses? (Answer:  $38 \div 760 = 0.05 = 5\%$ ; five percent of the pupils at the school wear glasses.)
3. Pupils will solve the problems they are given and then discuss solutions in pairs. When all pairs are done, ask if anyone wants to share their solution to the problems. Call on one pupil per problem to put their solution on the board.

### Closing (2 minutes)

1. **Say:** We will continue working with decimals and percentages in word problems.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.



<b>Lesson Title:</b> Devising Word Problems Involving Decimals and Percentages	<b>Theme:</b> Everyday Arithmetic; Word Problems	
<b>Lesson Number:</b> M-06-149	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to devise word problems involving decimals and percentages.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

1. **Say:** Today we are going to work with word problems with decimals and percentages. The goal for today, though, is for you to create your own word problems that work with decimals and percentages. First we want to make a list of things we can use percentages to describe.

### Introduction to the New Material (10 minutes)

1. **Ask:** When do we use percentages?  
(Possible answers: Test scores; portions of classes; any portion of a whole)
2. Have pupils raise their hands to offer answers to the questions. Write all of the answers on the board for them to reference for the class activity.
3. **Say:** Today you will create your own word problems that model situations that we listed on the board. I want each of you to create two word problems. After about 15 minutes, you share your word problems with another pupil. That pupil will solve the problem. Then you will discuss the solutions.
4. Pupils will work on creating their own word problems using decimals and percentages. Walk around the room and assist if pupils are struggling.

### Guided Practice (10 minutes)

1. Pupils will work independently during this time. Walk around the room and assist pupils as they work. Answer questions if they arise.




### Independent Practice (10 minutes)

1. **Say:** Switch papers with a partner. Spend five minutes solving the word problems you are given. Once you are both finished, discuss the solutions in pairs. Be sure to find your answer as a decimal and then convert to the equivalent percentage.
2. Pupils will solve the problems they are given and discuss solutions in pairs. When all pairs are done, ask if anyone wants to share a word problem. If they do, have them come to the board to share the word problem and the solution.

**Closing** (2 minutes)

1. **Say:** We will continue working with word problems tomorrow, but tomorrow the word problems will involve ratios and proportions.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

<b>Lesson Title:</b> Devising Word Problems Involving Ratios and Proportions	<b>Theme:</b> Everyday Arithmetic; Word Problems	
<b>Lesson Number:</b> M-06-150	<b>Class/Level:</b> Primary 6	<b>Time:</b> 35 minutes

 <b>Learning Outcomes</b> By the end of the lesson, pupils will be able to devise word problems involving ratio and proportion.	 <b>Teaching Aids</b> None	 <b>Preparation</b> None
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### Opening (3 minutes)

1. **Say:** Today we are going to work with word problems with ratios and proportions. The goal for today, though, is for you to create your own word problems that work with ratios and proportions. First we want to make a list of situations we can use ratios to describe. Remember, with ratios and proportions we have standard ratios that are similar to percentages as well as direct and inverse proportions. You can use any of these scenarios for our brainstorming session.

### Introduction to the New Material (10 minutes)

1. **Ask:** When do we use ratios or proportions? (Possible answers: When figuring out how much time it will take to complete a job with different numbers of people; when comparing different portions of a total group)
2. Have pupils raise their hands to offer answers to the questions. Write all of the answers on the board for them to reference for the class activity.
3. **Say:** Today you will create your own word problems that model situations that we listed on the board. I want each of you to create two word problems. After about 15 minutes, you share your word problems with another student. That student will solve the problem. Then you will discuss the solutions.
4. Pupils will work on creating their own word problems using ratios and proportions. Walk around the room and assist if pupils are struggling.

### Guided Practice (10 minutes)

1. Pupils will work independently during this time. Walk around the room and assist pupils as they work. Answer questions if they arise.

### Independent Practice (10 minutes)

1. **Say:** Switch papers with a partner. Spend five minutes solving the word problems you are given. Once you are both finished, discuss the solutions in pairs. Be sure to find your answer as a decimal and then convert to the equivalent percentage.
2. Pupils will solve the problems they are given and discuss solutions in pairs. When all pairs are done, ask if anyone wants to share a word problem. If they do, have them come to the board to share the word problem and the solution.

**Closing** (2 minutes)

1. **Say:** Great work today creating word problems.
2. **Ask:** Does anyone have any questions about today's lesson?
3. Answer any question that pupils have.

















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