USAID
FROM THE AMERICAN PEOPLE

MINISTRY OF EDUCATION
SHOW THE LIGHT
THE PEOPLE WILL FIND THE WAY
REPUBLIC OF LIBERIA

LEARNER WORK BOOK

MATHEMATICS | LEVEL 3 | SEMESTER 2

MATHEMATICS | ABE
LEARNER WORKBOOK

L3S2

Table of Contents

MODULE D

✍ Lesson 57 - 59: Measurement – Length

✓ **Objectives -** By the end of the lesson, learners will be able to**:**

   a. Estimate and measure the length of objects or distance between 2 points using the English and metric systems

   b. Convert between centimeters, meters and kilometers, and between inches, feet and yards.

🔔 Opener

1. **Introduction to new module:** Now you will switch topics from working with numbers (operations, fractions, decimals, percentages, business math) to measurement – length, weight and volume in the English and metric systems, how to convert between measurement systems, time and calendars.

2. **Today's lesson:** Today's lesson will focus on measuring length, using both the English and metric systems.

❓ Problem Solving Activity

1. Give learners a challenge – Find an object in the room that you think is:
   a. 10 inches long

   b. 10 centimeters long

   c. 1 inch long

   d. 1 centimeter long

   e. 3 feet long

   f. 100 centimeters long

Use a ruler to measure the length. Remember that rulers often have both inches and centimeters for measuring. In Liberia we use mostly the English system but most countries use the metric system so we need to be familiar with both.

---
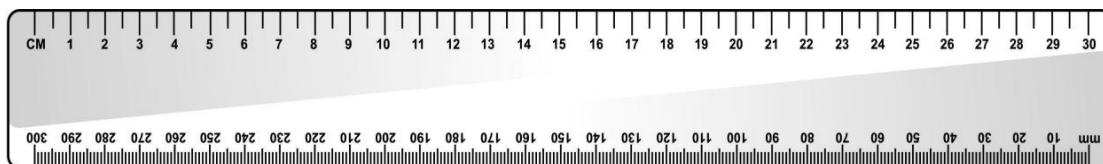
2. **Answer the questions:**

   a. Give other examples of items we might measure with a ruler

   b. How else can we measure length?

   c. Did anyone find an object that was 1 meter long? How many centimeters are in a meter? _____

   d. How many centimeters is 2 meters? _____ 4 meters? _____ 10 meters? _____

   e. Did anyone find an object that was 1 yard long? How many inches are in a foot? _____. What does 3 feet equal? _____

   f. How do we measure the distance between towns? Is it in centimeters? Meters? Inches? Feet? _____ Think about the distance of 1 km. If you measured that with a meter stick, how many would it be? _____Do you know how many yards or feet a mile is equal to? _____

   g. How many meters are in 2 km? _____ 3km _____? 100km? _____

   h. Have you converted from miles to kilometers or kilometers to miles before? How did you do it?

   Math Facts!
   - Measure shorter objects (less than 30 cm or less than 12 inches) in centimeters or inches with a ruler.
   - Measure longer items (more than 50 cm or more than 1 or 2 feet) with a yard stick, meter stick or tape measure.
   - Distances are measured in kilometers or miles.
   - 100 cm = 1 m; 10 mm = 1 cm; 1 000 m = 1 km
   - 12 inches = 1 foot; 3 feet = 1 yard; 1,760 yards = 1 mile

✍ Guided Practice

1. **With your group:**

   a. Find and measure 3 items to the nearest centimeter and to the nearest inch, using a ruler.

   b. One by one throw the feather as far as they can and measure the distance from where they stood to where the feather landed. Record the distance for each person in meters and centimeters (eg. 2 m 36 cm) _____ and also in feet and inches (eg. 2 ft 3 in) _____.

   Write the total distance in cm (eg. 236 cm) _____ and in inches _____.

   Find the group sum of the distances thrown by each group member. Express the sum in: meters and centimeters _____; feet and inches _____; and finally in all centimeters and all inches _____.

   c. Measure the distance around the inside of the classroom. What is the length of each wall in meters and centimeters? _____In just centimeters? _____ In feet and inches? _____In just inches? _____ What is the total distance around the room? _____

⚒ Application

1. How do you measure in your daily activities?

2. **Solve:**

   Problem 1: The distance between your house and the shop where you work is 2,000 meters. Every day you walk to and from work. How many kilometers do you walk per day?

   Problem 2: The distance between 4 places is as shown below. How many kilometers is it between A and D?

A	B		C		D
● - - - - - - - -	● - - - - - - - - - - - - - - - -		● - - - - - - - - - - - - - - -		●
500 m	**1 300 m**			**3 200 m**	
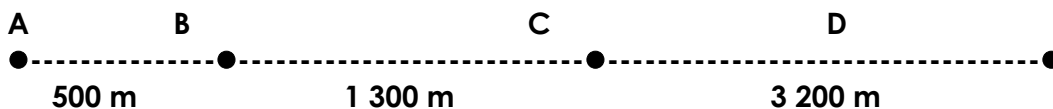
3. **Problem 3:** You need to make a wooden frame for a painting. The dimensions of the painting are 40 inches by 20 inches. What is the total length of wood you will need in inches? feet? yards?

⤷Assessment and Reflection

1. In your team, answer the questions given by the facilitator. The first team finished with all correct answers wins.

🏠 Homework

1. Observe and record ways in which people measure length. What tools did they use, if any?

2. Measure the size of a room where you stay. If you do not have a measuring tape or ruler, be creative and find another way in which to measure.

✍ Lesson 60: Measurement – Basic Operations Using Length Measurements

✓ **Objectives -** By the end of the lesson, learners will be able to:

    a. Perform basic operations using the metric and English systems.

    b. Convert within the metric and English systems.

♫ Opener

1. **Review of previous section:** Share the results of your homework assignment.

2. **Today's lesson:** Today's lesson will still focus on measuring length but we will practice adding, subtracting, multiplying and dividing different measurements in the metric and English systems.

❓ Problem Solving Activity

1. Add and express in feet and inches: 10 inches + 11 inches + 13 inches =

2. Add and express in meters and centimeters: 30 cm + 80 cm + 95 cm =

3. Add:

yd	ft	in
3	2	7
+ 5	6	4

4. Subtract and express in yards, feet and inches: 200 inches - 22 inches =

5. Multiply and express in kilometers: 400 m x 20 =

6. Divide and express in inches: 3 ft 4 inches ÷ 4 =

Math Facts!

- Remember the conversions:
  - ‣ 12 inches = 1 foot; 36 inches = 3 feet = 1 yard
  - ‣ 100 cm = 1 m; 10 mm = 1 cm; 1 000 m = 1 km
- When adding or subtracting, you can line the yards, feet and inches up and do the operation. In your final answer you can convert to appropriate measurement. For ex:

	yd	ft	in
	9	2	3
+	7	6	4
Ans:	1	5	9
=	2 yd	2 ft	9 in

- When dividing, convert the measurements to the same unit before doing the operation. For ex:
  4 yds 3 ft 2 in ÷ 2 = (144 in + 36 in + 2 in) ÷ 2 = 182 in ÷ 2 = 91 in
  To convert inches to yards, divide 91 by 36 = 2 yds 19 in = **2 yd 1 ft 7 in**

✍ Guided Practice

1. Solve the following and express in the proper measurement:

a.	yd	ft	in	**b.**		yd	ft	in
	25	1	9			355	10	9
+	17	2	8		-	237	2	6

2. 40 cm x 55 =

3. 60 m x 150 =

4. 21 yd 2 ft 8 in ÷ 4 =

⚒ Application

1. **Solve:** You have been hired to construct a fence around 2 rectangular plots of land that have the following dimensions:

Plot A:

60 ft

40 ft   40 ft

60 ft

Plot B:

90 ft

70 ft   70 ft

90 ft
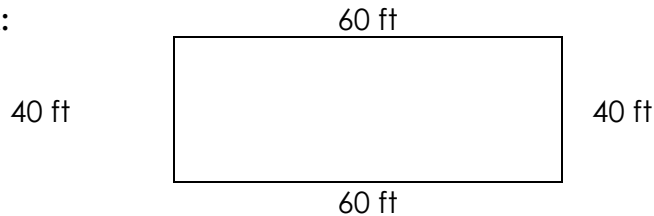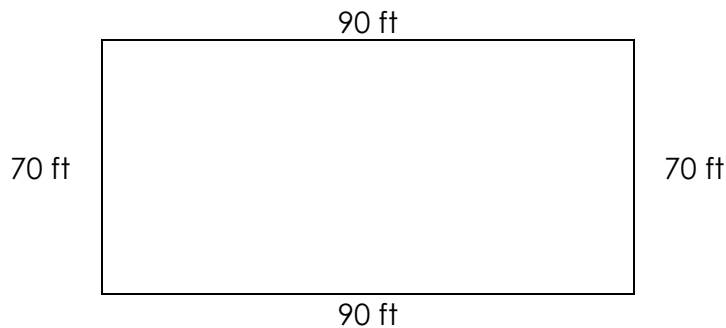
a. Calculate the length of fence that will go around Plot A and the length that will go around Plot B. Express your answer in yards, feet and inches as appropriate.
   Answer:

b. What is the total amount of fencing you will need for both plots together?

⇲ Assessment and Reflection

1. In your group, answer the question given by the facilitator, The first group whose members each solve the problem correctly, wins. Answer must be expressed in the best form possible.

🏠 Homework

1. Identify other ways in your daily lives in which you or people around you are working with length and when you might need to convert within the metric or English systems. Write them down to share with your class.

✍ Lesson 61: Measurement – Volume: Every day Measurements (English System)

✓ **Objectives -** By the end of the lesson, learners will be able to:

a. Estimate and measure the capacity of objects

b. Convert between cups, fluid ounces, pints, quarts and gallons

🔔 Opener

1. **Review of previous lesson:** What do we commonly use to measure length? What typical conversions might we use?

2. **Introduce today's lesson:** Today's lesson will focus on volume. We will start with some typical measurements you might already be familiar with.

❓ Problem Solving Activity

1. Use the containers given to your group to answer the following"

a. How many cups makes a pint?

b. How many pints make a quart?

c. How many cups make a quart?

d. How many quarts makes a gallon?

e. How many pints make a gallon?

f. How many cups make a gallon?

Math Facts!

Most common measurements

English System:	Metric System:
teaspoon	milliliter
tablespoon	liter
Fluid Ounce	
Cup	
Pint	
Quart	
Gallon	

Fluid Ounces (fl oz) are small.

"Fluid Ounce" is used for volume whereas "Ounce" is for mass. They are different. For example, 1 fluid ounce of honey has a mass of about 1.5 ounces! But for water, 1 fluid ounce has a mass of about 1 ounce.
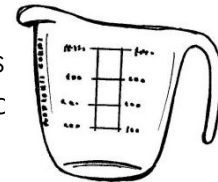
Cups: A small glass holds about 8 fluid ounces, which is also called 1 cup.

1 cup = 8 fluid ounces

There are 16 tablespoons to a cup and a cup is 8 fluid ounces,

 so 1 tablespoon is about ½ fluid ounce.

Pints: A pint is equal to 2 cups (example: a large glass of water)

1 pint = 2 cups = 16 fluid ounces

Quarts: A quart (qt) is the same thing as 4 cups or 2 pints

1 quart = 2 pints = 4 cups = 32 fluid ounces
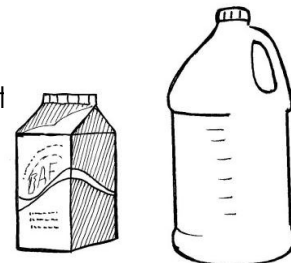
Gallons: A **gallon** (gal) is the same as 16 cups or 8 pints or 4 quarts.

It is the largest liquid measurement. (Note that a *quart* is a *quarter* of a gallon!)

✍ Guided Practice

1. **Solve and explain** your answer: The capacity of a medium sized car's fuel tank is about:

   a. 0.16 gallon

   b. 1.6 gallons

   c. 16 gallons

   d. 160 gallons

2. **Solve:** There are 16 tablespoons in a cup. How many fluid ounces are there in a tablespoon?

3. **Solve:**

   a. How many cups are in 3 pints?

   b. How many pints are in 6 quarts? How many cups is this?

   c. 6 quarts make how many gallons?

✗ Application

1. How do you use cups, pints, quarts, gallons, etc. in your daily life? Give examples of when you might have to convert between them.

2. **Solve:** The doctor prescribes Binta a 10.5 fluid ounce bottle of medicine with the instructions to take 0.25 fluid ounces twice a day. How long does the medicine last?

3. **Solve:** How many cups are there in a 20 fluid ounce bottle of palm oil?

⇗Assessment and Reflection

1. Answer the questions given by the facilitator.

⌂ Homework

1. Identify ways you see people in your community measuring capacity. List 3 examples.

✍ Lesson 62: Measurement – Volume: Every day Measurements (Metric System)

✓ **Objectives -** By the end of the lesson, learners will be able to:

   a. Estimate and measure the capacity of objects

   b. Convert between milliliters and liters

🔔 Opener

1. **Review of previous lesson:** Share examples of how people use capacity measurements in your community and when you need to convert between cups, pints, quarts, gallons, etc.

2. **Today's lesson:** Today's lesson will still focus on capacity (volume) but will use the metric system. Give examples of bottles or containers that use the metric system for measurement.

❓ Problem Solving Activity
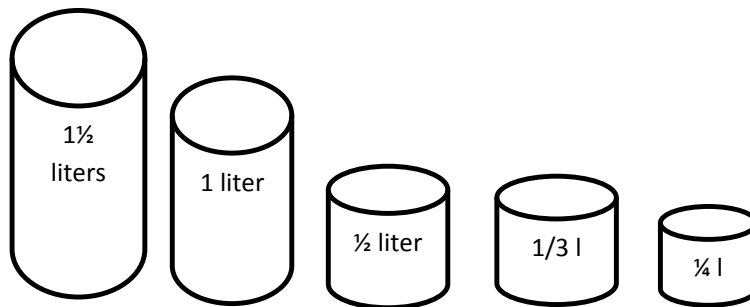
1. **Solve:**

   a. Calculate how many ½ liter bottles can be filled from 3 liters of water.

   b. Calculate how many ¼ liter containers it takes to fill a 1 ½ liter bottle.

2. Think about a small bottle of water that can be bought in a store or restaurant. How many milliliters of water does it contain? _____. How many milliliters are in a liter? _____ Express 500 ml as a fraction _____.

Math Facts!

- The unit of measurement of capacity is called a liter.

- 1 liter = 1,000 milliliters

- We can make comparisons between measurements in the metric and English systems by knowing:

  ‣ a fluid ounce is approximately 30 milliliters
  ‣ a pint is about a half a liter
  ‣ a quart is about a liter

✎ Guided Practice

1. **With your group and the given containers:**

   a. Calculate how many ½ liter containers fit into 4 liters.

   b. Calculate how many liter bottles can be filled from 2 liters of water.

   c. Convert 2 000 milliliters to liters.

2. **Solve** (use the Math Facts for clues):

   a. Approximately how many milliliters are in a tablespoon?

   b. Approximately how many pints are in a 1.5 liter bottle of water?

   c. Approximately how many liters are in a gallon?

⚒ Application

1. **Solve the following problems:**

   Problem 1: A restaurant uses 120 liters 150 milliliters of cooking oil each month. How much oil does it use in 2 months? What is the answer in milliliters?

   Problem 2: How many 240 ml containers can be filled from 72 liters of milk?

   Problem 3: A large drum of kerosene holds 450 liters. How many gallons is this approximately?

⌖ Assessment and Reflection

1. **Solve:** How many ¼ liter containers can 8,000 milliliters fill?

⌂ Homework

1. Identify examples of people using milliliters or liters in your community. Write three examples.

## ✍ Lesson 63 - 64: Measurement – Weight in Metric and English Systems

---

✓ **Objectives -** By the end of the lesson, learners will be able to:

a. Estimate and measure the weight of objects

b. Convert within and between common measures of weight in the metric (milligrams, centigrams, grams, kilograms) and English (ounces, pounds) systems.

c. Calculate net and gross weight.

🔔 Opener

1. **Review of previous lesson:** Share how you have seen people using liters, milliliters, etc. in your community.

2. **Today's lesson:** Today's lesson will focus on weight, using both the metric and English systems. Give examples of when one needs to measure weight.

❓ Problem Solving Activity

1. Measure the weight of various items: - a learner's book, a rock, a person, cup of rice, etc.
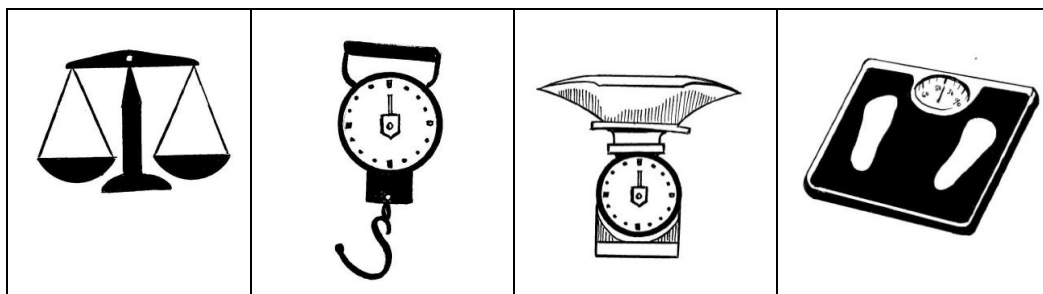
Balance Scale   *Spring Scales*   *Standing Scale (type of spring scale)*

.
2. Using a scale and a kilogram of rice, figure out how many pounds of rice a kilogram is equal to.

---

3. Some scales measure in kilograms while others measure in smaller units such as milligrams, centigrams and grams grams (or some scales were in pounds and others in ounces). Do you think it is possible to convert between these measurements? How many milligrams are in a gram? _____ How many grams are in a kilogram? _____ How many kilograms are in a ton? _____ How many pounds are in a ton?_____

   Convert:

   a. 2 kilograms (kg) to grams (g)

   b. 3 000 milligrams (mg) to grams (g)

   c. 6 000 kg to tons

   d. 10 pounds to ounces

   e. 80 ounces to pounds

   f. 120 oz to lbs and oz

4. **Gross weight** is the total weight of the container and the contents, and **net weight** is the weight of the content itself. **Calculate:**

   a. The weight of a bag of coffee is 105 kg. Find the weight of the empty sack if the coffee alone weighs 100 kg.

   b. The gross weight of 50 cartons of biscuits in a box is 10 kg. The empty box weighs 2 kg. What is the net weight of the biscuits?

Math Facts!

- The metric unit to measure weight is called grams and the English unit is pounds.
- 1 gram = 1, 000 milligrams = 100 centigrams
- 1 000 grams = 1 kilogram
- 1 pound = 16 ounces
- 1 ton = 2,000 lbs = 1,000 kilograms
- Gross weight: total weight of the container and the contents
- net weight: weight of the content itself.

✍ Guided Practice

1. Calculate the gross weight and the net weight of the box of stones given to you.

2. **Convert:**

    a. 5 000 g to kg

    b. 6 000 milligrams (mg) to grams (g)

    c. 400 centigrams (cg) to grams (g)

    d. 3 000 kg to tons and to pounds

    e. 64 oz to lbs

3. **Calculate:**

    a. How many ¼ kg are there in 4 ¼ kg?

    b. How many ½ kg are there in 3 ½ kg?

    c. How many ¼ kg are there in 5 ½ kg?

⚒ Application

1. **Solve:**

   Problem 1: The weight of a pickup truck and 20 bags of maize is 4 tons. The weight of the pickup alone is 2,000 kg. What is the net weight of the maize in lbs and in kg?

   Problem 2: A full box of cassava flour weighs 10 lbs. The empty box weighs 3 lbs 6 oz. What is the net weight of the cassava flour?

   Problem 3: A lorry full of 500 pieces of timber weighs 15 tons. Each piece weighs 25 kg. Calculate the weight of the empty lorry in tons.

⮆ Assessment and Reflection

1. You will work in a small group. Follow the instructions of the facilitator.

🏠 Homework

1. See how many shops you can find in your neighborhood that use scales. What types of scales are they and what do they use them for?

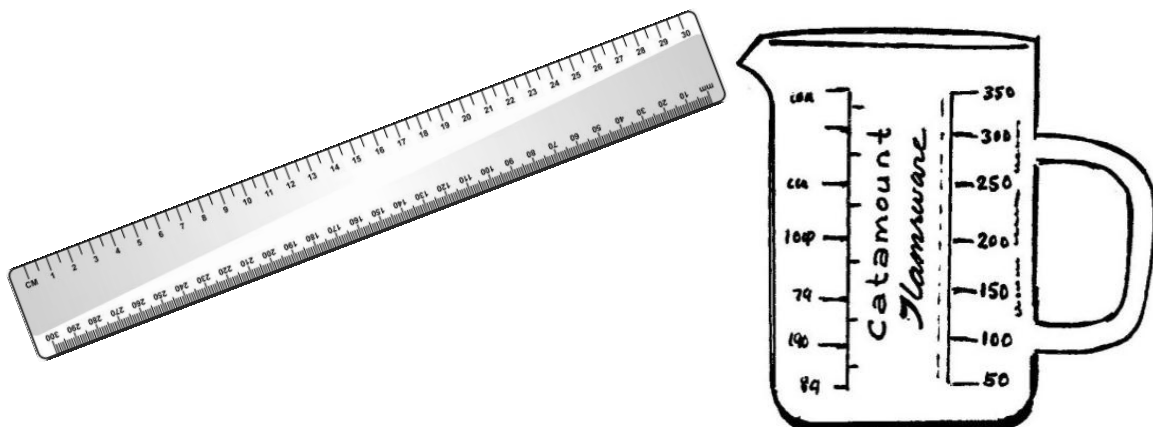# ✍ Lesson 65 - 66: Measurement – Converting Between Metric and English Systems

✓ **Objectives -** By the end of the lesson, learners will be able to:

   a. Convert from English to metric measurements and metric to English measurements

   b. Apply conversions between measurement systems to real life situations

🔔 Opener

1. **Review of previous lesson:** Share the results of the homework assignment. What types of scales did you find? What were they used for?

2. **Today's lesson:** Today's lesson focuses on converting between the metric and English systems. Which system are you most familiar with? Give examples when you had to convert from one system to the other in your daily life.

❓ Problem Solving Activity

1. **Estimate** (use the ruler and measuring cups if you want):

   a. Your thumb measures 2 inches long. How many centimeters is that?

   b. How many cups of water are in a small water bottle of 500 milliliters?

   c. Binta weighs 130 pounds. What is her weight in kilograms?

Mathematics Level 3, Semester 2, Learners' Work Book (Field Test Version)   Page 22
Alternative Basic Education Curriculum, January 2014

Math Facts!

- Conversion Table

Distance

1 inch	=	2.54 cm
1 foot	=	0.3 meters
1 yard	=	0.9 meters
1 mile	=	1.6 kilometers

Weight

1 ounce	=	28.4 grams
1 pound	=	0.45 kilograms

Volume

1 teaspoon	=	4.9 milliliters
1 cup	=	237 milliliters
1 pint	=	473 milliliters
1 quart	=	0.9 liters
1 gallon	=	3.79 liters

You don't need to memorize these conversions but it is good to have a general idea of some measurements. For example, that an inch is about 2.5 cm, or that 1 yard is about 1 meter and 1 pound is about ½ kg.

How to use the conversion table: When converting from the English to metric system, all you have to do is multiply. For example, 3 inches is how many cm? You know 1 inch is 2.54 cm. Just multiple 2.54 cm x 3 to find out how many centimeters are in an inch.

2. **Convert** the following from English to metric measurements:

a. 10 inches = _____ centimeters

b. 3 yards = _____ meters

c. 5 miles = _____ kilometers

d. 20 pounds = _____ kilograms

e. 5 teaspoons = _____ milliliters

f. 6 cups = _____ liters = _____ milliliters

---

3. Convert the following from metric to English measurements:

a. 15 cm = _____ inches

b. 5 meters = _____ yards

c. 10 km = _____ miles

d. 60 kg = _____ pounds

e. 50 ml = _____ teaspoons

f. 500 ml = _____ cups

✐ Guided Practice

1. Use the conversion chart and either multiply or divide to find the missing number.

1.	7.5	lbs	=	_____	kg
2.	_____	in	=	7	cm
3.	_____	yds	=	9.5	m
4.	19	miles	=	_____	km
5.	_____	teaspoons	=	20.5	ml
6.	4.5	ft	=	_____	m
7.	3	gallons	=	_____	l
8.	_____	ounces	=	22	g
9.	6	qts	=	_____	l
10.	_____	mph	=	12	kph

2. **Solve:** You are instructed to give 10 ml of medicine to your child but your measuring spoon is in teaspoons. How many teaspoons should you give to her?

⚒ Application

1. **Solve:** A truck driver was transporting goods to Guinea. He noticed a speed limit sign that said 50 kph, which he thought was the same as 50 mph. The police pulled him over and gave him a ticket for speeding. Help the driver find out how many miles per hour 50 kilometers per hour is equal to.

2. **Solve:** A map has a scale of 1 inch = 50 miles. Bensonville, Montserrado and Harper, Maryland are 5 inches apart.

   a. How many miles apart are the towns?

   b. How many kilometers apart are the towns?

⇗ Assessment and Reflection

1. With your group, work out the problems given by the facilitator.

🛖 Homework

1. **Solve:** The instructions on a fertilizer mixture say to combine 1 teaspoon per gallon of water. Your bucket holds approximately 15 liters. How many teaspoons of fertilizer should you mix in this amount of water?

✍ Lesson 67: Measurement – Revision Lesson/Mid-Module Assessment

✓ **Objectives –** Under a good test environment, learners will be able to:

a. Work independently to solve problems reinforcing what they have learned in previous lessons

b. Assess how well they have understood the topics of previous lessons

c. Set goals on how to solidify their understanding of topics they find difficult

🔔 Opener

General Instructions: In this assessment, there are growth charts that are used to measure the progress of children's weight and height. You will learn how to read the chart and also do some conversions between the metric and English systems of measurement. At the very end you will assess how well you have understood the lessons up until now.

Part I (to be read and explained by facilitator): The first table below shows a growth chart for boys between the ages of 2 and 20 years of age. This is an example of a growth chart that compares height and age. There are other growth charts that include the ages of 0 – 36 months (3 years). When babies and children go to the clinic for checkups, the nurse or doctor will note their height and weight and record these on a chart like the one below. Depending on which curve they are near, they are considered to be in a certain percentile. All that means is that a certain percentage of children are below them or above them in terms of their height or weight. For example, if a boy is in the 10th percentile for height, that means that 10% of the children for his age are shorter than him and 90% are taller than him. The actual percentile is not important, but rather it is the trend over time. The child should be progressing on or near the curve he is closest to.

We will do more with plotting points on the graph in the last module. For now we will focus on the measurements used for height. On the left side of the chart you will see measurements in inches and in in centimeters. The conversions are already done for you! All you have to do is read the chart. For example, if you look at 145 cm, you see that is about 57 inches.

See pages 30 and 31 for the charts.

1. Read the chart to **estimate** the following: (see pages 30 and 31)

    a. 120 cm = _____ in

    b. 91 cm = _____ in

    c. 48 in = _____ cm

    d. 72 in = _____ cm

    e. 193 cm = _____ in

2. **Calculate** the following conversions using either multiplication or division (Reminder: 1 inch = 2.54 centimeters). Compare your answer to what you find in the chart.

a. 35 in = _____ cm	**c.** 155 cm = _____ in
b. 50 in = _____ cm	**d.** 120 cm = _____ in

3. **Solve:**

    a. Express 65 inches as feet and inches.

    b. Express 125 centimeters as meters and centimeters.

4. Growth Chart 2 plots weight and age. Like the previous chart, the weight is provided in metric (kilograms) and the English system (pounds). Read the chart to **convert**:

   a. 20 kg = _____ lbs

   b. 27 kg = _____ lbs

   c. 106 lbs = _____ kg

   d. 130 lbs = _____ kg

   e. 70 kg = _____ lbs

5. **Calculate** the following conversions using either multiplication or division (Reminder: 1 kg = 2.2 pounds). Compare your answer to what you find in the chart.

a. 50 kg = _____ lbs	**c.** 15 kg = _____ lbs
b. 40 lbs = _____ kg	**d.** 50 lbs = _____ kg

Part II: Your daughter has become sick. The doctor says to give her 15 ml of medicine three times a day. He also instructs you to make sure she drinks ½ of a gallon of water per day. Reminder: 1 teaspoon = 4.9 milliliters and 1 gallon = 3.8 liters

6. **Calculate** the total number of ml of medicine per day your daughter will take.

7. You realize you only have teaspoons at home, not something that will measure milliliters. Convert 15 ml to teaspoons.

8. The water bottles you have are measured in liters. Convert ½ gallon to liters to figure out how much your daughter should drink in a day.

Growth Chart 1: Height (Stature)

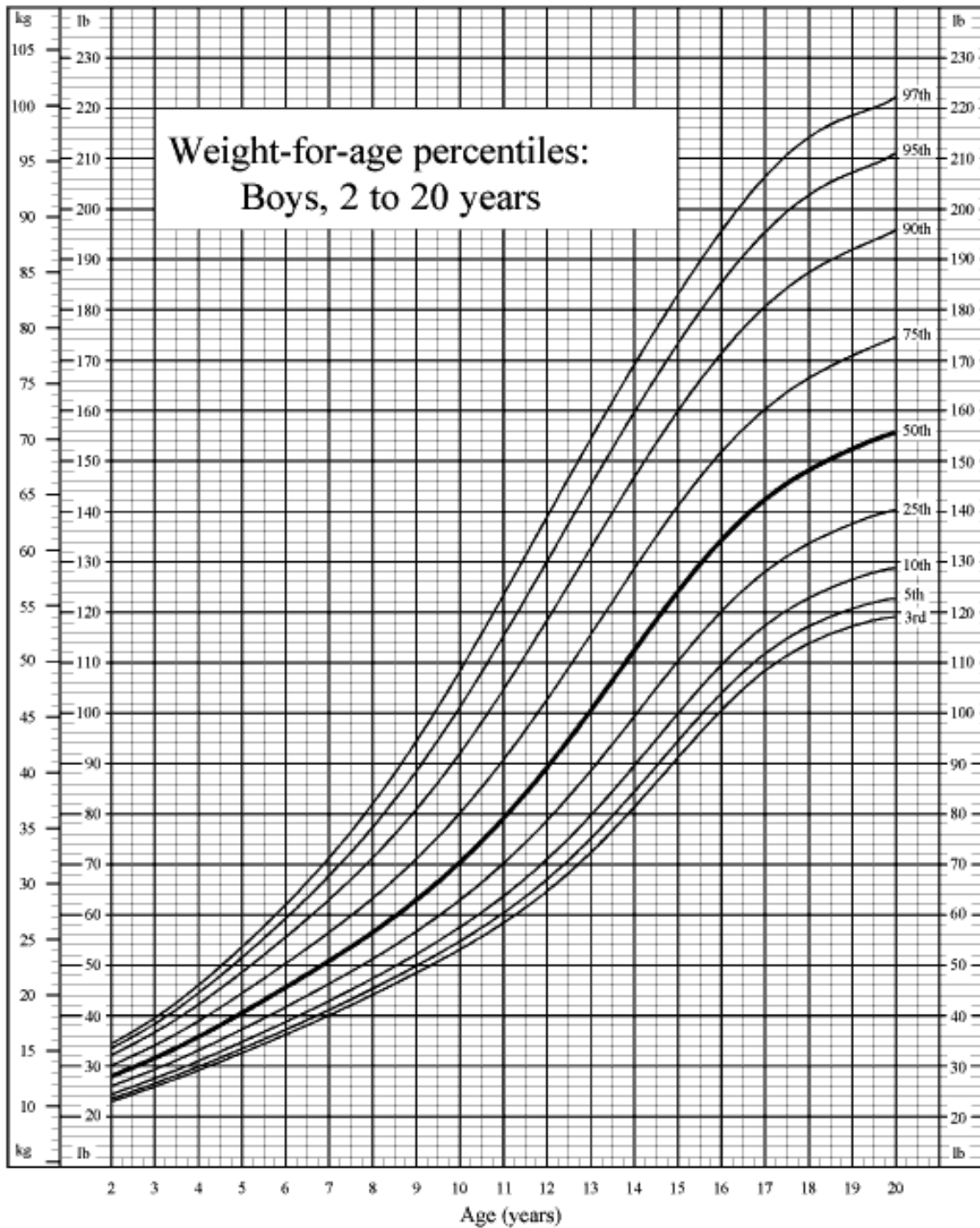Stature-for-age percentiles:
Boys, 2 to 20 years
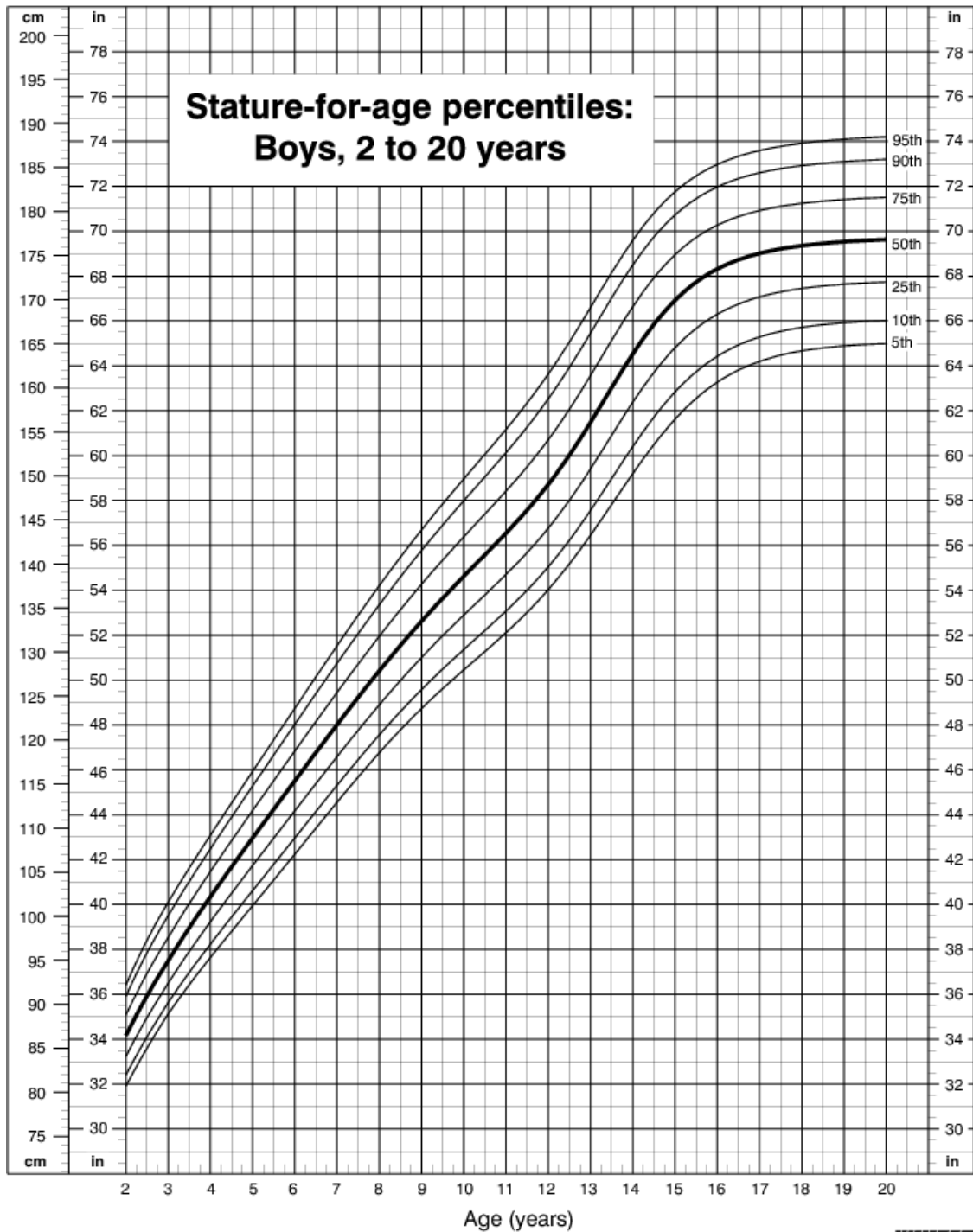
Published May 30, 2000.
SOURCE: Developed by the National Center for Health Statistics in collaboration with
the National Center for Chronic Disease Prevention and Health Promotion (2000).

CDC
SAFER · HEALTHIER · PEOPLE™

Growth Chart 2: Weight

Weight-for-age percentiles:
Boys, 2 to 20 years

SOURCE: Developed by the National Center for Health Statistics in collaboration with
the National Center for Chronic Disease Prevention and Health Promotion (2000).

CDC

✍ Lesson 68 - 69: Measurement – Time

> ✓ **Objectives -** By the end of the lesson, learners will be able to:
>
> a. Tell time (to the hour, half hour, 15 minutes, 5 minutes and minute)
>
> b. Do calculations that involve time

☖ Opener

1. **Review of previous lesson:** Share results of homework from 2 lessons ago on the fertilizer/water mixture.

2. **Today's lesson:** Today's lesson will continue with measurement but focus on time – telling time on a clock, converting time from hours to days, hours to minutes, etc.). Give examples of when you need to tell time.

❓ Problem Solving Activity
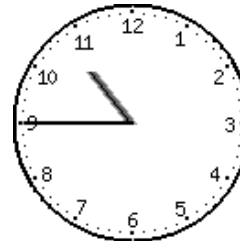
1. **Write the time below each clock:**

a.

b.

c.

d.

____:____   ____:____   ____:____   ____:____

e.

f.
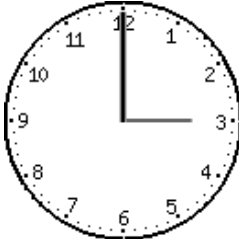
g.

h.

____:____   ____:____   ____:____   ____:____
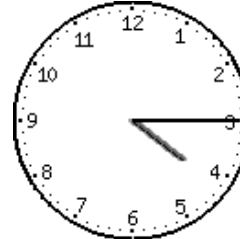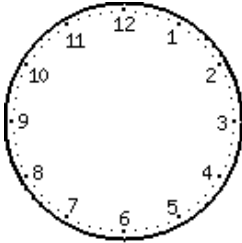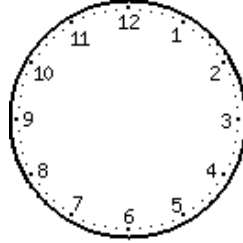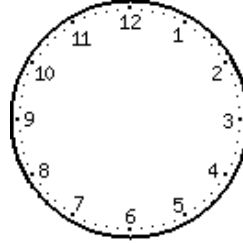
Draw the time on the clock:

a.

9:00

b.
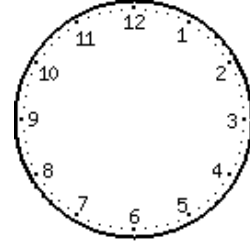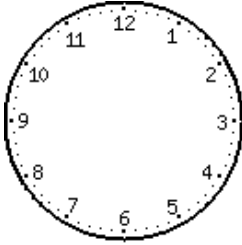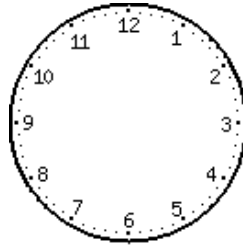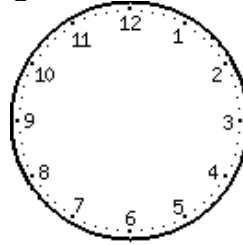

8:30

c.

11:45

d.

10:15

e.

5:48

f.

2:31

g.

9:57

h.

1:28
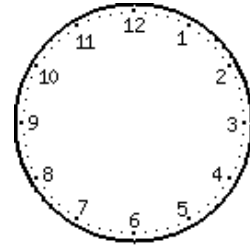
2. **Calculate:**
   a. The number of seconds in a minute

   b. The number of minutes in an hour

   c. The number of minutes in a half hour

   d. The number of hours in a day

   e. If the work day starts at 8:00 am, and it takes you twenty minutes to get to work, what time should you leave your house?

3. Using a watch or clock, time group members to see who can do the following challenges the longest:

   a. Stand on tiptoes. Lift one foot off the ground. See who can stand the longest on one foot while on tiptoes.

   b. Hold your breath.

   c. Find a partner. Hold hands facing each other. Each person should lift one leg straight behind them so it is perpendicular to the floor.

   d. Think of a challenge to give the other groups.

Math Facts!

- The hour hand is shorter and points to the hour between 12 and 11, and the minute hour is longer, pointing to the minute between 0 and 59.

- The second hand moves constantly, although not every clock has a second hand. There are 60 seconds in a minute. The minute hand moves every minute.

- It takes one hour, or 60 minutes, for the hour hand to move from one number to the next.

- Moving to the right from 12, there are 5 minute intervals between the numbers. So, for example, if the minute hand is on the 3, it is 15 minutes. If the minute hand is on the 6, it is 30 minutes, or half way around.

- This is 8:30, which can be said as "eight thirty" or "half past eight".
  When the hour hand is between numbers, as in this example, the time is between the 2 hours. This can be said as either 5: 48 (forty eight minutes past 5 o'clock) or as 12 minutes before 6:00.

- Morning hours (am) are from midnight – 12:00 am until 11:59 am, just before noon. Night hours (pm) are from noon – 12:00 pm until 11:59 pm, just before midnight.

✍ Guided Practice

1. Write the time below each clock:

   a.   b.   c.   d.

   ____:____   ____:____   ____:____   ____:____

2. Draw the time on the clock:
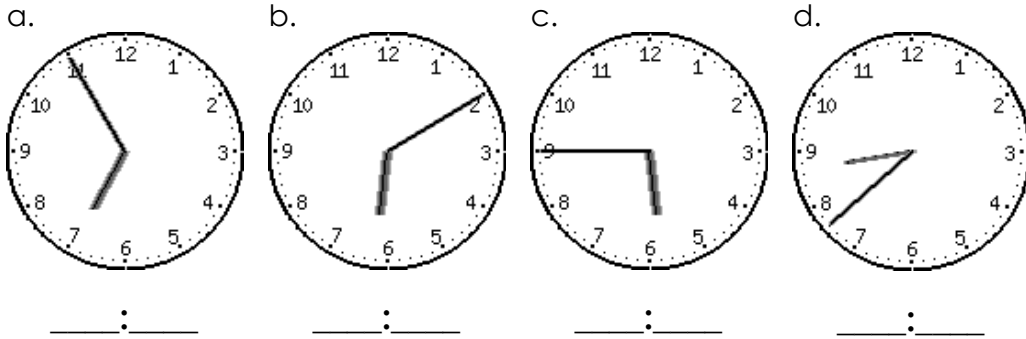
   a.   b.   c.   d.

   10:53   **6:10**   **5:00**   **12:30**
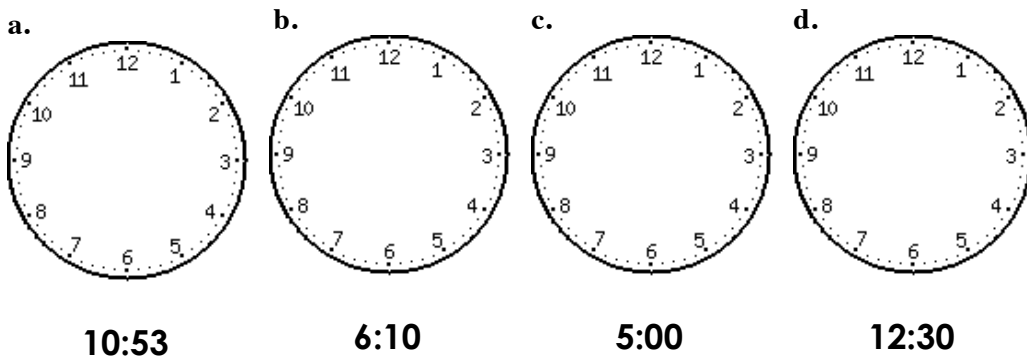
3. Calculate:
   a. The number of minutes in 2 hours

   b. The number of minutes in 3 ½ hours

   c. The number of minutes in half of a day

⚒ Application

1. **Solve** the following problems:

   a. If you leave town at 5:35 pm and arrive home at 6:20, how long did it take you to reach home?

   b. A wood glue takes 45 minutes to dry. If you apply it at 10:15 am, at what time will it be dry?

   c. You need to clean the hotel guest rooms before they arrive at 4:00 pm. It is currently 2:13 pm. How much time do you have to complete the task? If the task normally takes you 1 hour and 30 minutes, will you have enough time?

⇖ Assessment and Reflection

1. With your group, answer the questions given by the facilitator.

🏠 Homework

1. See how many times per day you need to tell the time or do a calculation related to time.

2. Teach a family member or friend how to tell time.

✍ Lesson 70 - 71: Measurement – Calendars

✓ **Objectives -** By the end of the lesson, learners will be able to:

    a. Read and use a monthly, weekly and daily calendar

    b. Convert days into weeks and months

🔔 Opener

1. **Review of previous lesson:** Share results of your homework.

2. **Today's lesson:** Today's lesson will continue with measurement but focus on calendars – reading and using monthly, weekly and daily calendars. Give examples of when one needs to use calendars.

❓ Problem Solving Activity

1. Look at the different types of calendars as they get passed to your group. Answer:

    a. What is it?

    b. What purpose does it serve/When would you use it?

    c. Show an example of how it can be used.

Monthly Calendar

December 2011

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Weekly Calendar

Week of: _____

Monday		Tuesday		Wednesday		Thursday		Friday	
5 am		5 am		5 am		5 am		5 am	
6 am		6 am		6 am		6 am		6 am	
7 am		7 am		7 am		7 am		7 am	
8 am		8 am		8 am		8 am		8 am	
9 am		9 am		9 am		9 am		9 am	
10 am		10 am		10 am		10 am		10 am	
11 am		11 am		11 am		11 am		11 am	
12noon		12 noon		12 noon		12 noon		12 noon	
1pm		1 pm		1 pm		1 pm		1 pm	
2 pm		2 pm		2 pm		2 pm		2 pm	
3 pm		3 pm		3 pm		3 pm		3 pm	
4 pm		4 pm		4 pm		4 pm		4 pm	
5 pm		5 pm		5 pm		5 pm		5 pm	
6 pm		6 pm		6 pm		6 pm		6 pm	
7 pm		7 pm		7 pm		7 pm		7 pm	

Daily Planning

Date: _____

Appointment Schedule

Prioritized Task List	
Priority	Task

Appointment Schedule
8am
9 am
10 am
11 am
12noon
1pm
2 pm
3 pm
4 pm
5 pm
6 pm

Time Sheet

Name: _____

DAY	DATE	START – STOP	HRS	DESCRIPTION OF WORK PERFORMED
TOTAL HOURS WORKED:				

Math Facts!

- **Monthly calendar:** helps organize activities, meetings, events, etc. for the month
- **Weekly calendar:** helps organize the activities for each day of a week
- **Daily Planner:** helps organize activities for the day by the hour; can help prioritize activities that need to happen during the day from most important to least important
- **Time Sheet:** some jobs require you fill out a time sheet every week or every other week to record the number of hours you have worked.

✍ Guided Practice

1. In pairs, use a calendar/planner to help Grace organize her week. Grace recently started her own beauty salon and has become quite busy. She makes appointments via her mobile phone and walk-ins. Susan wants her hair done at 3:00 on Wed, Laura calls to make an appointment for Friday at 10:45, her mother's friend Marie stops by to make an appointment for Tuesday at 4:30. Nadine calls to schedule an appointment on Wednesday at 9:00. Use the chart (Weekly Calendar on page 39)

2. Help Patrick Harris, who works part time for a construction company, fill out his timesheet this week: Monday and Tuesday he worked from 8 am – 4pm, laying cement flooring. Wednesday it was raining in the morning so he worked from 12 pm – 4 pm on preparing window frames. Thursday he worked from 8:00 am – 2:30 pm on the window frames and Friday he did not work.

Time Sheet

Name: _____

DAY	DATE	START – STOP	HRS	DESCRIPTION OF WORK PERFORMED
TOTAL HOURS WORKED:				

3. **Calculate:**

   a. The number of days in a week.

   b. The number of days in one year.

   c. The number of weeks in a month.

   d. The number of weeks in 3 months.

   e. The number of hours in one week.

✄ Application

1. Choose one of the calendars/planners and fill it out (for the day, week, or month) for yourself. Provide help as needed.

↬ Assessment and Reflection

1. Share your calendar/planner with others and see what they have done too.

🛖 Homework

1. Observe how other people use calendars and planners in your home, at the market, etc.

2. Continue working on your own calendar/planner.

✎ Lesson 72: Module D Assessment

Instructions: The assessment is based on what you have learned in this module and will take one hour. In this assessment, there are 6 questions with different parts. Read the instructions for each question and solve to provide the correct answer. Good luck!

1. You are going to make a fence for a small vegetable garden that is 50 feet by 60 feet. *(10 pts)*

```
              60 ft



  50 ft                    50 ft



              60 ft
```
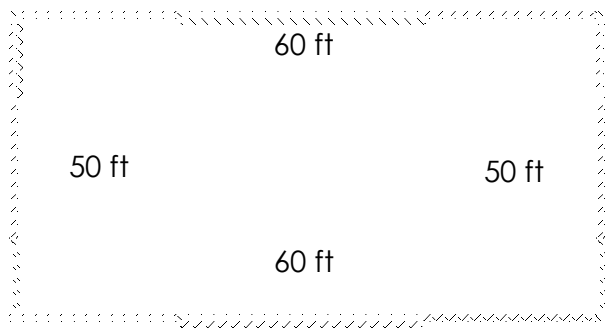
   a. Calculate the amount of fence you will need in feet. *(4 pts)*

   b. Express the answer to (a) in yards and feet. *(3 pts)*

   c. Express the answer to (a) and (b) in inches. *(3 pts)*

2. Solve: *(16 points = 4 pts/question)*
   a. Add and express in meters and centimeters: 20 cm + 50 cm + 60 cm

   b. Divide and express in inches: 6 ft 5 in ÷7

	yd	ft	in			yd	ft	in
c.	30	2	3	d.		150	8	4
+	10	6	9		−	37	2	6

3. Solve the following. Reminder: *(15 pts = 3 pts per question)*

1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts = 128 fluid ounces
1 liter = 1,000 milliliters
1 gallon = approximately 4 liters

a. How many cups are there in 4 pints?

b. 4 pints = _____ quarts

c. How many gallons are there in 16 quarts? *(*

d. 16 quarts = _____ fluid ounces.

e. A jerry can of water holds 20 liters of water. About how many gallons is that?

4. Solve the following. Reminder: *(15 pts = 3 pts per question)*

    1 inch = 2.54 cm

    1 miles = 1.6 km

    1 kg = 2.2 pounds

    1 teaspoon = 4.9 milliliters

    a. 20 inches = _____ centimeters

    b. 8 miles = _____ kilometers

    c. 10 km = _____ miles

    d. 100 pounds = _____ kilograms

    e. 4 teaspoons = _____ milliliters

5. Answer the following questions about time: *(15 pts = 3 pts per question)*

    a. What time is it?

                       _____:_____

    b. What time is it?

                       _____:_____

    c. Draw the time on the clock: 9: 40
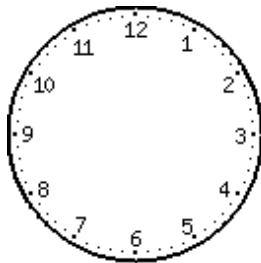
Draw the time on the clock: 4:15
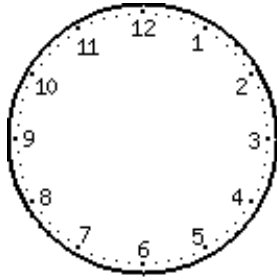
d. If you leave one town at 11:10 am and arrive in another town at 2:45 pm, how long did the journey take?

6. Binta Kollie works for a caterer. She helps with preparing food and serving the food at events. Help Binta record her hours so she can get paid. Fill in the day, date, start-stop time, hours and description of work performed. *(14 pts – each entry worth 2 points & total hrs calculated worth 4 pts)*

On Friday Nov 15th, Binta was in the kitchen preparing banana cakes from 7 am – 11:15 am. In the afternoon of the 15th she went to the banquet hall to decorate it for the wedding. She was decorating from 2 pm – 5:30 pm.
On Nov 16th, she spent the whole day at the banquet hall, preparing food and serving it to the guests. She was there from 9 am – 4:45 pm.
On Nov 17th she needed to return to the hall to clean up. She did this from 12 pm – 3 pm.
Binta took the day off on the 18th and on the 19th baked cakes between 7 am – noon.

Time Sheet (with answers for trainer)

Name:_____

DAY	DATE	START - STOP	HRS	DESCRIPTION OF WORK PERFORMED
TOTAL HOURS WORKED:				

MODULE E
✍ Lesson 73: Geometry – Lines

✓ **Objectives -** By the end of the lesson, learners will be able to:

   c. Identify different types or parts of lines – segment, ray, indefinite line

   d. Draw horizontal, vertical, oblique, perpendicular and parallel lines

   e. Identify objects in their everyday life that have oblique, parallel and perpendicular lines

🔔 Opener

1. **Introduction to new module:** We will now switch topics from working with measurement (length, weight, volume in English and metric system, time and calendars) to geometry.

2. **Today's lesson:** Today's lesson will focus on something very basic to geometry – lines. For some of you, it might be a review of what you have previously learned or already know. What types of lines have you heard about? Why do you think lines might be important in math and in our lives in general?

❓ Problem Solving Activity

1. Working with a partner, do the following:

   a. Draw a point and label it A.

   b. Draw another point and label it B.

   c. Draw a straight line between A and B.

   d. Is the line that you drew horizontal or vertical?

   e. Draw line AB horizontally. Draw another line parallel to it.

   f. Draw a line perpendicular to line AB.

   g. Are all of the following the same?

     ————   ⟶   ⟷
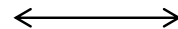
Math Facts!

- **A line** has no beginning point or end point. It can continue forever in both directions.
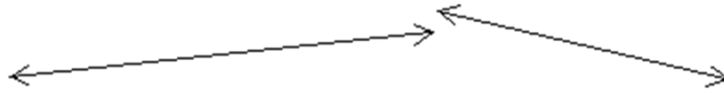
- **A line segment** has a beginning point and an end point.
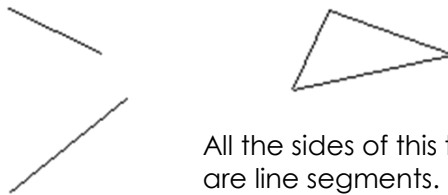
    All the sides of this triangle are line segments.

- **A ray** has a beginning point but no end point. Think of sun's rays: they start at sun and go on forever...
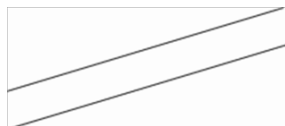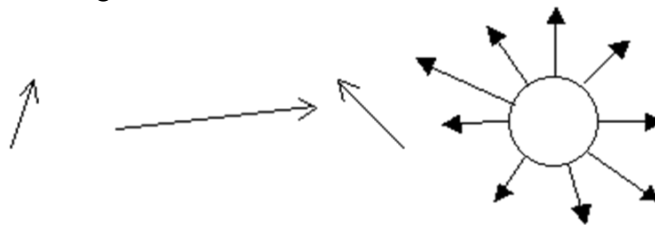
    These lines are **parallel**.
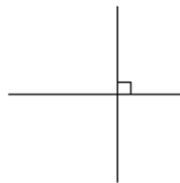
    These lines are **perpendicular**. The lines form right angles.

- An oblique line has a slope that is not equal to zero.

- Oblique lines are those lines that are neither perpendicular nor parallel to each other.
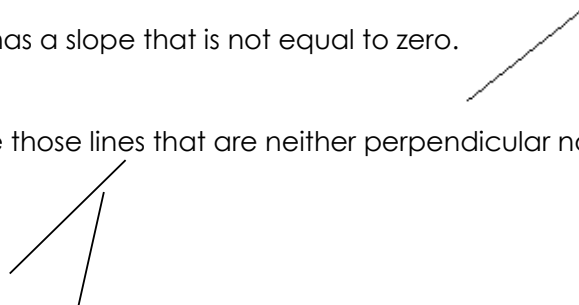
✍ Guided Practice

1. With a partner:

   a. Draw vertical, horizontal, oblique, parallel and perpendicular lines on the board.

   b. List as many things in the room that show oblique, parallel or perpendicular lines.

✗ Application

1. **Solve:**

   a. Identify whether or not the following have perpendicular lines:
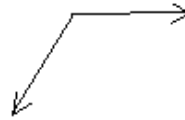
   b. Could a door frame or chair be built without using perpendicular lines? What would happen if they were not?

2. You are working on plans to build a door. You start out by drawing 2 parallel lines for the sides. But are they parallel? Check and see. Use a ruler to extend each line. What happens? (*When extended, the lines will eventually cross because they are not parallel.*)

   A t-square is a good tool to make sure sides are perpendicular or parallel.
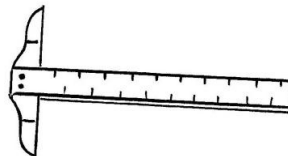
⇗Assessment and Reflection

1. Draw lines as instructed by the facilitator.

🏠 Homework

1. See how many different horizontal, vertical, oblique, parallel and perpendicular lines you can identify in your house or community. List them.

✍ Lesson 74 - 76: Geometry – Angles (∠ 's)

✓ **Objectives -** By the end of the lesson, learners will be able to:

    a. Identify different types of angles

    b. Measure angles using a protractor

    c. Draw angles using a protractor

🔔 Opener

1. **Review of previous lesson:** Share the results of your homework assignment. What type of lines did you see in your house and community?

2. **Today's lesson:** Today's lesson will still focus on angles. What is an angle and how are angles formed?

❓ Problem Solving Activity

1. Working with a partner, use a ruler or a protractor to:
   a. Draw an acute angle, a right angle, and an obtuse angle.

Measure the following angles:
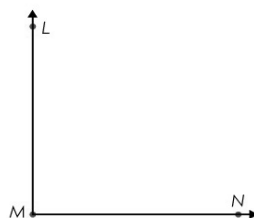
∠LMN = _____

∠RST = _____
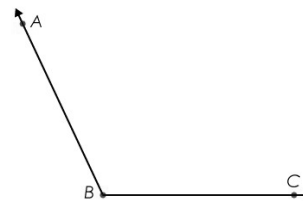
∠ABC = _____

---

b. Draw a 50°, 95°, and 120° angle using a protractor.
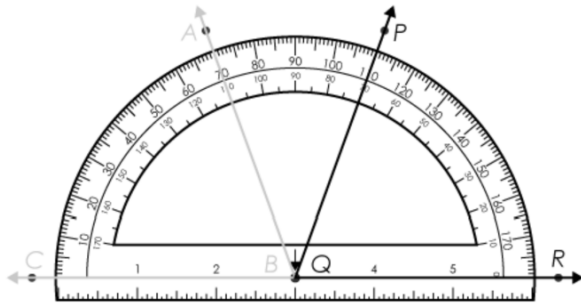
The protractor's arrow and pen hole is placed on the angle's vertex. The 0° line is placed over one side of the angle. If the 0° line is used on the left of the pen hole, use the outside edge for the measure. If the 0° line is used on the right of the pen hole, use the inside edge. Read the measure where the other leg of the angle intersects the protractor.

∠ ABC and ∠ PQR both measure 70°.
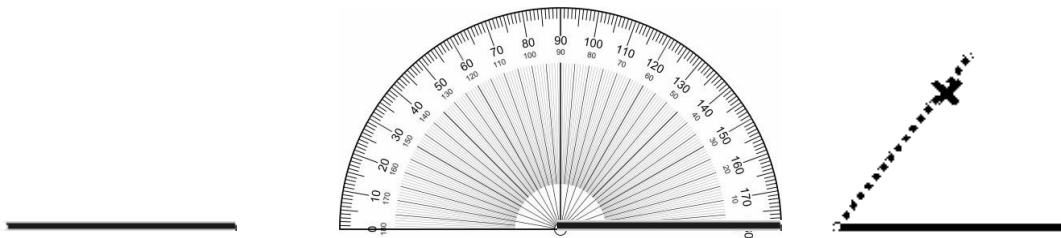
To draw an angle of 50°, first draw a line segment that is to be the one side of the angle.

Then put the protractor so that its zero line matches with your line segment and that the vertex is in place. Then put a little mark at the 50° spot.

Take the protractor off and draw a line through your mark.

Math Facts!

- **An angle** is made up from two rays that have the same beginning point. That point is called the **vertex** and the two rays are called the **sides** of the angle.
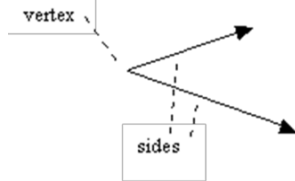
- **Acute angles** are less than a right angle (< 90°).
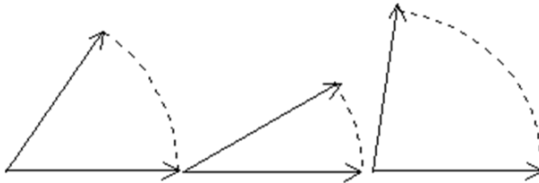
In each picture the angle keeps getting bigger. The arc of the circle is larger. The angle is opened more and more. These angles are **acute angles**, which means they are less than a right angle.

- **Right angle:** perpendicular lines, or 90°

- **Obtuse angle:** larger than 90°
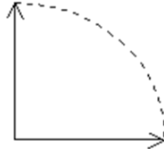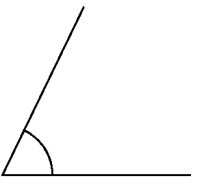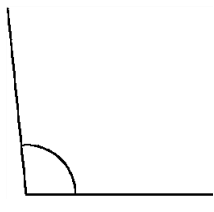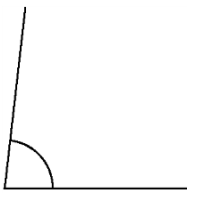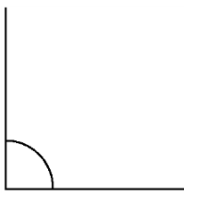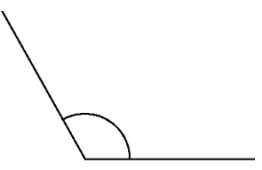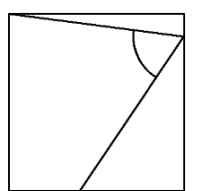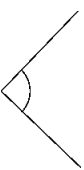
- **Straight angle:** 180°

✍ Guided Practice

1. Work in pairs. Identify the angle as acute, right, obtuse or straight angles.

a. _____	b. _____	c. _____	d. _____
e. _____	f. _____	g. _____	h. _____

2. Find acute, obtuse and right angles in the following diagram
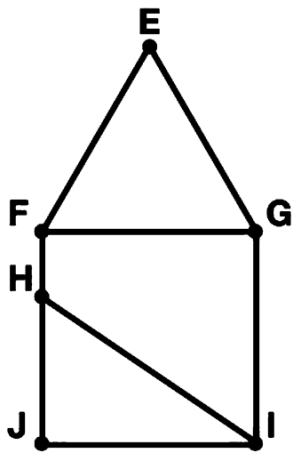
Acute Angles:	Right Angles:	Obtuse Angles:
Ex. ∠EFG (same as ∠GFE)		

⚒ Application

1. Measure the following angles using a protractor:

∠LMN = _____   ∠ABC = _____   ∠UVW = _____
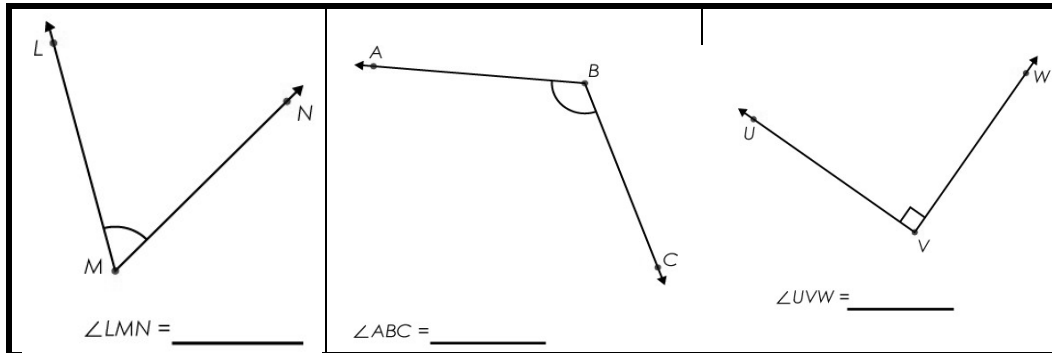
2. Draw angles of 35°, 145° and 180°.

35°	145°	180°
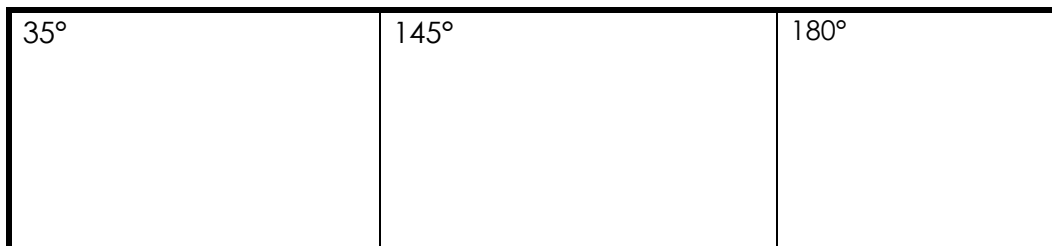
3. You will be given two slips of paper which represent 2 sides of a wooden window frame. Your task is to cut 2 pieces of "wood" at 45 degree angles so they can fit nicely together. Measure 45 degrees and draw a dotted line of where you will cut it. Then cut along the dotted lines and put the 2 pieces together.

    A miter joint is a 45-degree cut on both ends of two pieces which will join to form a 90-degree angle.
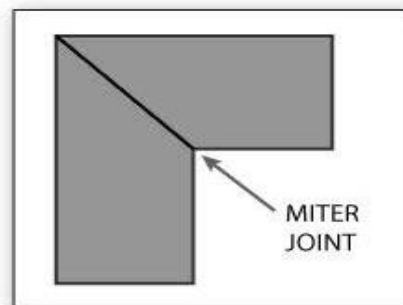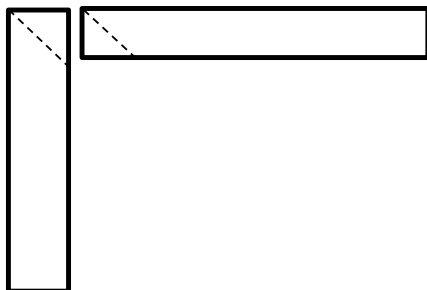
Assessment and Reflection

1. With your group, draw or identify angles as instructed by the facilitator.

Homework

1. Identify different angles you see in your house or community. Measure them with you protractor.

2. Identify types of work or activities in which one might need to know about angles.

3. Practice drawing angles of different sizes.

✍ Lesson 77 - 79: Geometry – Triangles

✓ **Objectives -** By the end of the lesson, learners will be able to:

    a. Identify and draw different types of triangles

    b. Identify the different properties of triangles

    c. Calculate angles in a triangle

🔔 Opener

1. **Review of previous lesson:** Share the results of your homework assignment. What types of jobs require some knowledge about angles?

2. **Today's lesson:** Today's lesson will focus on triangles. What is a triangle?

❓ Problem Solving Activity

1. Working with a partner, ask participants to determine the type of triangles drawn below. Keep in mind the last lesson on angles.
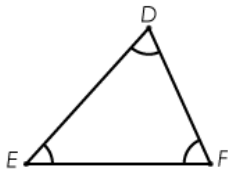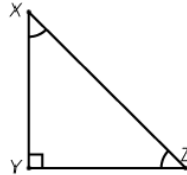
    a.   **b.**   **c.**

_____   _____   _____
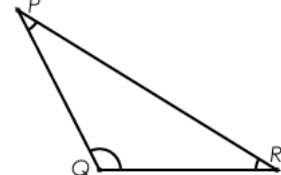
Draw a triangle with 3 equal sides. What is it called?

Draw a triangle with 2 equal sides. What is it called?

Draw a triangle with 3 unequal sides. What is it called?

2. Draw a right angle. Make a right triangle out of it by drawing in the third side. Draw two more right triangles of a different size. Measure all the angles in all three triangles, using a protractor. Are those angles acute, right, or obtuse? What is the sum of the angles within each triangle?

   What have you discovered about angles of a triangle?

3. Do the following:

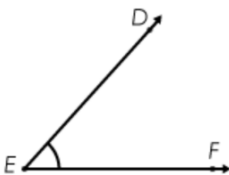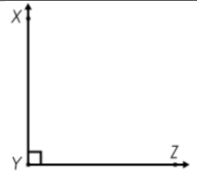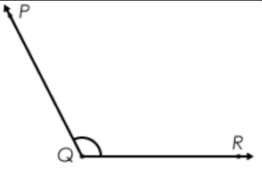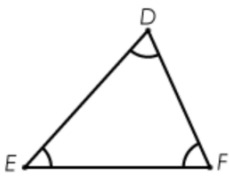   a. Draw and cut out a triangle from scrap paper (use a ruler for straight lines).
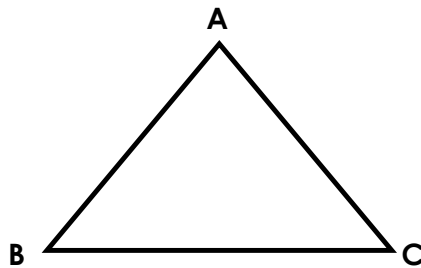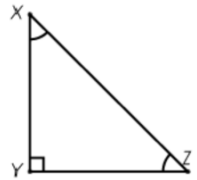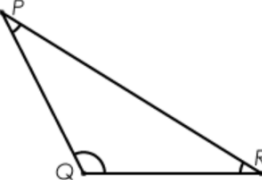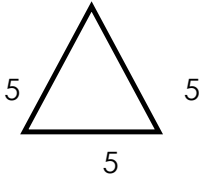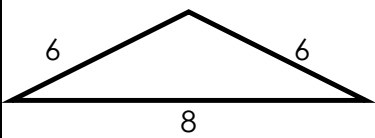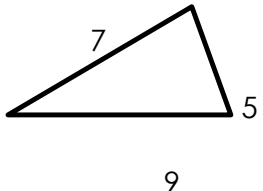

   b. Cut or tear out each angle and arrange them on a line.
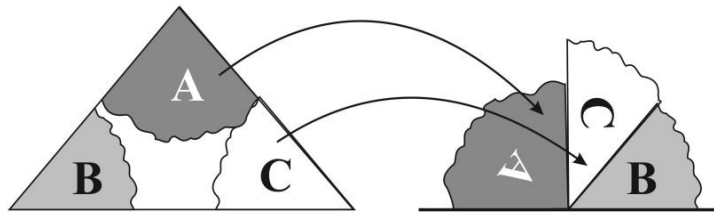
   The angles fit on the straight line, meaning it they add up to 180° since a straight line has 180°!

Math Facts!

- **Angles and Triangles:**

An acute angle is less than 90°	A right angle has exactly 90°	An obtuse angle is greater than 90°
An acute triangle has 3 acute angles	A right triangle has 1 right angle and 2 acute angles	An obtuse triangle has 1 obtuse angle and 2 acute angles

Equilateral Triangle: All sides are the same length & all angles are equal	**Isosceles Triangle:** at least 2 sides are the same length & 2 angles are equal	**Scalene Triangle:** no sides are the same length and all angles are different

Math Facts!

- All 3 angles in a triangle always add up to 180°!
- An equilateral triangle has equal sides and equal angles, meaning each angle = 60°.
- In a right triangle, one angle = 90° and the other 2 angles are acute angles that add up to 90°.

✍ Guided Practice

1. Name each triangle by the length of its sides:
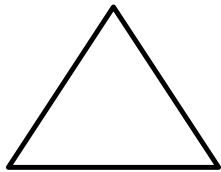
   a. 3 ft, 4 ft, 5 ft_____

   b. 12 in 12 in, 15 in_____

   c. 20 cm, 20 cm 20 cm_____

2. Name the triangles pictured. Measure them with a ruler to be sure:
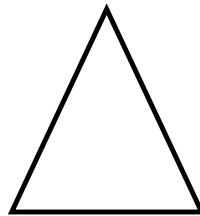
   a. _____   b. _____   c. _____

3. Solve:

   a. Can a right triangle ever be an isosceles triangle? If so, under what conditions?

   b. What are the measurements of the angles in an equilateral triangle? Why?

   c. Can a right triangle ever have an obtuse angle in it? Why or why not?

4. Ask participants to find the missing angles and identify what type of angle it is:

a.
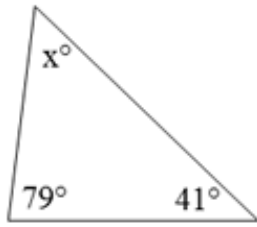
b.
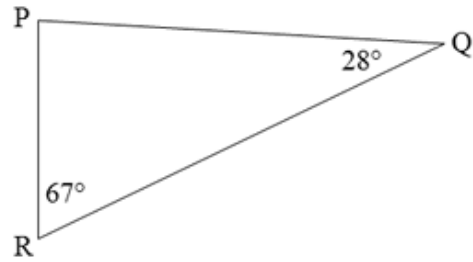
c. Hint: Remember the number of degrees in a straight line!
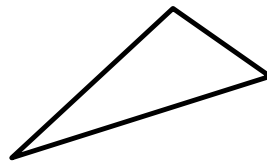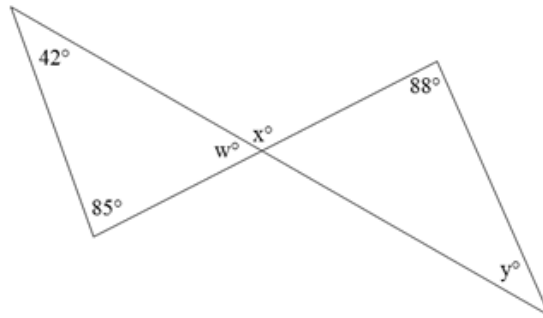

⚒ Application

1. Use a protractor to do the following:

   a. Draw a triangle with one angle of 55° and another angle of 35°. Measure the third angle. How many degrees is it? What kind of triangle is it – acute, right or obtuse?

   b. Draw an isosceles triangle whose base angles are 40. What is the top angle? The sides can be any length.

2. **Solve:**

   a. Is it possible to have an equilateral right triangle? Why? If so, draw one. If not, why not?

   b. Is it possible to have an equilateral obtuse triangle? Why? If so, draw one. If not, why not?

   c. Is it possible to have an isosceles acute triangle? Why? If so, draw one. If not, why not?

Assessment and Reflection

1. Identify the type of triangles drawn or described on the board by the facilitator.

Homework

1. Practice drawing triangles with different angles – acute, right, obtuse, isosceles, equilateral and scalene.

✏ Lesson 80 - 82: Geometry - Polygons

✓ **Objectives -** By the end of the lesson, learners will be able to:

   a. Identify and define polygons

   b. Identify different quadrilaterals and their properties

   c. Use their understanding of polygons to draw objects

🔔 Opener

1. **Review of previous lesson:** Share the results of your homework assignment. Draw or calculate angles of a triangle as instructed.

2. **Today's lesson:** Today's lesson will focus on other shapes besides triangles. What is a polygon?

❓ Problem Solving Activity

1. Identify all the shapes you see in the following pictures. Which shapes are polygons and why?
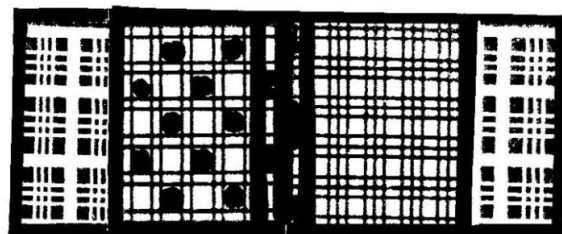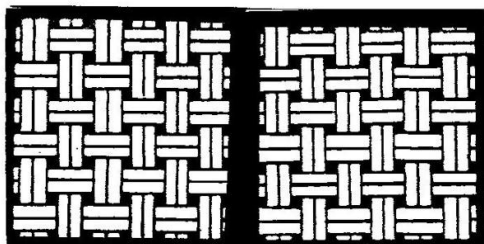
Math Facts!

- **Polygon**: a closed shape with straight sides
- **Regular polygon:** closed shape with all equal sides and angles
- **Irregular polygon:** closed shape with sides and angles of different sizes
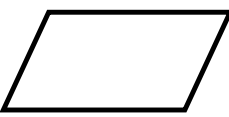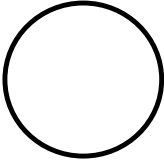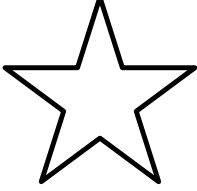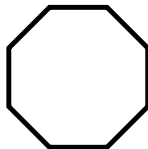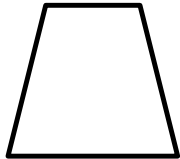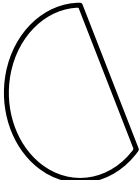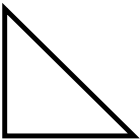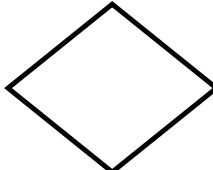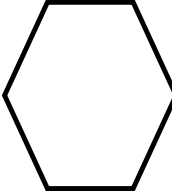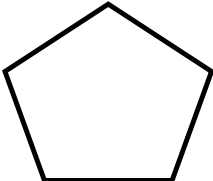
2. Like the honey comb, shapes and patterns appear throughout nature. Give examples of things in nature that have a geometric design. Some include shapes that are polygons and some have other types of shapes like circles. Look at some examples below.

Shapes and Patterns in Nature:
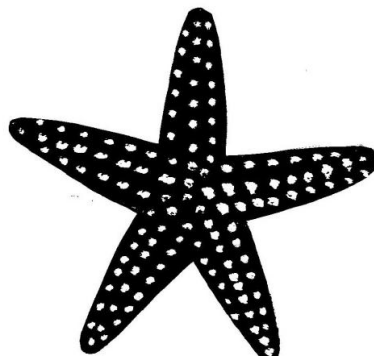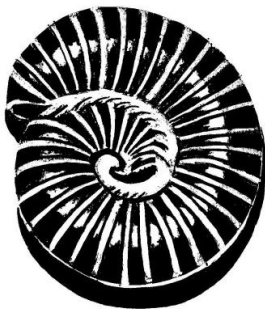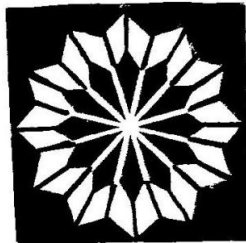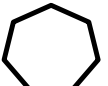
✍ Guided Practice

1. Name the following shapes and determine if they are polygons or not.

a.	b.	c.	d.

e.	f.	g.	h.

i.	j.	k.	l.

Math Facts!

Shape	Name	Number of Sides	Sum of Angles	Other Properties
	Triangle	3	180°	
	Quadrilateral:	4	360°	any 4 sided closed shape
	Parallelogram	4	360°	quadrilateral with opposite sides parallel; opposite angles are equal; opposite sides equal in length
	Rectangle	4	360°	A parallelogram with 4 equal angles of 90°; opposite sides equal in length
	Rhombus	4	360°	A parallelogram with 4 equal sides; opposite angles are equal
	Square	4	360°	A rhombus with 4 equal angles of 90°, 4 equal sides, opposite sides parallel
	Trapezium / Trapezoid)	4	360°	A quadrilateral with one pair of opposite sides parallel
	Kite	4	360°	A quadrilateral with 2 pairs of adjacent sides equal
	Pentagon	5	540°	
	Hexagon	6	720°	
	Heptagon	7	900°	
	Octagon	8	1 080°	
	Nonagon	9	1 260°	
	Decagon	10	1 440°	

Solve:

    a. Name three types of parallelograms

    b. Is a trapezium a parallelogram?

    c. If a parallelogram has all sides equal and all angles equal 90°, it is a
      _____.

    d. A square is also a _____, _____, and a _____.

2. Use the information above to calculate the missing angles. Sketch the
information you are given. The first one we will do together:

    a. A parallelogram with two of its angles equal to 60° and 120°.
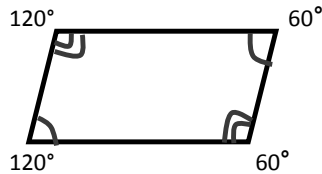
    b. If one angle of a rhombus is 45°, what are the three other angles?

⚒ Application

1. Use a protractor to:

   a. Draw 2 different types of quadrilaterals. For each one, measure the angles. What is the sum of all the angles?

2. You are going to create your own design using what you know about polygons. This could be a design for cloth, a painting, a wood carving, etc.

   Start out by thinking about what shapes you would like to include and how you can put them together to make a design. Anything goes! Be creative.

↳ Assessment and Reflection

1. Describe your drawings. Explain the polygons used and the properties of those polygons.

🏠 Homework

1. Identify polygons all around you – in furniture, in a stone wall, etc. List where you find them.

2. Draw more designs using the various polygons!

✍ Lesson 83: Geometry – Revision Lesson/Mid-Module Assessment

✓ **Objectives –** Under a good test environment, learners will be able to:

a. Work independently to solve problems reinforcing what they have learned in previous lessons

b. Assess how well they have understood the topics of previous lessons

c. Set goals on how to solidify their understanding of topics they find difficult

🔔 Opener

General Instructions: In this assessment, we are going to have a lot of fun. You are going to draw a football, using what you know about lines, angles and polygons. Follow the step-by-step instructions below.

1. Identify all the polygons you see in the following footballs:
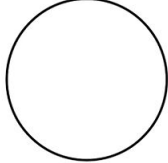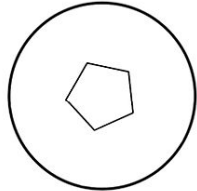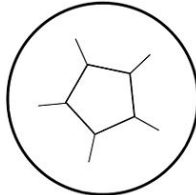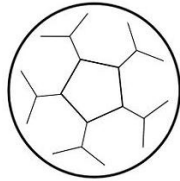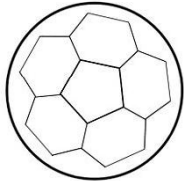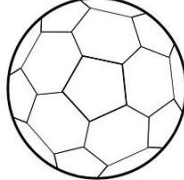
2. Now you are going to draw a football! Follow the steps listed below. Use a ruler, protractor, and a compass (if you don't have a compass to draw a circle, trace something that is round to make a circle).

How to Draw a Football!
(http://www.wikihow.com/Draw-a-Soccer-Ball)

How to Draw a Football!

Step 1: Draw a large circle. This is the ball.	
Step 2: Draw a pentagon in the middle of the circle, about 1/8th the size of the circle.	
Step 3: Draw lines from each point on the pentagon out towards the edge of the circle.	
4. Add "V" shapes outwards from the lines. Make them a little less than 135 degrees each	
5. Connect the endpoints of the "V's" to make hexagons.	
6. Finish the outer pentagons by drawing 135 degree angle lines to the circle's edge from the tip two points on each hexagon.	
7. Color the shapes in, using black or any other color!	

✍ Lesson 84 - 85: Geometry - Perimeter of Triangles and Quadrilaterals

✓ **Objectives -** By the end of the lesson, learners will be able to:

a. Calculate the perimeter of triangles and different types quadrilaterals

b. Determine the side of a triangle and quadrilaterals given the perimeter

🔔 Opener
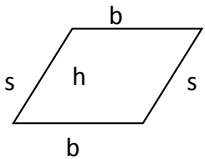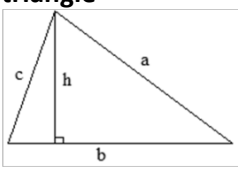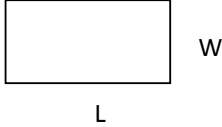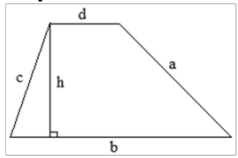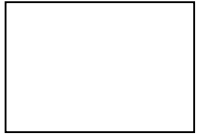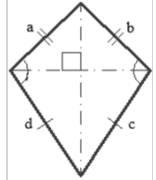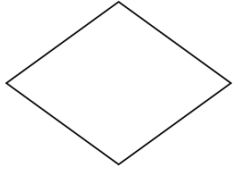
1. **Review of previous lesson:** Review the properties of triangles and different quadrilaterals by answering the facilitator's questions on the sides and angles:

2. **Introduce today's lesson:** Today's lesson will focus on calculating the perimeter of a parallelogram, rectangle, rhombus, square, triangle, trapezium and kite. The perimeter is the length around the shape.

❓ Problem Solving Activity

1. Working with a partner, measure and draw the shapes below and calculate the length around (the perimeter of) each shape.

   a. a **parallelogram** of 4 inches a side and a **rectangle** of 3 cm and 8 cm.

   b. a **rhombus** 3 cm a side and a **square** of 3 inches a side.

   c. an **isosceles triangle** of 4cm, 4cm, 2cm and a **trapezium** of 5 cm, 5cm, 6cm, 2cm.

   d. a **kite** of 2m, 7cm.

Math Facts!

- **To find perimeter of a triangle and quadrilaterals we add the length of the sides**

Figure	perimeter	Figure	perimeter
parallelogram b s / h \ s b	P=(b + s) + (b + s) P=(b + s) x 2	**triangle** c h a b	P= a +b + c
Rectangle W L	P=(L + W) + (L + W) P=(L + W) x 2	**trapezium** d c h a b	P= a +b + c + d
rhombus	P=S + S + S + S P= S x 4	**kite** a b d c	P= a +b + c + d
Square S	P=S + S + S + S P= S x 4		

✍ Guided Practice

1. Calculate the perimeter for each quadrilateral by using the given sides:

	base	side/slanting side	length	width	adjacent sides	perimeter
a) Parallelogram	12 in	10 in				
b) Rhombus		20 in				
c) Kite					5 in; 17 in	

2. Find the missing side given the perimeter and one or two other sides.

	base	side/slanting side	length	width	adjacent sides	perimeter
a) Parallelogram	7cm					22 in
b) Rectangle				10 in		50 in
c) Square						100 in

✗ Application

1. Give examples of when you use perimeters of triangles and quadrilaterals in your daily lives.

2. **Solve:**

   Problem 1. A farmer has a plot of land in the shape of a parallelogram, and he needs to fence it. The base is 120 ft and the slanting side is 70 ft. What is the length of the barbed wire he will need to buy to surround his property?

Problem 2. A vegetable garden is divided into 2 parts. A squared part of cabbages and a triangular part of carrots as shown below:

50 yards

30 yards   40 yards

- What is the perimeter of the cabbage garden and that of carrots garden?

- What kind of shape do those two parts of a vegetable garden make? Calculate the perimeter of that shape.

Assessment and Reflection

1. Calculate the perimeter for each quadrilateral by the given dimensions or find the missing dimension:

	base	Side/slanting side	length	width	perimeter
Rhombus		30 cm			
Parallelogram	a) 7 cm b)	a) b) 10 cm			a) 22 cm b) 44 cm
Rectangle			a) b) 405 cm	a) 10 cm b)	a) 50 cm b) 834 cm
Square		a) 25 cm b) 36 cm			a) 100 cm b)

🏠 Homework

1. Calculate the perimeter for each quadrilaterals by the given dimensions or find the missing dimension:

	base	Side/slanting side	length	width	perimeter
Parallelogram	12 in	8 in			
Rectangle			25 in	12 in	
Square		15 in			
Rhombus					20 in

✍ Lesson 86 - 87: Geometry - Area of Triangles and Quadrilaterals

---
✓ **Objectives -** By the end of the lesson, learners will be able to:

a. Calculate the area of different types of regular triangles and quadrilaterals

b. Determine the dimensions of a triangle and quadrilaterals given its area

---

🔔 Opener

1. **Review of previous lesson:** Share answers to homework problems.

2. **Today's lesson:** Today's lesson will focus on calculating the area of a parallelogram, rectangle, rhombus, square, triangle, trapezium and kite.

❓ Problem Solving Activity

1. Draw a parallelogram, rectangle, rhombus, square, triangle, trapezium and kite.
   Use cm or inches. The diagrams below are in cm.
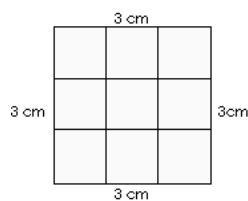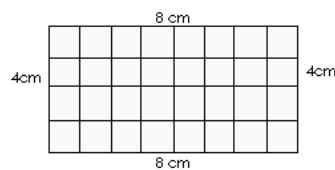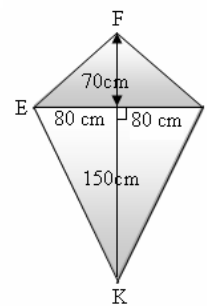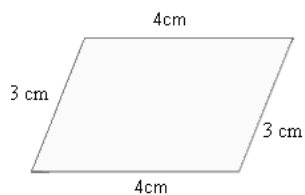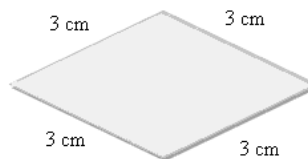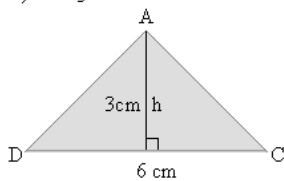
---
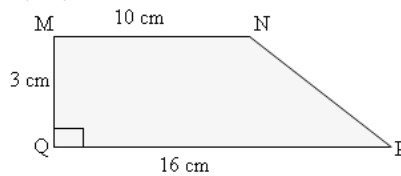
2. Divide the **square** into smaller units, with three 1 cm squares across and three 1 cm squares vertically.

3 cm

3 cm   3cm

3 cm
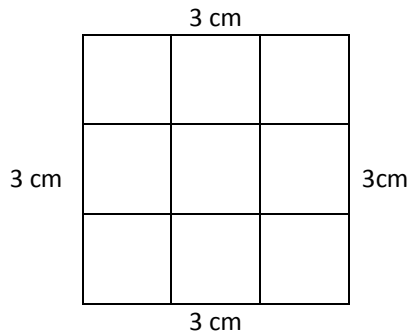
How many unit squares are there inside the large square?

This is the **area** of the square.

What is the formula to calculate the area of square?

3. Use the same process to calculate the area of the **rectangle**.

8 cm

4cm   4cm

8 cm
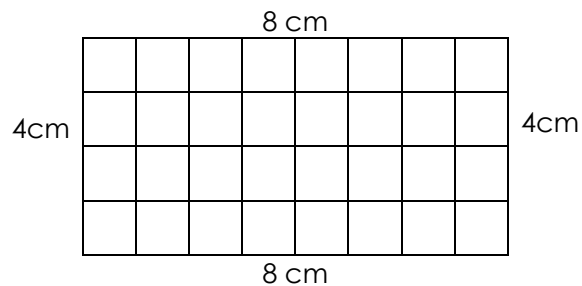
What is the formula for an area of a rectangle?

What is the area of this rectangle?

4. Draw a straight line joining the two horizontal and parallel sides of the **parallelogram** from one vertex, forming a right angle to the opposite side. Measure that height and name it h.
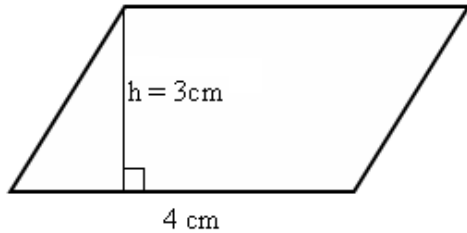
The area of a parallelogram is b x h.

What is the base? What is the height?

Calculate the area of the parallelogram.

5. For the **rhombus**, draw a rectangle over the rhombus drawn previously. Measure the dimensions of the rectangle.
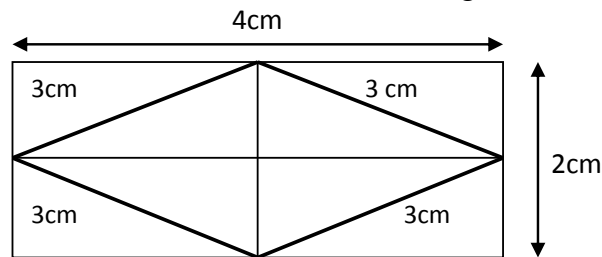
How does the area of the rhombus compare to the area of the rectangle?

Calculate the area of the rhombus using the formula rhombus area = ½ (length X width).

6. For the **triangle**, draw a parallelogram ABCD (*of 6 cm base and 3 cm height*) and then divide it into 2 equal triangles ABC and ACD.

- How many triangles are in the parallelogram?

- Shade the triangle ACD.

- Draw a perpendicular to the base of shaded triangle ACD and name it h = 3 cm.
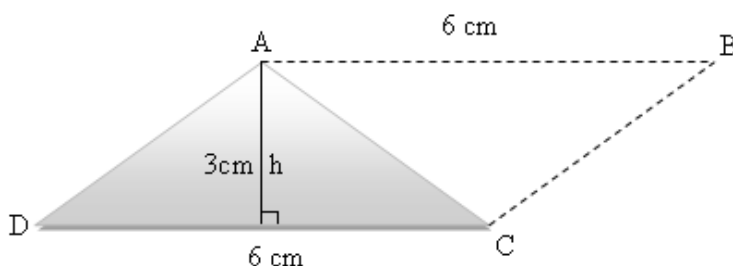
Calculate the area of the parallelogram.

What do you think is the area of the shaded triangle in the parallelogram?

What is the base of the triangle? the height?

Verify your answer by using the formula for the area of a triangle:

Triangle area = ½ (base X height)

7. Draw a **trapezium** MNPQ given the dimensions: long base 16 cm, short base 10 cm and height 3 cm.
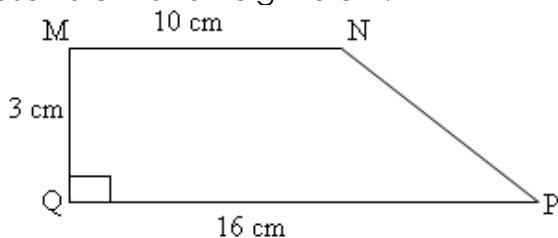
Divide it into two triangles from one vertex Q to the other vertex N.
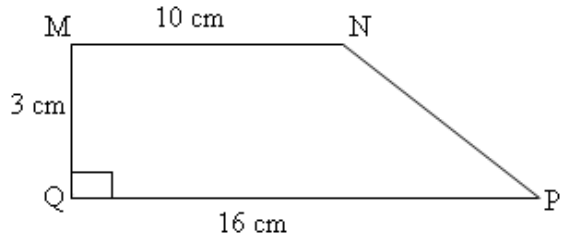
How can you determine the area of the two triangles MNQ and NPQ?
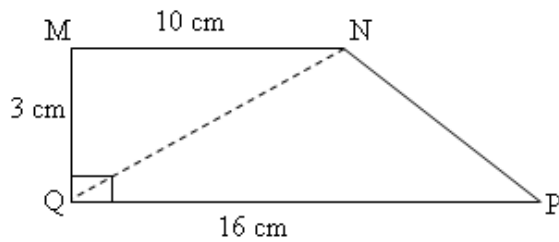
What is the area of the trapezium?

Trapezium area = A = ½ (B + b) x h where B = long base and b = short base.
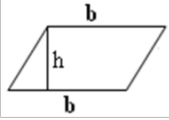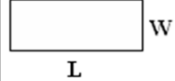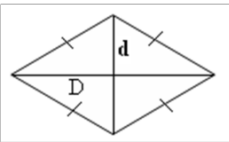
8. Given the **kite** with the dimensions EJ = 160 cm , FK = 220 cm, calculate the area of each triangle in the kite (area of the triangle EFJ and the area of a triangle EJK).
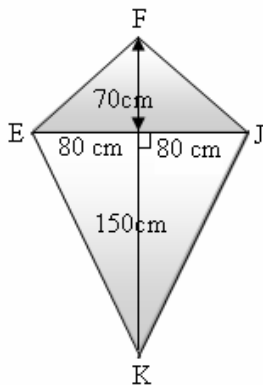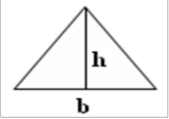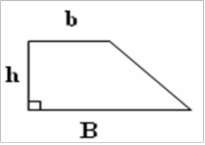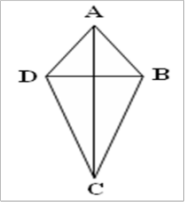
What do you think is the area of the kite?

Math Facts!

- **Area of parallelogram, rectangle, rhombus and a square**

Figure	Area (A)
parallelogram	$A = b \times h$
Rectangle	$A = L \times W$
Rhombus	$A = \frac{1}{2} (D \times d)$
Square	$A = S \times S = S^2$

- **Area of a triangle, a trapezium and a kite**

Figure	Area (A)
Triangle	$A = \frac{1}{2} (b \times h)$
Trapezium	$A = \frac{1}{2} (B + b) \times h$
Kite	A = the sum of the surface areas of 2 triangles (ABD and BCD) or A = height x width / 2

✍ Guided Practice

1. Calculate the area of the following shapes:

   a. A square that has a side of 6 inches.

   s=6 in
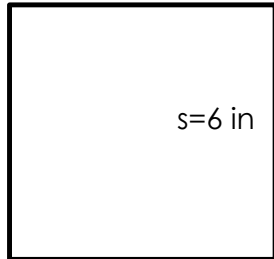
   b. A rectangle that has a length of 10 cm and a height of 5 cm.

   10 cm

   5cm
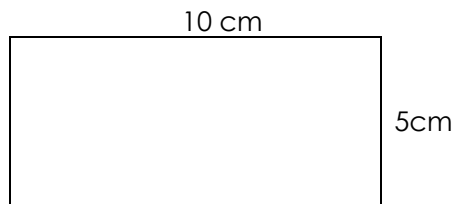
   c. A parallelogram with a base of 7 inches and a height of 10 inches.

   h = 10 in

   b = 7 in
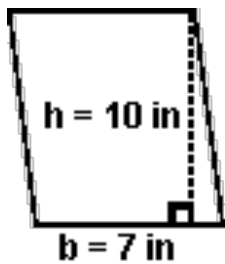
   d. What is the area of the following triangle?

   5cm

   8cm
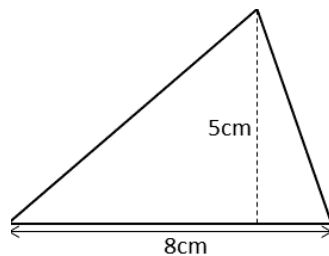
e. What is the area of the following trapezium?

6m

7m

10m
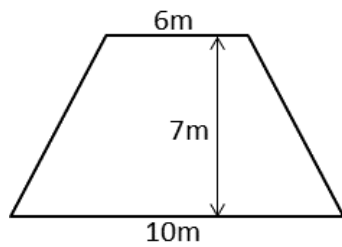
f. What is the area of the kite?

6 cm

8 cm
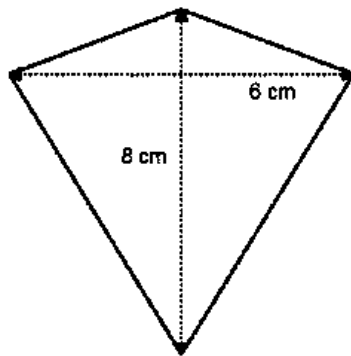
g. Find the area of a rhombus PQRS. The horizontal diagonal PR is 12 ft and the vertical diagonal QS is 26 ft.

Q

12

P   R

26

S
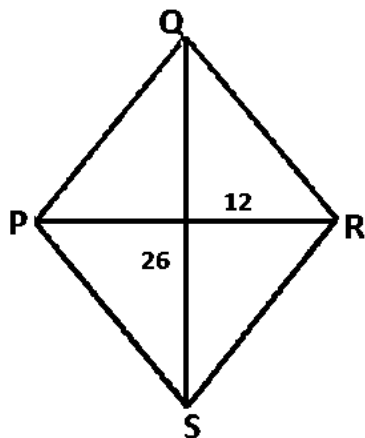
⚒ Application

1. Give examples of when you use the perimeter and area of triangles and quadrilaterals in your daily life.

2. **Solve:**

   A farmer has a plot land in form of a parallelogram whose base is 120 m and side is 100 m. He needs to fence it and calculate the area of his plot.
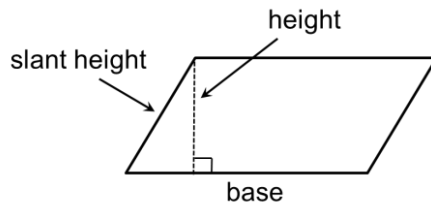
   a. What is the length of the barbed wire he will need to buy to cover the whole surrounding fence?

   b. Find its area if its height is 80 m.

⇪Assessment and Reflection

1. Find a partner. Create an area problem for your partner by giving the necessary dimensions. For example, what is the area of a triangle whose base is 5 inches and height is 8 inches?

🛖 Homework

1. Find the area of the following figure. Hint: Sometimes you can break down a picture into several shapes you know.
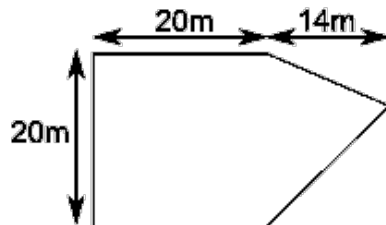
✍ Lesson 88 - 89: Geometry – The Circle

✓ **Objectives -** By the end of the lesson, learners will be able to:

    a. Draw a circle

    b. Name parts of a circle

    c. Calculate the radius of the circle

    d. Calculate the diameter of the circle

    e. Calculate the circumference of the circle

    f. Calculate the area of the circle

🔔 Opener

1. **Review of previous lesson:** Share your response to the homework problem on calculating the area of the given shape.

2. **Today's lesson:** Today's lesson will focus on the circle – its parts, perimeter and area.

❓ Problem Solving Activity

1. With a partner, hold tight a piece of rope by its two ends. One person keeps motionless and the other one moves around the still learner, keeping the rope tightened. Move in one direction to the starting point. What can you say about the movement?

2. In small groups, use two sticks to draw a circle on the ground:
Attach a rope on the two sticks, one stick is fixed into the ground and the other one at the end of the rope is free to move. One person uses the free stick to draw a circle on the ground, moving around the fixed stick as it was done previously.

    a. Measure the distance from the fixed stick to the boundary of the circle. Call this value 1. This distance is known as the **radius (r)** (see diagram below).

    b. Measure the distance from one edge across to the other edge, passing through the fixed stick. Write this down as value 2. This distance is known as the **diameter (D)** (see diagram below).

c. Compare the two values.

d. Take the other piece of string / rope and lay it along the boundary of the circle. Measure the length of the rope. Call it value 3. This is called the **circumference** of the circle.

Divide the circumference value 3) by the diameter (value 2). What does it equal?
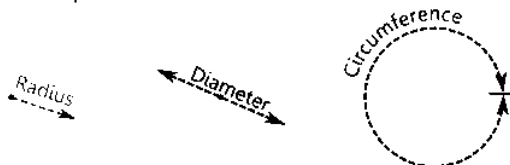
$$\frac{\text{Circumference}}{\text{Diameter}} = \pi = 3.14159...$$

π = 3.14 = 22/7

The **area** inside the circle is:

$$A = \pi \times r \times r \qquad \textbf{or} \qquad A = \pi r^2$$

3. Solve based on what you now know about the radius, diameter, circumference and area of a circle.

   a. Find the diameter and the radius of the circle below.

   10 cm | 10 cm
   O
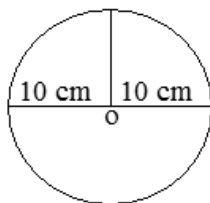
   b. What is the radius of a circle whose diameter is 12 cm?

   c. What is the diameter of a circle whose radius is 34 in?

   d. Find the circumference of a circle whose diameter is 22 cm

   e. Find the circumference of a circle whose diameter is 140 cm

f. Find the area of a circle whose radius is 28 cm

g. Find the area of a circle whose radius is 8 ft

Math Facts!

- A **circle** is the set of all points on a plane that are a fixed distance from a center.

- The fixed point is the **center** of the circle and the given distance is the **radius (r)**

- A **diameter (D)** passes through the center of a circle from one side to

  D = 2r or $r = \frac{D}{2}$

- **Circumference (Cir)** is the length of a boundary of a circle

  *Cir = **π** x D or Cir = **π** x 2r where **π = 3.14 or π** $= \frac{22}{7}$*

- The **area of a circle (A)** is the region that it encloses

  $\mathbf{A = \pi \times r \times r}$ or $\mathbf{A = \pi\, r^2}$

✍ Guided Practice

1. Draw on a piece aper a circle with a 7 cm radius using the compass and a ruler.

2. What is the radius of a circle whose diameter is 27 cm?

3. What is the diameter of a circle whose radius is 33.7 in?

4. Find the circumference of a circle whose diameter is 45 ft

5. Find the circumference of a circle whose radius is 595 cm

6. Find the area of a circle whose radius is 56 in

7. Find the area of a circle whose diameter is 128 mm

⚒ Application

1. Give examples of when you use circles in your life.

2. **Solve:** A wheel of a car is 42 cm in diameter. What distance does it cover in 1 complete revolution?

3. **Solve:** A man has a drum which has the big end with 48 inches in diameter. He wants to cover that end with a leather which has 25 inches in radius. Will that man be able to do it?

4. Mr. Kagabo has to dig a toilet whose radius is 55 cm in a square plot of land with 1 m by side. Will Kagabo be able to fit the toilet in that plot of land?

⇲ Assessment and Reflection

1. Complete the missing dimensions:

radius	5 m			
diameter		21 in	24 ft	100 cm
circumference				
area				

🛖 Homework

1. Practice! Complete the missing dimensions:

radius	14 cm	36 in	
diameter			35 ft
circumference			
area			

✍ Lesson 90: Module E Assessment

Instructions: The assessment is based on what you have learned in this module and will take one hour. In this assessment, there are 9 questions with different parts. Read the instructions for each question and solve to provide the correct answer. Good luck!

1. State if the following lines are vertical, oblique, horizontal, parallel, or perpendicular lines. (8 pts)
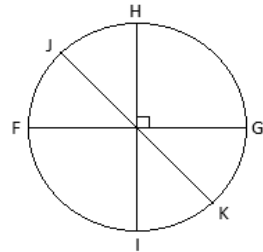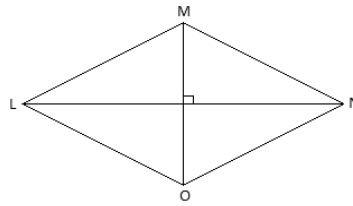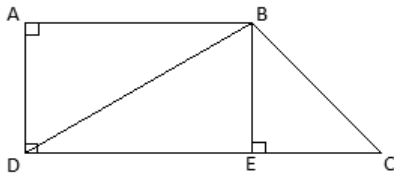
   a) Line AD is …………………….……

   b) Line DB is …………………….…….

   c) Line LM is …………………….………

   d) Line JK is …………………….………

   e) Lines AB and DE are …………..…..

   f) Lines AB and AD are ……………..

   g) Lines MN and LO are …………….

   h) Lines HI and FG are ………………

2. Charles is a boy aged 5. He is amusing himself by opening and folding a hinge to make different types of angles. Study the indicated angles made by the two sides of the hinge as shown by arrows and name them: (3 pts each = 12 pts)
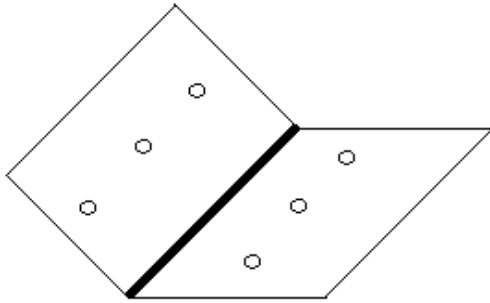
a. _____
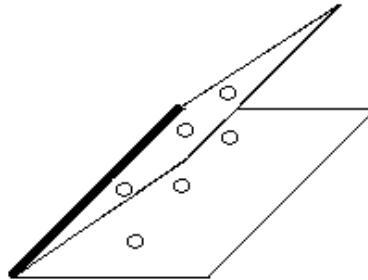
b. _____
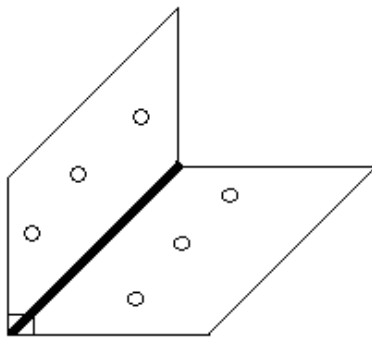
c. _____
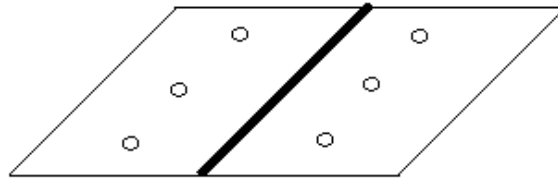
d. _____

3. A school garden has a squared surface measuring 40 yards by side.
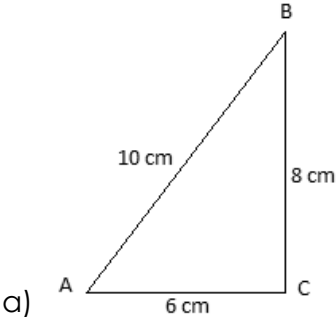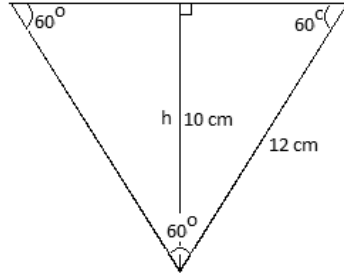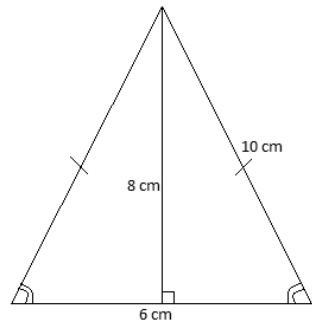
    a. Find its area.   (3 pts)

    b. Determine the length of a wire to buy if the school wants to fence round it once. (3 pts)

4. a. Using a pair of compasses and a ruler, construct the rectangle ABCD measuring 8 cm long and 5 cm wide. (8 pts)

    b. Calculate its perimeter and area. (6 pts)

5. Name the triangles below and determine their perimeters and areas. (3 pts each = 9 pts)

	Answers:
a) B 10 cm 8 cm A 6 cm C	
b) 60° 60°C h | 10 cm 12 cm 60°	
c) 10 cm 8 cm 6 cm	

6. Find the perimeter and area of the parallelograms below.
(3 pts each = 12 pts)

12 cm

11 dm

10 dm

20 cm

9 cm

14 dm
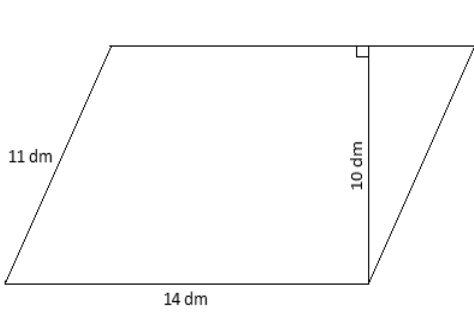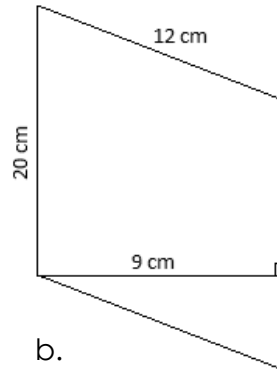
a.   b.

7.   a. Find the perimeter and area of the following rhombus.
       (3 pts each = 6 pts)

8 cm

12 cm

10 cm
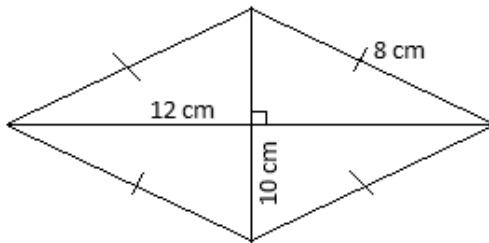
   b. A maize garden in the form of a rhombus has been fenced round
       once with a wire measuring 656 m long. Find the length of one side.
       (3 pts).

8. Find the perimeter and area of the trapeziums below.
   (3 pts each = 12 pts)

24 cm

9 cm

a.   b.

6 cm

14 cm

8 cm

12 cm

14 cm

12 cm

10 cm
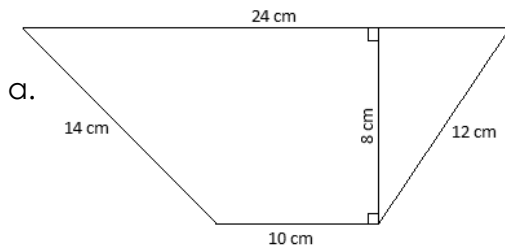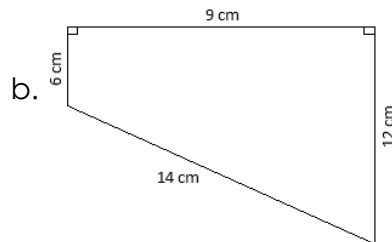
9. A water tank has 21 ft by radius of its base.
   (3 pts each = 6 pts)

Find:

   a. The diameter of the tank

   b. The circumference of the tank

MODULE F

✍ Lesson 91 - 92: Statistics and Data Analysis: How to Find Mean

---

✓ **Objectives -** By the end of the lesson, learners will be able to:

   a. Define mean

   b. Examine real-world problems in which the mean of a set of whole numbers is computed

   c. Examine real-world problems in which the mean of a set of decimals is computed

   d. Describe the procedure for finding the mean of a set of numbers

   e. Compute the mean of a set of numbers

🕐 **Time Required:** 2 hours

✏ **Materials and Preparation:** standard materials, number cards

   ❑ Prepare cards with numbers as explained in opener.

🔔 Opener

1. **Introduction to new module:** We will now switch topics from geometry to Statistics and Data Analysis. While these words might sound complicated, they are not! Basically, this module will focus on information – collecting it, organizing it, making sense of it and using it to make decisions.

2. **Today's lesson:** Today's lesson will focus on "mean".

❓ Problem Solving Activity

1. To begin with this session, we will look at few terms and their meanings and how they relate to real life situations.

   With your small group, you will write down what you know about: **statistics, data, and mean**.

Term	Explanation	Example
Statistics	Act of gathering and analyzing numbers or information to reflect, show or interpret specific events or situation which took place.	The number of learners in ABE system in Lofa. The number of learners' workbook distributed this year, agricultural production in a year, …
Data	Actual information or facts gathered after the occurrence of specific task or event.	In Kpakio ABE school, there are 30 women; there are 150 ABE sites in Liberia; 500 lbs of tomatoes and 800 pounds of potatoes was grown in Kpakio this season.
Mean	The arithmetic mean of a set of data is found by taking the sum of the data, and then dividing the sum by the total number of values in the set. A mean is commonly referred to as an average.	a) In the warm-up, we had 8 persons with a certain number each. We added the numbers (7 + 13 + 13 + 16 +17+22+23+25) and got 126. We divided this number (126) by 8 and got 15.75 or approximately 16. So our average or mean is 16.

2. In small groups, brainstorm and give examples of the use of statistics and data analysis in real life situations.

3. How to find mean in a given set of data?

As a reminder: *The mean is found by taking the sum of the data, and then dividing the sum by the total number of values in the set. A mean is commonly referred to as an average.*

Solve:

a) Find the mean driving speed for 6 different cars on the same highway.

66 mph, 57 mph, 71 mph, 54 mph, 69 mph, 58 mph

b) Sebastian drove through 4 cities to deliver seed packets to agricultural supply shops in Lofa County. Gasoline prices varied from city to city. What is the mean gasoline price considering the set of data: LD325, LD325, LD335, LD345?

Math Facts!

- Mean – represents a fair share concept of the data – often called the average.
- Statistics – the study of data; how to collect, summarize and present it.
- Data – are facts or figures from which conclusions can be drawn.

✍ Guided Practice

1. A school race was completed by 5 learners in the times given below. What is the mean race time for this school race?

   2.7 min, 8.3 min, 3.5 min, 5.1 min, 4.9 min

2. Find the mean swimming time rounded to the nearest tenth:
   2.6 min, 7.2 min, 3.5 min, 9.8 min, 2.5 min

⚒ Application

1. On an interview for a job, the interviewer tells you that the average annual income of the company's 25 employees is LD$60,849. The annual incomes of the 25 employees are shown below. What are the mean of the incomes? Was the person telling you the truth?

$17,305	$478,320	$45,678	$18,980	$17,408
$25,676	$28,906	$12,500	$24,540	$33,450
$12,500	$33,855	$37,450	$20,432	$28,956
$34,983	$36,540	$250,921	$36,853	$16,430
$34,654	$98,213	$48,980	$94,024	$35,671

2. The ABE school facilitator told the class that he would use the mean value of learners' test scores to determine their final grades. If Gayduo Harris scored 90, 85, 80, 85, and 100 on her exams, what will be her final grade?

⇗ Assessment and Reflection

1. The USAID Advancing Youth Project distributes learners' workbook per learner per class throughout in all five counties at the beginning of each school year. This academic 2013 – 2014, each county is expected to do the following distribution:

   Monts: 1400   Bong: 1550   Lofa: 1600   G. Bassa: 1250   Nimba: 1550

What is the mean number of learners' workbooks to be distributed in each county?

⌂ Homework

1. Think about how statistics can be used in real life situations. Write as many as 20 different examples!

✍ Lesson 93 - 94: Statistics and Data Analysis: How to Find Median

✓ **Objectives -** By the end of the lesson, learners will be able to:

  a. Define median
  b. Examine real-world problems in which the median of a set of whole number is computed
  c. Examine real-world problems in which the median of a set of decimals is computed.
  d. Differentiate between finding the median of an odd number of items and an even number of items.
  e. Describe the procedure for finding the median of a set of data
  f. Compute the median for an odd number of items and for an even number of items

🕑 **Time Required:** 2 hours

✏ **Materials and Preparation:** standard materials, number cards

🔔 Opener

1. **Review of previous lesson:** Share the results of your homework assignment. What examples did you identify on how statistics is used in real life?

2. **Today's lesson:** Today's lesson will focus on finding the **median** of a set of numbers. The median is the middle most number in a set.

❓ Problem Solving Activity

1. **How do we find the MEDIAN of set of numbers?**

   Follow the instructions of the facilitator. Then with your small group, try to define median.

   Definition: Median of a set of data is the middlemost number in the set. The median is also the number that is halfway into the set. To find the median, the data should be first arranged in order from least to greatest.

To remember the definition of a median, just think of the median of a road, which is the middlemost part of the road.

2. **Example:** Seven basketball players shoot 30 free throws during a practice session. The numbers of baskets they make are listed below. What is the median number of baskets made? What steps do you need to take to find the median? Give learners a few minutes to try it on their own.

$$22, 23, 11, 18, 22, 20, 15$$

Math Facts!

- **Median:** The symbol for median is Mdn. Median of a set of data is the middlemost number in the set.

Here is the rule:
- With an Odd number of scores of data set, the median will be an actual score.
- With an Even number of score of data set, the median will not be an actual score. Instead, it will be the score midway between the centermost scores. To get the midpoint, simply average the two centermost scores. In our first example: this is 16 + 17 ÷2 = 33/2 = 16.5

Formula
- Formula used to find the median is ({the number of data points} +1)÷ 2
  For example: 1, 2, 4, 7 = n + 1 ÷ 2. In this case, there are four data + 1 ÷ 2 = 5 ÷2 = 2.5. So we take the two middle numbers (2 + 4) and divide by 2 we get: 6 ÷ 2 = 3. The median is 3.

✍ Guided Practice

1. **Solve:** There are 12 members of a basket weaving cooperative. Some are just learning the trade and others have been making baskets for several years. During the week, the following numbers of baskets were made by the 12 women:

$$2, 3, 6, 10, 12, 12, 14, 15, 15, 15, 24, 25$$

Question: What is the median number of baskets produced?

2. **Solve:** In Goba Town ABE School, 10 level 2 learners sat the end of module tests and scored the following grades.

   a. What is the median number of these scores?

   87, 98, 79, 88, 79, 76, 95, 65, 74, 91

   b. What is the mean of the scores?

⚒ Application

1. Five farmers bring their rice to a shop in town to sell. They bring in 100 lbs, 250 lbs, 300 lbs, 175 lbs and 120 lbs.

   a. What is the median number of pounds?

   b. What is the mean number of pounds brought in to the shop?

⤷Assessment and Reflection

1. The USAID Advancing Youth Project distributes learners' workbook per learner per class throughout in all five counties at the beginning of each school year. This academic 2013 – 2014, each county is expected to do the following distribution:

   Monts: 1400   Bong: 1550   Lofa: 1600   G. Bassa: 1250   Nimba: 1550

   a. What is the median number of learners' workbook to be distributed in each county?

   b. In the last lesson you calculated the mean for the workbook distribution. How does the mean compare to the median?

Homework

1. Think about when you might use median in real life situations. List examples.

2. The age range for learners that should enroll into the Alternative Basic Education (ABE) class is between ages 13 and 35. Ten learners enrolled of the following ages 13, 15, 17, 18, 20, 25, 26, 31, 31, 35. You want to divide the learners into two groups. How can you use the median to help you form the groups?

✍ Lesson 95 - 96: Statistics and Data Analysis: How to Find Mode

----
✓ **Objectives -** By the end of the lesson, learners will be able to:
   a. Define mode and bimodal
   b. Examine real-world problems in which the mode of a set of whole numbers, decimal, or integers is computed
   c. Examine problems in which there is no mode
   d. Examine problems for which the data is bimodal
   e. Examine problems for which the mode is zero
   f. Differentiate a set of data with no mode, a mode of zero, and two modes
   g. Determine the mode of a set of data

🕐 **Time Required:** 2 hours

✎ **Materials and Preparation:** standard materials; basket or rubbish bin to throw paper balls into
----

🔔 Opener

1. **Review of previous lesson:** Share the results of your homework assignment – What was the median? How did you group the ages?

2. **Today's lesson:** Today's lesson will focus finding the **mode** of a set of numbers. The mode is the number in a set that appears that most often. Ex, 1, 2, 2, 2, 3, 3, 4, 5. The mode is 2 since it appears the most times.

❓ Problem Solving Activity

1. **Solve:** A group of learners are traveling to their agricultural garden. They decide to meet on the farm by 9:30am. Mary arrived at 7:10, John arrived at 7:10, Moses arrived at 9:00, Esther arrived 8:15, and Forkpa arrived at exactly 9:30.

   a. What is the median of their arrival time?

   b. How many people arrived at the same time?

---

c. What is the average time of their arrival?

d. Which one of the time was repeated?

Definition of mode: Mode is defined as the most frequent score or number in a set of numbers. In other words, the mode of a set of data is the value in the set that occurs most often.

2. Solve this example with the class and facilitator: 11 learners in the class decided to have a paper ball throwing contest. They wanted to see who could make the most baskets by throwing a balled up piece of paper into the bin while standing 15 meters away from the bin. Find the mode. These were the results:

14, 6, 11, 8, 7, 20, 11, 3, 7, 5, 7

Answer:

a) Arrange the number from lowest to highest scores. In this case:

3, 5, 6, 7, 7, 7, 8, 11, 11, 14, 20

b) Create a frequency table. Here are the scores in a descending order frequency table.

Score	Frequency
20	1
14	1
11	2
8	1
7	**3**
6	1
5	1
3	1

The mode is 7 because there are more 7's than any other number. There are 3 of them. Note that the number of lessons on either side of the mode (7) does not have to be equal. It might be equal, but it doesn't have to be. In this example, there are three scores below the mode and five scores above the mode. See below:

3. Here are some real-world examples of mode. Give other examples.

   a. Conducting a health survey on common diseases in a community: Data is collected at a health clinic to see which diseases are common and how many people have them. Out of 100 people, 20 have malaria, 40 have diarrhea, 10 have typhoid fever and 30 have sexually transmitted diseases (STDs).

   Let's check which one is most common:

Malaria	20
Diarrhea	40
Typhoid fever	10
STDs	30

   Diarrhea has occurred most often. So diarrhea is the mode of this survey. Now, authorities can come in and act. They will prioritize diarrhea.

4. **Solve:** Binta decided to start selling eggs at her shop. To get a better understanding of how many eggs she sells per day, she recorded the number sold each day for 11 days. It was as follows:

   24, 15, 18, 20, 18, 22, 24, 26, 18, 26, 24

   Find the mode, median and mean. How many eggs should plan on selling per day?

Math Facts!

- **Mode:** Mode of a set of data is the value in the set that occurs the most often. Ex. 1, 2, 2, 2, 3, 3, 4, 5, 5,   *3 is the mode.*

- A set of data can be **bimodal**. That is, it can have more than one set of data having the same frequency in the data. Ex. 1, 1, 2, 3, 4, 4, 5
    1 and 4 are the modes. They are bimodal.

- It is also possible to have a set of data with no mode. That is, you cannot find any set of data occurring more than once. Ex. 1, 2, 3, 4, 5
  There is no mode.

- One way to remember that the mode is the "most popular" value is that mode and most begin with the letter combination m-o or you could point out another meaning of mode relates to fashion (dresses, spoken words or slangs, etc) since learners may associate both meanings as they relate to the concept of "popular".

✍ Guided Practice

1. Find the mode of the following set of numbers:

   100, 180, 140, 120, 130, 180, 160, 110

2. Draw a frequency table and find the mode of the following set of numbers:

   6.8, 4.2, 9.8. 6.8, 5.5, 9.8, 3.7, 6.6, 4.2, 9.8

⚒ Application

1. **Solve:** How can Gaydou Weegie use the concept of "mode" to prove that she is a valuable member of the grow - your- business and agriculture club? Gaydou harvested the following number of bags of vegetables over 9 days:

    6, 8, 14, 12, 11, 14, 4, 6, 14

2. The Alternative Basic Education Back-to-School Race was completed by 5 learners selected from the counties. What is the mode of these times given in minutes?

    2.7 min, 8.3 min, 3.5 min, 5.1 min, 4.9 min

⚘ Assessment and Reflection

1. The following numbers represent the number of films learners watch in a month. Find the mode:

    20, 18, 14, 10, 130, 8, 10, 11, 8

🛖 Homework

1. Solve:

    Finda and Yawa are ABE learners in Kpakio ABE site. After their first Agriculture and Livelihood class they decided to establish their vegetable garden. They need to make a profit from the garden so decided to do a survey of the type of vegetables that would be most needed by the people in the community. They did a sample of 10 households. They asked each household: "What are your favorite vegetables?", getting the following results: bitter ball, cassava, eggplant, beans, bitter ball, pepper, potato greens, pepper, cabbage, and bitter ball.

a) What is the mode?

b) Which vegetable crop will Finda and Yawa decide to grow the most of? Why?

c) What vegetable crop will they decide to grow the next most?

✍ Lesson 97: Statistics and Data Analysis: How to Find Range

✓ **Objectives -** By the end of the lesson, learners will be able to:
   a. Define range.
   b. Examine real-world problems in which the range of a set of whole numbers is found.
   c. Examine a real-world problem in which the range of a set of decimals is found.
   d. Examine a real-world problem in which the range of a set of integers is found.
   e. Compute the range of a set of numbers.
   f. Describe the procedure for computing the range of a set of numbers.

🕐 **Time Required:** 1 hour

✏ **Materials and Preparation:** standard materials; measuring tape or meter stick/ruler

🔔 Opener

1. **Review of previous lesson:** Share the results of your homework assignment on Finda and Yawa's vegetable garden planning. Discuss.

2. **Today's lesson:** Today's lesson will focus on how to find the range of a set of numbers.

❓ Problem Solving Activity

1. Discuss the meaning of the word "range" in your small group. For example, if there is a range of ages in the class, what does that mean? What other examples are there where one would say there is a range or where one would find the range?

---

2. **Summary:** A range of ages means that there are people of different ages in the group. Some could be in their teens and others in their twenties. You might have a range between 15 and 25, for example in the classroom. Other examples could include any category where things have some difference. For example a range of colors in a picture, a range of learners' heights, a range of learners' weights, etc.

The **range** of a set of <u>data</u> is the difference between the highest and lowest values in the set. So, for example, if the ages of learners in a group is 15, 15, 17, 18, 20, 21, 21, 23, 24, 24, 25, the range is 25 (highest age) – 15 (lowest age) = 10.

3. **Solve with class and facilitator:** Eleven women in the market were selling watermelons. They sold the following number of watermelons: 14, 6,11,8,7,20,11,3,7,5,7. What was the <u>range</u> of the number of watermelons sold?

4. **Solve**: This week learners of Goba Town ABE site elect the leadership for their Agriculture and Livelihood Club. Here are the contestants' number of votes received during the election.

Contestants	Number of Votes
Esther	52
Moses	50
Gbolu	47
Kermie	44
Eyea	39
Ma Yei	38
Nancy	36
Johnson	32

a) Find the range of the contestants' number of votes.

b) Why would you want to find the range of this data?

Math Facts!

- **Range:** The <u>range</u> of a set of <u>data</u> is the difference between the highest and lowest values in the set.

- The range is NOT a measure of the average; however, it is often taught along with average because it's another helpful way to analyze data.

- The range measures the "spread" of the data, how far apart the smallest and largest values are.

- To find the range, subtract the smallest value in the data from the largest value. Ex: 10, 20, 40, 60, 70, 100   *The range is 100 – 10 = 90*

✍ Guided Practice

1. **Solve:** The Bureau of ABE at the Ministry of Education took a tour to visit ABE schools in both rural and urban communities in six counties. Gasoline prices varied from county to county. What is the range of gasoline prices?

    $4.11, $4.30, $4.37, $4.43, $4.49, $4.56

2. Find the range of the following integers: 220, 40, 300, 420, 60, 90, 500

3. Mr. Marcus Seneceh listed 9 integers on the blackboard. What is the range of these integers?

    14, -12, 7, 0, -5, -8, 17, -11, 19

⚒ Application

1. A fish farm cooperative brought in the following amount of money over a 7 day period. What is the range of the revenue?

   Monday: LD $5,000
   Tuesday: LD $7,800
   Wednesday: LD $4,300
   Thursday: LD $6,560
   Friday: LD $8,010
   Saturday: LD $12,320
   Sunday: LD $4,100

2. Measure your height with a tape measure and record it in inches on the blackboard. Once everyone's height is written on the board, find the range of heights in the class.

⇙ Assessment and Reflection

1. Transportation time between towns can vary depending on the time of day one is travelling, the condition of the vehicle, the speed, etc. You decide to record the length of time it takes for a bus journey to a town upcountry from where you live. You take 5 trips over time. What is the range of times?

   2.7 hr, 1.3 hr, 3.2 hr, 2.5 hr, 3.6 hr

🏠 Homework

1. **Solve:** In Zoweinta ABE Level 2 class, 7 learners sat for the end-of–module numeracy tests. What is the range of their test scores?

   89, 73, 84, 91, 87, 77, 94

✍ Lesson 98: Statistics and Data Analysis: Revision Lesson / Mid-Module Assessment (Mean, Median, Mode, and Range).

✓ **Objectives –** Under a good test environment, learners will be able to:
   a. Work independently to solve problems reinforcing what they have learned in previous lessons
   b. Assess how well they have understood the topics of previous lessons
   c. Set goals on how to solidify their understanding of topics they find difficult

🕐 **Time Required:** 1 hour

✎ **Materials and Preparation:** standard materials; learner's copy / assessment booklet.

🔔 Opener

Today will be used to review and practice more of what you have learned during the past few weeks.

General Instructions: In this assessment, we are going to review the mean, median, mode and range of a data set. A farmer's cooperative has hired you to help them analyze weather patterns. They want to use the information to make sure they apply best farming practices at the appropriate time. Ex. when to plant vegetables, when to plant rice, when they might need to irrigate, etc. Use the table below to answer the questions.

Climatological Information

Month	Mean Temperature ºf		Mean Total Precipitation (mm)	Mean Number of Precipitation Days
Jan	68.0	92.1	1.3	0.5
Feb	70.2	93.9	1.8	0.4
Mar	70.9	95.7	5.1	0.5
Apr	73.0	96.6	18.4	2.1
May	74.1	93.4	198.2	12.0
Jun	73.6	89.8	247.1	16.7
Jul	73.0	89.8	147.7	13.2
Aug	72.7	89.8	202.8	14.7
Sep	72.1	88.3	361.6	19.9
Oct	72.0	88.0	316.6	18.2
Nov	70.7	88.9	102.3	9.2
Dec	70.0	90.7	10.6	3.1

1. Look at the monthly maximum temperature column. Calculate:
   a. the mean maximum temperature

   b. the median maximum temperatures

   c. the mode of the maximum temperature

   d. the range of maximum monthly temperatures

2. Look at the monthly precipitation column.

    a. Round the monthly precipitation amounts to the nearest whole number.

Month	Precipitation (mm)
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

Use the rounded numbers to **calculate:**

    b.   the mean monthly rainfall amounts

    c.   the median monthly rainfall amounts

    d.   the mode of the monthly rainfall amounts

    e.   the range of monthly rainfall amounts

3. Answer the following questions based on the table and your calculations above:

    a. The farmers are trying to decide whether or not to put in an irrigation system. It was recommended that they water their crops when the monthly rainfall is below 125 mm of rain. "Great, said one farmer. We do not need to irrigate at all because the mean and median are equal to or above 125 mm of rain." Do you agree that the farmers should not irrigate at all based on the mean and median?

    b. To determine when the temperature is the most consistent would one look at the mean, median, mode or range? In what months is the temperature the most consistent?

Part II: Self-Assessment

Step 1: Now you will assess your level of understanding of lessons 41 - 48 covered over the previous few weeks. Tell them that they will use the table below as they did in previous modules.

Lessons taught	1	2	3	4	5
Business Math	I am very confused	Most of the time I am confused	I understand sometimes	I understand most of the time	I understand all the time
Lesson 91 - 92: Statistics and Data Analysis: How to Find Mean					
Lesson 93 - 94: Statistics and Data Analysis: How to Find Median					
Lesson 95 - 96: Statistics and Data Analysis: How to Find Mode					
Lesson 97: Statistics and Data Analysis: How to Find Range					

Step 2: List the lessons that you have found to be difficult (a score of 1, 2, or 3) List reasons why you think they may be difficult. For example: Was the instructor going too fast? Were there not enough real life examples? Was your partner or small group not giving you the chance to practice? Were you absent? Did you not have a solid foundation in the basics (ex. multiplication tables) to be able to do the work in the lesson? etc.

Step 3: Develop a plan: What will I do to better understand the lessons that I have found to be difficult?

Step 4: Share the lessons you identified as difficult with a small group of 4 people. Brainstorm on ways they can go about better understanding lessons identified as difficult. Facilitator moves around to provide help where necessary.

✍ Lesson 99 - 100: Statistics and Data Analysis: Introduction to Graphs.

✓ **Objectives -** By the end of the lesson, learners will be able to:
 a. Identify different types of graphs
 b. Identify the importance of using graphs to represent information
 c. Begin to interpret the meaning of graphs

🕐 **Time Required:** 2 hours

✏ **Materials and Preparation:** standard materials; poster of different types of graphs
 ❑ Prepare a poster of the different graphs presented below.

🔔 Opener

1. **Review of previous lesson:** Review problems in mid-module assessment together. Ask questions if you do not understand something.

2. **Today's lesson:** While the last several lessons have focused on mean, median, mode and range, the next few lessons will focus on graphing as another way to interpret and analyze data.

❓ Problem Solving Activity

1. In your small group, discuss the following bar graph. What is the meaning of it?
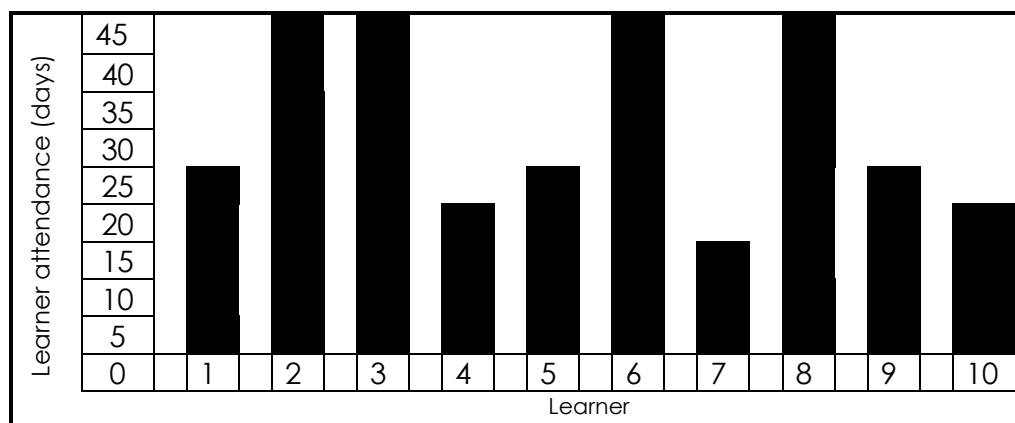
2. Answer the following questions based on the attendance graph above:

a. Which learners attended the most days? How many days did they each attend?

b. Which learners attended the least number of days? How many days did they attend?

c. What is the mean number of days attended?

d. What is the median number of days attended?

e. What is the mode?

f. What is the range of days attended?

g. If somebody asked you the average number of days learners attended the class would you use the mode or mean?

h. If you were the facilitator and wanted to increase learners' attendance, how might you use this information to help you do that?

Math Facts!

N0.	Type of graph	Definition	Example
1	Bar Graph	A bar graph is a chart that uses either horizontal or vertical bars to show comparisons among groups of things. It is a good way to show relative size (ex. how many people prefer different types of films).	Enrolment statistics per level Number of people who like different types of films:
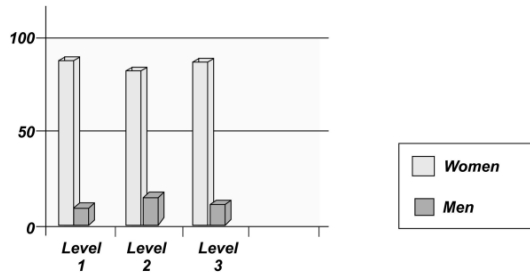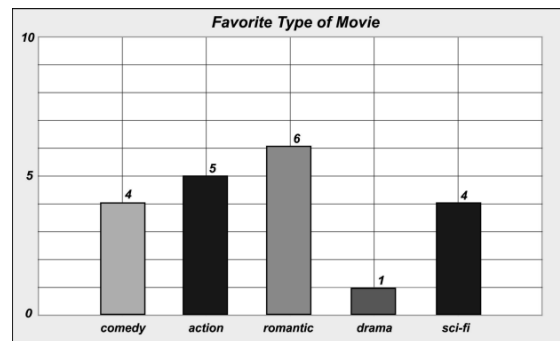
Math Facts!

N0.	Type of graph	Definition	Example
2	Histograms	Histograms are similar to bar graphs but use continuous data instead of data that is in categories such as the types of films above. The data tends to be a range such as ages, height, weight, etc. The histogram at the right shows the age ranges 1 -5, 6 – 10, etc. Vertically could be the number of people who use a certain product such as milk, for ex. So there are 22 children between ages of 1 – 5 in the survey who drink milk.	*No Gaps* Histogram Bar Graph
3	Pie charts	A pie chart (Pie graph) is shown by a circle to express the value of each item in the data. Each piece of the circle shows the value and percent of each item. For example the type of vegetables consumed by the community.	A 12%, B 29%, C 33%, D 10%, F 16%
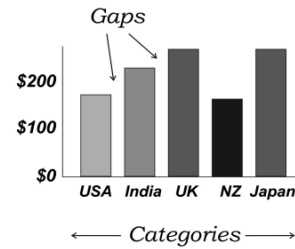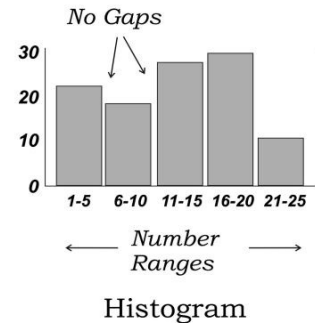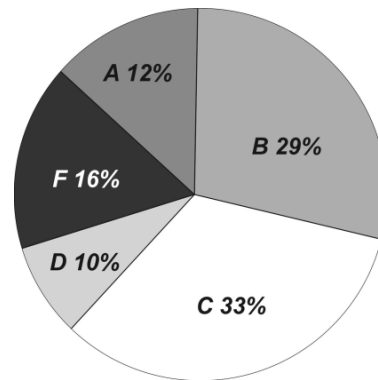
✍ Guided Practice

1. **Solve:** The following graph shows the height of some young rubber trees on Farmer Musah's land. Answer the questions based on the information in the graph.

Heights of Rubber Trees on Farmer Musah's Land
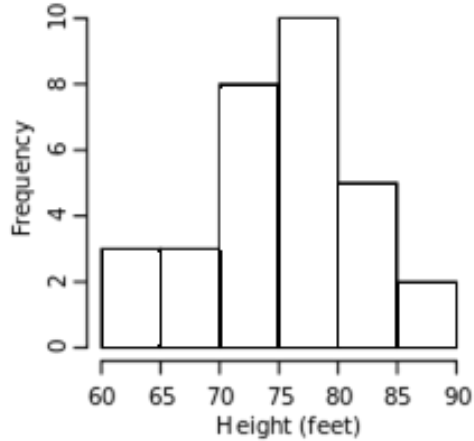
a. What is the height of the tallest tree? How many are there?

b. What is the height of the lowest tree? How many are there?

c. How many trees are between 70 and 75 feet?

d. Most trees are at what height? How many trees are at this height?

e. What is the range of the heights of trees?

2. Below is a pie chart of the same information found in the math facts about which types of films people liked best. Answer the questions below using the information provided.

Here were the results of a survey (from www.mathisfun.com):

Table: Favorite Type of Movie				
Comedy	Action	Romance	Drama	SciFi
4	5	6	1	4

Here it is shown as a pie chart:
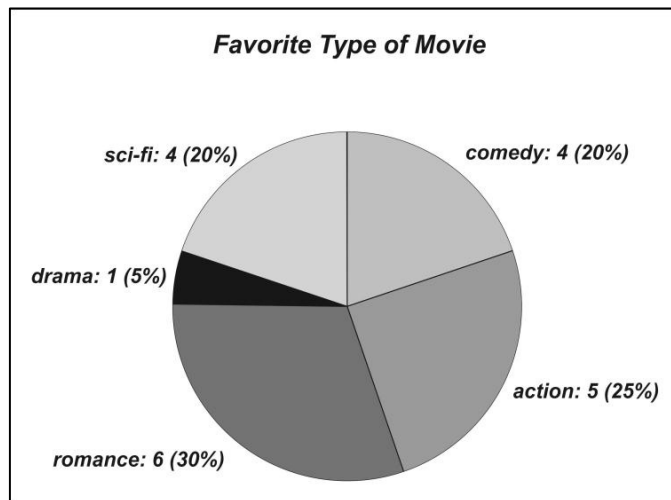
a. Can you tell my looking at the circle, which type of film is the most popular? Least? How can you tell?

b. What do all the percentages add up to? Why?

c. What is the mode?

d. Why does drama have the smallest piece of the circle?

⚒ Application

1. The following histogram shows the heights of 21 learners, grouped into 5 inch groups (50 – 55, 55 – 60, etc.)
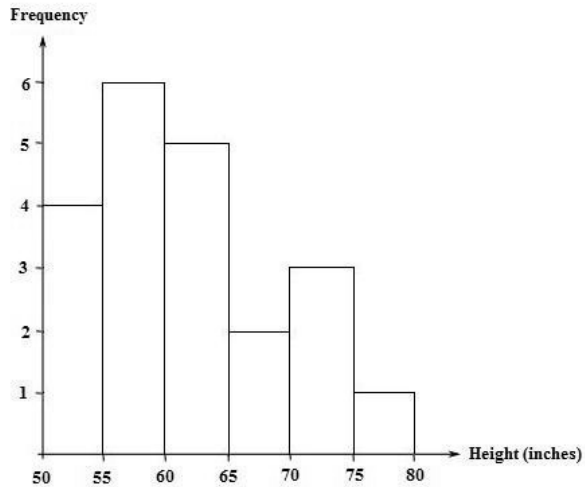
a. How many learners are in the shortest category?

b. How many learners are in the tallest category?

c. How many learners are less than 65 inches?

d. How many leaners are greater than 60 inches?

💡Assessment and Reflection

1. The following graph show the birth weights of 100 new born babies.
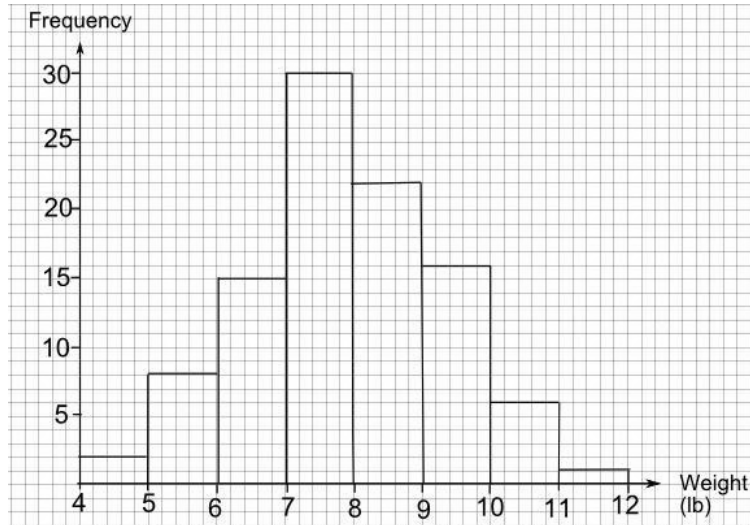
   a. What weight category do most newborns fall into? How many of the 100 babies are in this category?

   b. What is the range of weights?

   c. How many babies are under 8 lbs?

🏠 Homework

1. The following pie chart shows the amount of time Binta spends on various daily activities.

Time spent on daily activities
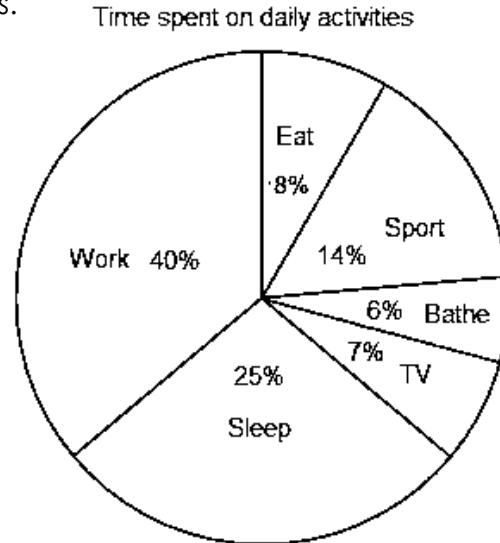
a. Which activity does she spend the most time doing?

b. Which activity does she spend the least time doing?

c. How much time does she spend on eating and watching television?

✍ Lesson 101 - 103: Statistics and Data Analysis: Collecting Data and Drawing a Graph

✓ **Objectives -** By the end of the lesson, learners will be able to:
   a. Collect and tally basic every day data
   b. Represent data on a graph
   c. Calculate the repetition rate (frequency), mode, scope and mean
   d. Interpret information on a graph
   e. Create a bar graph using data

🕐 **Time Required:** 3 hours

✏ **Materials and Preparation:** standard materials

🔔 Opener

1. **Review of previous lesson:** Review the homework problem on the pie chart of daily activities..

2. **Today's lesson:** Today's lesson will continue with interpreting information on a graph and will introduce how to collect data and make a bar graph using the data.

❓ Problem Solving Activity

1. Write your age on the blackboard. In pairs, fill out the following table using the information on the blackboard. Explain that to tally is to keep count so under the tallies column they can make small slashes / to keep track of the number of people at a certain age.

Age	Tallies	Number of learners

---

2. Based on the information in the table, calculate or identify the:

   a. frequency (repetition rate) for each age

   b. mode

   c. range

   d. mean

3. Represent the data in the table above in a picture or graph based on what you know and the last lesson.

4. **Review the answers together.** Compare your table with others. Do you have similar information?

5. What does tally mean and how do you do it? Demonstrate using the information on the board. To tally is to count. It is easy to count by using the symbol /. When using tallies, we group the number of items in 5. So 5 would be represented by 4 lines with a 5th line drawn diagonally through it.
   ⊬⊬

   The **answer will depend on the number of learners at each age** in your class but here is an example:

Age	Tallies	Number of learners
15	/	1
16	////	4
17	⊬⊬	5
18	////	4
19	⊬⊬ /	6
20	////	4
21	⊬⊬	5
22	///	3
23		0
24	/	1

Basic steps of creating a graph:

Step 1: Draw the graph shape.

Step 2: Label the x axis (horizontal line) with the appropriate categories (ages in this case).

```
15    16    17    18    19    20    21    22    23    24
```
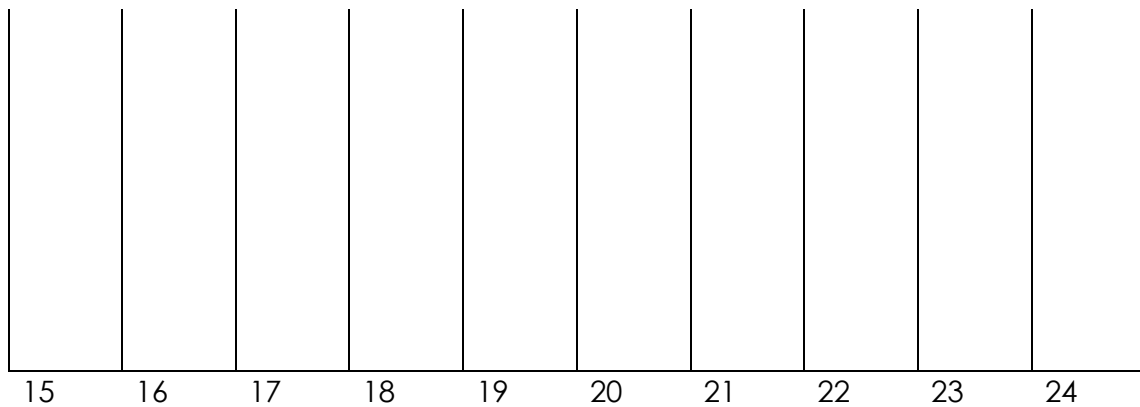
Step 3: Measure and number the y axis (vertical line) on your left from 0 – 10. Label accordingly (in this case number of learners).

```
10
9
8
7
6
5
4
3
2
1
0    15    16    17    18    19    20    21    22    23    24
```
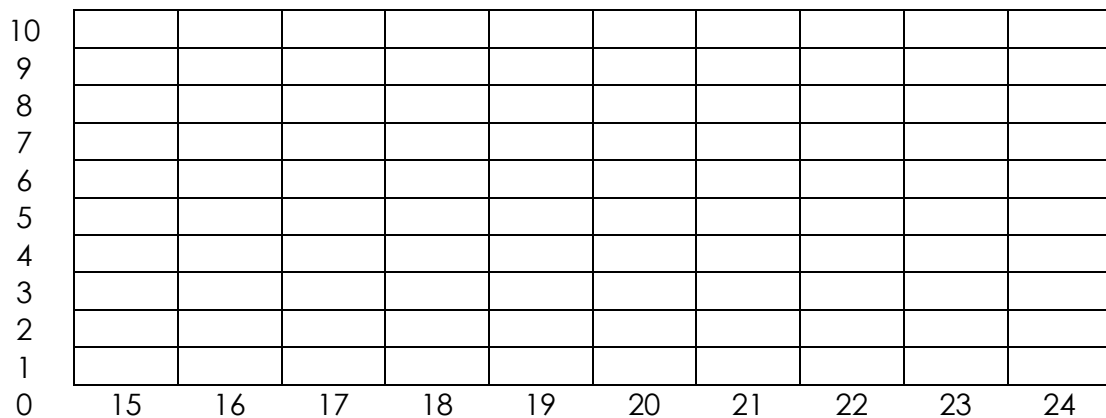
Step 4: Make the bar for each age up to the correct number (ex. if there is one 15 year old, make a bar up to 1).

Ages of Learners
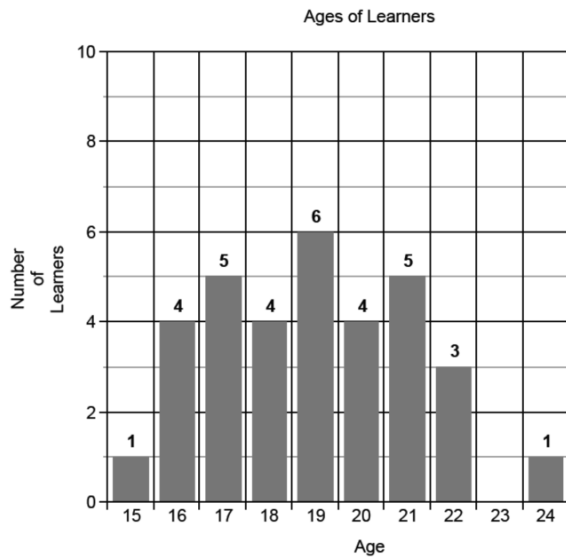
6. **Solve:**

   a. How many children are 18 years of age? 20?

   b. Which bar is the highest? Why?

   c. Which bar is the lowest, why?

   d. Why is there no bar for 23?

   e. How many learners are 20 and below?

Math Facts!

- To **tally** is to keep count. We keep count in groups of 5:
  / one   // two   /// three   //// four   ⊬⊬ five

- The **frequency** is the number of times an item (age in the case above) appears.

  Reminder:
- The **mode** is the most common score (age in case above).
- The **range** is found by subtracting the lowest score from the highest score
- The **average** or the **mean** is found by adding all the scores (ages) and dividing the sum by the total number of the

✍ Guided Practice

1. Measure your partner's height and write your responses on the board, like you did for your ages.

2. As we did with the age information – make a table tallying table, calculate the frequency for each height, the mode, the scope and the mean (average). Then draw a bar graph that represents the information.

Height	Tallies	Number of learners
Ex.: 160 cm	////	4

Frequency or repetition rate: number of learners for each height

Mode: the height which has the most leaners

Scope: subtract the smallest height from the largest height

Mean: add up all the heights and divide by the number of learners measured

Heights of Learners
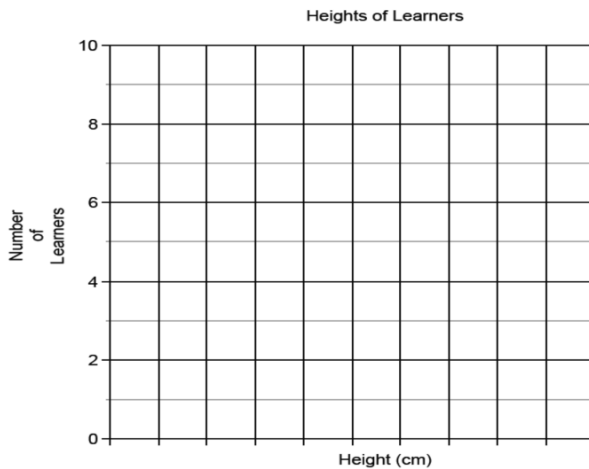
3. Look at the table on the next page and answer the questions:

   a. What type of information is presented in the table?

   b. To tell you the temperatures at different times of the day. For example, what was the temperature at 12 pm?

   c. When was it the hottest?   The coldest?

   d. What is the range?

   e. What is the mode?

   f. What is the average temperature?

Daytime Temperature 20 January 2012
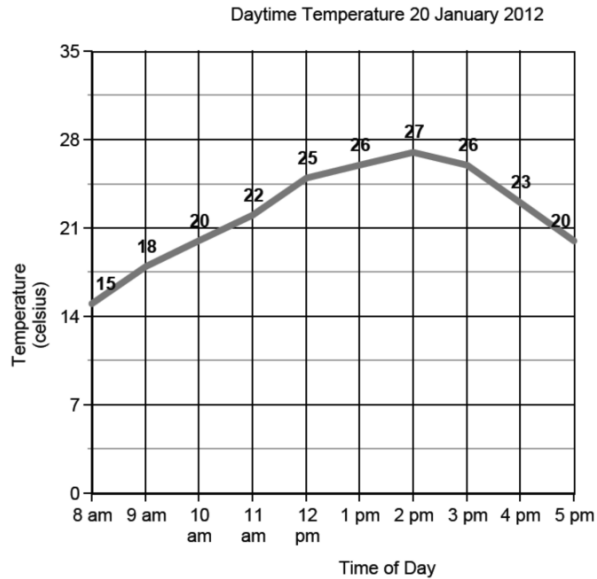
⚒ Application

1. Look at the following table in their books and answer the following questions:

Furniture Produced January 2012
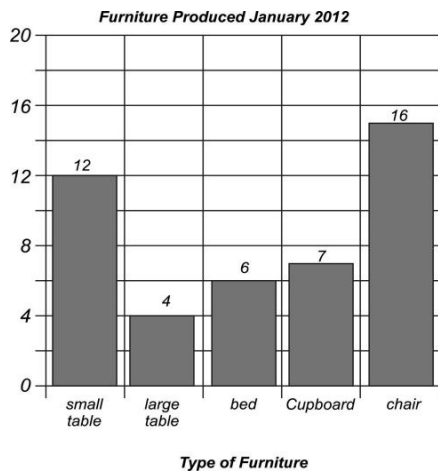
a. What type of information is presented in the table?

b. Why would a carpenter want to keep track of the number of pieces of furniture he made in a month?

c. How many beds did the carpenter make?   chairs?   small tables?

d. The carpenter made 7 pieces of which type of furniture?

e. List the types of furniture produced, from the highest to lowest number of pieces made.

2. The graph below is called a pie chart. The space inside the circle represents 100%.

    a. What information does this pie chart tell you?

    b. What percentage of land is used for growing maize?   Beans?
         Onions?   Bananas?

    c. Which crop uses the most land?

    d. Which crops together make up 50% of the land?

Land Use

⬜	Maize
▣	Bananas
▨	Tomatoes
▦	Beans
▨	Onions
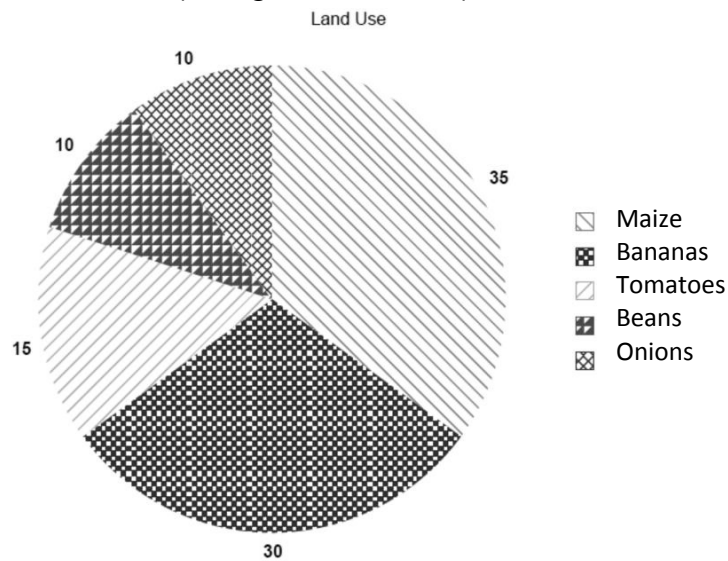
Assessment and Reflection

1. With a partner, choose 2 of the graphs above and pose questions to one another. For example, what crop takes 15% of the land? What was the average number of pieces of furniture made in January 2012?...

At Home

1. Identify ways in which people around you use data.

2. Look in the newspaper or other written material for tables, graphs, or pictures that represent data.

3. **Solve:** Mackina and Dority form a part of the Yarkpauh Social Club. They have learned so much about micro – business and vegetable crops in their "Grow Your Business" classes, and so they have decided to invest in vegetable crop production. They decided to conduct a survey of 50 people to find out what type of vegetables people need the most.   At the end of the survey, they got the following results:

Vegetable crops	# of people
Bitterball	12
Egg plant	05
Potato greens	18
pepper	15

a) Prepare a bar graph to show this data.

b) If you were a part of this group, what vegetable crop would you recommend to grow?

c) Which is the second vegetable you would grow?

✍ Lesson 104 - 105: Statistics and Data Analysis: Reading and Drawing Pie Charts

> ✓ **Objectives -** By the end of the lesson, learners will be able to:
>
>   a. Follow the steps needed to make a pie chart from given data
>   b. Interpret the meaning of pie charts
>
> 🕐 **Time Required:** 2 hours
>
> ✏ **Materials and Preparation:** standard materials

🔔 Opener

1. **Review of previous lesson:** Review the three homework problems together. Answer any questions learners may have.

2. **Today's lesson:** Today's lesson will continue with interpreting information on a graph. We will focus on the pie chart and how to create them.

❓ Problem Solving Activity

1. Tell participants we are going to re-visit our example of favorite types of films.

Here were the results of a survey put into pie chart form:

How to Make the Pie Chart:

First, put your data into a table, then add up all the values to get a total:

Comedy	Action	Romance	Drama	SciFi	TOTAL
4	5	6	1	4	**20**

Favorite Type of Movie

sci-fi: 4 (20%)   comedy: 4 (20%)

drama: 1 (5%)

action: 5 (25%)

romance: 6 (30%)
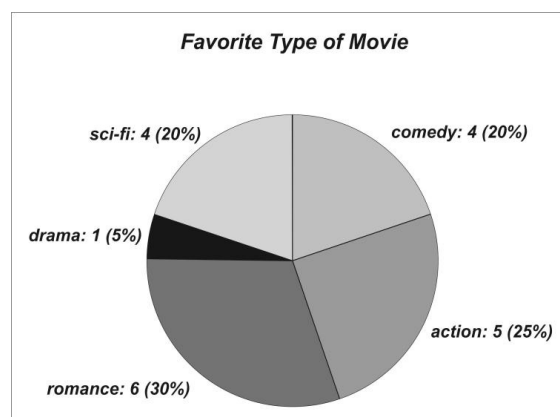
Next, divide each value by the total and multiply by 100 to get a percent:

Comedy	Action	Romance	Drama	SciFi	TOTAL
4	5	6	1	4	**20**
4/20 = **20%**	5/20 = **25%**	6/20 = **30%**	1/20 = **5%**	4/20 = **20%**	**100%**

Now you need to figure out how many degrees for each "pie slice" (correctly called a <u>sector</u>).

Remember a full circle has 360 degrees, so we do this next calculation to find out how many degrees each percentage takes:

Comedy	Action	Romance	Drama	SciFi	TOTAL
4	5	6	1	4	**20**
4/20 = **20%**	5/20 = **25%**	6/20 = **30%**	1/20 = **5%**	4/20 = **20%**	**100%**
4/20 × 360° = **72°**	5/20 × 360° = **90°**	6/20 × 360° = **108°**	1/20 × 360° = **18°**	4/20 × 360° = **72°**	**360°**
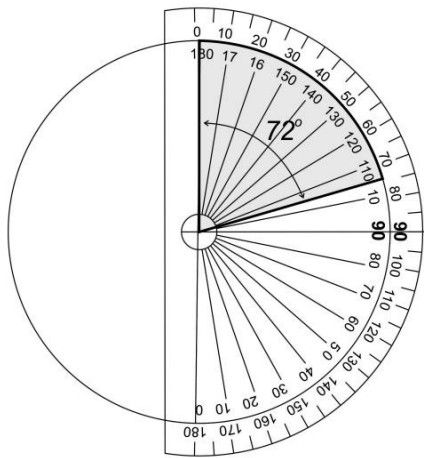
Now you are ready to start drawing!

Draw a circle.

Then use a protractor to measure the degrees of each sector. Here is the first sector on comedy.

Now you draw the other types of film in. You should end up with something that looks like the circle shown at the beginning.

✍ Guided Practice

1. Draw a circle and divide it in sectors according to the information below:

   In Mary's farm, there are 34 cows, 22 goats and 16 sheep. Each type of animal should be represented by a sector in the drawn circle.

2. Draw a pie chart representing the following results from students' tests. A is the highest score and D is the lowest score.

   Number of students getting A, B, C, or D:

A	B	C	D
4	12	10	2

⇪ Assessment and Reflection

1. Here is the pie chart of Binta's various daily activities you have seen before. What is the angle for the sector of the pie chart representing the time she spends playing sport? Find the angles of the other activities for homework.

   Time spent on daily activities
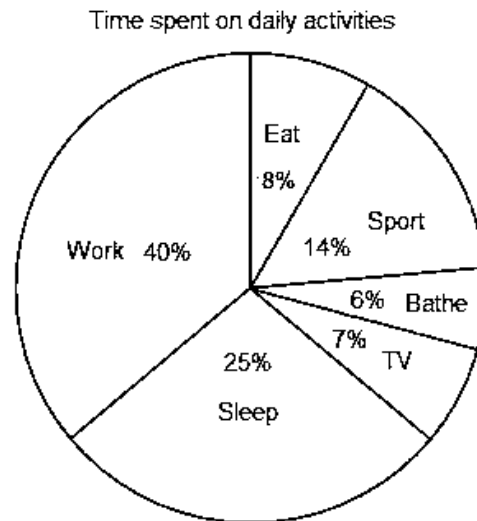
🏚 At Home

1. Complete the assessment assignment above. Find the number of degrees in each area.

✍Lesson 106 - 107: Statistics and Data Analysis: Interpreting Every Day Information

✓ **Objectives -** By the end of the lesson, learners will be able to:
    a. Follow the steps needed to make a pie chart from given data
    b. Interpret the meaning of pie charts
🕐 **Time Required:** 2 hours
✎ **Materials and Preparation:** standard materials

🔔 Opener

1. **Review of previous lesson:** Review the three homework problem together.

2. **Today's lesson:** Explain that today's lesson will continue with interpreting information on a graph and also look at how information can be presented in pictures. The format for this lesson will be different from the others. Different examples will be given, covering topics from the themes of all 6 modules.

❓ Problems

Below are several types of graphs, pictures and other ways of presenting information. Work on all the problems in your small group and then you will get assigned one of the problems to present back to the class.

1. Here are 2 different graphs that show the population in Liberia over time. Note that the data source is different for each graph so the numbers are not exactly the same. Answer the questions below.

Population between 1961- 2003 (in millions), Liberia

Population between 1961- 2003 (in millions), Liberia
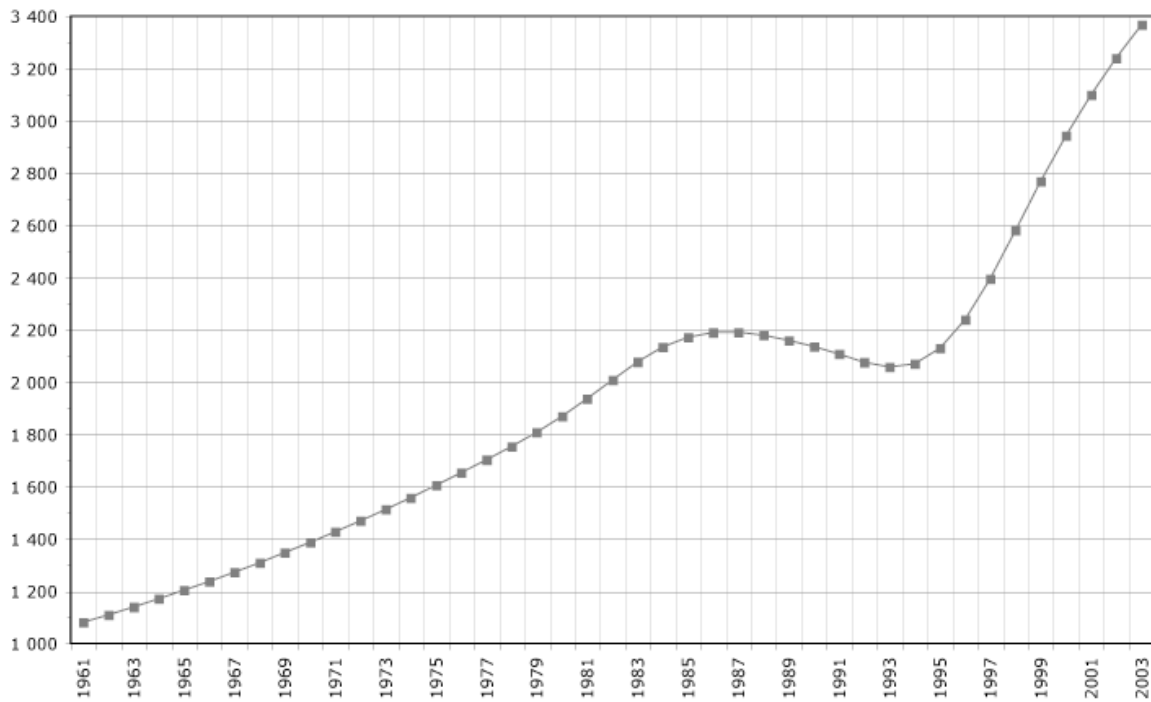
Source: http://en.wikipedia.org/wiki/File:Liberia-demography.png

Population between 1961- 2003 (in millions), Liberia

Source: http://www.tradingeconomics.com/liberia/population-total-wb-data.html
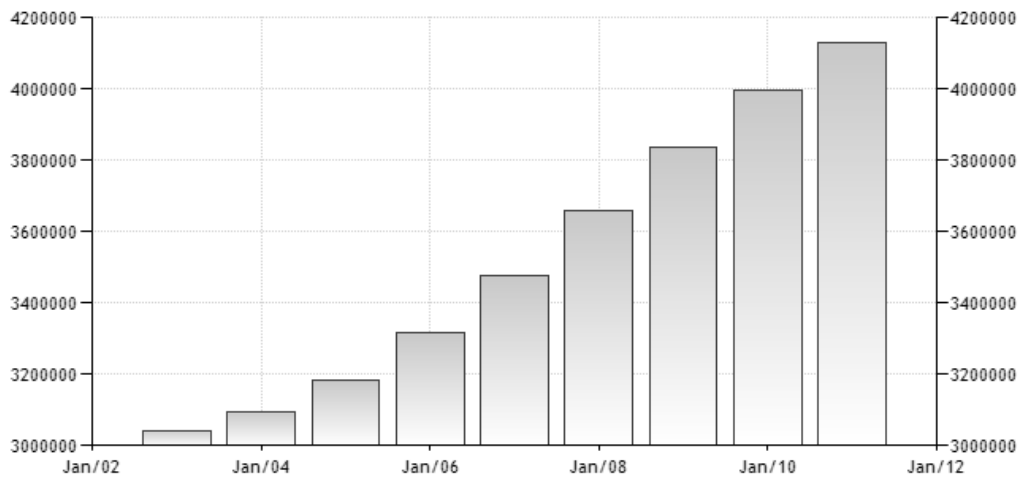
Look at the first graph. What was the approximate population in 1965? 1987? 1993? 2003?

    a. What happened to the population between 1987 and 1993? What change is there in the graph?

    b. Look at the first graph. What do you think will happen to the population after 2003?

    c. Look at the second graph. For what years does this graph provide data?

    d. Why is this graph different than the first? How could you make this graph look like the first one?

    e. What happens to the population between 2003 and 2011 according to the second graph?

2. Below is a pie chart of the gross domestic product (GDP) by sector. A simple way of understanding the GDP is that it represents the income made in a country. Answer the questions below.

GDP by Sector in 2006 (percentage)

Source: http://www.oecd.org/dev/emea/40578137.pdf
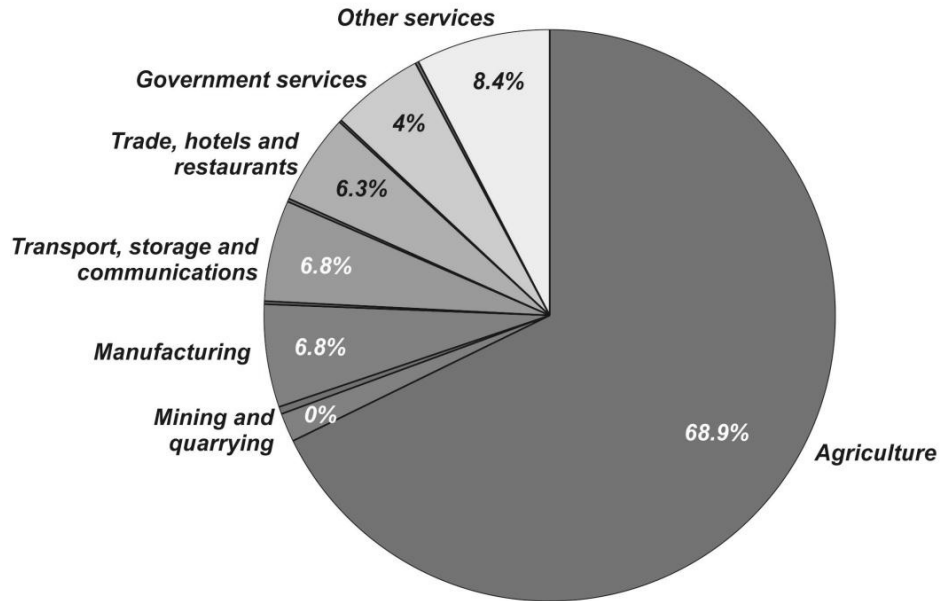
   a. Put the percentages and name of the sectors in ascending order (from smallest to largest).

   b. The majority of Liberia's income comes from which sector? How do you know?

   c. What percentage do manufacturing, transport, storage and communications, and government services make all together?

3. The graph below combines a line graph and a bar graph. Answer the questions below.

Rice Production Gap

a. What type of information does this graph provide?

b. What do the bars represent?

c. What information does the line represent?

d. Why is the line above the bars? What does that mean?

e. Compared to the 1960's, does the gap seem to be getting smaller or larger in 2010?

f. What advice would you give to the Liberian government based on this graph?

4. Information can also be presented in a picture format, not necessarily a graph. Look at the pictures below and answer the questions.

a. What does this picture represent? Explain the information.

Carnivore

Carnivore

Carnivore

Herbivore

Plant

A terrestrial food chain

| Quaternary Consumers |

| Tertiary Consumers |

| Secondary Consumers |

| Primary Consumers |

| Primary Producers |

Carnivore

Carnivore

Carnivore

Zooplankton

Phytoplankton

A marine food chain
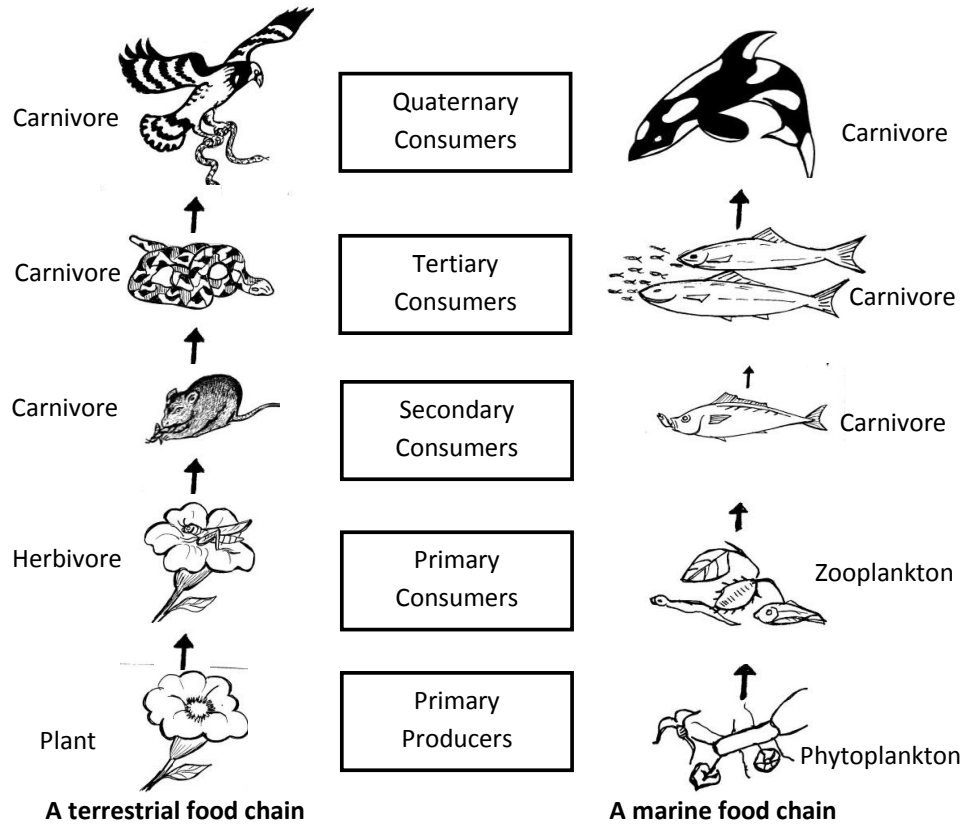
www.karimedalla.wordpress.com/

b. Here is another picture representing a scientific process. Describe what the process is, including the steps.

The Water Cycle

The Water Cycle
(The Hydrologic Cycle)
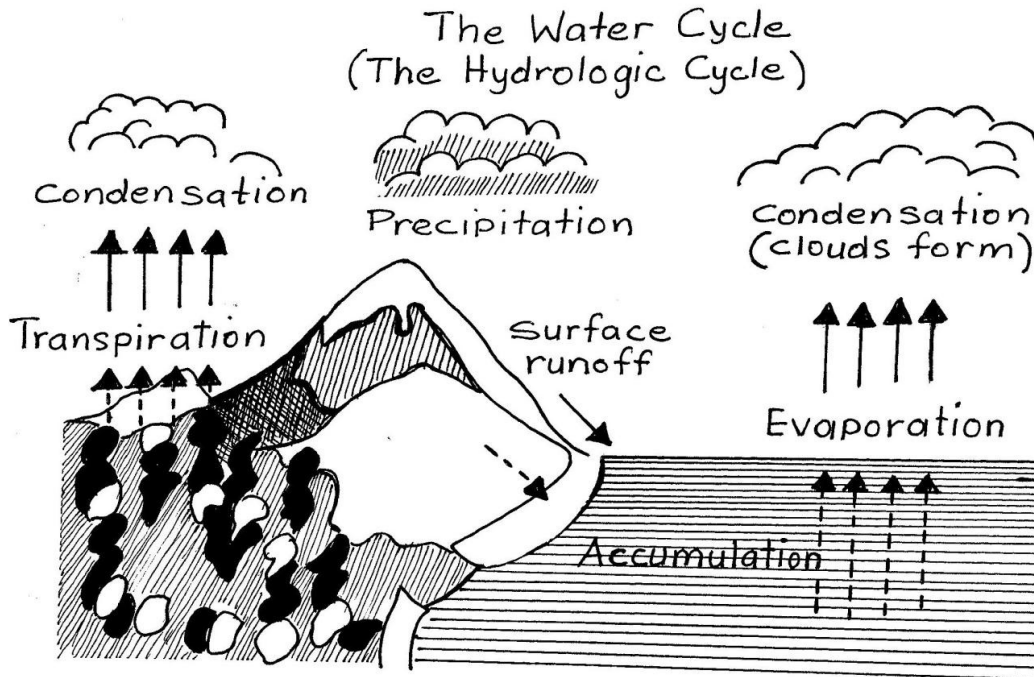
5. Below is yet another type of graph called a stacked bar graph. of how water is distributed on earth. Answer the questions.

Distribution of Earth's Water
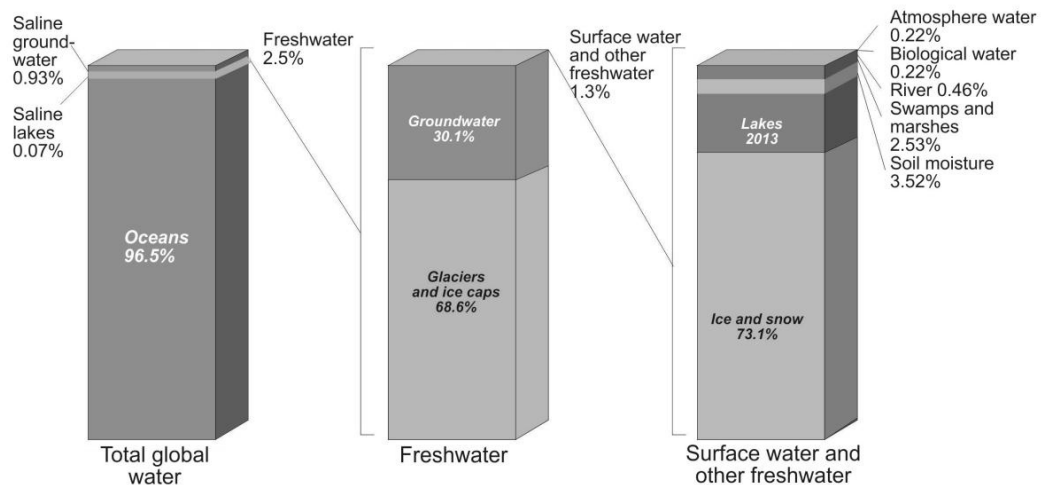
Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993
Water in Crisis: A Guide to the World's Fresh Water Resources.

a. What does this graph represent? What are each of the stacks?

b. What is most of the water in the world? What percentage of the water is it?

c. Freshwater makes up what percentage of the total global water?

d. Of the freshwater, how much is groundwater?

e. Think about the water we drink and use to wash with. Which category does it fall under? It makes up what percentage of the freshwater? Would you say the water we use to drink is abundant in the world?

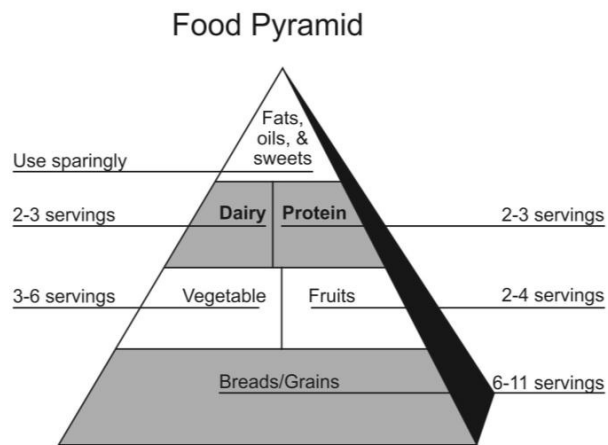6. Below are 3 pictures/graphs. What information do they represent? What type of information does each one provide? Is the information different or similar?

Food Pyramid

Use sparingly — Fats, oils, & sweets

2-3 servings — Dairy | Protein — 2-3 servings

3-6 servings — Vegetable | Fruits — 2-4 servings
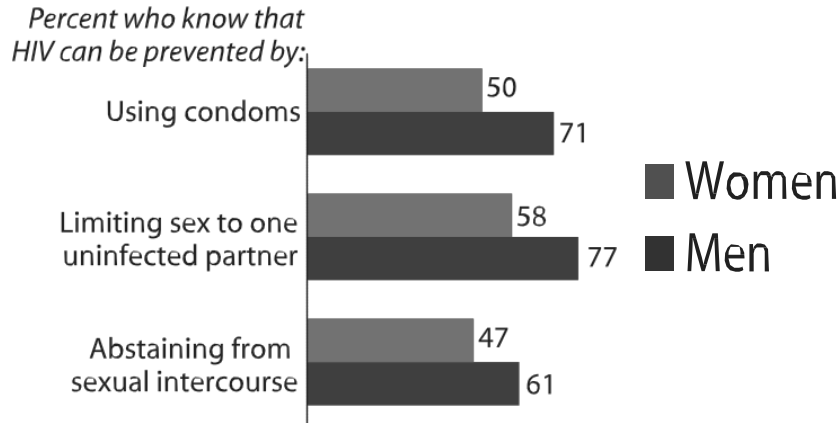
Breads/Grains — 6-11 servings

3 servings for women who are pregnant or breast-feeding, teenagers and adults under 24

The advised number of serving from each group varies depending on how many calories you take in each day. This in turn. depends on your activity level, body size, gender, age, and stage of life. U.S. Department of Agriculture.

7. Here are some health related graphs. The first is a horizontal bar graph. For each prevention, there are 2 bars. The top bar represents women and the lower bar for each prevention area represents the men. Answer the questions.

Knowledge of HIV Prevention
Percent of women and mean age 15 - 49

Percent who know that
HIV can be prevented by:

Using condoms
50
71

Women
Men

Limiting sex to one uninfected partner
58
77

Abstaining from sexual intercourse
47
61

a. Summarize what the graph is generally about.

b. Which prevention method seems to be best understood by both men and women?

c. Do men or women seem to have a better understanding of how to prevent HIV? Support your response with data.

d. Based on this data, what advice would you give to the Ministry of Health?

.

Congratulations! You have reached the end of the module.

✍ Lesson 108: Module F Assessment (for Learner)

Instructions: The assessment is based on what you have learned in this module and will take one hour. In this assessment, there are 9 questions with different parts. Read the instructions for each question and solve to provide the correct answer. Good luck!

1. Answer the questions based on the following set of numbers:
   25, 45, 95, 15, 10, 30, 100, 30, 55

   a. Find the mean of the numbers.   *(4 pts)*

   b. Find the mode.   *(4 pts)*

   c. Find the median.   *(4 pts)*

   d. What is the range of the numbers?   *(4 pts)*

2. The daily wages of six construction workers is LD $650, $400, $800, $500, $450, $500.

   a. Find the mean daily wage.   *(4 pts)*

   b. Find the mode.   *(4 pts)*

   c. Find the median.   *(4 pts)*

   d. Find the range.   *(4 pts)*

3. The ages of learners in the class are:

```
15  18  16  20  22
24  16  17  18  21
21  15  16  22  19
```

a. Complete the frequency table below using the above marks. *(4 pts)*

Ages	Tally	Frequency
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		

b. Represent the data in a bar graph.   *(5 pts)*

c. Find the mean age.   *(4 pts)*

d. What is the mode?   *(4 pts)*

4. Uncle Kai measured the daily rainfall in mm at the same spot in his garden for each day in the year (365 days). He recorded his results to the nearest millimeter. The results are shown in the following histogram:
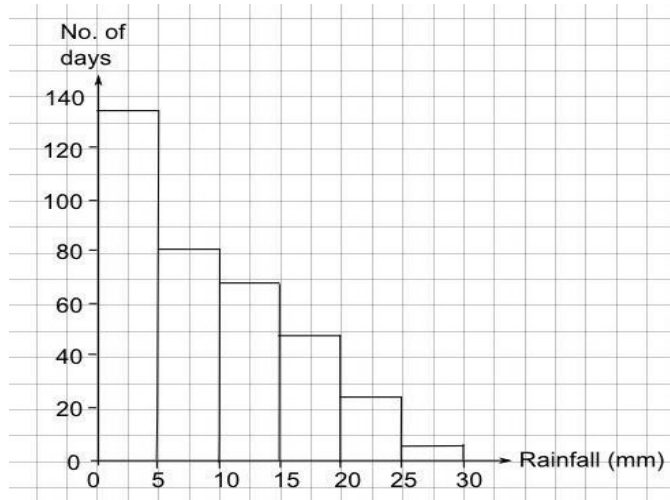
a. On approximately how many days was the rainfall between 0 and 5 mm? *(4 pts)*

b. On approximately how many days was the rainfall between 10 and 20 mm? *(4 pts)*

c. On approximately how many days was the rainfall less than 10 mm? *(4 pts)*

d. What is the range of rainfall?   *(4 pts)*

5. The following pie chart represents Binta's monthly expenditure and savings. (The numbers are degrees in the circle.) If she earns LD $2,500 per month, calculate how much she spends on each item.

Monthly Expenditure and Savings
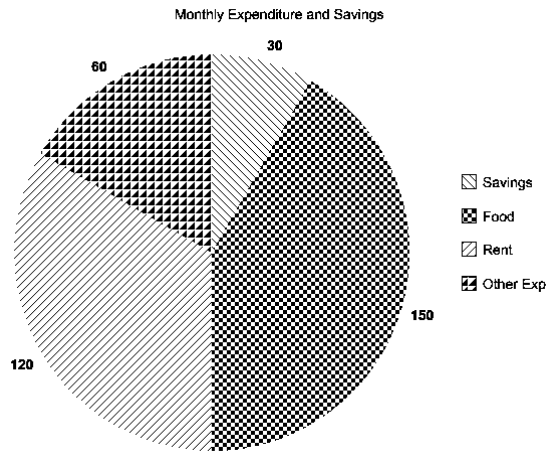
a. Rent =   *(5 pts)*

b. Food =   *(5 pts)*

c. Savings =   *(5 pts)*

d. Other Expenses =   *(5 pts)*