

# *Discovering Math: Beginning Measurement*

## Teacher's Guide

**Grade Level:** K–2

**Curriculum Focus:** Mathematics

**Lesson Duration:** Three class periods

### **Program Description**

*Discovering Math: Beginning Measurement* – From linear measurements to the telling time to counting money, introduce young students to the basic properties and concepts of measurement.

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### **Lesson Plan**

#### *Student Objectives*

- Demonstrate the basic measures of length, width, height, weight, and temperature by measuring objects and recording the information.
- Demonstrate how time is measured by recording it to the nearest minute.
- Count money using coins and bills.

#### *Materials*

- *Discovering Math: Beginning Measurement* video
- Ruler
- Tape measure
- Yardstick
- Scale, such as a bathroom scale
- Large, alcohol-based thermometer
- Classroom objects to be measured and weighed (pencil, box, book, desk, etc.). Be sure the objects can be easily measured with the tools you are using.
- Weekly-sales circulars
- Clock (Judy Clocks, if possible)
- Charts 1–6 (see below)

## Procedures

1. Display a ruler, yardstick, tape measure, and scale. Explain to students that these tools are used to measure.

The ruler, tape measure, and yardstick are tools for measuring the length, width, and height of an object. Model how to use these tools by lining up the end of an object with the end of the tool and identifying the nearest inch as the length, width, or height.

The scale is used to find the weight of an object. Model how to place an object on the scale and read the display (display will vary depending on type of scale teacher is using).

Set up two stations for students to practice measuring length, width, height, and weight.

- Station 1 – Place several classroom objects and the ruler, tape measure, and yardstick at the station. Have students take turns using the measuring tools to find the length, width, and height of each object. They should record their measurements in Chart 1 Measuring the Length, Width, and Height of Objects. Then they can compare and discuss measurements using terms like greater than, less than, longer, and shorter.
- Station 2 – Place several classroom objects and the scale at the station. Have students take turns weighing each object. They should record their measurements in Chart 2 Measuring the Weight of Objects. Then they can compare and discuss measurements using terms like greater than, less than, heavier, and lighter.

The students' abilities will determine the amount of guidance and support needed at each station. For very young students one or two objects to measure are sufficient.

As an extension students can go outside and find the length, width, and height of larger objects. They can find the perimeter of the playground, the length of the slide, or draw large boxes with sidewalk chalk and measure the length and width.

2. Ongoing activity – Show students a thermometer. Ask them what a thermometer is used for. Elicit responses and have them share their ideas. If possible, let students handle and observe the thermometer. Model how to read the temperature on the thermometer.

Tell students that a thermometer will be placed outside and they will take turns reading the thermometer to find out the temperature every day. The daily temperature will be recorded throughout the year on a temperature chart. Discussions regarding the daily temperature can accompany the reading (today is colder or warmer than yesterday by \_\_\_ degrees).

3. Show students a penny, nickel, dime, quarter, and one-dollar bill (students' abilities should determine the bills and coins that are introduced in this activity). Ask them the value of each piece of money. Record the answers on the board.

Practice identifying the bills and coins that can be combined to make specific amounts of money. (\$.37 = 1 quarter, 1 dime, and 2 pennies, or 3 dimes, 1 nickel, and 2 pennies, or 37 pennies.)

Have students work in pairs. Distribute a weekly-sales circular to each pair. Have students identify an item from the circular, write down the price, and then determine the bills and coins

needed to purchase the item. They should record their information in Chart 3 Buying Items at the Store.

Young students, with introductory monetary skills, can use Chart 4 Bills and Coins Activity instead of the weekly sales circular. Assign values in the "Amount of Money" column and have them complete the "Bills and Coins Needed" section.

As an extension students can create a whole shopping list, determine the total price of the items, and identify the bills and coins needed to make the purchase.

4. Show students a clock (Judy Clock, if possible). Ask them why we use clocks and what clocks measure. Have them discuss their ideas. Explain that clocks are used tell time and to measure the passing of time.

If possible, let students work with their own clocks. Display a time on the clock. Ask them to read the time. Continue to practice telling time.

Tell students they are going to make a daily schedule using their clocks. Go through each activity of the day, including the start time and end time. Students should follow along by displaying the times on their clocks and recording the information Chart 5 Daily Schedule. It may be helpful to display each time as a model for the class.

If students are able they can determine the amount time that elapsed during each activity, using Chart 6 Daily Schedule Including Elapsed Time.

As an extension students can create their own daily schedule or make their weekend schedule. More advanced students can practice telling and displaying time in five-minute intervals.

## Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students produced complete charts, including all the requested information; clearly demonstrated the ability to measure length, width, height, weight, and temperature, count bills and coins, and tell and display times on a clock.
- **2 points:** Students produced adequate charts, including most of the requested information; satisfactorily demonstrated the ability to measure length, width, height, weight, and temperature, count bills and coins, and tell and display times on a clock.
- **1 point:** Students produced incomplete charts with little or none of the requested information; did not demonstrate the ability to measure length, width, height, weight, and temperature, count bills and coins, and tell and display times on a clock.

## Vocabulary

### clock

*Definition:* A device used for measuring or telling time

*Context:* The clock on the wall showed the students it was 3:00 p.m. They knew there were only ten more minutes of recess.

### ruler

*Definition:* A straight strip of material (plastic, wood, or metal) marked off in units and used for measuring

*Context:* The students used a ruler to find out that the length of the book was eight inches.

### scale

*Definition:* A balance or other device used for weighing objects

*Context:* The teacher placed the block on the scale to measure its weight. The block weighed 13 pounds.

### schedule

*Definition:* A list showing the order in which items might be completed

*Context:* Each team created a schedule to show when they would complete each section of the project.

### tape measure

*Definition:* A tape (metal or cloth) marked off in units and used for measuring

*Context:* The students used a tape measure to find out that the height of the desk was 28 inches.

### thermometer

*Definition:* An instrument used for measuring temperature

*Context:* The students look at the thermometer every day to find out what the temperature is outside.

### yardstick

*Definition:* A measuring stick that is one yard, or three feet, or 36 inches long

*Context:* The students used a yardstick to find out that the length of the driveway was 10 yards, or 30 feet, long.

## Academic Standards

### Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following benchmarks:

- Mathematics: Understands and applies basic and advanced properties of the concepts of measurement.

### National Council of Teachers of Mathematics (NCTM)

The National Council of Teachers of Mathematics (NCTM) has developed national standards to provide guidelines for teaching mathematics. To view the standards online, go to <http://standards.nctm.org>.

This lesson plan addresses the following standards:

- Understand how to measure using nonstandard and standard units.
  - Select an appropriate unit and tool for the attribute being measured.
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## Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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## DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

### How to Use the DVD

The DVD starting screen has the following options:

**Play Video** – This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

**Video Index**—Here the video is divided into chapters indicated by title. Each chapter is then divided into four sections indicated by video thumbnail icons; brief descriptions are noted for each section. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

**Quiz**—Each chapter has four interactive quiz questions correlated to each of the chapter's four sections.

**Standards Link**—Selecting this option displays a single screen that lists the national academic standards the video addresses.

**Teacher Resources**—This screen gives the technical support number and Web site address.

## Video Index

### I. Basic Measures (5 min.)

#### **Basic Measures: Introduction**

Measurements help us learn about the world. They help us complete useful activities, from weighing ourselves to building a house.

#### **Example 1: Length, Width, and Height**

We can measure the length, width, and height of anything. See measurements taken of a small box and of a humpback whale and giraffe.

#### **Example 2: Weight**

Weight is a measure of how heavy or light an object is. Things get measured on different types of scales. A baby crocodile and a rhinoceros are not weighed using the same tool.

#### **Example 3: Temperature**

Temperature is a measure of how hot or cold something is in degrees Fahrenheit or Celsius. Air temperature varies in different places, over wide areas, and even among locations at the beach.

### II. Measuring Time (5 min.)

#### **Measuring Time: Introduction**

Events occur as time passes. We have many ways to measure time, from movement of shadows to changes of a clock.

#### **Example 1: Days, Months, and Years**

The passage of days, months, and years can be measured using a calendar and by recognition of special events. The moon changes its appearance over the course of about a month before it repeats its cycle.

#### **Example 2: Hours and Minutes**

We measure passage of hours and minutes using clocks. The minute hand moves all the way around in one hour, and the hour hand in 12 hours. TRT: 1:22

**Example 3: Seconds**

We measure seconds on a clock by movement of the second hand. A second is about the amount of time it takes to breathe in.

**III. Counting Money (5 min.)**

**Counting Money: Introduction**

Money was not always the form we know today as currency and coins. We learn the values of other objects and how to add them.

**Example 1: Counting Coins**

Different coins have different values. Groups of coins with lesser value can have the same value as a single coin.

**Example 2: Counting Dollars and Coins**

Dollar bills and coins can be combined to get larger values. Change for larger bills results from subtracting the value of the payment from the value of the larger bill.

**Example 3: Counting Higher Bills**

Amounts of money larger than five dollars can be conveyed by coins and bills. See how to count money with different larger values.

**IV. Measuring Length (6 min.)**

**Measuring Length: Introduction**

Measurement is comparing one object to another with a known size. Two boys remodel a room for a friend, including making a structure by cutting lengths of bamboo.

**Example 1: Measuring Length in Inches**

Length is measured in inches using a ruler or tape measure. To measure accurately, the zero at the end of the measuring tool must line up with one end of the object measured.

**Example 2: Measuring a Pool – Two Systems**

Items or distances can be measured in yards in the customary system or meters in the metric system. The customary system includes inches, feet, and yards.

**Example 3: Measuring Race Tracks**

For longer distances, the customary system uses miles and the metric system uses kilometers. To measure the size of a circuit on a racetrack, start at zero.

**V. Telling Time (6 min.)**

**Telling Time: Introduction**

Telling time is a way to know what part of the day it is. People use clocks to tell time, which is stated in hours and minutes.

**Example 1: The Hands Tell All – Hours**

For clocks with hands, the positions indicate the time. When the minute hand points to 12, the time is evenly an hour. For digital clocks, an even hour is indicated by its number followed by two zeros.

**Example 2: Two Cycles and Half-hours**

The clock goes through two cycles of hours in a day, twelve hours each. A half-hour is indicated by the minute hand pointing to the 6.

**Example 3: Minutes to Go**

Quarter-hours are indicated by the minute hand pointing to 3 or 9. The numbers around the clock indicate intervals of 5 minutes of the minute hand's movement.

**VI. Estimating Measurements (6 min.)**

**Estimating Measurements: Introduction**

Estimating amounts or measurements is useful when a more exact number is not needed. Builders can estimate the materials they'll need to build a house.

**Example 1: Estimating Length**

We estimate the amount of space along a wall in units of floor tiles to see if furniture will fit in the space.

**Example 2: Estimating Weight**

The weight of a piece of cheese can be estimated by comparing it to a piece of cheese with known weight.

**Example 3: Estimating Time**

Angela estimates how long it will take to walk to school, using other information she knows. Her sister estimates how long it will take to clean her room by adding the estimated times of the tasks.

**Quiz**

**I. Basic Measures**

1. What are scientists doing when they compare objects to a set of standard units?
  - A. measuring
  - B. riding a horse
  - C. building a house
  - D. drawing a picture
2. What tool can you use to measure the length, width, and height of a box?
  - A. ruler
  - B. scale
  - C. thermometer
  - D. measuring cup

*Answer: A*

*Answer: A*

3. How can people figure out how heavy they are?
  - A. take their temperature
  - B. measure how tall they are
  - C. weigh themselves on a scale
  - D. measure the length of their legs

*Answer: C*

4. Why would someone use a thermometer?
  - A. to measure width
  - B. to measure height
  - C. to measure weight
  - D. to measure temperature

*Answer: D*

## II. Measuring Time

1. What does a sundial measure?
  - A. time
  - B. sunlight
  - C. darkness
  - D. temperature

*Answer: A*

2. How many months are in one year?
  - A. 4
  - B. 7
  - C. 10
  - D. 12

*Answer: D*

3. How many minutes are in one hour?
  - A. 5
  - B. 12
  - C. 24
  - D. 60

*Answer: D*

4. About how long does it take for you to breathe in?
  - A. one week
  - B. one hour
  - C. one second
  - D. one minute

*Answer: C*

### III. Counting Money

1. What do you need to buy a new toy?
  - A. art
  - B. stones
  - C. masks
  - D. money

*Answer: D*

2. Jack has two nickels and one penny. How much money does he have?
  - A. \$.06
  - B. \$.10
  - C. \$.11
  - D. \$.21

*Answer: C*

3. How many quarters equal one dollar?
  - A. 2
  - B. 4
  - C. 5
  - D. 10

*Answer: B*

4. Lara has one ten-dollar bill and two one-dollar bills. How much money does she have?
  - A. \$7
  - B. \$10
  - C. \$12
  - D. \$22

*Answer: C*

#### IV. Measuring Length

1. What tool do the boys use to measure the length of the bamboo sticks?
  - A. saw
  - B. scale
  - C. tape measure
  - D. thermometer

*Answer: C*

2. What is the first thing you do to measure the length of an object?
  - A. put the object in the middle of the scale
  - B. place the end of the object with the 1 on the ruler
  - C. use a thermometer to measure the length of the object
  - D. line up the zero at the end of the ruler with the end of the object

*Answer: D*

3. About how long is one meter?
  - A. 1 inch
  - B. 1 foot
  - C. 1 yard
  - D. 1 mile

*Answer: C*

4. Amy wants to measure the distance from her house to the grocery store across town. What unit of measurement should she use?
  - A. mile
  - B. foot
  - C. yard
  - D. inch

*Answer: A*

#### V. Telling Time

1. What tool measures time?
  - A. scale
  - B. ruler
  - C. clock
  - D. thermometer

*Answer: C*

2. What time is it if the hour hand (the short hand) points to the 7 and the minute hand (the long hand) points to the 12?
  - A. 12 o'clock
  - B. 7 o'clock
  - C. 5 o'clock
  - D. 3 o'clock

*Answer: B*

3. How many minutes are in a half-hour?
  - A. 15
  - B. 30
  - C. 45
  - D. 60

*Answer: B*

4. How many minutes past the hour is it when the minute hand (the long hand) points to the 4?
  - A. 4
  - B. 15
  - C. 20
  - D. 30

*Answer: C*

## VI. Estimating Measurements

1. Jessica wants to know about the length of her long piece of wood. What can she do to find a length that is close to the total length of the wood?
  - A. estimate
  - B. subtract
  - C. play with the wood
  - D. divide the wood into smaller pieces
2. You would like to put new pillows on your couch. Each pillow is about one foot wide and your couch is about five feet long. What is the highest number of pillows that would fit on your couch?
  - A. 1
  - B. 3
  - C. 5
  - D. 9

*Answer: C*

3. If one pound of cheese makes about eight sandwiches, about how many sandwiches can you make from half a pound of cheese?
- A. 2
  - B. 4
  - C. 10
  - D. 16

***Answer: B***

4. Angela wants to estimate how long it will take to do her homework. She has about 10 minutes of math, about 5 minutes of science, and she will read for 10 minutes. What is a good estimate for how long Angela will spend on her homework?
- A. 15 minutes
  - B. 20 minutes
  - C. 25 minutes
  - D. 35 minutes

***Answer: C***

*Chart 1*

Measuring Length, Width, and Height of Objects

Object	Length	Width	Height

*Chart 2*

Measuring the Weight of Objects

Object	Weight

*Chart 3*

Buying Items at the Store

Item	Cost	Bills and Coins Needed

*Chart 4*

Bills and Coins Activity

Amount of Money	Bills and Coins Needed

*Chart 5*

Daily Schedule

Activity	Start Time	End Time

**Chart 6**

Daily Schedule Including Elapsed Time

Activity	Start Time	End Time	Elapsed Time