The learner will recognize and use standard units of metric and customary measurement.

2

2.01 Estimate the measure of an object in one system given the measure of that object in another system.

Notes and textbook references

Students need to have a solid understanding of the measurement units before they can ever begin to compare estimating within the two systems. In order for students to gain this understanding, they need to experience measuring a variety of objects throughout the entire year, and to have ample opportunities to measure benchmarks for each of the units.

A. Hold up an object each day for the students to estimate its measure in a given system. Find the actual measurement of the object in that system. Help students estimate that object in the other system. Be sure students share their strategies for finding these estimates. The teacher may first need to model strategies and thinking that is not understood by the class.

B. Students must have good benchmarks for each of the measurements in order to be able to make reasonable measurement estimates of objects. Help students find benchmarks for the measurements of each of our two systems for units of linear, mass, and capacity measurements.

C. After students have made benchmarks for the units of both systems, allow them to practice measuring objects. Students need to have a good feel for each of the units before they can begin estimating and comparing units within the two different systems.

D. Give students a variety of items to weigh (apples, books, shoes, sweaters, . . .). Weigh objects in pounds. Convert to ounces. Complete similar activities with grams and kilograms.

Notes and textbook references

E. Students need to practice comparing units in the two systems to understand which system has the larger unit. Students can cut string or adding machine tape that is one meter long and another piece one yard long. Label the two strips. Compare to see which is largest unit of linear measurement. Does this hold true for comparisons of linear measurement throughout the two systems? If an inch is larger than a cm, have students conjecture to see if all the Customary System length units are larger than the metric system unit for length. Is a yard longer than a meter? A mile longer than a kilometer? Try to get the students to come up with a way to remember which is longer. There are some sayings like, "a liter is a quart and a swallow." If students determine some saying or way to remember which unit is larger, it will help them to remember measurements more accurately.

F. After students have had ample practice using their benchmarks and creating sayings ask them to use their knowledge of benchmarks and measurements to make estimations of objects in one system to another. Have the students create questions that give objects in one unit and ask for the objects in another. Assign groups one of the following system comparison units; in-cm, m-yd, qt-l, lbs-kg, and miles–km. Have them write questions on the front of index cards and determine the answers for the back. Example: If I live 12 miles from school, about how many kilometers would that be? Hold class discussions on the different strategies used to find the estimates for the different systems.
NOTE: Students do <u>not</u> need to be taught exact conversions!

G. Although this objective does not specify that students should formulate problems, this approach is very powerful. Have students work in small groups to write application problems in the following domains: length, weight, time, capacity, temperature, perimeter, and area. Emphasize the need for the problems to include both standard and metric measurement. If students choose to write separate problems for each domain and type of measurement system, they should have a minimum of 14 problems when they finish. Of course, they also need to be able to solve the problems they write and/or evaluate the answers. If the problems they create are open-ended, they need to be accompanied by some kind of rubric or scoring guide. Tell them that the five most challenging problems will be used to test the skills of another fifth-grade class. If possible, work with another fifth-grade teacher to arrange this swap of the five most challenging problems from each class.

Notes and textbook references

H. Have your students predict the distance they can throw a paper plate. (Use inches, feet, yards or centimeters, meters). Make a chart like this:

Student	Prediction	Actual Toss		
		Inches	Feet	Yards
Maria	2 feet	31″	2′ 7″	$\frac{31}{36}$ yd.
Sam	7 feet	78″	6′ 6″	2 $\frac{1}{6}$ yd.
Lee				

or like this:

		Actual Toss	
Kara	50 cm	72cm	0.72m
Jamal	2m	125cm	1.25m
Debbi			
Brad			

Notes and textbook references

2.02 Identify, estimate, and measure the angles of plane figures using appropriate tools.

A. Look at a set of capital letters of the alphabet. Classify letter as to acute, obtuse or right angles. Which letters use more than one type of angle? See Blackline Master II - 1.

B. Review types of angles, acute, obtuse, right, and straight. If you have not already, talk about the number of degrees in each. Use two pencils, rulers, paper plate angle makers to model angles of different sizes, and ask students to estimate the number of degrees. This step is critical to the process of using a protractor to measure. It isn't so important how close they are to the correct measure as that they have a measure between 90° and 180° for obtuse angles, and between 0° and 90° for acute angles.

Next you will ask students to select the correct measurement of an angle from two choices. Both appear at the same place on the protractor. Only one answer could possibly be right, but often students will choose the wrong one when measuring, and very few, myself included, can remember the rule about which way the angle points and whether to use the top or bottom number. This activity helps them see the importance of having a good estimate in mind before using the protractor.

As you either make angles with rulers, or draw them on the board, display the pair of answer choices and ask students to choose the correct one and explain why.

a. 30 or 150
b. 70 or 110
c. 80 or 100
d. 20 or 160

C. Is it possible to draw a triangle with more than one acute angle? More than one right angle? More than one obtuse angle? Why or why not? How about quadrilaterals? Can you draw a quadrilateral with only acute and obtuse angles? Acute and right? Right and obtuse? Why?

Notes and textbook references

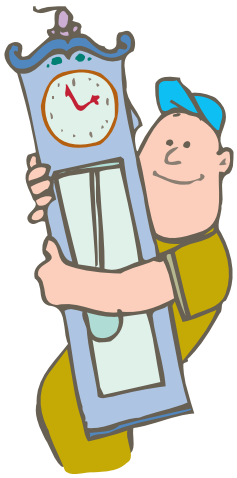
D. Have each student draw an angle on an index card (5 x 8). Collect the cards and number them from 1 to the number of students in the class. Put a card on each student's desk in random order. Have the students number their papers from 1 to the number of cards used. On the sign of "go", the students measure the angle on the card with a protractor, recording the answer beside its matching number. After a few minutes, say "go" and the students move to the next desk. Repeat the process until the students have traveled to each desk.

E. Have the students print their names. Ask the students to examine their names for obtuse angles, acute angles, right angles, vertical lines, and horizontal lines. Make a chart. Compile the data. Arcs and slanted lines can also be included.

F. With a partner, study the letters of the alphabet. See Blackline Master II - 1. Find the value of each letter using the following:

- Acute angles are worth 6¢
- Obtuse angles are worth 8¢
- Right angles are worth 5¢
- Vertical lines are worth 3¢
- Horizontal lines are worth 4¢

Challenge: Find the most valuable 5-letter word.



G. At various times in the day look at the hands on an analog clock. What kind of angle is formed? What angle is formed when you go to music? Gym? Lunch? Use manipulative clocks to make angles.

H. Give each student a magazine picture depicting life in North Carolina. Have each student trace acute angles with red, trace obtuse angles with blue, and trace right angles with green.

Notes and textbook references

I. Have students make a shape with many different kinds of angles. Then, cut out the shape carefully. Now mark the angles in colors, using the key:

green - right angles
red - less than a right angle (acute)
blue - between a right and straight angle (obtuse)
purple - greater than a straight angle

Ask students to give their shape an interesting name. Finally, record the biographical information as listed below:

My Snazzy, Jazzy, Angular Shape

_____number of right angles
_____number of acute angles
_____number of obtuse angles
_____number of angles greater than a straight angle
_____grand total of angles in my shape

J. Construct "angle makers" with two strips of tag board or heavy cardstock and a brad. Students can demonstrate their geometric vocabulary as they describe the angles generated. Other "angle makers" can be constructed with two straws or coffee stirrers and a pipe cleaner as a connector. Challenge students to adjust their angle to a given measure like 30º and then measure to see how close they are.

K. Begin by modeling for students how to measure angles with a protractor. This modeling needs to include how to extend the rays of an angle when necessary for measurement purposes. Of course, the other issue is which number to read. If students will relate measures of less than or greater than 90º to acute and obtuse angles, this might be less confusing. If they record their measures in a table, students might notice some interesting relationships.

Notes and textbook references

L. Have students draw three angles on a sheet of paper. Students then trade papers and label the other person's angles with vertex, rays, interior and exterior of the angle. Measure each angle.

M. Give students many different kinds and sizes of triangles, quadrilaterals, etc. Have students measure each angle and record the results in a table. The table could show information as indicated in the box to the left. Have students color all acute angles blue and obtuse angles yellow. Have students discuss any patterns they observe. See Blackline Masters II - 2 through II - 10.

Triangles	∠1	∠2	∠3

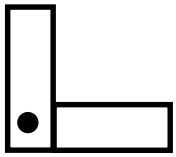
Quadrilaterals	∠1	∠2	∠3	∠4

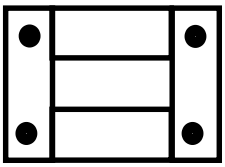
N. Model how to draw angles of specific measure using a protractor. Be sure to use the vocabulary related to angles: vertex, ray, interior, and exterior angles. Have students create a list of instances in which someone might need to use a protractor to draw a specific angle. Invite role models such as architects, draftpersons, airplane pilots, ship's captain or navigators etc. to explain how this skill, and others, fit into their career.

Notes and textbook references

O. Have student make figures on a geoboard, make triangles which illustrate acute, obtuse and right angles. Can you make a triangle that has an obtuse, an acute and a right angle in the same figure? Why or why not?

P. Make a georule by connecting two strips of stiff paper 2″ x 12″ with a paper fastener. Use it to make different angles. Connect more pieces to make polygons.





Q. Have students use their elbows and arms to illustrate angles. Have students model with their bodies right, obtuse, and acute angles.

R. Write the words “North Carolina” in all capital letters.

NORTH
CAROLINA

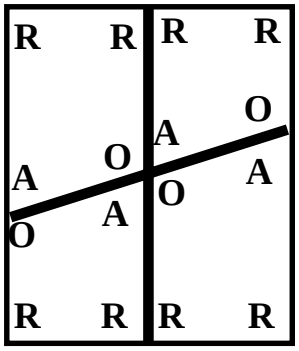
Make copies (see Blackline Master II - 11) and distribute to the class. Students use a red crayon to shade in right angles; blue to shade in obtuse angles; yellow to shade in acute angles.

S. Students classify shapes according to whether they contain right angles only, all angles smaller than a right angle, or at least one angle larger than a right angle.

Notes and textbook references

T. Use the corner of a piece of newspaper or tagboard as a "right angle tester." Start a class list of right angles found in the room.

U. Draw two lines on a piece of paper. Make the lines connect the opposite edges. Lightly shade the front of the paper. Cut along these lines and then label each angle: A = acute, O = obtuse, R = right. Put the puzzle pieces back into a rectangle. Do you notice any patterns?



V. Use toy houses or small cardboard food boxes to set up a village. Draw a picture of this with a city park, houses, mall, etc. that includes parallel, perpendicular and intersecting lines as well as acute, right and obtuse angles.

W. Use a door swinging on a hinge to model angles. Put masking tape on the floor to mark where the door is when closed. Open the door different distances and mark the other rays with tape.

X. Plastic stir sticks can be joined with small sections of pipe cleaners to create a variety of angles and shapes. Slip one end of the pipe cleaner into a stir stick and the other end into a second stir stick. Then the two stir sticks can be formed into an angle held in place by the bend in the pipe cleaner. The students will create books illustrating a certain type of angle. A page from the "Acute Angle" book might show the hands of a clock at 1:00 with text from the nursery rhyme, "Hickory Dickory Dock, the mouse ran up the clock, etc.". This approach will also encourage students to notice angles in their environment in order to incorporate these ideas into books.

Notes and textbook references