

**What's Your Benchmark?**

ID: 12291

**Time required**

45 minutes

**Activity Overview**

*This activity introduces students to the importance of benchmarks when estimating measurements. Students will also use the **Convert** menu to change from one unit to another.*

**Topic: Measurement**

- *Apply appropriate techniques, tools, and formulas to determine measurements*
- *Use common benchmarks to select appropriate methods for estimating measurements*

**Teacher Preparation and Notes**

- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it.*
- *The StudyCard application needs to be loaded on the TI-73 calculator before beginning the activity. To download the app, go to [education.ti.com](http://education.ti.com).*
- ***To download the student worksheet and calculator file, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter “12291” in the quick search box.***

**Associated Materials**

- *MGAct21\_Benchmark\_worksheet\_TI73.doc*
- *BNCHMARK.73v*

**Suggested Related Activities**

*To download the activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the quick search box.*

- *Measurement Benchmarks (TI-73 Explorer with TI-Navigator) — 6689*
- *Estimation and Precise Measurement (TI-73 Explorer) — 6246*
- *Geometry and Measurement (TI-73 Explorer) — 5197*

**Problem 1 – Finding Benchmarks**

Questions 1-10

Helping students find memorable benchmarks for standard measurements will help them determine reasonableness of answers and to make reasonable estimates of measurements. Students may find very individual items that they can remember.

**Problem 2 – Calculator Measurements**

As a part of finding benchmark measurements, having students compare benchmarks to a non-standard unit, a TI-73. Again, a goal of this set of questions is to help students with estimation using a benchmark.

Questions 11-14

Although students should estimate the number of TI-73s that are equal to a given length, you could also allow groups to line their calculators up and compare to a yardstick or tiles on the floor.

Students' estimation skills should be improving as they progress through the lesson. If students' estimations are considerably off, have them provide justification for their estimate. Communicating why they feel an estimate is appropriate may provide insight as to how they are over or under estimating a given length.

Question 15

After performing several estimates, students should begin to see the value of having a benchmark in their mind for making estimates. Emphasize that having a benchmark in mind can help in many situations, including testing situations. Students can use benchmarks to help determine if an answer selection is reasonable.

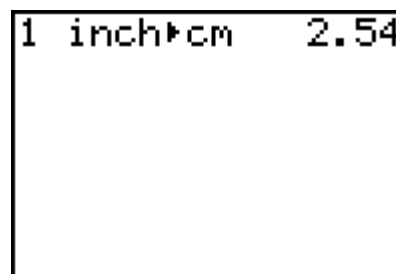
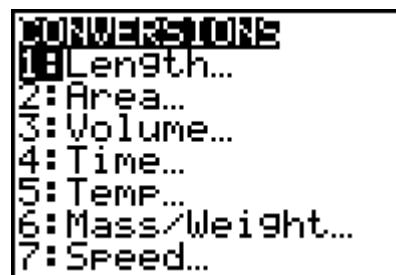
**Problem 3 – Benchmark Challenge**

Questions 16-20

Students should select at least one unit to compare with the first unit. This exercise will help students look at relative size of unit and compare them.

From a clear home screen, press the following for Question 16.  $\boxed{1}$   $\boxed{2nd}$   $\boxed{UNIT}$ , and  $\boxed{1}$  for Length, then  $\boxed{4}$   $\boxed{2}$ , and  $\boxed{ENTER}$  to evaluate. This will convert 1 inch to centimeters. Each of the other conversions can be done in a similar manner.

You may want to encourage students to convert to several different units and discuss with a partner what they have learned. Being more familiar with the relative size of different units will only help with estimations.



**Problem 4 – Using Your Benchmarks**Questions 21-25

In this question set, students should use the benchmarks they are identified in previous questions to assist in estimating. Add other measurements for students to estimate based on need.

Have two students walk a certain distance apart and then have a third student estimate the distance. Have students switch roles until everyone has had an opportunity to be the estimator.

**Solutions – student worksheet**Problem 1

1.-10. Answers will vary. Make sure the benchmarks selected by students are reasonable.

Problem 2

11. 8 TI-73s long

12. 5 TI-73s long

13. 5 TI-73s long (about the same as a yard)

14. 2.5 TI-73s long

15. Answers will vary. Sample answer: Knowing a benchmark helps me visualize how many of those benchmarks make up the length of an unknown object.

Problem 3

16-20. objects will vary. Check students' answers for reasonableness.

17. 0.394 inches

18. 0.26 gallons

19. 0.45 kilogram

20. 3.28 feet

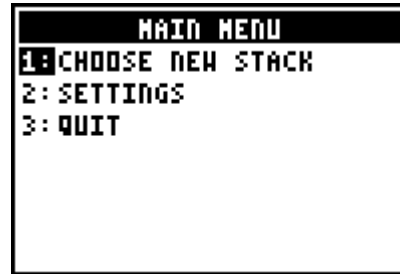
21-24. Answers will vary.

25. Sample answer: Knowing a benchmark helps me visualize how many of those benchmarks make up the length of an unknown object.

**Extension – TI-Navigator™**

1. Send the **BNCHMARK.73v** StudyCard™ stack to students for practice. This is a self-check stack that provides additional examples of benchmarks for measurements.

They need to start the **StudyCrd** app and then select BNCHMARK from the Choose New Stack menu.



2. When students are asked to perform an approximation, have them enter their value (in the stated unit) on a blank home screen. Then use **Screen Capture** to gather their estimates. Have students discuss any values that are well above or below the average response.
3. Once students have discussed benchmarks for various measurements, use **Quick Poll** (with Open Response) to ask several questions such as:
  - Estimate the height of the flagpole in front of the school knowing that a school bus is about 36 feet long.
  - Estimate the height of the school knowing that each floor is about 10 feet in height.
  - Estimate the width of your desk knowing that a standard piece of paper is 11 inches long.

Remember to start and stop the poll before and after each question. The question format can also be changed to give students ranges to choose from. (under 50 ft, 50 ft to 75 ft, or over 75 ft)

**Problem 1 – Finding Benchmarks**

For each measurement below, identify a benchmark that will help you remember the size of one unit.

Unit	Benchmark
1. centimeter	_____
2. foot	_____
3. 25 feet	_____
4. inch	_____
5. yard	_____
6. pound	_____

7. ounce

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8. meter

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9. 10 meters

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10. mile

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**Problem 2 – Calculator Measurements**

For Questions 11 – 14, state how many TI-73s would be equivalent to the given length. For example, two feet is about 2.5 TI-73s long.

11. 5 feet = \_\_\_\_\_ TI-73s long

12. 3 feet = \_\_\_\_\_ TI-73s long

13. 1 meter = \_\_\_\_\_ TI-73s long

14. 50 centimeters = \_\_\_\_\_ TI-73s long

15. How is it helpful to have benchmarks as references for different measurements?

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**Problem 3 – Benchmark Challenge**

Complete the following table. The first answer is an object with approximately the given measurement. The second answer is an equivalent measure with a different unit. To find a second measure, use the **Convert** menu.

	Object that is Approximately the Given Length	Convert to a Second Measurement
16. 1 inch	<u>length of small paper clip</u>	<u>2.54 cm</u> (Press <input type="text" value="1"/> <input type="text" value="2nd"/> <input type="text" value="UNIT"/> <input type="text" value="1"/> <input type="text" value="4"/> <input type="text" value="2"/> <input type="text" value="ENTER"/> )
17. 1 centimeter	_____	_____
18. 1 liter	_____	_____
19. 1 pound	_____	_____
20. 1 meter	_____	_____

**Problem 4 – Using Your Benchmarks**

For Questions 21-24, estimate the lengths. If it is helpful to estimate in one unit then convert to another unit, use the **Convert** menu.

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|--|--|
| <p><b>21.</b> How many feet is your desk from the classroom door?</p> <p>_____</p>         | <p><b>22.</b> How tall in yards is the flagpole (or another tall object outside)?</p> <p>_____</p> |
| <p><b>23.</b> How tall in meters is your classroom from floor to ceiling?</p> <p>_____</p> | <p><b>24.</b> How long is the hallway outside your math classroom? Pick a unit.</p> <p>_____</p>   |
- 25.** How does having a benchmark help you estimate the length of objects?
- \_\_\_\_\_
- \_\_\_\_\_