
Estimation Games

ID: 4637

Time required
45 minutes

Activity Overview

In this activity, students will play some games that will help them develop skills accurately estimating an answer. Each estimation game requires the class to form several teams with two players on each team. The teams share a single calculator.

Topic: Number Sense and Operations

- *Use estimation for multiplication and division problems*
 - *Develop estimation strategies*
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Teacher Preparation and Notes

- *The games in this activity are designed to help students develop number sense with the operations of multiplication and division.*
- *When forming teams, students should always work with someone else to discuss strategies for number selections. It is better to have teams of three than to have individuals competing.*
- *If competition is not something you wish to foster in your classroom, you can choose to have students work in teams on problems where you have selected the range and start numbers. The goal then would be to have teams demonstrate their reasoning for reaching the goal and how they could reach it in the fewest number of moves.*
- ***To download the student worksheet, go to education.ti.com/exchange and enter "4637" in the quick search box.***

Associated Materials

- *EstimationGames_Student.doc*

Suggested Related Activities

To download the activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- *Somewhere In Between (TI-73 Explorer) — 4487*
- *Number and Operations – 100 or Bust (TI-15 Explorer) — 5350*
- *Estimation and Precise Measurement (TI-84 Plus family) — 1906*

Multiplication Game

This game involves using the calculator to compute products of numbers. The goal is to be the team who finds a product that is between two given numbers (the **Target Range**) chosen by one team at the start of play.

Tell students that within their two groups of competing players, determine which of them will celebrate his or her birthday next. That player's team is Team A and the other team is Team B.

Go over the directions for the game given on page 1 on the student worksheet. Make sure that all students understand that the teams will take turns guessing the factor.

When playing the multiplication game, the range students decide to select is arbitrary. If, however, the numbers chosen for the target range are relatively small (45 to 50, for example), the game will be too easy for most. You may want to provide further guidelines on the initial selection of a range to avoid such problems.

The factor and product recording section of the student worksheet provided allows for discussion and analysis of strategies so that students may communicate and share their thinking with others. It will also provide you with an assessment of student understanding as you examine their selections of factors (and later divisors).

If students forget to press the multiplication key prior to entering their factor (but before they press **ENTER**), they can press **CLEAR** **2nd** **ANS** and then the multiplication key.

A discussion of the sample game prior to class play may prove helpful to some students who may otherwise play the game using a pure guessing strategy. For example, when faced with the number 925 and the goal of multiplying by some number to get a product between 830 and 840, a student may initially say that it is impossible if he or she forgets the use of decimal factors. One might reason first that the desired factor must be less than one. Since 925 is about 90 too big, "reducing" 925 by a factor of 0.1, that is 92.5, should come close to the goal. So multiplying by 0.9 seems like a good choice.

Example:

Team A chooses 830 – 840 as the Target Range and 37 as the Starting Number.

37	37
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Team B selects 25, hoping that 37×25 is somewhere between 830 and 840.

37	37
Ans*25	925

Team B has not won so the calculator goes to Team A.

Team A selects 0.9, hoping that 925×0.9 is somewhere between 830 and 840.

Rather than focusing only on computational algorithms, this activity allows students to think about the effects that decimal factors (or divisors) have on products (or quotients). This kind of mental reasoning might not occur when students first play the game. When you discuss some of the completed tables, you could focus some discussion on such important mental strategies.

Once a game is completed, the team selecting the Target Range and Starting Number should switch.

Student Worksheet – Sample Game

Game 1	
Selected by Team A:	
Target Range: 830 – 840 Starting Number: 37	
Factor	Product
35	925
0.9	832.5

37	37
Ans*25	925
Ans*.9	832.5

Division Game

This game is very much like the multiplication game, but focuses on a different element of number sense. This game involves using the calculator to compute answers to division problems. The goal is to be the team who causes the calculator display to show a quotient that is between two given numbers (the **Target Range**) chosen by one team at the start of play.

Tell students that from within the two groups of competing players, they need to decide who has the school locker with the largest number. That player’s team is Team A and the other team is Team B.

Go over the directions for the game given on page 2 on the student worksheet. Make sure that all students understand that the teams will take turns guessing the divisor.

As with the previous game, students may make corrections to their conceptual understandings as they experience this game. Many students may be surprised that dividing by a decimal less than one produces a quotient that is larger than the dividend. The idea that “division makes smaller” is challenged by this game.

Game 1	
Selected by Team A:	
Target Range: 26 – 32 Starting Number: 742	
Divisor	Quotient
35	742
0.8	26.5

742	742
Ans/35	21.2
Ans/.8	26.5