

Taxes & Tips

ID: 11356

Time Required
15 minutes

Activity Overview

In this activity, students will increase their understanding of the use of the formula $T = r \cdot p$, which is encountered both in the real world and in most Algebra 1 class. They will calculate the amount of taxes and tips exactly, and then use estimation.

Topic: Linear Equations

- *Percents*
- *Using formulas*
- *Estimation and mental math*

Teacher Preparation and Notes

- *This activity serves as a good introduction to using formulas that involve percentages.*
- *The student worksheet provides instructions and questions to guide inquiry and focus observations.*
- ***To download the student worksheet, go to education.ti.com/exchange and enter "11356" in the quick search box.***

Associated Materials

- *Alg1Week04_TaxTip_worksheet_TI84.doc*

Suggested Related Activities

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

- *Discount Savings (TI-Navigator) — 5618*
- *Returns on a Share of Stock (TI-84 Plus) — 4410*
- *Deposit and Forget It (TI-Nspire technology) — 9635*

Problem 1 – Percentage %

As the students divide their numbers by 100, they are to observe the pattern and describe how the decimal point moves. They should see that the decimal point moves to the left by two places.

17/100	.17
4.5/100	.045
5.75/100	.0575

Problem 2 – $T = r \cdot p$

Some students may not be aware of how the tax on an item is calculated. For this activity, the students will use the formula $T = r \cdot p$. For clarity and to reinforce the concept, have the students re-read what the variables represent.

The student activity gives some hypothetical prices for various items that may be of interest to them. Students will select three of these items.

First, students will use the calculator to find the taxes paid on three items listed on their worksheets and find the sum of those taxes. Remind students to round to 2 decimal places because the situation involves money.

4.79*.06	.2874
20.53*.06	1.2318
131.97*.06	7.9182

Second, students are to sum up the three individual prices and multiply this sum by the tax rate they chose to use in this example.

.28+1.23+7.92	9.43
(4.79+20.53+131.97)*.06	9.4374

Students should see that these two amounts are almost the same, varying only by a penny.

Note that the amounts are almost the same because of the distribution property.

$$price \cdot tax + price \cdot tax + price \cdot tax = (price + price + price) \cdot tax$$

Note: Make sure the students have converted the tax rate to a non-percentage before finding the taxes paid.

Discussion questions:

Are there different tax rates for the state in which you live for products and services?

Examine a receipt from a store (other than a grocery store, since there is often no tax on food) and determine if the tax rate charged is correct.

Do an internet search of “sales tax by state” to find the real tax information from various states and use this information to compare the tax paid if the item was purchased in another state. (www.taxadmin.org/fta/rate/sales.html).

Problem 3 – Mental math and estimating

The student worksheet gives an example of estimating 15% of an amount. They will use estimation or mental math to solve three other real-world tip questions.

Students should see that the estimate in the example is a relatively good estimate because it is less than 20 cents away from the actual amount.

If students' estimates of 15% of 17.97 is anywhere near \$2.70, they have estimated correctly.

To estimate 20% on a bill, students should round up to the nearest ten and then multiply the first number by 2.

Two ways to determine 4% tax on \$1000:

- a) $4 \cdot 1000 = 4000 \rightarrow 1\% \text{ of } 4000 = 40$
- b) $1\% \text{ of } 1000 = 10 \rightarrow 10 \cdot 4 = 40$

$28.85 \cdot .15$	4.3275
$17.97 \cdot .15$	2.6955

$51.12 \cdot .2$	10.224
$1000 \cdot .04$	40

Extension

To solve the problem, students should multiply the tax rate by 2, using 15% instead of 7.25% to estimate the tip.

In some states, like Illinois, the tax rate is 7.5% in a restaurant. If the taxed amount on a bill is doubled, the 15% tip amount will be calculated. This also avoids what some people dread – “tipping on the tax.”