

Estimate sales and expenses = Choose a level of accuracy appropriate to limitations on measurement when reporting quantities

**Program Task:** Estimate sales and expenses.

**PA Core Standard:** CC.2.1.HS.F.5

**Program Associated Vocabulary:**  
SALES, PROJECTED SALES, BUDGET, EXPENSES, PROJECTED BUDGET

**Description:** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

**Math Associated Vocabulary:**  
ROUNDING, PLACE VALUE, MENTAL MATH, AVERAGE

**Program Formulas and Procedures:**  
It is often necessary to estimate expenses to get an approximate monetary amount to make business decisions.

**Formulas and Procedures:**  
It is often more practical to use estimation to solve problems, using mental math, so that a calculator is not necessary. Usually the situations presented require you to either round to the nearest whole number, tens, hundreds, or thousands, or require you to take an average of the range of numbers given. The two examples below demonstrate specific situations where rounding and averaging are useful.

**Example:**  
Moving out into an apartment brings some new expenses for a graduating senior. Preparing a budget for this new experience is a big responsibility. A list of the expenses for the apartment is below:

Expenses	Cost
Electric	\$57.00
Phone	\$42.00
Water	\$36.00
Rent	\$475.00

**Rounding:**  
Henry just purchased a cell phone plan that will cost him \$38.99 per month. His friend, Elizabeth, just purchased a cell phone plan that will cost her \$59.99 per month. Estimate how much more money Elizabeth will spend on her cell phone plan in one year.

Estimate the monthly expenses for the apartment.

- To estimate, round to the nearest tens. Henry will spend about \$40/mo. and Elizabeth will spend \$60/mo.
- Take the difference between the two:  $\$60 - \$40 = \$20$  to determine how much more Elizabeth will spend in one month.
- Multiply by 12.  $\$20 \times 12 = \$240$  more per year.

**Solution:**

Expenses	Cost
Electric	\$60.00
Phone	\$40.00
Water	\$40.00
Rent	\$500.00

**Averaging:**  
Billy notices that 4-6 cars pass by his house each hour. Estimate the number of cars that will pass by his house in 8 hours.

Monthly Estimated Expenses: \$640.00

- Find the average of 4 and 6. Average =  $(4 + 6) \div 2 = 5$ .
- Multiply this by 8 hours:  $5 \times 8 = 40$  cars  
Approximately 40 cars should pass his house.

## Sales, Distribution, and Marketing Operations (52.1801) T-Chart

### **Instructor's Script – Comparing and Contrasting**

When teaching estimation, there are many ways that students can round and still obtain a reasonable answer. In the example provided in the Marketing side of the T-chart, the monthly expenses were rounded to the nearest \$10, with the exception of rent, which was rounded to the nearest 100. The purpose of rounding is to make mental math easier and to get a reasonable estimate quickly. It is recommended that the rounding be consistent among numbers. For instance, if the numbers were all rounded to the nearest \$10, the answer would have been \$620. The numbers also could have been rounded to the nearest \$25, since these are also easy to add quickly and without a calculator. Rounding this way would have yielded  $50+50+50+475=\$625$ . One important aspect to estimation is to use numbers that do not require one to use a calculator or perform manual calculations. The actual answer without estimation is \$610 so all of the methods yield an answer that is close enough to the actual to be reasonable.

Estimation is a strategy that good problem solvers employ. Even if the question requires an exact answer, a mental estimate should be completed before the calculations so that the estimate can be used to check the validity of the answer.

### **Common Mistakes Made By Students**

Problems arise when the students do not consider the limitations of estimating and how the situation determines when to estimate. For instance, if the cost per color copy is \$0.74/copy and 8,000 copies are made, rounding the price to an even dollar will yield an unreasonable answer. In this case, the estimate would produce a price of \$8,000 even though the actual price is only \$5,920.

### **CTE Instructor's Extended Discussion**

Estimating is a useful skill in the field of Marketing and Business and in preparing personal budgets. Businesses use estimation when preparing their yearly budgets. The figures from the previous year are used to forecast figures for the next year's budget.

Whether creating a budget for personal, family, or business purposes, rounding is a great skill to use. When shopping at a store a customer rounds the prices of items in the shopping cart to determine whether or not the money that is available will cover the cost of the purchases being made.

# Sales, Distribution, and Marketing Operations (52.1801) T-Chart

Problems	Career and Technical Math Concepts	Solutions
<p>1. Alexa is purchasing a car. The expenses for the car are:</p> <p>car insurance \$145.00/month                      car payment \$180.00/month                      gas \$110.00/month</p> <p>Estimate Alexa's monthly car expenses.</p>		
<p>2. Maycee is considering a new job at the local pizza shop. It pays \$7.75/hour with a guarantee of 20 hours per week. Estimate Maycee's gross weekly earnings.</p>		
<p>3. A retail store is open 70 hours per week; average hourly sales for the store are \$82.00. Estimate the weekly sales for the retail store.</p>		
Problems	Related, Generic Math Concepts	Solutions
<p>4. A software support contract is quoted for one or two years. One year would cost \$795, but two years would cost \$1,495. Round each price to the nearest hundred dollars and estimate the savings for a two year commitment.</p>		
<p>5. Students want to raise \$500 for a field trip. With fundraising, they collected \$127 on Monday, \$130 on Tuesday, \$84 on Wednesday, and \$90 on Thursday. Approximately how much money will they need to collect on Friday to reach their goal?</p>		
<p>6. A car can be rented for \$37.99/day plus \$0.39/mile. Which of the following is the best estimate for the cost of renting the car for 4 days if you are driving 100 miles?</p> <p>a) \$150    b) \$160    c) \$200    d) \$250</p>		
Problems	PA Core Math Look	Solutions
<p>7. A company is offering a salary of \$48,500 per year. If about 20% is taken from taxes, how much will a person have made in 5 years after taxes?</p>		
<p>8. Every hour, the store sells between 40-50 items that range from \$1.99 - \$7.99. What would be a good estimate for the amount of money the store generates in a 10 hour day?</p>		
<p>9. Two friends went to dinner. Their bill came to \$37.79. If a fair tip is between 15 and 20 percent, what would be a fair tip to leave their waiter?</p>		

# Sales, Distribution, and Marketing Operations (52.1801) T-Chart

Problems	Career and Technical Math Concepts	Solutions
<p>1. Alexa is purchasing a car. The expenses for the car are:</p> <p>car insurance \$145.00/month car payment \$180.00/month gas \$110.00/month</p> <p>Estimate Alexa's monthly car expenses.</p>		<p>Car insurance \$150.00 Car payment \$200.00 Gas \$100.00 Estimated Car Expenses \$450.00</p>
<p>2. Maycee is considering a new job at the local pizza shop. It pays \$7.75/hour with a guarantee of 20 hours per week. Estimate Maycee's gross weekly earnings.</p>		<p>Estimated hourly rate \$8.00 Weekly Hours: 20 Estimated Gross Weekly Earnings \$160.00</p>
<p>3. A retail store is open 70 hours per week; average hourly sales for the store are \$82.00. Estimate the weekly sales for the retail store.</p>		<p>Retail store is open 70 hours per week Estimated hourly sales for the store are \$80.00 per hour. Estimated weekly sales are \$5600.00.</p>
Problems	Related, Generic Math Concepts	Solutions
<p>4. A software support contract is quoted for one or two years. One year would cost \$795, but two years would cost \$1,495. Round each price to the nearest hundred dollars and estimate the savings for a two year commitment.</p>		<p>Rounding: One year <math>\approx</math> \$800, while two years <math>\approx</math> \$1,500. <math>\\$1,500/2 = \\$750</math> per year \$50 per year savings, or a \$100.00 savings for the two year commitment.</p>
<p>5. Students want to raise \$500 for a field trip. With fundraising, they collected \$127 on Monday, \$130 on Tuesday, \$84 on Wednesday, and \$90 on Thursday. Approximately how much money will they need to collect on Friday to reach their goal?</p>		<p>Rounding the amounts to the nearest ten, <math>130 + 130 + 80 + 90 = 430</math> <math>500</math> (their goal) <math>- 430</math> (the approx. amt. collected) = \$70 is approximate amount they would need to collect on Friday</p>
<p>6. A car can be rented for \$37.99/day plus \$0.39/mile. Which of the following is the best estimate for the cost of renting the car for 4 days if you are driving a total of 100 miles?</p> <p>a) \$150      b) \$160      c) \$200      d) \$250</p>		<p>c. \$200 (Answer)</p> <p>C= Total Cost    x = # of days    y = # of miles Equation:                    C = 37.99(x) + .39(y) Estimate Amounts:        C= 40x + .40x Substitute and Solve:    C = 40(4) + .40(100) C = 160 + 40 = \$ 200</p>
Problems	PA Core Math Look	Solutions
<p>7. A company is offering a salary of \$48,500 per year. If about 20% is taken from taxes, how much will a person have made in 5 years after taxes?</p>		<p>\$50,000 salary estimate. 10% is \$5,000, so 20% is \$10,000. 5 years x \$10,000 tax/year = \$50,000 taxes in 5 years. \$50,000 salary x 5 years = \$250,000 estimated salary for 5 years \$250,000 (estimated salary) <math>- 50,000</math> (estimated taxes) = \$200,000 (estimated net, or after tax, income for 5 years)</p>
<p>8. Every hour, the store sells between 40-50 items that range from \$1.99 - \$7.99. What would be a good estimate for the amount of money the store generates in a 10 hour day?</p>		<p>45= Average of 40-50 5 = Average 1.99 and 7.99 45 items x \$5 = \$225 per hour \$225 per hour x 10 hours = \$ 2,250.00 per day</p>
<p>9. Two friends went to dinner. Their bill came to \$37.79. If a fair tip is between 15 and 20 percent, what would be a fair tip to leave their waiter?</p>		<p>Estimate a \$40 bill. 15% is \$6 and 20% is \$8, so a fair tip would be any amount between 6 and 8.</p>