

Error

7.M.10 Identify the relationships between relative error and magnitude when dealing with large numbers (e.g. money, population)

Significant error can occur when estimating or making predictions using large numbers. By comparing estimates to exact calculations, you can identify the amount of error that occurred as a result of rounding or estimating.

EXAMPLE 1

Elizabeth is planning a wedding reception for 500 guests. The table shows the cost per person for each part of the meal. She needs to know approximately the total cost of the food for the reception. Estimate the total cost of the food, then find the actual cost. Compare your estimate to the actual total and explain.

Cost (per person)	
Appetizer	\$1.50
Entrée	\$4.50
Beverage	\$1.25
Cake	\$2.75

Estimate: $500(\$2.00) + 500(\$5.00) + 500(\$1.00) + 500(\$3.00) = \$5,500$

Actual: $500(\$1.50) + 500(\$4.50) + 500(\$1.25) + 500(\$2.75) = \$5,000$

The estimate is significantly higher than the actual cost. Rounding the cost of each part of the meal and multiplying by 500, resulted in a difference, or error, of \$500.

EXAMPLE 2

Estimate the population increase for New York City from 2000 to 2003. Then find the actual population increase and compare.

Estimate: $8,100,000 - 8,000,000 = 100,000$

Actual: $8,085,742 - 8,017,078 = 68,664$

New York City	
Year	Population
2003	8,085,742
2002	8,072,011
2001	8,055,166
2000	8,017,078

Source: U.S. Census Bureau

The estimate is much higher than the actual population increase. The difference between the estimate and the actual answer is $100,000 - 68,664$, or 31,336 people. The amount of error was significant because the populations were rounded to the nearest hundred-thousands place.

EXERCISES

Solve each problem. Compare your estimate to the actual answer and explain.

1. Find the area of a circle with a radius of 15 centimeters. First calculate the area using 3 as an estimate for π . Then use 3.14 to find the area.
2. As part of their grand-opening, a new grocery store decides to give a free gallon of milk to their first 1,500 customers. Normally the milk sells for \$2.78 per gallon. How much will this grand-opening special cost the grocery store?

3. Dale took a survey of 1,500 students at his school to determine their favorite ice cream flavor. Dale found that 50% of students chose vanilla as their favorite ice cream flavor. Suppose Dale would have predicted the results of his survey for all 1,500 students using only the data from the first 25 students he surveyed. Use the table below to find what percent of the first 25 students chose vanilla as their favorite flavor.

Favorite Ice Cream	
chocolate	5
vanilla	8
strawberry	2
cookies and cream	3
other	7

Compare the results of this survey to the results of the survey of 1,500 students. Explain.

4. Carissa is driving 2,462 miles from New York City to Los Angeles. She drives about 68 miles per hour for most of the trip. Carissa estimates how long her trip will take by rounding 68 to 70 and 2,462 to 2,500. Will her estimate be reasonable?