

## • Rounding Numbers and Estimating

### Power Up

**facts**

Power Up F

**count aloud**

Count by 12s from 12 to 96. Count by 6s from 6 to 96.

**mental math**

- a. **Time:** How many months are in half a year? ... a year and a half?
- b. **Money:** How much money is 4 quarters? ... 5 quarters? ... 6 quarters?
- c. **Money:** The cost of one video game is \$42. What is the cost of ten video games?
- d. **Percent:** 50% of 40
- e. **Percent:** 25% of 40
- f. **Percent:** 10% of 40
- g. **Money:** The regular price is \$8.40. If the item is on sale for \$1.40 off, what is the sale price?
- h. **Calculation:**  $8 \times 8, - 1, \div 9, \times 3, - 1, \div 4$

**problem solving**

Choose an appropriate problem-solving strategy to solve this problem. Julio identified a pattern in the lunches served at the school cafeteria. He found that macaroni was served as part of every eighth lunch. If macaroni was last served on a Friday, what are the next two days of the week Julio can expect macaroni to be served? (School is in session Monday through Friday with no holidays.)

## New Concept

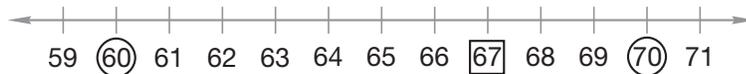
When we do not need an exact amount to describe a situation, we can round numbers to a specific place value.

*The attendance at the game was 614.* 614 was rounded to  
*About 600 people attended the game.* the nearest hundred.

*The price of the shoes was \$48.97.* \$48.97 was rounded to  
*The shoes cost about \$50.* the nearest ten dollars.

Numbers that have been rounded usually end in one or more zeros. When we want to estimate, sometimes we use numbers that have been rounded to a specific place.

When we *round* a number, we find another number to which the number is near. One way we can do this is with a number line. To round 67 to the nearest ten, for example, we find the multiple of ten that is nearest to 67. On the number line below we see that 67 falls between 60 and 70.



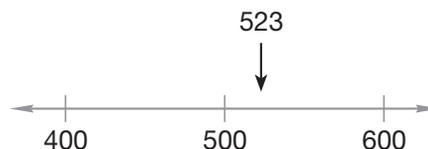
Since 67 is nearer to 70 than to 60, we *round up* to 70.

When the number we are rounding is halfway between two multiples of ten, we usually round up to the larger number. Sixty-five is halfway between 60 and 70, so we would round 65 to 70. Likewise, 450 is halfway between 400 and 500, so we would round 450 to 500.

### Example 1

**Round 523 to the nearest hundred.**

When we round a number to the nearest hundred, we find the multiple of 100 to which it is nearest. Recall that the multiples of 100 are the numbers we say when we count by hundreds: 100, 200, 300, 400, and so on. We use a number line marked and labeled with hundreds to picture this problem.



Placing 523 on the number line, we see that it falls between the multiples 500 and 600. Since 523 is nearer to 500 than to 600, we *round down* to **500**.

Rounding can help us **estimate** the answer to a problem. One way we estimate is by calculating with **round numbers** that are easy to use.

### Example 2

**In a presidential election, each state is assigned a certain number of electoral votes. Based on the 2000 Census, the state of Florida was assigned 27 electoral votes and the state of Texas was assigned 34 electoral votes. About how many electoral votes can a candidate win altogether in those states?**

The word “about” means we may estimate. We will round each number to the nearest ten. Since 27 rounds to 30 and 34 rounds to 30, we estimate that a candidate can win **about 60 electoral votes** in Florida and Texas.

### Example 3

**The average depth of the East China Sea is 620 feet. The average depth of the Yellow Sea is 121 feet. To the nearest hundred feet, about how many feet deeper is the average depth of the East China Sea?**

We round both numbers to the nearest hundred and then find the difference.

$$620 \text{ rounds to } 600.$$

$$121 \text{ rounds to } 100.$$

$$600 - 100 = 500$$

The average depth of the East China Sea is about **500 feet** deeper than the average depth of the Yellow Sea.

### Example 4

**A community theater group is giving four performances of a play. The theater can seat 424 guests. All of the tickets for each performance have been sold. Estimate the total number of guests who plan to see the performances by first rounding the number of guests for each performance to the nearest hundred.**

We round 424 to 400 before multiplying.

$$400 \times 4 = 1600$$

About **1600 guests** plan to see the performance. The exact answer is 1696, so we see that our estimate is close to the exact answer.

When estimating, it is not necessary to use numbers rounded to the nearest ten or hundred or thousand. Instead we may use **compatible numbers**, which are numbers that are easy to compute mentally.

Consider Example 4 again. In that problem, 424 is multiplied by 4. Since 25 is easy to mentally multiply by 4 (think of 4 quarters), we could replace 424 with 425 and multiply by 4 to estimate the product.

$$4 \times 400 = 1600$$

$$4 \times 25 = 100$$

$$\text{so } 4 \times 425 = 1700$$

In this case, using the compatible number 425 results in an estimate that is close to the exact answer.

### Example 5

**Lela's car traveled 129 miles and used 4 gallons of gas. About how many miles did the car travel on each gallon?**

We will use compatible numbers to estimate. Instead of changing 129 to 130, we change 129 to 128 and divide by 4.

$$128 \div 4 = 32$$

Lela's car traveled about **32 miles per gallon**.

### Lesson Practice

**Represent** Round to the nearest ten. For each problem, you may draw a number line to help you round.

a. 72

b. 87

c. 49

d. 95

**Represent** Round to the nearest hundred. For each problem, you may draw a number line to help you round.

e. 685

f. 420

g. 776

h. 350

i. **Estimate** A row of bleachers in a gymnasium can seat 96 people. Estimate the total number of people who can be seated in eight rows. Explain your reasoning.

j. **Estimate** In their Major League Baseball careers, Lou Gehrig hit 493 home runs and Frank Robinson hit 586 home runs. About how many home runs did those two players hit altogether?

1. **Represent** Draw a pair of vertical parallel lines.  
(31)
2. a. Round 537 to the nearest hundred.  
(33)  
b. Round 78 to the nearest ten.
3. Use your answer to problem 2 to estimate the product of 537 and 78.  
(33)
4. **Analyze** Forty animals were brought to the pet show. One half were mammals, one fourth were fish, one tenth were reptiles, and the rest were birds. How many mammals were brought to the pet show? How many fish? How many reptiles? How many birds?  
(Inv. 2)
5. Keisha was standing in a line that had 20 people in it (including herself). If 5 people were in front of her, how many people were behind her?  
(7)

**Formulate** For problems 6–8, write an equation and find the answer.

6. Seven hours is how many minutes?  
(28)
7. After paying \$7.50 for a movie ticket, Salvador still had \$3.75. How much money did Salvador have before paying for the ticket?  
(16)
- \*8. **Estimate** The Price family set the odometer to zero before they started their trip. By the end of the first day, the Price family had traveled 427 miles. By the end of the second day, they had traveled a total of 902 miles. About how far did the Price family travel the second day?  
(11)

$$\begin{array}{r} 9. \quad \$34.28 \\ (13) \quad \$ 9.76 \\ + \$20.84 \\ \hline \end{array}$$

$$\begin{array}{r} 10. \quad 3526 \\ (14) \quad - \quad \quad v \\ \hline 1617 \end{array}$$

$$\begin{array}{r} 11. \quad \$10.00 \\ (13) \quad - \$ 0.86 \\ \hline \end{array}$$

$$\begin{array}{r} 12. \quad 499 \\ (6) \quad 25 \\ 43 \\ 756 \\ 67 \\ 94 \\ + 32 \end{array}$$

$$\begin{array}{r} 13. \quad 563 \\ (29) \quad \times \quad 90 \\ \hline \end{array}$$

$$\begin{array}{r} 14. \quad \$2.86 \\ (29) \quad \times \quad 70 \\ \hline \end{array}$$

$$\begin{array}{r} 15. \quad 479 \\ (29) \quad \times \quad 800 \\ \hline \end{array}$$

$$16. \quad 3 \overline{)1122} \\ (26)$$

$$17. \quad 6m = \$5.76 \\ (26)$$

$$18. \quad 10 \overline{)2735} \\ (26)$$

19.  $\$64.23 + \$5.96 + \$17 + (\$1 - \$0.16)$   
(13, 24)

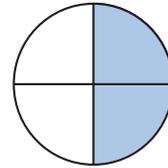
20. From March 1 to December 1 is how many months?  
(28)

\*21. a. What fraction of the circle is shaded?

(30,  
Inv. 3)

b. What decimal part of the circle is shaded?

c. Is more than or less than 25% of the circle shaded?



22. **Multiple Choice** Which word means “parallel to the horizon”?

(31)

A vertical      B oblique      C horizontal      D perpendicular

23. Write the time that is a quarter after one in the afternoon.

(28)

24. **Represent** Draw a horizontal number line from 0 to 50 with only zero and tens marked and labeled.

(12)

25. **Predict** What is the tenth term of this counting sequence?

(1)

7, 14, 21, ...

26. **Represent** Draw an acute angle.

(31)

\*27. **List** Write the factors of both 7 and 28. Circle the common factors.

(25)

\*28. **Multiple Choice** At which of these times are the hands of a clock perpendicular?

(28, 31)

A 6:00      B 12:30      C 9:00      D 2:00

29. Main Street and Allen Street intersect at a traffic light. The two streets form square corners where they meet.

(31)

a. Draw segments to show how Main Street and Allen Street meet.

b. **Multiple Choice** Which of these words best describes the segments in your drawing?

A parallel      B perpendicular      C oblique      D horizontal

\*30. **Estimate** In 1804 Lewis and Clark, along with their guide, Sacagawea, explored the northwestern United States. About how many years ago did that exploration take place?

(33)