

Discuss



1. **A.** Keenya brings a bag of 24 cookies to school to share with the class. Five of her classmates also bring 24 cookies each. How might Keenya estimate the total number of cookies they will have for the class?
B. Keenya thinks, "We each bring about 25 cookies. Since 25×6 is 150, we will have about 150 cookies." What is Keenya's convenient number? How did she pick it?
2. Jackie's Girl Scout® troop is planning a hike. The troop needs to know how heavy the supplies will be. Jackie weighs a bottle of water and finds that it weighs 4.5 kg. About how much will 3 bottles of water weigh?

We find estimates when we need to have a good idea about how big or small a number is, but we do not need to know exactly. Sometimes it is impossible to know an exact answer. We use estimates in many different situations.

For example, you can estimate the things below:

- the area of the school playground
- the amount of water in a swimming pool
- the amount of money you can expect to make selling lemonade
- the cost of uniforms for a soccer team
- the number of students in your school

We can estimate answers to problems that involve multiplication by finding a product that is reasonably close to the exact answer. It may be bigger or smaller than the actual answer, depending on the problem.

Since estimating is often done mentally, it is helpful to choose **convenient numbers** that are easy to multiply in our heads. Convenient numbers are close to the actual numbers in a problem, but they are really **estimates**, too.

Use convenient numbers to solve the problems below. Decide if your estimate is an overestimate or an underestimate. Consider and tell which is better for the problem situation: an overestimate, an underestimate, or it doesn't matter. Fill in the circle by your answer.

3. Mrs. Borko buys 4 jackets for her children. Each jacket costs \$47. About how much will all 4 jackets cost?
 \$100 \$20 \$160 \$2000 \$200
4. There are about 27 students in each fourth-grade class at Hill Street Elementary School. If there are 6 fourth-grade classes, about how many fourth-graders are there at the school?
 120 1200 150 180 300

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Questions 1–16 (SG pp. 272–275)

1. **A.** Answers will vary. If using 25 as a convenient number, $25 \times 6 = 150$ cookies.
B. 25; It is convenient to think of 25 as a quarter dollar, so six quarters is \$1.50.
2. About 12 or 15 kg
3. * \$160 or \$200; better to overestimate
4. * 120, 150, or 180; better to overestimate
5. **A.** 90 people
B. 100 people; 10 rows of 10 people
6. **A.** \$2.00; lower
B. \$1.75
C. Jackie's estimate; it is higher, so they will feel more confident that they have enough money. It is better to overestimate when dealing with money.
7. **A.** Estimates will vary. Possible response: $350\text{--}400$ miles. $70 \times 5 = 350$ miles; $80 \times 5 = 400$ miles
B. Answers will vary.

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5. Keenya and her sister went to a concert in the park with her parents. People sat on benches in rows. Keenya counted 12 people in the first row. There were 9 rows.
 - A.** Keenya thought, "There are about 10 people in each of the 9 rows. There are about . . ." Finish Keenya's statement using 10 as a convenient number.
 - B.** Keenya's sister thought, "There are about 10 rows and about 10 people in each row. I'd say there are about . . ." Finish her statement. What convenient numbers did Keenya's sister use to make her estimate?
6. At the grocery store, Jackie and her brother choose some grapes and weigh them. The grapes weigh 3 pounds and 7 ounces. Grapes are on sale for 49¢ a pound (1 pound = 16 ounces). Jackie and her brother estimate the price of the grapes.
 - A.** Jackie thinks, "3 pounds and 7 ounces is about 4 pounds. 4 pounds of grapes at 50¢ a pound would be . . ." Finish Jackie's statement. Will the actual price be higher or lower than this estimate?
 - B.** Jackie's brother thinks, "3 pounds of grapes cost $3 \times 50\text{¢}$ or \$1.50. 7 ounces is about $\frac{1}{2}$ pound. If 1 pound costs 50¢, $\frac{1}{2}$ pound costs about 25¢. The grapes we picked should cost about . . ." Finish his statement.
 - C.** If Jackie and her brother want to be sure they have enough money for the grapes, whose estimate would be better to use? Why do you think so?
7. Michael's father travels 36 miles each way to work every day.
 - A.** About how many miles does he travel to and from work in one week (5 days)? Solve this problem in your head. Then, explain how you solved it. Be sure to tell what convenient numbers you used.
 - B.** Share your method with a classmate. What convenient numbers did your classmate choose?

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*Answers and/or discussion are included in the lesson.

8. **A.** 179 miles
B. Convenient numbers will vary. 175, 180, or 200 miles
9. Estimates will vary. 1400 miles is a reasonable estimate.
10. **A.** About 250 miles.
B. Indianapolis to St. Louis
C.* Estimates for the subtraction problem $257 - 179$ will vary. About 60–80 miles
11. Estimates will vary. $250 \times 3 = 750$ miles is a reasonable estimate.
12. **A.*** Estimates will vary. $30 \times 8 = 240$;
 $40 \times 8 = 320$; between 240 and 320 cars
B.* Estimate may vary based on estimate for Part A. A possible response is $300 \times 8 = 2400$ cars.
C.* Possible estimate: $2500 \text{ cars} \times 5 \text{ miles} \times 4 \text{ wheels} = 50,000 \text{ wheels}$.
13. Estimates for $179 + 112 + 294$ will vary. Possible response: about 575–610 miles
14. **A.** Estimates will vary. Possible response: about 200–260 miles.
B. No; Chicago to Indianapolis is 179 miles. They can travel more than 200 miles on their tank of gas. They will need gas on their way from Indianapolis to Louisville.
15. Estimates will vary. Possible response: $\$3 \times 30 \text{ gal} = \90
16. More; Driving 8 hours at 48 miles per hour is about 400 miles. Their trip is about 600 miles. They must have driven for longer than 8 hours.

Travel Estimation

Jerome and his family are thinking about taking a vacation. Jerome found a mileage chart.

	Chicago	Indianapolis	Louisville	St. Louis
Chicago	X	179	294	302
Indianapolis	179	X	112	257
Louisville	294	112	X	275
St. Louis	302	257	275	X



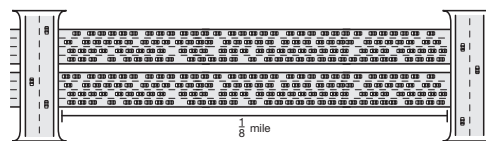
- 8. A.** How far is it from Chicago to Indianapolis?
B. Give two possible convenient numbers for this distance.
9. Jerome's grandparents live in Indianapolis. About how many miles will Jerome and his family travel if they drive from Chicago to Indianapolis and back four times in one year?
10. **A.** Jerome's cousins live in St. Louis. How far is it from St. Louis to Indianapolis?
B. Which drive is longer: the drive from Chicago to Indianapolis or the drive from Indianapolis to St. Louis?
C. About how much longer?
11. Jerome looks on a map of the U.S. and notices the distance from St. Louis to Buffalo, NY, is about three times as far as the distance from St. Louis to Indianapolis. About how far is it from St. Louis to Buffalo?



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12. A traffic reporter in a helicopter flies over a traffic jam. Below is a picture of the cars she sees on the highway. She knows the distance between the two bridges is $\frac{1}{8}$ of a mile. Use estimation to answer the following questions. Show or tell how you found your answer.



- A.** Estimate the number of cars on the stretch of highway in the picture.
B. If the traffic jam went on for a distance of one mile, about how many cars would be in the traffic jam?
C. If the traffic jam went on for a distance of five miles, about how many wheels would be in the traffic jam?

✓ **Check-In: Questions 13-16**

13. Jerome's family decides to take the following trip: Chicago to Indianapolis, Indianapolis to Louisville, and Louisville back home to Chicago. About how many miles will they drive altogether?
14. Their car goes about 21 miles on one gallon of gasoline. At the start of the trip in Chicago, their gas gauge shows about 12 gallons of gas.
A. About how many miles can they travel on 12 gallons of gas?
B. Will they have to get more gas before they reach Indianapolis? Before they reach Louisville?
15. At the time they were leaving, gasoline cost about \$2.89 per gallon in Chicago. They estimated that they would need about 28 gallons of gas in all to make the trip. If gas costs about the same in other cities as in Chicago, about how much money will they spend for gas on the trip?
16. Jerome's parents averaged 48 miles per hour on the entire trip. By the time they got back to Chicago, did the family drive for more or less than 8 hours? How did you decide?

Use the *Our Best Estimate* pages in the *Student Activity Book* to practice estimating products.

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*Answers and/or discussion are included in the lesson.

Homework

Estimate answers to these problems. Be ready to tell how you used convenient numbers.

- A box of crackers weighs 269 grams. John and Kim wondered about how much 5 boxes of crackers weigh altogether.
 - John thought, "Each box weighs about 300 grams, so the 5 boxes weigh about . . ." Finish his statement.
 - Kim thought, "Each box weighs about 250 grams . . ." Finish her statement.
- Ana found 12 tomatoes on one tomato plant. Ana has 11 tomato plants. If all the plants have about the same number of tomatoes, about how many tomatoes do the plants have altogether?
- You have \$70. If a pizza costs \$7.75, a bag of apples \$2.50, and a quart of milk \$1.50, do you have enough money to buy 8 pizzas, 4 bags of apples, and 3 quarts of milk?
- If a pizza costs \$7.75, about how much will 26 pizzas cost?
- Jacob's brother works at a fast-food restaurant and earns \$7.55 an hour. If he worked 21 hours one week, about how much money did he earn?
- Tanya earned \$9.45 babysitting on Friday and \$15.25 on Saturday. If she earns the same amount for five weeks in a row, about how much does she earn over the five weeks?
- A large jar of salsa costs \$4.79. A small jar costs \$2.89. Estimate which is cheaper to buy: 5 large jars of salsa or 8 small jars of salsa.



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Homework (SG pp. 276–277)

Questions 1–11

Answers will vary.

- About 1500 grams
 - 5 boxes weigh about 1200 grams
- About 100–130 tomatoes
- Students who use low convenient numbers should respond they do not have enough money: $8 \times \$7.00 = \56 , $4 \times 2 = \$8$, $3 \times \$1 = \3 and $\$56 + \$8 + \$3 = \67 , too low—they need much more because they dropped all the amounts after the decimal. Students who use higher convenient numbers should also respond they do not have enough money: $8 \times \$8 = \64 , $4 \times \$3 = \12 , $3 \times \$2 = \6 and $\$64 + \$12 + \$6 = \82 .
- About \$200
- About \$160
- About \$125
- The small jars are cheaper.
- Answers will vary. Possible responses:
 - 120
 - 200
 - 320
 - 2400
 - 3500
 - 6000
 - 9000
 - 21,000
- About 250 miles
- Range of estimates will vary. A number between 1600 and 2000 students is reasonable.
- About 8,000 minutes
 - About 150 hours
 - About 48,000 minutes

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- Estimate answers to the following multiplication problems. Show how you used convenient numbers to find your estimate.

A. 19×6	B. 24×8	C. 16×19	D. 355×7
E. 47×74	F. 127×51	G. 3×2904	H. 21×998
- A school bus driver drives 28 miles on her morning route and 24 miles on her afternoon route. About how many miles does she drive in a regular school week? Show or tell how you estimated your answer.
- A school bus has 24 seats. Each seat has enough room for two students. About how many students can fit into 38 school buses? Give your answer as a range between two numbers.
- A student spends about 45 minutes traveling on the school bus per day. There are about 180 days in a school year.
 - About how many minutes does the student spend traveling on the bus per year?
 - About how many hours does the student spend traveling on the bus per year?
 - If the student rides the same route on the bus for six years, about how many minutes will the student spend traveling on the bus during the six years?



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Student Activity Book

Our Best Estimate
Questions 1–6 (SAB pp. 225–226)

Estimates will vary for each problem. Possible reasonable estimates are shown.

1. 200
2. 900
3. 4000
4. 2700
5. 4500
6. 72,000

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Our Best Estimate

Work in groups of three to estimate answers for each of the problems below. For each problem:

- Estimate an answer on your own (use mental math if you can). Write your own estimate in the first box.
- Share your estimate with your partners and explain your reasoning. Write your partners' estimates in the boxes under their names.
- Discuss with your partners which estimate is the best and why you think so. Write your group's best estimate in the "Our Best" column.
- In the "Our Reasoning" column, show or tell why your group decided it was the best estimate.

The first problem is an example.

Problem	ESTIMATES			Our Best	Our Reasoning
	Mine	Partner Name:	Partner Name:		
Example 38×9	210	240	200	240	This estimate is best because we had to use only one convenient number (40) which is close to 38. $40 \times 6 = 240$
1. 8×27					

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Name _____ Date _____

Problem	ESTIMATES			Our Best	Our Reasoning
	Mine	Partner Name:	Partner Name:		
2. 98×9					
3. 77×52					
4. 89×27					
5. 752×6					
6. 72×965					

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Name _____ Date _____

Operations, Divisibility, and Estimation Quiz

1. Solve the following problems using the correct order of operations.

A. $6 + 5 \times 6$ B. $7 - 4 + 2$

C. $9 \times (6 - 5) \times 4$ D. $16 \div 2 \times 8 + 5$

2. Look at the following list of numbers:
1243 482 981 815 1080 36

A. Which numbers in the list are divisible by 2?

B. Which numbers in the list are divisible by 9?

3. A. Is 480 divisible by 5? _____ Give a reason for your answer.

B. Is 480 divisible by 6? _____ Give a reason for your answer.

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Name _____ Date _____

4. Jacob wants to show how to multiply 20×40 by using the rectangle grid below. He started by showing the length and width of the rectangle grid and then he marked off one 10-by-10 square. Help Jacob finish solving the problem. Use the rest of the rectangle to show how you found the answer.

5. Solve the following multiplication problems using any method you choose.

A. $40 \times 80 =$ B. $50 \times 600 =$

6. Show or tell how you solved Question 5B. Explain why your method works.

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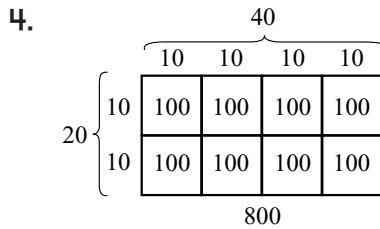
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Operations, Divisibility, and Estimation Quiz

Questions 1–8 (TG pp. 1–3)

1. A. 36 B. 5
C. 36 D. 69
2. A. 482, 1080, 36
B. 981, 1080, 36
3. A. Yes; 480 ends with a zero
B. Yes; 480 is divisible by 2 because it is even; it is divisible by 3 because $4 + 8 + 0 = 12$, which is divisible by 3; therefore, it is divisible by 6.



5. A. 3200 B. 30,000
6. Answers will vary. A possible strategy is:

$$\begin{aligned}
 50 \times 600 &= 5 \times 10 \times 6 \times 100 \\
 &= 5 \times 6 \times 10 \times 100 \\
 &= 30 \times 1000 \\
 &= 30,000
 \end{aligned}$$

7. **A.** $n = 700$ **B.** $n = 100$
8. **A.** Answers may vary. One possible strategy is:
 $\$36 \times 20 = \720
- B.** Higher; Mrs. Dewey is better off having too much money than being short of money.

Name _____ Date _____

7. Find the value of n that makes each number sentence true.
A. $n \times 8 = 5600$ **B.** $100 \times n = 10,000$

8. Mrs. Dewey is buying science books for the 18 students in her class.
A. If the books are \$35.99 each, estimate about how much money she should bring to the bookstore. Show how you estimated.

B. Should your estimate be higher or lower than the exact answer? Explain your reasoning.

Operations, Divisibility, and Estimation Quiz Feedback Box

	Expectation	Check In	Comments
Use divisibility rules to identify factors and multiples. [Q# 2-3]	E1		
Multiply numbers that are multiples of ten. [Q# 4-7]	E2		
Follow the order of operations. [Q# 1]	E5		
Estimate products. [Q# 8]	E6		

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