

Estimating Products to Solve Problems

Sometimes you don't need an exact answer to solve a problem.



We raised \$500.
For sure we have
enough money to buy
12 sweatshirts for
the team!

How do the students know they have enough money?

Explore



A Grade 5 class has a bake sale to raise money for charity.



The students use a cookie recipe that makes about 36 cookies.

The students bake 12 batches of cookies.

Estimate to find about how many cookies they baked.

Show and Share

Discuss and compare your strategies for estimating with those of another pair of students.

Did you get the same estimates?

If your answer is no, is one estimate wrong? Explain.

Is one estimate closer than the other? Explain.

There are different ways to estimate products.
Think about the problem and the factors.
Choose a strategy.

► You can use **compatible numbers**.

Compatible numbers are close to the actual numbers and are easy to work with.

Multiples of 10 and of 100 are easy to work with.

- Each bus can seat 48 students.
About how many students can travel on 8 buses?

To estimate: 48×8

Think of the multiples of 10 and 100 closest to one or both factors.

Think: $50 \times 8 = 400$

Or, $48 \times 10 = 480$

Or, $50 \times 10 = 500$

About 400 students can travel on 8 buses.

Since $50 > 48$, and $10 > 8$, all the estimates are greater than the exact answer. When you make the factor a greater number, the estimate is greater than the exact product. It is an *overestimate*.

- During the summer vacation, Julia delivers 215 flyers each day. She delivers flyers for 1 week. About how many flyers does Julia deliver?

To estimate: 215×7

Think: $200 \times 7 = 1400$

Julia delivers about 1400 flyers.

Since 200 is less than 215, I know that 1400 is an *underestimate*.

► You can use compatible numbers and compensation.

A large jug fills 38 glasses of juice.

There are 52 jugs.

About how many glasses can be filled?

To estimate: 38×52

Think: $40 \times 50 = 2000$

About 2000 glasses of juice can be filled.

We round 38 up to 40, so we round 52 down to 50. We have *compensated*.



► You can use **front-end rounding**.

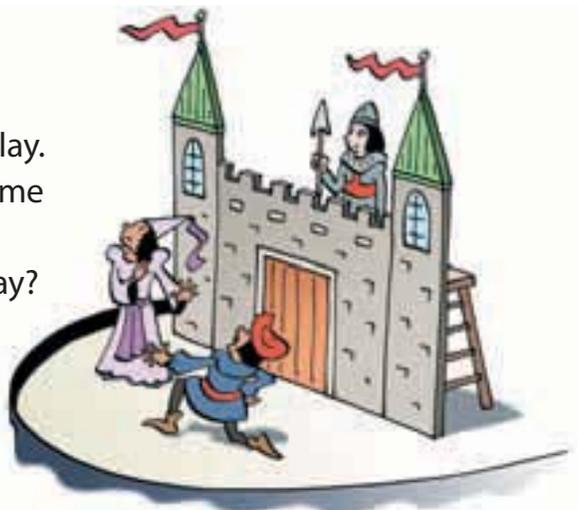
Use the front digit of each factor.

- There will be 6 performances of the school play. Fred estimates that about 240 people will come to each performance. About how many people will come to the play?

To estimate: 6×240

Think: $6 \times 200 = 1200$

About 1200 people will come to the play.



- Fred wants to estimate how many programs to print for the play. If he uses the estimate 1200, he will not have enough programs.

Front-end rounding gives an underestimate.

To improve the estimate, use a compatible number *greater* than 240.

6×240 is about 6×250 .

Fred knows that 4×25 is 100.

So, 2×25 is 50.

Then, $6 \times 25 = 100 + 50$
 $= 150$

So, $6 \times 250 = 1500$

Fred should print 1500 programs to make sure he has enough.

I think about money.
Four quarters make \$1,
or 100¢.
So, $4 \times 25 = 100$
2 quarters make 50¢.
So, $2 \times 25 = 50$



Practice

1. Which compatible numbers would you use to estimate each product?

a) 9×65

b) 833×7

c) 23×69

d) 72×12

2. Estimate each product.

Tell if your estimate is an overestimate, an underestimate, or why you cannot tell.

a) 28×9

b) 74×28

c) 467×5

d) 8×123

3. Estimate to predict which products are greater than 2000.

Explain your thinking. Which estimation strategies did you use?

a) 289×7

b) 95×9

c) 48×57

d) 375×3

4. Estimate the product of 476 and 8.

Do you think the exact answer will be less than or greater than your estimate?

Explain your thinking.

5. Jack delivers 58 newspapers each day.
About how many papers does Jack deliver in one week? Show your work.
6. There are 48 chairs in each row.
There are 64 rows of chairs.
About how many people can sit down?
Show your work.



7. Zoé estimated the product 245×9 .
She wrote these statements about the product.
- The product is less than 2500.
 - The product is greater than 1800.
- How do you think Zoé got each estimated product?
Use words and numbers to explain.
8. The students want to sell about 2000 tickets to a fashion show.
They hope to sell 425 tickets each day.
The students sell tickets for 5 days.
Do you think they will sell enough tickets?
How do you know?
9. The estimated answer to a multiplication question is 4200.
What might the question be?
10. Write a story problem for which an overestimate would be needed.
Solve your problem.
Show your work.
11. Here are 3 students' estimates of the product 93×8 .
Amal estimated 1000.
Bernard estimated 720.
Chloe estimated 950.
- a) Which estimation strategy do you think each student used? Explain.
 - b) Without calculating the exact product, how can you tell which estimate is closest to the exact product?

Reflect

Choose a question from *Practice* where you used compensation in your estimate. Explain why you compensated.