Name _____

4.2 Estimate Products

Learning Target: Use rounding and compatible numbers to estimate products.

Success Criteria:

- I can use rounding to estimate a product.
- I can use compatible numbers to estimate a product.
- I can explain whether an estimate is an overestimate or an underestimate.

Explore

Choose an expression to estimate each product. You may use an expression more than once.

20×20	20×25	30×25	30×30

29×26 $\_\_\_\_ \times \_\_\_\_$	21×24 $\_\_\_\_ \times \_\_\_\_$	32×26 $\_\_\_\_ \times \_\_\_\_$	28×24 $\_\_\_\_ \times \_\_\_\_$

Compare your answers to your partner's answers. Did you choose the same expressions?

Construct an Argument You estimate 23×26 using the expression 25×30. Without multiplying, determine whether the estimate is *greater than* or *less than* the actual product. Explain.

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Number Sense and Operations
MA.5.NSO.2.1: Multiply multi-digit whole numbers including using a standard algorithm with procedural fluency.

Build Understanding: Estimate Products

An **overestimate** is greater than the actual value, and an **underestimate** is less than the actual value. When estimating products, an overestimate occurs when both numbers are greater than the original factors. An underestimate occurs when both numbers are less than the original factors.

Example Use rounding to estimate 204×61. Is your estimate an *overestimate* or an *underestimate*.

Round each factor to the nearest ten. Then multiply.

$$200 \times 60 = (2 \times 100) \times (6 \times 10)$$
$$= (2 \times 6) \times (100 \times 10)$$
$$= \square \times \square$$
$$= \_\_\_\_\_$$

So, 204×61 is about _____. This is an _____.

Example Use compatible numbers to estimate $23 \cdot 194$. Is your estimate an *overestimate* or an *underestimate*.

Choose compatible numbers. Then multiply.

$$25 \cdot 200 = (25 \cdot 2) \cdot 100$$
$$= \square \cdot \square$$
$$= \_\_\_\_\_$$

So, $23 \cdot 194$ is about _____. This is an _____.

Another Way 2 MTR
What other compatible numbers can you use? Compare the estimates.

Try It

Estimate the product. Is your estimate an *overestimate* or an *underestimate*.

1. 387×29

2. $52 \cdot 913$

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Name _____

In-Class Practice

1 I don't understand yet. | 2 I can do it with help. | 3 I can do it on my own. | 4 I can teach someone else.

Estimate the product. Is your estimate an *overestimate* or an *underestimate*.

3. 45×98

4. $21 \bullet 404$

5. $394 \bullet 285$

6. 596×488

Construct an Argument 4 MTR
Why is it important to know whether an estimate is an *overestimate* or an *underestimate*? Explain.

7. 194×46

8. $22 \bullet 221$

9. **Analyze a Problem** 1 MTR You and your friend estimate 27×408. Without multiplying, determine which is an *overestimate* and which is an *underestimate*. Explain.

Your method: round each factor to the nearest ten

Your friend's method: use the compatible numbers 25 and 400

10. **Choose a Method** 3 MTR Explain two different methods to estimate 49×305. Which do you prefer?

11. **DIG DEEPER** You estimate 9×26 using the compatible numbers 10 and 25. Is your estimate an *overestimate* or an *underestimate*? Explain.

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Model Real Life

7 MTR

Example Earth travels about 1,118 miles in 1 minute. About how far does Earth travel in 1 hour?

Think: What do you know? What do you need to find? How will you solve?

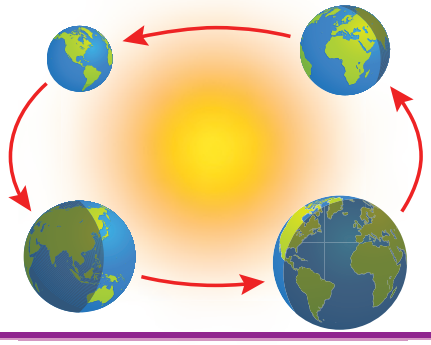
There are 60 minutes in 1 hour, so multiply the distance by 60.

$60 \times 1{,}118 = ?$

Use rounding to estimate the product.

$60 \times 1{,}000 =$ _____

So, Earth travels about _____ miles in 1 hour.



Try It

12. Old Faithful in Yellowstone National Park erupts about 17 times each day. Each eruption sprays about 6,050 gallons of water. About how many gallons of water does Old Faithful spray each day?

about _____ gallons

13. Workers place a foam finger on every seat in a stadium for an upcoming football game. There are 29 sections in the stadium and about 245 seats in each section. About how many foam fingers are needed? Is it better to have an *overestimate* or an *underestimate*? Explain.

14. **DIG DEEPER** One acre of land is equal to the area of a rectangular piece of land that is 22 yards wide and 220 yards long. Central Park in New York City is 843 acres. What is the approximate area of Central Park in square yards?

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Name _____

Learning Target: Use rounding and compatible numbers to estimate products.

4.2 Practice

Example Use compatible numbers to estimate 368×245. Is your estimate an *overestimate* or an *underestimate*.

$400 \times 250 = (4 \times 100) \times (25 \times 10)$

$= (4 \times 25) \times (100 \times 10)$

$= 100 \times 1{,}000$

$=$ 100,000

So, 368×245 is about 100,000. This is an overestimate.

Use rounding to estimate the product. Is your estimate an *overestimate* or an *underestimate*.

1. 85×96

2. $41 \cdot 21$

Use compatible numbers to estimate the product. Is your estimate an *overestimate* or an *underestimate*.

3. $56 \cdot 106$

4. 23×597

Estimate the product.

5. 203×85

6. $67 \cdot 405$

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7. **Maintain Accuracy** Estimate 426 × 2,045. Is your answer an *overestimate* or an *underestimate*? Explain.

3 MTR

8. **Open-Ended** Write 2 three-digit numbers. Then estimate their product by rounding so that the answer is an underestimate.

9. **Construct an Argument** Without multiplying, determine whose estimate is closer to the actual product of 21 and 372. Explain.

4 MTR

You: 20 × 400 = 8,000

Your friend: 25 × 400 = 10,000

10. **Model Real Life** Your cousin sells guanabana jam at a farmers' market. He sells 48 jars for $12 each. About how much money does he collect?

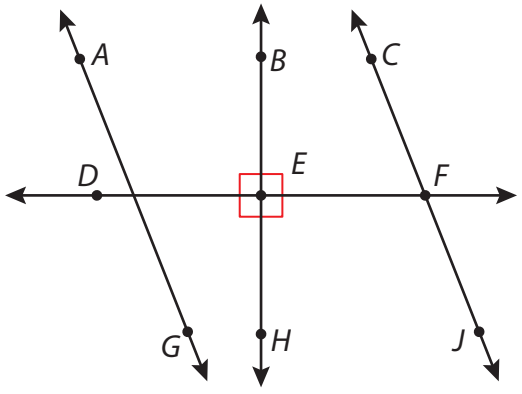
7 MTR

about $_____

11. **DIG DEEPER** About how much heavier, in pounds, was the *Argentinosaurus* than the *Supersaurus*? (1 ton = 2,000 pounds)

Review & Refresh

Use the figure.



12. Name a pair of lines that appear to be parallel.

13. Name two lines that are perpendicular.

14. Name two intersecting lines.

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