Name _____

Multiply Using Mental Math

Essential Question How can you use mental math and properties to help you multiply numbers?

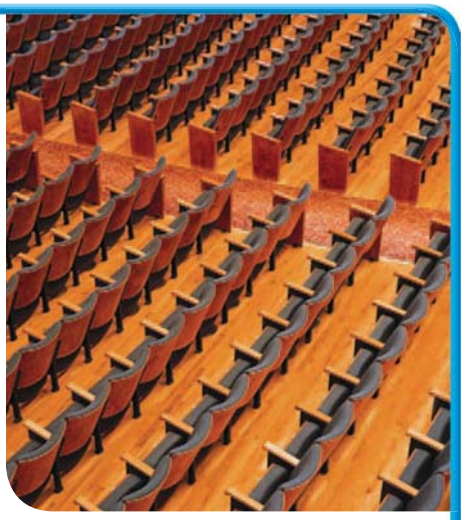
Common Core **Number and Operations in Base Ten—4.NBT.B.5**

MATHEMATICAL PRACTICES
MP1, MP7, MP8

Unlock the Problem Real World

Properties of Multiplication can make multiplication easier.

There are 4 sections of seats in the Playhouse Theater. Each section has 7 groups of seats. Each group has 25 seats. How many seats are there in the theater?



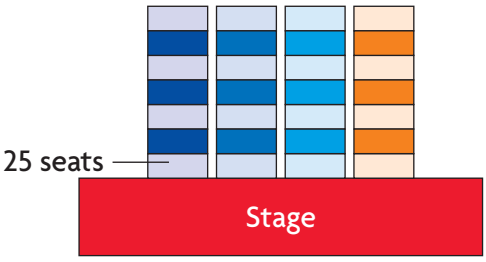
Find $4 \times 7 \times 25$.

$4 \times 7 \times 25 = 4 \times 25 \times 7$ Commutative Property

$= \_\_\_\_\_ \times 7$ **Think:** $4 \times 25 = 100$

$= \_\_\_\_\_$ **Think:** $100 \times 7 = 700$

So, there are 700 seats in the theater.



Math Talk MATHEMATICAL PRACTICES 8

Draw Conclusions What do you know about 4×25 that will help you find 6×25?

Try This! Use mental math and properties.

A **Find $(6 \times 10) \times 10$.**

$(6 \times 10) \times 10 = 6 \times (10 \times 10)$ Associative Property

$= 6 \times \_\_\_\_\_$

$= \_\_\_\_\_$

B **Find $(4 \times 9) \times 250$.**

$(4 \times 9) \times 250 = 250 \times (4 \times 9)$ Commutative Property

$= (250 \times 4) \times 9$ Associative Property

$= \_\_\_\_\_ \times 9$

$= \_\_\_\_\_$

Remember

The Associative Property states that you can group factors in different ways and get the same product. Use parentheses to group the factors you multiply first.

More Strategies Choose the strategy that works best with the numbers in the problems.

Examples

A **Use friendly numbers.**

Multiply. 24×250

Think: $24 = 6 \times 4$ and $4 \times 250 = 1{,}000$

$24 \times 250 = 6 \times 4 \times 250$

$= 6 \times$ _____

$=$ _____

B **Use halving and doubling.**

Multiply. 16×50

Think: 16 can be divided evenly by 2.

$16 \div 2 = 8$ Find half of 16.

$8 \times 50 =$ _____ Multiply.

$2 \times 400 =$ _____ Double 400.

C **Use addition.**

Multiply. 4×625

Think: 625 is 600 plus 25.

$4 \times 625 = 4 \times (600 + 25)$

$= (4 \times 600) + (4 \times 25)$

$=$ _____ $+$ _____

$=$ _____

D **Use subtraction.**

Multiply. 5×398

Think: 398 is 2 less than 400.

$5 \times 398 = 5 \times (400 - 2)$

$= (5 \times$ _____$) - (5 \times 2)$

$= 2{,}000 -$ _____

$=$ _____

- What property is being used in Examples C and D? _____

Share and Show

MATH BOARD

1. Break apart the factor 112 to find 7×112 by using mental math and addition.

$7 \times 112 = 7 \times ($_____ $+ 12)$

$=$ _____

$=$ _____

$=$ _____

Name _____

Find the product. Tell which strategy you used.

2. $4 \times 6 \times 50$

3. 5×420

4. 6×298

On Your Own

Math Talk

MATHEMATICAL PRACTICES 7

Identify Relationships
How is using an addition strategy related to using a subtraction strategy?

Find the product. Tell which strategy you used.

5. 14×50

6. 32×25

7. $8 \times 25 \times 23$

Practice: Copy and Solve **Use a strategy to find the product.**

8. 16×400

9. $3 \times 31 \times 10$

10. 3×199

11. $3 \times 1{,}021$

MATHEMATICAL PRACTICE 7 **Identify Relationships** **Algebra** **Use mental math to find the unknown number.**

12. $21 \times 40 = 840$, so $21 \times 42 =$ _____.

13. $9 \times 60 = 540$, so $18 \times 30 =$ _____.

14. GO DEEPER The science museum sells dinosaur models to schools and libraries for $107 each. The town library buys 3 models. The town elementary school buys 5 models. What is the total cost of the models the town buys?

15. GO DEEPER Kyle and Karen each bought 6 books of ride tickets at the fair. Each book has 15 tickets. How many tickets did they buy altogether?

Problem Solving • Applications Real World

Use the table for 16–18.

16. GO DEEPER Three thousand, forty-three people buy tickets at the gate for Section N and one hundred people buy tickets at the gate for Section L. How much money is collected for Section N and Section L at the gate?

Arena Ticket Prices Per Game

Section	Full Season	15-Game Plan	Gate Price
K	$44	$46	$48
L	$30	$32	$35
M	$25	$27	$30
N	$20	$22	$25

17. MATHEMATICAL PRACTICE 1 **Use Diagrams** Tina and 3 of her friends buy the full season plan for Section M. If there are 45 games in the full season, how much money do they spend?

WRITE Math • Show Your Work

18. THINK SMARTER When the full season tickets first went on sale, 2,000 Full Season tickets sold for Section N. Two weeks after the tickets first went on sale, another 1,500 full season tickets were sold for Section N. How much money was spent on full season tickets for Section N in total? How much more money was spent when the tickets first went on sale than after the first two weeks?

Math on the Spot

Personal Math Trainer

19. THINK SMARTER+ Find 6×407. Show your work and explain why the strategy you chose works best with the factors.

Name _____

Multiply Using Mental Math

COMMON CORE STANDARD—4.NBT.B.5
Use place value understanding and properties of operations to perform multi-digit arithmetic.

Find the product. Tell which strategy you used.

1. 6×297

Think: $297 = 300 - 3$
$6 \times 297 = 6 \times (300 - 3)$
$= (6 \times 300) - (6 \times 3)$
$= 1{,}800 - 18$
$= 1{,}782$

1,782;

use subtraction

2. $14 \times 25 \times 4$

_____

_____

3. 8×604

_____

_____

4. 50×28

_____

_____

Problem Solving Real World

5. Section J in an arena has 20 rows. Each row has 15 seats. All tickets cost $18 each. If all the seats are sold, how much money will the arena collect for Section J?

_____

6. At a high-school gym, the bleachers are divided into 6 equal sections. Each section can seat 395 people. How many people can be seated in the gym?

_____

7. WRITE Math Show how to multiply 6×298 using friendly numbers and then using properties and mental math. Write about which method you like better and why.

_____

_____

_____

_____

Lesson Check (4.NBT.B.5)

1. Pencils come in cartons of 24 boxes. A school bought 50 cartons of pencils for the start of school. Each box of pencils cost $2. How much did the school spend on pencils?

2. The school also bought 195 packages of markers. There are 6 markers in a package. How many markers did the school buy?

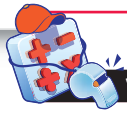
Spiral Review (4.NBT.B.4, 4.NBT.B.5)

3. Alex has 175 baseball cards. Rodney has 3 times as many baseball cards as Alex. How many fewer cards does Alex have than Rodney?

4. A theater seats 1,860 people. The last 6 shows have been sold out. Estimate the total number of people attending the last 6 shows.

5. At one basketball game, there were 1,207 people. At the next game, there were 958 people. How many people were at the two games?

6. Bill bought 4 jigsaw puzzles. Each puzzle has 500 pieces. How many pieces are in all the puzzles?



FOR MORE PRACTICE GO TO THE Personal Math Trainer