Warm-up:

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You can use the properties of operations to help you simplify numerical expressions more easily.

Properties of Addition

Commutative Property of Addition — flip
If the order of addends changes, the sum stays the same.
12 + 7 = 7 + 12

Associative Property of Addition — ( )
If the grouping of addends changes, the sum stays the same.
5 + (8 + 14) = (5 + 8) + 14

Identity Property of Addition — 0
The sum of any number and 0 is that number.
13 + 0 = 13 (same)

Properties of Multiplication

Commutative Property of Multiplication — flip
If the order of factors changes, the product stays the same.
4 × 9 = 9 × 4

Associative Property of Multiplication — ( )
If the grouping of factors changes, the product stays the same.
11 × (3 × 6) = (11 × 3) × 6

Identity Property of Multiplication — 1
The product of any number and 1 is that number.
4 × 1 = 4 (same)

PROPERTIES OF ADDITION AND MULTIPLICATION

	ADDITION	EXPLANATION	MULTIPLICATION	EXPLANATION
COMMUTATIVE PROPERTY	a + b = b + a 22 + 5 = 5 + 22 27 = 27	THE ORDER OF THE ADDENDS DOESN'T CHANGE THE SUM	a x b = b x a 3 X 7 = 7 X 3 21 = 21	THE ORDER OF THE FACTORS DOESN'T CHANGE THE PRODUCT
ASSOCIATIVE PROPERTY	(a + b) + c = a + (b + c) 14 +(5 + 7) = (14 +5)+7 14 + 12 = 19 + 7 26 = 26	CHANGING THE GROUPING OF THE ADDENDS DOESN'T CHANGE THE SUM	(a x b) x c = a x (b x c) (4x 5) x 6 = 4 x (5 x 6) 20 x 6 = 4 x 30 120 = 120	CHANGING THE GROUPING OF THE FACTORS DOESN'T CHANGE THE PRODUCT
IDENTITY PROPERTY	a + 0 = a 6 + 0 = 6	THE SUM OF A NUMBER AND 0 IS THE NUMBER	a x 1 = a 4 x 0 = 0	THE PRODUCT OF A NUMBER AND 1 IS 0.

Unlock the Problem (Real World)

The table shows the number of bones in several parts of the human body. What is the total number of bones in the ribs, the skull, and the spine?

To find the sum of addends using mental math, you can use the Commutative and Associative Properties.

Part	Number of Bones
Ankle	7
Ribs	24
Skull	28
Spine	26

Use properties to find 24 + 28 + 26.

24 + 28 + 26 = 28 + 24 + 26 — Use the commutative Property to reorder the addends.

= 28 + (24 + 26) — Use the associative Property to group the addends.

= 28 + 50 — Use mental math to add.

= 78

So, there are 78 bones in the ribs, the skull, and the spine.

Math Talk Mathematical Processes
Explain why grouping 24 and 26 makes the problem easier to solve.

Distributive Property

Multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products.

5 × (7 + 9) = (5 × 7) + (5 × 9)

Use Distributive Rule

What is the answer to **2(4 + 3)** ?

2 (4 + 3) = (2x4) + (2x3) = **14** ✓

The "2" outside the brackets is multiplied onto everything that is inside the brackets.

Classwork:

PAGE 6-8 #3-17 ODD

Odd: #3,5,7,9,11,13,15,17

Use properties to find the sum or product.

2. $89 + 27 + 11$ (89+11)+27 100+27 127

3. 9×52 52 × 9 468

4. $107 + 0 + 39 + 13$ (21+39)+(25+5) 60+30 90

Problem Solving

Practice: Copy and Solve Use properties to find the sum or product.

5. 3×78 3 78 × 3 234

6. $4 \times 60 \times 5$

7. $21 + 25 + 39 + 5$

Complete the equation, and tell which property you used.

8. $11 + (19 + 6) = (11 + \underline{19}) + 6$ Associative

9. $25 + 14 = \underline{14} + 25$ Commutative

10. H.O.T. Show how you can use the Distributive Property to rewrite and find $(32 \times 6) + (32 \times 4)$.

Problem Solving

11. **Multi-Step** Three friends' meals at a restaurant cost $13, $14, and $11. Use parentheses to write two different expressions and find how much the friends spent in all. Which property does your pair of expressions demonstrate?

(13 + 14) + 11
13 + (14 + 11)

associative

12. **Multi-Step** Jacob is designing an aquarium for a doctor's office. He plans to buy 6 red blond guppies, 1 blue neon guppy, and 1 yellow guppy. The table shows the price list for the guppies. How much will the guppies for the aquarium cost?

Fancy Guppy Prices	
Blue neon	$11
Red blond	$22
Sunrise	$18
Yellow	$19

13. H.O.T. **Sense or Nonsense?** Julie wrote $(15 - 6) - 3 = 15 - (6 - 3)$. Is Julie's equation sense or nonsense? Do you think the Associative Property works for subtraction? **Explain.**

nonsense. You can't change the order in subtraction!

(15 − 6) − 3
9 − 3
6

15 − (6 − 3)
15 − 3
12

Fill in the bubble completely to show your answer.

14. **Connect** In a flea circus, 12 fleas pull carts, 23 fleas ride on tiny bicycles, and 18 fleas sit on seesaws. You can add $12 + 23 + 18$ to find the total number of fleas. Which equation shows the Commutative Property of Addition?

Ⓐ $12 + 23 + 18 = 23 + 12 + 18$
Ⓑ $12 + 23 + 18 = (12 + 23) + 18$
Ⓒ $12 + 23 + 18 = 12 + (23 + 18)$
Ⓓ $12 + 23 + 18 = 35 + 18$

15. **Use Symbols** Complete the equation.

$15 + (25 + 27) = (15 + \underline{25}) + 27$

Ⓐ 40 Ⓒ 10
25 Ⓓ 52

TEXAS Test Prep

17. Canoes rent for $29 per day. Which expression can be used to find the cost in dollars of renting 6 canoes for a day?

✗ $(6 + 20) + (6 + 9)$
$(6 \times 20) + (6 \times 9)$ ✓
✗ $(6 + 20) \times (6 + 9)$
Ⓓ $(6 \times 20) \times (6 \times 9)$

29 = (20+9)
6(20+9)
(6×20)+(6×9)

5 29 × 6 $174

Homework:

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circle odd: #1, 3, 5, 7, 9, 11, 13

NAME

*evens are extra credit!