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*P.I. A.N.I: Apply the properties of real numbers
(commutative, associative, distributive, inverse)*

1. What is the reciprocal of $\frac{4}{9}$?

[A] $\frac{5}{9}$ [B] 4 [C] $\frac{9}{4}$ [D] 9

Name the inverse operation.

2. Subtract 6.

[A] Add 6. [B] Multiply by 6.
[C] Add -6. [D] Divide by -6.

3. Divide by 14.

[A] Add 14. [B] Multiply by 14.
[C] Multiply by -14. [D] Divide by -14.

4. Multiply by -12.

[A] Divide by 12. [B] Subtract -12.
[C] Divide by -12. [D] Add 12.

5. Add 8.

[A] Subtract -8. [B] Subtract 8.
[C] Divide by 8. [D] Multiply by -8.

6. Use the distributive property to simplify:
 $3(5x - 8y)$

[A] $15x - 8y$ [B] $15x + 24y$
[C] $5x - 8y$ [D] $15x - 24y$

7. Which of the following statements is not true?

[A] $78 \cdot (-7) = 70(-7) + 8(-7)$
[B] $8 + (-6) \cdot 5 = 8 + 5 \cdot (-6)$
[C] $24 \cdot (-6) = 20(-6) + 4(-6)$
[D] $12 \cdot (-3) + 6 = 12 \cdot 6 + (-3)$

8. Find the missing number. $8.4(1.5 + 2.3) = 12.6 + ?$

[A] 8.45 [B] 25.33
[C] 14.67 [D] 19.32

9. Which of the following illustrates use of the associative property of addition?

[A] $5 \times (3 + 8) = ? + 40$
[B] $7 + (4 + 9) = ? + 9$
[C] $76 + ? = 52 + 76$ [D] $? + 17 = 17$

10. Use the numbers 9 and 6 to illustrate the commutative property of addition.

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11. Use the numbers 5 and 4 to illustrate the commutative property of multiplication.
12. Use the numbers 5, 7, and 8 to illustrate the associative property of addition.
13. Find the reciprocal of 6.
14. Find the reciprocal of $\frac{5}{11}$.
15. How many $\frac{3}{5}$'s are in 1?
16. Write the reciprocal of each of these numbers.
(a) $\frac{4}{9}$ (b) $3\frac{2}{3}$ (c) 17
17. (a) What operation is the inverse operation of addition?
(b) What operation is the inverse operation of multiplication?
18. Jake wrote $3(2x - 6)$ as $6x - 6$. Jan wrote the same expression as $6x - 18$. Which answer is correct? Why?
19. Put these algebraic statements in logical order. Justify each step.
 $5(3 - x) = 20$; $x = -1$; $\frac{5(3 - x)}{2} = 10$; $-5x = 5$
; $15 - 5x = 20$
20. Show how to use the distributive property and mental math to find the total cost of 6 books that sell for \$7.99 each.

[1] C

[2] A

[3] B

[4] C

[5] B

[6] D

[7] D

[8] D

[9] B

[10] $9 + 6 = 6 + 9$

[11] $5 \times 4 = 4 \times 5$

[12] $(5 + 7) + 8 = 5 + (7 + 8)$

[13] $\frac{1}{6}$

[14] $\frac{11}{5}$

[15] $\frac{5}{3}$

[16] (a) $\frac{9}{4}$ (b) $\frac{3}{11}$ (c) $\frac{1}{17}$

(a) subtraction
[17] (b) division

Jan's answer is correct because she used the
[18] distributive property.

$$\frac{5(3-x)}{2} = 10 \text{ given}$$

$$5(3-x) = 20 \text{ mult. prop. =}$$

$$15 - 5x = 20 \text{ distrib. prop.}$$

$$-5x = 5 \text{ add. prop. =}$$

[19] $x = -1 \text{ div. prop. =}$

[20] $6(7.99) = 6(8 - 0.01) = 48 - 0.06 = \47.94