

Algebraic Reasoning

Solutions Key

ARE YOU READY?

- | | |
|---|---|
| 1. division | 2. place value |
| 3. multiplication | 4. quotient |
| 5. thousands | 6. tens |
| 7. ten thousands | 8. billions |
| 9. hundred thousands | 10. millions |
| 11. hundreds | 12. ten millions |
| 13. $2 \cdot 2 \cdot 2 = 8$ | 14. $9 \cdot 9 \cdot 9 \cdot 9 = 6,561$ |
| 15. $14 \cdot 14 \cdot 14 = 2,744$ | |
| 16. $10 \cdot 10 \cdot 10 \cdot 10 = 10,000$ | |
| 17. $3 \cdot 3 \cdot 5 \cdot 5 = 225$ | 18. $2 \cdot 2 \cdot 5 \cdot 7 = 140$ |
| 19. $3 \cdot 3 \cdot 11 \cdot 11 = 1,089$ | |
| 20. $5 \cdot 10 \cdot 10 \cdot 10 = 5,000$ | |
| 21. $49 \div 7 = 7$ | 22. $54 \div 9 = 6$ |
| 23. $96 \div 12 = 8$ | 24. $88 \div 8 = 11$ |
| 25. $42 \div 6 = 7$ | 26. $65 \div 5 = 13$ |
| 27. $39 \div 3 = 13$ | 28. $121 \div 11 = 11$ |
| 29. $\begin{array}{r} 425 \\ +12 \\ \hline 437 \end{array}$ | 30. $\begin{array}{r} 619 \\ +254 \\ \hline 873 \end{array}$ |
| 31. $\begin{array}{r} 62 \\ -47 \\ \hline 15 \end{array}$ | 32. $\begin{array}{r} 373 \\ +86 \\ \hline 459 \end{array}$ |
| 33. $\begin{array}{r} 62 \\ \times 42 \\ \hline 124 \\ +2,480 \\ \hline 2,604 \end{array}$ | 34. $\begin{array}{r} 122 \\ \times 15 \\ \hline 610 \\ +1,220 \\ \hline 1,830 \end{array}$ |
| 35. $\begin{array}{r} 89 \\ 7 \overline{)623} \\ \underline{-56} \\ 63 \\ \underline{-63} \\ 0 \end{array}$ | 36. $\begin{array}{r} 6r5 \\ 24 \overline{)149} \\ \underline{-144} \\ 5 \end{array}$ |

LESSON 1

Think and Discuss

- Possible answer: The expressions do not have the same value.
 $3 + 4^2 = 3 + 16 = 19$
 $(3 + 4)^2 = 7^2 = 49$
- The order of operations are as follows:
 - multiply $3 \cdot 20$
 - add 5 to the product
 - square 3
 - divide the result from step 2 by 13
 - add the result from step 3 to the quotient.
The result of the expression is 14.

$$3. 3 + (9 - 4) \cdot 2 = 13$$

Exercises

- | | |
|---|---|
| 1. $\begin{array}{r} 43 + 16 \div 4 \\ 43 + 4 \\ 47 \end{array}$ | 2. $\begin{array}{r} 28 - 4 \cdot 3 \div 6 + 4 \\ 28 - 12 \div 6 + 4 \\ 28 - 2 + 4 \\ 26 + 4 \\ 30 \end{array}$ |
| 3. $\begin{array}{r} 25 - 4^2 \div 8 \\ 25 - 16 \div 8 \\ 25 - 2 \\ 23 \end{array}$ | 4. $\begin{array}{r} 26 - (7 \cdot 3) + 2 \\ 26 - 21 + 2 \\ 5 + 2 \\ 7 \end{array}$ |
| 5. $\begin{array}{r} (3^2 + 11) \div 5 \\ (9 + 11) \div 5 \\ 20 \div 5 \\ 4 \end{array}$ | 6. $\begin{array}{r} 32 + 6(4 - 2^2) + 8 \\ 32 + 6(4 - 4) + 8 \\ 32 + 6(0) + 8 \\ 32 + 0 + 8 \\ 40 \end{array}$ |
| 7. $\begin{array}{r} (3 \cdot 4 + 2 \cdot 8) \cdot 10 \\ (12 + 16) \cdot 10 \\ 28 \cdot 10 \\ 280 \\ \$280 \end{array}$ | 8. $\begin{array}{r} 3 + 7 \cdot 5 - 1 \\ 3 + 35 - 1 \\ 37 \end{array}$ |
| 9. $\begin{array}{r} 5 \cdot 9 - 3 \\ 45 - 3 \\ 42 \end{array}$ | 10. $\begin{array}{r} 3 - 2 + 6 \cdot 2^2 \\ 3 - 2 + 6 \cdot 4 \\ 3 - 2 + 24 \\ 25 \end{array}$ |
| 11. $\begin{array}{r} (3 \cdot 3 - 3)^2 \div 3 + 3 \\ (9 - 3)^2 \div 3 + 3 \\ 6^2 \div 3 + 3 \\ 36 \div 3 + 3 \\ 12 + 3 \\ 15 \end{array}$ | 12. $\begin{array}{r} 2^5 - (4 \cdot 5 + 3) \\ 32 - (4 \cdot 5 + 3) \\ 32 - (20 + 3) \\ 32 - 23 \\ 9 \end{array}$ |
| 13. $\begin{array}{r} (3 \div 3) + 3 \cdot (3^3 - 3) \\ 1 + 3 \cdot (27 - 3) \\ 1 + 3 \cdot 24 \\ 1 + 72 \\ 73 \end{array}$ | 14. $\begin{array}{r} 4^3 \div 8 - 2 \\ 64 \div 8 - 2 \\ 8 - 2 \\ 6 \end{array}$ |
| 15. $\begin{array}{r} (8 - 2)^2 \cdot (8 - 1)^2 \div 3 \\ 6^2 \cdot 7^2 \div 3 \\ 36 \cdot 49 \div 3 \\ 1,764 \div 3 \\ 588 \end{array}$ | |
| 16. $\begin{array}{r} 9,234 \div [3 \cdot 3(1 + 8^3)] \\ 9,234 \div [3 \cdot 3(1 + 512)] \\ 9,234 \div [3 \cdot 3(513)] \\ 9,234 \div 4,617 \\ 2 \end{array}$ | |
| 17. $\begin{array}{r} 14 + 5 \cdot 25 \\ 14 + 125 \\ 139 \\ \$139 \end{array}$ | 18. $\begin{array}{r} 35 + 20(12^2 \div 9) \\ 35 + 20(144 \div 9) \\ 35 + 20(16) \\ 35 + 320 \\ 355 \\ \$355 \end{array}$ |

19. $90 - 36 \times 2$
 $90 - 72$
 18
20. $16 + 14 \div 2 - 7$
 $16 + 7 - 7$
 $23 - 7$
 16
21. $64 \div 2^2 + 4$
 $64 \div 4 + 4$
 $16 + 4$
 20
22. $(4.5 \times 10^2) + 6 \div 3$
 $4.5 \times 100 + 2$
 $450 + 2$
 452
23. $(9 - 4)^2 - 12 \times 2$
 $(5)^2 - 12 \times 2$
 $25 - 12 \times 2$
 $25 - 24$
 1
24. $[1 + (2 + 5)^2] \times 2$
 $[1 + (7)^2] \times 2$
 $[1 + 49] \times 2$
 50×2
 100
25. $8 \cdot 3 - 2 \blacksquare 8 \cdot (3 - 2)$
 $24 - 2 \blacksquare 8 \cdot 1$
 $22 \blacksquare 8$
 $22 > 8$
26. $(6 + 10) \div 2 \blacksquare 6 + 10 \div 2$
 $16 \div 2 \blacksquare 6 + 5$
 $8 \blacksquare 11$
 $8 < 11$
27. $12 \div 3 \cdot 4 \blacksquare 12 \div (3 \cdot 4)$
 $4 \cdot 4 \blacksquare 12 \div 12$
 $16 \blacksquare 1$
 $16 > 1$
28. $18 + 6 - 2 \blacksquare 18 + (6 - 2)$
 $24 - 2 \blacksquare 18 + 4$
 $22 \blacksquare 22$
 $22 = 22$
29. $[6(8 - 3) + 2] \blacksquare 6(8 - 3) + 2$
 $[6(5) + 2] \blacksquare 6(5) + 2$
 $30 + 2 \blacksquare 30 + 2$
 $32 \blacksquare 32$
 $32 = 32$
30. $(18 - 14) \div (2 + 2) \blacksquare 18 - 14 \div 2 + 2$
 $4 \div 4 \blacksquare 18 - 7 + 2$
 $1 \blacksquare 11 + 2$
 $1 \blacksquare 13$
 $1 < 13$
31. $4 \cdot (8 - 3)$
 $4 \cdot 5$
 20
32. $5 + (9 - 3) \div 2$
 $5 + 6 \div 2$
 $5 + 3$
 8
33. $(12 - 2)^2 \div 5$
 $10^2 \div 5$
 $100 \div 5$
 20
34. $4 \cdot (2 + 6)$
 $4 \cdot 8$
 32
35. $(4 + 6 - 3) \div 7$
 $(10 - 3) \div 7$
 $7 \div 7$
 1
36. $9 \cdot (8 - 6) \div 3$
 $9 \cdot 2 \div 3$
 $18 \div 3$
 6
37. $8 \cdot 4 + 10 \cdot 5$
 $32 + 50$
 $\$82$
38. $(512 \cdot 4 - 512) \div 2$
 $(2,048 - 512) \div 2$
 $1,536 \div 2$
 $\$768$

39. a. Anelise bought four shirts. The picture shows that the shirts cost \$15 each.
 $4 \cdot 15$
- b. Anelise bought 2 pairs of jeans. The picture shows that the jeans cost \$30 each.
 $2 \cdot 30$
- c. Anelise spent money on shirts $\$(4 \cdot 15)$, and jeans $\$(2 \cdot 30)$, and sales tax $\$(6)$.
 $4 \cdot 15 + 2 \cdot 30 + 6$

- $60 + 60 + 6$
 126
 $4 \cdot 15 + 2 \cdot 30 + 6; \126
40. Check each answer choice to see if the sum of the squares of the three smallest numbers is equal to the square of the largest.

1, 4, 8, 9
 $1^2 + 4^2 + 8^2 \stackrel{?}{=} 9^2$
 $1 + 16 + 64 \stackrel{?}{=} 81$
 $17 + 64 \stackrel{?}{=} 81$
 $81 \stackrel{?}{=} 81$
 $81 = 81$

Answer choice A meets the requirement.

41. First add 2 and 4, and then square the result. Multiply 2 times 3, and subtract from 36. Then divide that answer by 6.
42. $3 \cdot 5 + 6^2 + 54 - 5$
 $3 \cdot 5 + 36 + 54 - 5$
 $15 + 36 + 54 - 5$
 100
Possible answer: $3 \cdot 5 + 6^2 + 54 - 5$
43. C; Using the order of operations, multiplication and division should be done first, right to left. $1 \cdot 9$ occurs first right to left. Multiplication should be done first.
44. Check each expression to see if it is equal to 81.
 $3 \cdot 25 + 2 \stackrel{?}{=} 81$
 $75 + 2 \stackrel{?}{=} 81$
 $77 \stackrel{?}{=} 81$
 $77 \neq 81$
Choice H does not equal 81.
45. D; Quinton bought 2 pairs of jeans for \$30 each and 3 pairs of socks for \$5 each.
Cost for jeans: $2 \cdot 30$
Cost for socks: $3 \cdot 5$
Total cost: $2 \cdot 30 + 3 \cdot 5$

LESSON 2

Think and Discuss

1. Possible answer: Use the order of operations:
 $7 \cdot (3 + 9) = 7 \cdot 12 = 84$
Use the Distributive Property:
 $7 \cdot (3 + 9) = (7 \cdot 3) + (7 \cdot 9) = 21 + 63 = 84$
2. Possible answer: Think of $6 \cdot 102$ as $6 \cdot (100 + 2)$. By the Distributive Property, this is equal to $6 \cdot 100 + 6 \cdot 2 = 600 + 12 = 612$.

Exercises

- The numbers have been regrouped.
Associative Property of Addition
- One of the factors is 1.
Identity Property of Multiplication
- The order of the numbers has been switched.
Commutative Property of Multiplication
- One of the addends is 0.
Identity Property of Addition
- The numbers have been regrouped.
Associative Property of Multiplication
- The order of the variables has been switched.
Commutative Property of Addition
- Possible justifications:
 $8 + 23 + 2$
 $= 8 + 2 + 23$ Commutative Property of Addition
 $= (8 + 2) + 23$ Associative Property of Addition
 $= 33$
- Possible justifications:
 $2 \cdot (17 \cdot 5)$
 $= 2 \cdot (5 \cdot 17)$ Commutative Property of Multiplication
 $= (2 \cdot 5) \cdot 17$ Associative Property of Multiplication
 $= 10 \cdot 17$ Perform operation in parentheses.
 $= 170$ Multiply.
- Possible justifications:
 $(25 \cdot 11) \cdot 4$
 $= (11 \cdot 25) \cdot 4$ Commutative Property of Multiplication
 $= 11 \cdot (25 \cdot 4)$ Associative Property of Multiplication
 $= 11 \cdot 100$ Perform operation in parentheses.
 $= 1,100$ Multiply.
- Possible justifications:
 $17 + 29 + 3$
 $= 17 + 3 + 29$ Commutative Property of Addition
 $= (17 + 3) + 29$ Associative Property of Addition
 $= 20 + 29$ Perform operation in parentheses.
 $= 49$ Add.
- Possible justifications:
 $16 + (17 + 14)$
 $= 16 + (14 + 17)$ Commutative Property of Addition
 $= (16 + 14) + 17$ Associative Property of Addition
 $= 30 + 17$ Perform operation in parentheses.
 $= 47$ Add.
- Possible justifications:
 $5 \cdot 19 \cdot 20$
 $= 5 \cdot 20 \cdot 19$ Commutative Property of Multiplication
 $= (5 \cdot 20) \cdot 19$ Associative Property of Multiplication
 $= 100 \cdot 19$ Perform operation in parentheses.
 $= 1,900$ Multiply.
- $2(19) = 2(20 - 1)$ $14. 5(31) = 5(30 + 1)$
 $= 2 \cdot 20 - 2 \cdot 1$ $= 5 \cdot 30 + 5 \cdot 1$
 $= 40 - 2$ $= 150 + 5$
 $= 38$ $= 155$
- $22(2) = (20 + 2)(2)$ $16. (13)6 = (10 + 3)6$
 $= 20 \cdot 2 + 2 \cdot 2$ $= 10 \cdot 6 + 3 \cdot 6$
 $= 40 + 4$ $= 60 + 18$
 $= 44$ $= 78$
- $17. 8(26) = 8(20 + 6)$ $18. (34)6 = (30 + 4)6$
 $= 8 \cdot 20 + 8 \cdot 6$ $= 30 \cdot 6 + 4 \cdot 6$
 $= 160 + 48$ $= 180 + 24$
 $= 208$ $= 204$
- Zero is one of the addends.
Identity Property of Addition
- The variables are regrouped.
Associative Property of Multiplication
- The numbers are regrouped.
Associative Property of Addition
- The order of the numbers is switched.
Commutative Property of Addition
- One of the factors is 1.
Identity Property of Multiplication
- The order of the numbers is switched.
Commutative Property of Multiplication
- $50 \cdot 16 \cdot 2$
 $= 50 \cdot 2 \cdot 16$ Commutative Property of Multiplication
 $= (50 \cdot 2) \cdot 16$ Associative Property of Multiplication
 $= 100 \cdot 16$ Perform the operation in the parentheses.
 $= 1,600$ Multiply.
- $9 + 34 + 1$
 $= 9 + 1 + 34$ Commutative Property of Addition
 $= (9 + 1) + 34$ Associative Property of Addition
 $= 10 + 34$ Perform operation in parentheses.
 $= 44$ Add.
- $4 \cdot (25 \cdot 9)$
 $= (4 \cdot 25) \cdot 9$ Associative Property of Multiplication
 $= 100 \cdot 9$ Perform the operation in the parentheses.
 $= 900$ Multiply.
- $27 + 28 + 3$
 $= 27 + 3 + 28$ Commutative Property of Addition
 $= (27 + 3) + 28$ Associative Property of Addition
 $= 30 + 28$ Perform the operation in the parentheses.
 $= 58$ Add.
- $20 + (63 + 80)$
 $= 20 + (80 + 63)$ Commutative Property of Addition
 $= (20 + 80) + 63$ Associative Property of Addition
 $= 100 + 63$ Perform the operation in the parentheses.
 $= 163$
- $25 + 17 + 75$
 $= 25 + 75 + 17$ Commutative Property of Addition
 $= (25 + 75) + 17$ Associative Property of Addition
 $= 100 + 17$ Perform the operation in the parentheses.
 $= 117$ Add.
- $9(15) = (10 - 1)15$ $32. 14(5) = (10 + 4)5$
 $= 10 \cdot 15 - 1 \cdot 15$ $= 10 \cdot 5 + 4 \cdot 5$
 $= 150 - 15$ $= 50 + 20$
 $= 135$ $= 70$
- $3(58) = 3(50 + 8)$ $34. 10(42) = 10(40 + 2)$
 $= 3 \cdot 50 + 3 \cdot 8$ $= 10 \cdot 40 + 10 \cdot 2$
 $= 150 + 24$ $= 400 + 20$
 $= 174$ $= 420$
- $(23)4 = (20 + 3)4$ $36. 16(5) = (10 + 6)5$
 $= 20 \cdot 4 + 3 \cdot 4$ $= 10 \cdot 5 + 6 \cdot 5$
 $= 80 + 12$ $= 50 + 30$
 $= 92$ $= 80$

37. Possible answer: $2 \cdot 5 = 5 \cdot 2$
38. Possible answer: $6 + 0 = 6$
39. Possible answer: $(4 + 3) + 10 = 4 + (3 + 10)$
40. Possible answer: $7(3 + 5) = 7 \cdot 3 + 7 \cdot 5$
41. $(14 + 8) \cdot 10 = 14 \cdot 10 + 8 \cdot 10$
 $= 140 + 80$
 $= 220$
 220 ft²
42. $32 + 26 + 43$
 $= 32 + 43 + 26$ Commutative Property of Addition
 $= (32 + 43) + 26$ Associative Property of Addition
 $= 75 + 26$ Perform the operation in the parentheses.
 $= 101$ Add.
43. $50 \cdot 45 \cdot 2^2$
 $= 50 \cdot 45 \cdot 5$ Simplify exponent.
 $= 50 \cdot 4 \cdot 45$ Commutative Property of Multiplication
 $= (50 \cdot 4) \cdot 45$ Associative Property of Multiplication
 $= 200 \cdot 45$ Perform the operation in the parentheses.
 $= 9,000$ Multiply.
44. $5 + 16 + 5^2$
 $= 5 + 16 + 25$ Simplify exponent.
 $= 5 + 25 + 16$ Commutative Property of Addition
 $= (5 + 25) + 16$ Associative Property of Addition
 $= 30 + 16$ Perform the operation in the parentheses.
 $= 46$ Add.
45. $35 \cdot 25 \cdot 20$
 $= 35 \cdot (25 \cdot 20)$ Associative Property of Multiplication
 $= 35 \cdot 500$ Perform the operation in the parentheses.
 $= 17,500$ Multiply.
46. The order of the numbers is switched.
 5; Commutative Property of Addition
47. One of the factors is 1.
 15; Identity Property of Multiplication
48. 3 is distributed into the parentheses.
 3; Distributive Property
49. The number is unchanged after addition.
 0; Identity Property of Addition
50. The numbers are regrouped.
 13; Associative Property of Multiplication
51. The numbers are regrouped.
 8; Associative Property of Addition
52. The 2 is distributed into the parentheses.
 6; Distributive Property
53. The 2 is distributed into the parentheses.
 2; Distributive Property
54. To find the total number of games won by the Denver Nuggets over the three seasons, simplify $27 + 17 + 43$. You can use the Associative Property of Addition to group 17 and 43. Adding 17 and 43 gives 60. Then you can add 27 and 60 to get 87.
55. The student did not multiply the 12 by 6.
56. No; $8 - 3 \neq 3 - 8$.

$$57. \frac{1}{6} \cdot \left(36 + \frac{1}{2}\right) = \frac{1}{6} \cdot 36 + \frac{1}{6} \cdot \frac{1}{2}$$

$$= 6 + \frac{1}{12}$$

$$= 6\frac{1}{12}$$

58. B; The Associative Property of Addition regroups numbers that are being added. The expression $9 + 8 + 2 = 9 + (8 + 2)$ uses regrouping of addition.

59. H; $2 \cdot (3 + 7) = (2 \cdot 3) + (2 \cdot 7)$ The 2 is distributed into the parentheses.
 Distributive Property

$$60. 8 \cdot (20 + 7) = 8 \cdot 20 + 8 \cdot 7$$

$$= 160 + 56$$

$$= 216$$

READY TO GO ON

1. $3 + 18 \div 3$
 $3 + 6$
 9

2. $(3 + 18) \div 3$
 $21 \div 3$
 7

3. $8 - 14 \div (9 - 2)$
 $8 - 14 \div 7$
 $8 - 2$
 6

4. $54 - 6 \cdot 3 + 4^2$
 $54 - 6 \cdot 3 + 16$
 $54 - 18 + 16$
 $36 + 16$
 52

5. $4 - 24 \div 2^3$
 $4 - 24 \div 8$
 $4 - 3$
 1

6. $4(3 + 2)^2 - 9$
 $4(5)^2 - 9$
 $4(25) - 9$
 $100 - 9$
 91

7. $(30 - 2 \cdot 5) \div 5$
 $(30 - 10) \div 5$
 $20 \div 5$
 4

Each remaining member made 4 costumes.

8. The order of the numbers is switched.
 Commutative Property of Multiplication

9. The numbers are regrouped.
 Associative Property of Addition

10. The 5 is distributed into the parentheses.
 Distributive Property

11. One of the factors is 1.
 Identity Property of Multiplication

12. $29 + 50 + 21$
 $= 29 + 21 + 50$ Commutative Property of Addition
 $= (29 + 21) + 50$ Associative Property of Addition
 $= 50 + 50$ Perform the operation in the parentheses.
 $= 100$ Add.

13. $5 \cdot 18 \cdot 20$
 $= 5 \cdot 20 \cdot 18$ Commutative Property of Multiplication
 $= (5 \cdot 20) \cdot 18$ Associative Property of Multiplication
 $= 100 \cdot 18$ Perform the operation in the parentheses.
 $= 1,800$ Multiply.

14. $34 + 62 + 36$
 $= 34 + 36 + 62$ Commutative Property of Addition
 $= (34 + 36) + 62$ Associative Property of Addition
 $= 70 + 62$ Perform the operation in the parentheses.
 $= 132$ Add.
15. $3 \cdot 11 \cdot 20$
 $= 3 \cdot 20 \cdot 11$ Commutative Property of Multiplication
 $= (3 \cdot 20) \cdot 11$ Associative Property of Multiplication
 $= 60 \cdot 11$ Perform the operation in the parentheses.
 $= 60 \cdot (10 + 1)$ Associative Property of Addition
 $= 60 \cdot 10 + 60 \cdot 1$ Distributive Property
 $= 600 + 60$ Multiply.
 $= 660$ Add.
16. $14(11) = 14(10 + 1)$
 $= 140 + 14$
 $= 154$

LESSON 3

Think and Discuss

- Possible answers:
 - $12 \cdot x$ or $12(x)$
 - $4 \div y$ or $4 \cdot \frac{1}{y}$
 - $3xy \div 2$ or $3xy \cdot \frac{1}{2}$
- Possible answer: The value of a variable can change, and the value of a constant remains the same. Variables are represented by letters.

Exercises

- Evaluate $n + 9$ for $n = 3$.
 $n + 9$
 $3 + 9$
 12
- Evaluate $n + 9$ for $n = 2$.
 $n + 9$
 $2 + 9$
 11
- Evaluate $n + 9$ for $n = 11$.
 $n + 9$
 $11 + 9$
 20
- Evaluate $2x - 3$ for $x = 4$.
 $2x - 3$
 $2(4) - 3$
 $8 - 3$
 5
- Evaluate $n \div 3 + n$ for $n = 6$.
 $n \div 3 + n$
 $6 \div 3 + 6$
 $2 + 6$
 8
- Evaluate $5y^2 + 3y$ for $y = 2$.
 $5y^2 + 3y$
 $5(2)^2 + 3(2)$
 $5(4) + 3(2)$
 $20 + 6$
 26

- Evaluate $\frac{8}{n} + 3m$ for $n = 2$ and $m = 5$.
 $\frac{8}{n} + 3m$
 $\frac{8}{2} + 3(5)$
 $4 + 15$
 19
- Evaluate $5a - 3b + 5$ for $a = 4$ and $b = 3$.
 $5a - 3b + 5$
 $5(4) - 3(3) + 5$
 $20 - 9 + 5$
 16
- Evaluate $n + 5$ for $n = 17$.
 $n + 5$
 $17 + 5$
 22
- Evaluate $n + 5$ for $n = 9$.
 $n + 5$
 $9 + 5$
 14
- Evaluate $n + 5$ for $n = 0$.
 $n + 5$
 $0 + 5$
 5
- Evaluate $5y - 1$ for $y = 3$.
 $5y - 1$
 $5(3) - 1$
 $15 - 1$
 14
- Evaluate $10b - 9$ for $b = 2$.
 $10b - 9$
 $10(2) - 9$
 $20 - 9$
 11
- Evaluate $p \div 7 + p$ for $p = 14$.
 $p \div 7 + p$
 $14 \div 7 + 14$
 $2 + 14$
 16
- Evaluate $n \div 5 + n$ for $n = 20$.
 $n \div 5 + n$
 $20 \div 5 + 20$
 $4 + 20$
 24
- Evaluate $3x^2 + 2x$ for $x = 10$.
 $3x^2 + 2x$
 $3(10)^2 + 2(10)$
 $3(100) + 2(10)$
 $300 + 20$
 320
- Evaluate $3c^2 - 5c$ for $c = 3$.
 $3c^2 - 5c$
 $3(3)^2 - 5(3)$
 $3(9) - 5(3)$
 $27 - 15$
 12

18. Evaluate $\frac{12}{n} + 7m$ for $n = 6$ and $m = 4$.

$$\begin{aligned} &\frac{12}{n} + 7m \\ &\frac{12}{6} + 7(4) \\ &2 + 28 \\ &30 \end{aligned}$$

19. Evaluate $7p - 2t + 3$ for $p = 6$ and $t = 2$.

$$\begin{aligned} &7p - 2t + 3 \\ &7(6) - 2(2) + 3 \\ &42 - 4 + 3 \\ &41 \end{aligned}$$

20. Evaluate $9 - \frac{3x}{4} + 20y$ for $x = 4$ and $y = 5$

$$\begin{aligned} &9 - \frac{3x}{4} + 20y \\ &9 - \frac{3(4)}{4} + 20(5) \\ &9 - 3 + 100 \\ &106 \end{aligned}$$

21. Evaluate $r^2 + 15k$ for $r = 15$ and $k = 5$.

$$\begin{aligned} &r^2 + 15k \\ &15^2 + 15(5) \\ &225 + 15(5) \\ &225 + 75 \\ &300 \end{aligned}$$

22. Evaluate $20x - 10$ for $x = 4$.

$$\begin{aligned} &20x - 10 \\ &20(4) - 10 \\ &80 - 10 \\ &70 \end{aligned}$$

23. Evaluate $4d^2 - 3d$ for $d = 2$.

$$\begin{aligned} &4d^2 - 3d \\ &4(2)^2 - 3(2) \\ &4(4) - 3(2) \\ &16 - 6 \\ &10 \end{aligned}$$

24. Evaluate $22p \div 11 + p$ for $p = 3$.

$$\begin{aligned} &22p \div 11 + p \\ &22(3) \div 11 + 3 \\ &66 \div 11 + 3 \\ &6 + 3 \\ &9 \end{aligned}$$

25. Evaluate $q + q^2 + q \div 2$ for $q = 4$.

$$\begin{aligned} &q + q^2 + q \div 2 \\ &4 + 4^2 + 4 \div 2 \\ &4 + 16 + 4 \div 2 \\ &4 + 16 + 2 \\ &22 \end{aligned}$$

26. Evaluate $\frac{16}{k} + 7h$ for $k = 8$, and $h = 2$.

$$\begin{aligned} &\frac{16}{k} + 7h \\ &\frac{16}{8} + 7(2) \\ &2 + 14 \\ &16 \end{aligned}$$

27. Evaluate $f \div 3 + f$ for $f = 18$.

$$\begin{aligned} &f \div 3 + f \\ &18 \div 3 + 18 \\ &6 + 18 \\ &24 \end{aligned}$$

28. Evaluate $3t \div 3 + t$ for $t = 13$.

$$\begin{aligned} &3t \div 3 + t \\ &3(13) \div 3 + 13 \\ &39 \div 3 + 13 \\ &13 + 13 \\ &26 \end{aligned}$$

29. Evaluate $9 + 3p - 5t + 3$ for $p = 2$ and $t = 1$.

$$\begin{aligned} &9 + 3p - 5t + 3 \\ &9 + 3(2) - 5(1) + 3 \\ &9 + 6 - 5 + 3 \\ &13 \end{aligned}$$

30. Evaluate $108 - 12j + j$ for $j = 9$.

$$\begin{aligned} &108 - 12j + j \\ &108 - 12 \cdot 9 + 9 \\ &108 - 108 + 9 \\ &9 \end{aligned}$$

31. Evaluate $3m^3 + \frac{y}{5}$ for $m = 2$ and $y = 35$.

$$\begin{aligned} &3m^3 + \frac{y}{5} \\ &3(2)^3 + \frac{35}{5} \\ &3(8) + \frac{35}{5} \\ &24 + 7 \\ &31 \end{aligned}$$

32. Evaluate $60m$ for $m = 7$.

$$\begin{aligned} &60m \\ &60(7) \\ &420 \\ &420; 420 \text{ seconds} \end{aligned}$$

33. Evaluate $0.25n$ for $n = 18$.

$$\begin{aligned} &0.25n \\ &0.25(18) \\ &4.5 \\ &\$4.50 \end{aligned}$$

34. Evaluate $200t$ for $t = 13$.

$$\begin{aligned} &200t \\ &200(13) \\ &2,600 \\ &2,600; 2,600 \text{ watts} \end{aligned}$$

35. Evaluate $1.8c + 32$ for $c = 30$.

$$\begin{aligned} &1.8c + 32 \\ &1.8(30) + 32 \\ &54 + 32 \\ &86 \\ &86^\circ\text{F} \end{aligned}$$

36. a. The graph shows that the boiling point of water is 100°C .

b. Evaluate $1.8c + 32$ for $c = 100$.

$$\begin{aligned} &1.8c + 32 \\ &1.8(100) + 32 \\ &180 + 32 \\ &212 \\ &212^\circ\text{F} \end{aligned}$$

37. A variable is a letter that represents a number, so x is the variable. $72x$ is an expression that contains a variable.

38. Possible answer: Using different values in place of a variable will cause the value of the expression to vary. If $x = 4$, $3x + 5 = 17$. If $x = 8$, $3x + 5 = 29$.
39. Evaluate $\frac{x+y}{y-x}$ for $x = 6$ and $y = 8$.
- $$\frac{x+y}{y-x}$$
- $$\frac{6+8}{8-6}$$
- $$\frac{14}{2}$$
- $$7$$
40. C; Evaluate each expression to find one that does not equal 15.
 $t \div 3$ for $t = 60$
 $t \div 3$
 $60 \div 3$
 20
 Choice C does NOT equal 15.
41. H; Evaluate $12x + 4y$ for $x = 11$, and $y = 8$.
 $12x + 4y$
 $12(11) + 4(8)$
 $132 + 32$
 164
 $\$164$

LESSON 4

Think and Discuss

- Possible answers: y less than 2, or y subtracted from 2, or 2 decreased by y .
- Possible answer: Because equal parts are being put together, you would multiply.

Exercises

For Exercises 2–4 and 7–11, a variable other than the one named may be used.

- Product means “multiply.”
 $7p$
- Less than means “subtract from.”
 $n - 3$
- Divided into means “division.”
 $\frac{n}{12}$
- Times means “multiply.”
Sum means “add.”
 $3(n + 5)$
- Separate the total cost of the notebooks into equal parts. This involves division.
 $\frac{\text{total cost of notebooks}}{\text{number of notebooks}} = \frac{5}{n}$
 $5 \div n$ or $\frac{5}{n}$
- The cost includes \$21 per month. Use m for the number of months. Multiply to put equal parts together: $21m$
 In addition to the monthly fee, the cost includes an installation fee of \$46. Add to put parts together:
 $46 + 21m$
- Sum means “plus.”
 $5 + x$

- Less than means “subtract from.”
 $y - 2$
- Quotient means “divide.”
 $n \div 8$
- Times means “multiply.”
 $9n$
- Product means “multiply.”
 $3y$
Less than means “subtract from.”
 $3y - 10$
- Separate the total cost of the tapes into equal parts. This involves division.
 $\frac{\text{total cost of tapes}}{\text{number of tapes}} = \frac{45}{v}$
 $45 \div v$ or $\frac{45}{v}$
- Multiply to put equal parts together: $2t$
 In addition to the yearly growth, the tree was 5 feet high when it was planted.
 Add to put the parts together.
 $5 + 2t$
- Product means “multiply.”
 $6n$
Plus means “addition.”
 $m + 6n$
- Quotient means “divide.”
 $\frac{23}{u}$
Minus means “subtract.”
 $\frac{23}{u} - t$
- Times means “multiply.”
 $6k$
Less than means “subtract from.”
 $6k - 14$
- Sum means “add.”
 $y + 5$
Times means “multiply.”
 $2(y + 5)$
- Plus means “add.”
 $6 + w$
Quotient means “divide.”
 $\frac{100}{6+w}$
 $100 \div (6 + w)$ or $\frac{100}{6+w}$
- Less means “subtract.”
 $r - 45$
Multiplied by means “multiply.”
 $35(r - 45)$
- a. Multiply to put equal parts together.
 $17n$
b. Evaluate $17n$ for $n = 4$.
 $17(4)$
68 pounds
- Multiply to find Karen's expected bonus.
 $2b$
Add the expected bonus to her base salary of \$65,000.
 $65,000 + 2b$

22. Possible answer: h plus 3
23. Possible answer: 90 divided by y
24. Possible answer: s minus 405
25. Possible answer: 16 multiplied by t
26. Possible answer: 5 times the quantity a minus 8
27. Possible answer: the difference between 4 times p and 10
28. Possible answer: the sum of r and 1, divided by 14
29. Possible answer: the sum of a number divided by fifteen and three.
30. Multiply to put equal parts together.
 $8m$
31. Grams of carbohydrates in y pieces of fruit: $15y$
Grams of carbohydrates in 1 cup of skim milk: 12
Total: $15y + 12$
 $15y + 12$
32. There are no carbohydrates in lean meat. Two slices of bread have $2 \cdot 15$, or 30, grams of carbohydrates. The sandwich has 30 grams of carbohydrates.
33. Possible answer: Which variable represents how many football cards Joe has?
34. Possible answer: You could use subtraction to find the difference between two numbers, or division to find how many times a number can fit into another number.
35. Each U.S. dollar was equivalent to 1.134 Canadian dollars. Write an expression for the number of U.S. dollars you could get for n Canadian dollars.
 $n \div 1.134$ or $\frac{n}{1.134}$
36. B; Decreased by means “subtract.”
 $x - 9$ is NOT the same as $9 - x$.
37. The charge per night for 2 people is \$104. Extra persons are \$19 for each person. A family of four has 2 extra people, or $19 \cdot 2$.
The total charge, per night, for 4 people is $104 + 19 \cdot 2$
The cost for x number of nights is $(104 + 19 \cdot 2)x$
The cost for 3 nights is $(104 + 19 \cdot 2)3 = 426$
 $(104 + 19 \cdot 2)x$; \$426

LESSON 5

Think and Discuss

- Possible answer: $5x$, $5x^2$, and $5x^3$ are not like terms because the exponent is different in each term.
- Possible answer: You can only combine like terms—constants or the same variables raised to the same power. If an expression does not have any like terms, then it cannot be simplified.

Exercises

- Look for like variables with like powers.
Like terms: $6b$ and $\frac{b}{2}$, $5x^2$ and x^2
- Look for like variables with like powers.
 $12a^2$ and $4a^2$, $4x^3$ and $3.5x^3$, b and $\frac{5}{6}b$

- $5x$ and $3x$ are like terms.
 $8x$
- $6a^2$ and a^2 terms are like terms.
 $(6a^2 - a^2) + 16$ Associative Property
 $5a^2 + 16$
- There are no like terms. The expression cannot be simplified.
 $4a^2 + 5a + 14b$
- $6b + 5n + 6b + 5n$
 $5n + 5n + 6b + 6b$ Commutative Property
 $(5n + 5n) + (6b + 6b)$ Associative Property
 $10n + 12b$
- Look for variables with like powers.
 b^6 and $3b^6$, $2b$ and b
- Look for variables with like powers and for constants.
 $2n$ and $\frac{n}{4}$, 6 and 7
- Look for variables with like powers and for constants.
 m and $2m$, 3^3 and 2
- Look for variables with like powers and for constants.
 6^3 and 6^2 , y^3 and $5y^3$
- $3a + 2b + 5a$
 $3a + 5a + 2b$ Commutative Property
 $(3a + 5a) + 2b$ Associative Property
 $8a + 2b$ Add the coefficients.
- $5b + 7b + 10$
 $(5b + 7b) + 10$ Associative Property
 $12b + 10$ Add the coefficients.
- $a + 2b + 2a + b + 2c$ Identify like terms.
 $a + 2a + 2b + b + 2c$ Commutative Property
 $(a + 2a) + (2b + b) + 2c$ Associative Property
 $3a + 3b + 2c$ Add the coefficients.
- $y + 4 + 2x + 3y$
 $2x + y + 3y + 4$ Commutative Property
 $2x + (y + 3y) + 4$ Associative Property
 $2x + 4y + 4$ Add the coefficients.
- $q^2 + 2q + 2q^2$
 $q^2 + 2q^2 + 2q$ Commutative Property
 $(q^2 + 2q^2) + 2q$ Associative Property
 $3q^2 + 2q$ Add the coefficients.
- $18 + 2d^3 + d + 3d$
 $18 + 2d^3 + (d + 3d)$ Associative Property
 $18 + 2d^3 + 4d$
- $2n + 3a + 3a + 2n + 5a$
 $3a + 3a + 5a + 2n + 2n$ Commutative Property
 $(3a + 3a + 5a) + (2n + 2n)$ Associative Property
 $11a + 4n$ Add the coefficients.
- $4x + 5x$
 $9x$ Add the coefficients.
- $32y - 5y$
 $27y$ Subtract the coefficients.
- $4c^2 + 5c + 2c$
 $4c^2 + (5c + 2c)$ Identify and group like terms.
 $4c^2 + 7c$ Add the coefficients.

21. $5d^2 - 3d^2 + d$
 $(5d^2 - 3d^2) + d$
 $2d^2 + d$ Identify and group like terms.
 Subtract coefficients.
22. $5f^2 + 2f + f^2$
 $(5f^2 + f^2) + 2f$
 $6f^2 + 2f$ Identify and group like terms.
 Add the coefficients.
23. $7x + 8x^2 - 3y$
 No like terms
24. $3(p + 9q - 2 + 9) + 14p$
 $3p + 27q - 6 + 27 + 14p$ Distribute inside
 parentheses.
 $(3p + 14p) + 27q + (-6 + 27)$ Identify and
 group like terms.
 $17p + 27q + 21$ Add the
 coefficients.
25. $6b + 6b^2 + 4b^3$
 No like terms
26. $2(a^2 + 2b + 2a^2) + b + 2c$
 $2a^2 + 4b + 4a^2 + b + 2c$ Distribute inside
 parentheses.
 $(2a^2 + 4a^2) + (4b + b) + 2c$ Identify and group
 like terms.
 $6a^2 + 5b + 2c$ Add the
 coefficients.
27. $4n + 5n + 6n$
 $(4n + 5n + 6n)$
 $15n$
 Evaluate $15n$ when $n = 1$.
 $15n$
 $15 \cdot 1$
 15
 Evaluate $15n$ when $n = 2$.
 $15n$
 $15 \cdot 2$
 30
 Evaluate $15n$ when $n = 3$.
 $15n$
 $15 \cdot 3$
 45
 Evaluate $15n$ when $n = 4$.
 $15n$
 $15 \cdot 4$
 60
 Evaluate $15n$ when $n = 5$.
 $15n$
 $15 \cdot 5$
 75
 $15n$; 15, 30, 45, 60, 75
28. $7m^2 + 2(2k - m^2) + 5k$
 $7m^2 + 4k - 2m^2 + 5k$ Distributive Property
 $7m^2 - 2m^2 + 4k + 5k$ Commutative Property
 $(7m^2 - 2m^2) + (4k + 5k)$ Associative Property
 $5m^2 + 9k$
 $5m^2 + 9k \neq 9m^2 + k$
 no
29. a. If Brad works 21.5 hours at d dollars per hour,
 then he earns $21.5d$.
 If Brad works 23 hours at d dollars per hour, then
 he earns $23d$.
 If Brad works 15.5 hours at d dollars per hour,
 then he earns $15.5d$.
 If Brad works 19 hours at d dollars per hour, then
 he earns $19d$.
 The total money earned is $21.5d + 23d + 15.5d$
 $+ 19d$.
 $21.5d + 23d + 15.5d + 19d$
 $79d$
 b. Evaluate $79d$ for $d = \$9.50$
 $79(9.50)$
 750.50
 $\$750.50$
 c. The expression represented the amount Brad
 earned in June.
30. Ashley worked h hours at \$8 per hour bagging
 groceries: $8h$
 Ashley worked twice as many hours stocking
 shelves: $2h$
 Ashley worked $2h$ hours at \$8 per hour stocking
 shelves: $8(2h)$
 Ashley earned $8h + 8(2h)$.
 $8h + 8(2h)$
 $8h + 16h$
 $24h$
 $8h + 8(2h)$; $24h$
31. The given terms are $3x$, $23x^2$, $6y^2$, $2x$, and y^2 .
 Use like terms from the given terms to see how to
 get $5x + 7y^2$.
 $3x + 2x = 5x$
 $6y^2 + y^2 = 7y^2$
 There is no x^2 term in $5x + 7y^2$, so $23x^2$ must be
 subtracted from $23x^2$ (or $-23x^2$ added to $23x^2$).
 The expression that equals $5x + 7y^2$ when
 simplified is:
 $3x + 23x^2 + 6y^2 + 2x + y^2 - 23x^2$.
 The missing term is $23x^2$ (or $-23x^2$).
32. Possible answer: What is the difference between the
 cost of buying both shirts and jeans from one store
 and the cost of buying them from the other store?
33. Add the coefficients of the x terms.
 Then combine the numbers: $7x - 12$.
34. The perimeter of a rectangle is the sum of the
 length of all of the sides.
 $(x + 2) + (3x + 1) + (x + 2) + (3x + 1)$
 $x + 3x + x + 3x + 2 + 1 + 2 + 1$
 $(x + 3x + x + 3x) + 2 + 1 + 2 + 1$
 $8x + 6$
35. D; Translate "six times the sum of x and y "
 $6 \cdot (x + y)$
 Translate "five less than y ."
 $y - 5$
 Find the sum of the expressions and simplify.
 $6 \cdot (x + y) + y - 5$
 $6x + 6y + y - 5$
 $6x + (6y + y) - 5$
 $6x + 7y - 5$

36. J; The four sides of a square are equal. The perimeter of a square is 4 times the length of a side.

$$4 \cdot (2x + 3)$$

$$4 \cdot 2x + 4 \cdot 3$$

$$8x + 12$$

READY TO GO ON

- Evaluate $7(x + 4)$ for $x = 5$
 $7(x + 4)$
 $7(5 + 4)$
 $7(9)$
 63
- Evaluate $11 - n \div 3$ for $n = 6$
 $11 - n \div 3$
 $11 - 6 \div 3$
 $11 - 2$
 9
- Evaluate $p + 6t^2$ for $p = 11$ and $t = 3$
 $p + 6t^2$
 $11 + 6(3)^2$
 $11 + 6(9)$
 $11 + 54$
 65
- Evaluate $8 - \frac{6x}{y} + 2x$ for $x = 2$ and $y = 4$
 $8 - \frac{6(2)}{4} + 2(2)$
 $8 - \frac{12}{4} + 2(2)$
 $8 - 3 + 2(2)$
 $8 - 3 + 4$
 $5 + 4$
 9
- quotient means "divide"
 $n \div 15$
- decreased by means "subtract"
 $n - 13$
- times means "multiply"
 difference of means "subtract"
 $10(p - 2)$
- plus means "add"
 product means "multiply"
 $3 + 8y$
- plus means "add"
 per minute means "multiply"
 $\$2.95 + \$0.14t$
- Look for like variables with like powers.
 Like terms: $4d^2$ and $5d^2$, $3d$ and $10d$
- Look for like variables with like powers.
 Like terms: x^2 and $4x^2$, $\frac{x}{2}$ and $5x$
- $2y - 2y^2 + 5y^2$
 $2y + (-2y^2 + 5y^2)$
 $2y + 3y^2$
- $x + 4 + 7x + 9$
 $x + 7x + 4 + 9$
 $(x + 7x) + (4 + 9)$
 $8x + 13$

$$14. 10 + 9b - 6a - b$$

$$10 + 9b - b - 6a$$

$$10 + (9b - b) - 6a$$

$$10 + 8b - 6a$$

15. The perimeter of the figure is the sum of the lengths of all of the sides.
- $$7a + 4b + 7a + 4b$$
- $$7a + 7a + 4b + 4b$$
- $$(7a + 7a) + (4b + 4b)$$
- $$14a + 8b$$

STUDY GUIDE: REVIEW

- numerical expression
- Identify property
- algebraic expression
- coefficient
- evaluate
- $2 + (9 - 6) \div 3 = 2 + 3 \div 3$
 $= 2 + 1$
 $= 3$
- $12 \cdot 3^2 - 5 = 12 \cdot 9 - 5$
 $= 108 - 5$
 $= 103$
- $11 + 2 \cdot 5 - (9 + 7) = 11 + 2 \cdot 5 - 16$
 $= 11 + 10 - 16$
 $= 5$
- $75 \div 5^2 + 8^2 = 75 \div 25 + 64$
 $= 3 + 64$
 $= 67$
- $3 \cdot 15 + 10 = 45 + 10$
 $= 55$
 Lola raised \$55 for the walk-a-thon.
- The order of the numbers is switched.
 Commutative Property of Addition
- One of the addends is 0.
 Identity Property of Addition
- The 6 is distributed into the parentheses.
 Distributive Property
- $28 + 15 + 22$
 $28 + 22 + 15$ Associate Property
 $(28 + 22) + 15$ Commutative Property
 $50 + 15$ Add inside parentheses.
 65
- $20 \cdot 23 \cdot 5$
 $20 \cdot 5 \cdot 23$ Associative Property
 $(20 \cdot 5) \cdot 23$ Commutative Property
 $100 \cdot 23$ Multiply inside parentheses.
 $2,300$
- $8(35) = 8(30 + 5)$
 $= 8 \cdot 30 + 8 \cdot 5$
 $= 240 + 40$
 $= 280$
- $(28)6 = (20 + 8)(6)$
 $= 20 \cdot 6 + 8 \cdot 6$
 $= 120 + 48$
 $= 168$

18. $4 \cdot 6 = 6 \cdot 4$
The order of the numbers is switched.
Commutative Property of Multiplication
19. $32 + 0 = 32$
Zero is one of the addends.
Identity Property of Addition
20. $15 + (3 + 8) = (15 + 3) + 8$
The numbers are regrouped.
Associative Property of Addition
21. Evaluate $4x - 5$ for $x = 6$
 $4x - 5$
 $4(6) - 5$
 $24 - 5$
19
22. Evaluate $8y^3 + 3y$ for $y = 4$.
 $8y^3 + 3y$
 $8(4)^3 + 3(4)$
 $8(64) + 3(4)$
 $512 + 12$
524
23. Evaluate $\frac{n}{5} + 6m - 3$ for $n = 5$ and $m = 2$.
 $\frac{n}{5} + 6m - 3$
 $\frac{5}{5} + 6(2) - 3$
 $1 + 12 - 3$
10
24. Evaluate $55t$ for $t = 4$
 $55t$
 $55(4)$
220
25. Quotient means "divide."
 $\frac{n}{9}$
26. Times means "multiply."
 $2n$
Less than means "subtract from."
 $2n - 6$
27. divided by means "division"
sum means "addition"
 $4 \div (n + 12)$
28. times means "multiply"
difference means "subtract"
 $2(t - 11)$
29. Missy spent a total of \$32 on s shirts. Use division to find an algebraic expression.
 $\$32 \div s$
30. Look for variables with like powers and for constants.
Like terms: 18 and 5 , p^3 and $2p^3$
31. Look for variables with like powers.
Like terms: $3a^4$ and $2a^4$, $6b$ and $\frac{1}{3}b$
32. $7b^2 + 8 + 3b^2$
 $7b^2 + 3b^2 + 8$
 $10b^2 + 8$
33. $12a^2 + 4 + 3a^2 - 2$
 $12a^2 + 3a^2 + 4 - 2$
 $15a^2 + 2$

$$34. \begin{aligned} &x^2 + x^3 + x^4 + 5x^2 \\ &x^4 + x^3 + x^2 + 5x^2 \\ &x^4 + x^3 + 6x^2 \end{aligned}$$

35. The perimeter of the figure is the sum of the length of all of the sides.
 $(n + 2) + n + n + n$
 $n + n + n + n + 2$
 $(n + n + n + n) + 2$
 $4n + 2$

CHAPTER TEST

1. $18 \cdot 3 \div 3^3$
 $18 \cdot 3 \div 27$
 $54 \div 27$
2
2. $36 + 16 - 50$
 $52 - 50$
2
3. $149 - (2^8 - 200)$
 $149 - (256 - 200)$
 $149 - 56$
93
4. $(4 \div 2) \cdot 9 + 11$
 $2 \cdot 9 + 11$
 $18 + 11$
29
5. $6 \cdot 12 + 4.25 - 8$
 $72 + 4.25 - 8$
 $72 + 100 - 8$
 $172 - 8$
164
Chris paid \$164.
6. 0 is one of the addends.
Identity Property of Addition
7. The groupings have changed.
Associative Property of Addition
8. The order of the numbers has changed.
Commutative Property of Multiplication
9. $8(22) = 8(20 + 2)$
 $= 8 \cdot 20 + 8 \cdot 2$
 $= 160 + 16$
 $= 176$
10. $6(72) = 6(70 + 2)$
 $= 6 \cdot 70 + 6 \cdot 2$
 $= 420 + 12$
 $= 432$
11. $(39)5 = (40 - 1)(5)$
 $= 40 \cdot 5 - 1 \cdot 5$
 $= 200 - 5$
 $= 195$
12. $14(12) = 14(10 + 2)$
 $= 14 \cdot 10 + 14 \cdot 2$
 $= 140 + 28$
 $= 168$

13. Evaluate $4a + 6b + 7$ for $a = 2$ and $b = 3$.

$$\begin{aligned}4a + 6b + 7 &= 4(2) + 6(3) + 7 \\ &= 8 + 18 + 7 \\ &= 33\end{aligned}$$

14. Evaluate $7y^2 + 7y$ for $y = 3$.

$$\begin{aligned}7y^2 + 7y &= 7(3)^2 + 7(3) \\ &= 7(9) + 7(3) \\ &= 63 + 21 \\ &= 84\end{aligned}$$

15. increased by means "add"

$$r + 12$$

16. quotient means "divide"

$$d \div 7$$

17. less than means "subtracted from"
product means "multiply"

$$7s - 5$$

18. difference between means "subtract"
times means "multiply"

$$3x - 4$$

19. $b + 2 + 5b$

$$\begin{aligned}b + 5b + 2 \\ (b + 5b) + 2 \\ 6b + 2\end{aligned}$$

Commutative Property
Associative Property
Add the coefficients.

20. $16 + 5b + 3b + 9$

$$\begin{aligned}5b + 3b + 16 + 9 \\ (5b + 3b) + (16 + 9) \\ 8b + 25\end{aligned}$$

Commutative Property
Associative Property
Add.

21. $5a + 6t + 9 + 2a$

$$\begin{aligned}5a + 2a + 6t + 9 \\ (5a + 2a) + 6t + 9 \\ 7a + 6t + 9\end{aligned}$$

Commutative Property
Associative Property
Add the coefficients.

22. $75 + 32m$