Multiplying Rational Numbers

The product of two numbers with the same sign is positive.

(-4)(-5) = 20

The product of two numbers with different signs is negative.

7(-9) = −63

Examples: Find the product.

odd # of neg = neg
even # of neg. = pos.

1. 20(-5)
   −100

2. -2(4)(5)
   −40

3. $-\frac{1}{3}(-3)(-2)$
   −2

4. $(-2)^3$
   (-2)(-2)(-2)
   −8

5. $-\frac{2}{5}(10)(-4)$
   16

6. $(-9)^2$
   (-9)(-9)
   81

Examples: Find the product.

7. $(-2)(-x)$

$2x$

8. $3(-k)(-k)(-k)$

$-3k^3$

9. $(-1)(-a)^2$

$(-1)(-a)(-a)$

$-a^2$

or

$-1a^2$

10. $-7(-b)^3$

$-7(-b)(-b)(-b)$

$7b^3$

Examples: Find the product.

11. $5(-m)$

$-5m$

12. $-9(-b)^5$

$-9(-b)(-b)(-b)(-b)(-b)$

$9b^5$

13. $8(-p)(-p)(-p)(-p)$

$8p^4$

14. $(-7)(-d)^4$

$(-7)(-d)(-d)(-d)(-d)$

$-7d^4$

Examples: Evaluate the expression if x = -1.

15. $-9(x)(-3)$

$-9(-1)(-3)$

-27

16. $3(4)(x)$

$3(4)(-1)$

-12

17. $3(-x)^3$

$3(+1)^3$

$3(1)(1)(1)$

3

18. $7(x)^2(-5)$

$7(-1)^2(-5)$

$7(-1)(-1)(-5)$

-35

DISTRIBUTIVE PROPERTY

$a(b + c) = ab + ac$ OR $a(b - c) = ab - ac$

EXAMPLES: Use the distributive property to simplify each expression.

19. $5(x + 2)$

$5 \cdot x + 5 \cdot 2$

$5x + 10$

20. $(y - 9)3$ or $3(y - 9)$

$3 \cdot y - 3 \cdot 9$

$3y - 27$

21. $4(3k + 8m)$

$4 \cdot 3k + 4 \cdot 8m$

$12k + 32m$

22. $(7a - 11b)2$

$2 \cdot 7a - 2 \cdot 11b$

$14a - 22b$

23. $-6(x + 7)$

$-6 \cdot x + -6 \cdot 7$

$-6x + -42$

$-6x - 42$

24. $(u - 1)(-3)$

$-3 \cdot u - -3 \cdot 1$

$-3u + 3$

25. $(6g + 4h)(-10)$

$-10 \cdot 6g + -10 \cdot 4h$

$-60g - 40h$

26. $-9(2w - 5x)$

$-9 \cdot 2w - -9 \cdot 5x$

$-18w + 45x$

27. $\frac{1}{2}(4f + 15)$

$\frac{1}{2} \cdot 4f + \frac{1}{2} \cdot \frac{15}{1}$

$2f + \frac{15}{2}$

28. $-\frac{1}{3}(6y - 15z)$

$-\frac{1}{3} \cdot \frac{6^{2}y}{1} - \frac{1}{3} \cdot \frac{15^{5}z}{1}$

$-2y + 5z$

LIKE TERMS - terms in an expression that have the same variable raised to the same power

EXAMPLES: Identify the like terms in the expressions below.

29. $-x^2 + 5x - 4 - 3x + 2$

$5x$ & $-3x$ $\quad\quad$ -4 & 2

30. $-5x^2 - x + 8 + 6x - 10$

8 & -10 $\quad\quad$ $-x$ & $6x$

An expression is simplified if it has no grouping symbols and if all the like terms have been combined.

EXAMPLES: Simplify the expressions below.

31. $8x + 3x + 2y$

$11x + 2y$

32. $2g^2 + 7g^2 - 2 + 1g^2$

$8g^2 - 2$

EXAMPLES: Simplify the expressions below.

33. $2(x + 3) + 6x$

$2 \cdot x + 2 \cdot 3 + 6x$

$2x + 6 + 6x$

$8x + 6$

34. $7(d + 3) + 4(2d - 3)$

$7 \cdot d + 7 \cdot 3 + 4 \cdot 2d - 4 \cdot 3$

$7d + 21 + 8d - 12$

$15d + 9$

35. $9h - 4(2h - 1)$

$9h + -4 \cdot 2h - -4 \cdot 1$

$9h - 8h + 4$

$h + 4$

36. $-(f + 2) - 1(1 - f)$

$-1(f+2) + -1(1 - f)$

$-1 \cdot f + -1 \cdot 2 + -1 \cdot 1 - -1 \cdot f$

$-1f - 2 + -1 + 1f$

-3