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.

1. $\frac{20}{1}\left(-\frac{4}{5}\right)$ → −16

2. $(-1.4)(-7)$

$$\begin{array}{r} 1.4 \\ \times\ 7 \\ \hline 9.8 \end{array}$$

9.8

3. $(3x)(-8y)$ → −24xy

4. $\left(-\frac{12}{15}\right)\left(-\frac{5}{84}\right)$ → $\frac{1}{4}$

5. $(4.3)(-1.5)$

$$\begin{array}{r} 4.3 \\ \times\ 1.5 \\ \hline 215 \\ +\ 430 \\ \hline 6.45 \end{array}$$

−6.45

6. $(-4a)\left(-\frac{7}{2}b\right)$ → 14ab

Examples: Find the product.

7. $(-2c)(3d) + (4c)(-6d)$

$-6cd + -24cd$

$\boxed{-30cd}$

8. $(5x)(-3y) + (-2x)(-8y)$

$-15xy + 16xy$

$\boxed{xy}$

Multiplicative Property of -1

$-1(a) = -a$ and $a(-1) = -a$

Examples: Find the product.

9. answer is positive

$\left(+\frac{1}{2}\right)(16)(5)\left(+\frac{2}{5}\right)(12) = 12$

$\frac{120 \div 10}{10 \div 10}$

10. ans. will be negative

$\left(-\frac{2}{3}\right)\left(-\frac{1}{36}\right)\left(\frac{9}{5}\right)\left(-\frac{1}{2}\right) = -\frac{1}{10}$

$-\frac{18 \div 18}{180 \div 18}$

Dividing Rational Numbers

The rules for dividing are the same as the rules for multiplying...

- *same sign = positive*
- *different sign = negative*

Examples: Find the quotient.

11. $\frac{-32g}{-8}$

$4g$

12. $-\frac{3}{4} \div \frac{5}{8}$

multiply by the reciprocal

$-\frac{3}{1\cancel{4}_{1}} \cdot \frac{\cancel{8}^{2}}{5}$

$-\frac{6}{5}$

13. $\frac{\frac{5}{8}}{25}$

$\frac{5}{8} \div \frac{25}{1}$

$\frac{\cancel{5}}{8} \cdot \frac{1}{\cancel{25}_{5}}$

$\frac{1}{40}$

14. $\frac{81h}{-9}$

$-9h$

15. $-\frac{1}{5} \div -\frac{3}{10}$

$-\frac{1}{\cancel{5}} \cdot -\frac{\cancel{10}^{2}}{3}$

$\frac{2}{3}$

16. $\frac{\frac{4}{9}}{-8}$

$\frac{4}{9} \div \frac{-8}{1}$

$\frac{\cancel{4}}{9} \cdot -\frac{1}{\cancel{8}_{2}}$

$-\frac{1}{18}$

Examples: Simplify.

17. $\frac{4a + 32}{4}$

$\frac{4a}{4} + \frac{32}{4}$

$a + 8$

18. $\frac{6f - 27}{3}$

$\frac{6f}{3} - \frac{27}{3}$

$2f - 9$

19. $\frac{6b + 30}{-6}$

$\frac{6b}{-6} + \frac{30}{-6}$

$-b + -5$

$-b - 5$

20. $\frac{-15g + 35}{-5}$

$\frac{-15g}{-5} + \frac{35}{-5}$

$3g + -7$

$3g - 7$

21. $-6(x + 7)$

$-6(x) + -6(7)$

$-6x - 42$

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

$-3(u) + -3(1)$

$-3u + 3$

23. $(6g + 4h)(-10)$

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

$-60g - 40h$

24. $-9(2w - 5x)$

$-9(2w) + -9(5x)$

$-18w + 45x$

25. $-\frac{1}{2}(4f + 15) + 3$

$-\frac{1}{2}(4f) + -\frac{1}{2}(15) + 3$

$-2f + -7.5 + 3$

$-2f - 4.5$

26. $-\frac{1}{3}(6y - 15z) - 4y$

$-\frac{1}{3}(6y) - -\frac{1}{3}(15z) - 4y$

$-2y + 5z + -4y$

$-6y + 5z$

27. $9h + -4(2h - 1)$

$9h + -4(2h) - -4(1)$

$9h - 8h + 4$

$h + 4$

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

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

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

$-f - 2 + -1 + f$

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