When multiplying integers, we use the following rules:

a negative # x a positive # a negative #
a negative # x a negative # a positive #
a positive # x a positive # a positive #

So, when the signs are opposite, the product is negative

and

when the signs are the same, the product is positive!

When we use brackets to write a product statement, we do not need the multiplication sign. For the rational numbers above, we can write $\frac{3}{2} \times \left(-\frac{1}{5}\right)$ as $\left(\frac{3}{2}\right)\left(-\frac{1}{5}\right)$, and $(-1.5) \times 1.8$ as $(-1.5)(1.8)$.

Example 1 Multiplying Rational Numbers in Fraction or Mixed Number Form

Determine each product.

a) $\left(-\frac{11}{7}\right)\left(-\frac{21}{44}\right)$ b) $\left(2\frac{2}{3}\right)\left(-1\frac{3}{4}\right)$

A Solution

a) $\left(-\frac{11}{7}\right)\left(-\frac{21}{44}\right)$

Predict the sign of the product: since the fractions have the same sign, their product is positive.

Simplify the fractions before multiplying.

$$\left(-\frac{11}{7}\right)\left(-\frac{21}{44}\right) = \left(-\frac{\overset{1}{\cancel{11}}}{\underset{1}{\cancel{7}}}\right)\left(-\frac{\overset{3}{\cancel{21}}}{\underset{4}{\cancel{44}}}\right)$$

$$= \frac{1 \times 3}{1 \times 4}$$

$$= \frac{3}{4}$$

Look for common factors in the numerators and denominators:
11 and 44 have the common factor 11.
21 and 7 have the common factor 7.
Divide numerator and denominator by their common factors.
Then multiply the numerators and multiply the denominators.

So, $\left(-\frac{11}{7}\right)\left(-\frac{21}{44}\right) = \frac{3}{4}$

b) $\left(2\frac{2}{3}\right)\left(-1\frac{3}{4}\right)$

Since the fractions have opposite signs, their product is negative.

Write the mixed numbers as fractions.

$$\left(\frac{8}{3}\right)\left(-\frac{7}{4}\right) = \left(\frac{\overset{2}{\cancel{8}}}{3}\right)\left(-\frac{7}{\underset{1}{\cancel{4}}}\right)$$ Dividing numerator and denominator by their common factor 4

$$= \frac{(2)(-7)}{(3)(1)}$$

$$= -\frac{14}{3}$$

$$= -4\frac{2}{3}$$

So, $\left(2\frac{2}{3}\right)\left(-1\frac{3}{4}\right) = -4\frac{2}{3}$

Practice Questions

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for tomorrow