

Review: Integers

Multiplying and Dividing Integers

Rules:

$$(+)(+) = (+)$$

$$(+)(-) = (-)$$

$$(-)(-) = (+)$$

$$(-)(+) = (-)$$

Examples

$$\begin{aligned} &(-2)^2 \\ &= (-2)(-2) \\ &= +4 \end{aligned}$$

$$\begin{aligned} &-2^2 \\ &= -(2)(2) \\ &= -4 \end{aligned}$$

$$\begin{aligned} &-8 \div (-2) \\ &= 4 \end{aligned}$$

$$\begin{aligned} &-8 \times 2 \\ &= -16 \end{aligned}$$

Adding and Subtracting Integers

Rules:

$$(+) \text{ and } (+) = (+)$$

$$(+) \text{ and } (-) = (\text{sign of the bigger})$$

$$(-) \text{ and } (-) = (-)$$

$$(-) \text{ and } (+) = (\text{sign of the bigger})$$

Examples

$$\begin{aligned} &5 - 6 \\ &= -1 \end{aligned}$$

$$\begin{aligned} &-5 - 6 \\ &= -11 \end{aligned}$$

$$\begin{aligned} &-5 - (-6) \\ &= -5 + 6 \\ &= 1 \end{aligned}$$

$$\begin{aligned} &-5 + 19 \\ &= 14 \end{aligned}$$

Order of Operations with Integers

Brackets

Exponents

Division or

Multiplication in the order they appear

Addition or

Subtraction in the order they appear

Examples

$$40 - 36 \div 3^2 \times (8 \div 2) + 1$$

$$\begin{aligned} &40 - 36 \div 9 \times (4) + 1 \\ &40 - 4 \times 4 + 1 \\ &40 - 16 + 1 \\ &24 + 1 \\ &25 \end{aligned}$$

$$-24 \div 4 \times (-2) - 5(-3-1)^2$$

$$\begin{aligned} &(-6) \times (-2) - 5(-4)^2 \\ &12 - 5(16) \\ &12 - 80 \\ &-68 \end{aligned}$$

$$-8(-4) \div 2 - (-3)(-2)$$

$$\begin{aligned} &32 \div 2 + 3(-2) \\ &16 + -6 \\ &10 \end{aligned}$$

Review: Fractions

Reminders

- A negative sign in a fraction means that the whole fraction is negative regardless of where it appears.

$$-\frac{1}{2} = \frac{-1}{2} = \frac{1}{-2}$$

It is always a good idea to move the negative out of the denominator when working with fractions.

- To convert a mixed number to an improper fraction, multiply the whole number by the denominator and add to the numerator.

$$5\frac{1}{3} = \frac{16}{3}$$

$$-8\frac{1}{4} = -\frac{33}{4}$$

↑ ignore neg

To convert an improper fraction to a mixed number, divide the numerator by the denominator and pull the whole number out of the fraction. The left over is the new numerator.

$$\frac{11}{3} = 3\frac{2}{3}$$

$$-\frac{22}{5} = -4\frac{2}{5}$$

Adding and Subtracting Fractions

- Change all mixed fractions to improper fractions. *→ can skip this step but may have to borrow + record from in proper form*
- Move negative signs into numerators (and get rid of double signs).
- Change all fractions so they have the same denominator (LCD).
- Add and subtract ONLY numerators using the same rules as adding and subtracting integers.
- Put answer in lowest terms.

Examples

$$\frac{3}{8} + \frac{1}{4} = \frac{3}{8} + \frac{2}{8} = \frac{5}{8}$$

$$\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$$

$$\frac{3}{-2} - \frac{1}{-14} - 1\frac{2}{7}$$

$$\begin{aligned} & \frac{-3}{2} + \frac{1}{14} - \frac{9}{7} \\ & \frac{-21}{14} + \frac{1}{14} - \frac{18}{14} \\ & \frac{-38}{14} \div 2 = \frac{-19}{7} \end{aligned}$$

$$\begin{aligned} 5\frac{1}{5} - 1\frac{2}{3} &= 5\frac{3}{15} - 1\frac{10}{15} \\ \text{borrow} &= 4\frac{23}{15} - 1\frac{10}{15} \\ &= 3\frac{13}{15} \end{aligned}$$

Multiplying Fractions

- Change all mixed fractions to improper fractions.
- Move negative signs into numerators (and get rid of double signs).
- Multiply numerators together and denominators together using the same rules as multiplying integers.
- Put answer in lowest terms. *→ there's a fast way to reduce*

Examples

$$\frac{3}{5} \times \frac{4}{7}$$

$$= \frac{-12}{35}$$

$$\begin{aligned} & \left(\frac{4}{5}\right)\left(-1\frac{7}{8}\right) \\ & \frac{4}{5} \left(-\frac{15}{8}\right) = \frac{-60}{40} \\ & = \frac{-3}{2} \end{aligned}$$

$$\begin{aligned} 2\frac{4}{7} \times 1\frac{5}{9} &= \frac{18}{7} \times \frac{14}{9} \\ &= \frac{4}{1} \end{aligned}$$

Dividing Fractions

1. Change all mixed fractions to improper fractions.
2. Move negative signs into numerators (and get rid of double signs).
3. Change division to multiplication and change the fraction after the operation sign to its reciprocal.
(For example, $\frac{2}{3} \rightarrow \frac{3}{2}$, $\frac{4}{5} \rightarrow \frac{5}{4}$, etc.)
4. Follow the steps for multiplying fractions.
5. Put answer in lowest terms.

Examples

$$\frac{6}{5} \div \frac{-3}{2}$$

$$\frac{6}{5} \times \frac{2}{3} = \frac{-12}{15} \\ = \frac{-4}{5}$$

$$3 \div \frac{1}{10}$$

$$3 \times \frac{10}{1}$$

$$\frac{18}{5} \div 4\frac{1}{2}$$

$$= \frac{18}{5} \div \frac{9}{2} \\ = \frac{18}{5} \times \frac{2}{9} = \frac{36}{45} = \frac{4}{5}$$

Order of Operations with Fractions

Brackets
Exponents
Division or
Multiplication in the order they appear
Addition or
Subtraction in the order they appear

Examples

$$53\frac{1}{2} - \left(\frac{-3}{4}\right)$$

$$53\frac{1}{2} + \frac{3}{4}$$

$$53\frac{2}{4} + \frac{3}{4}$$

$$53\frac{5}{4}$$

$$54\frac{1}{4}$$

$$\left(\frac{-3 \times 5}{4 \times 5} \div \frac{7}{10}\right) \div \left(\frac{3}{10} \times 4\frac{1}{6}\right)$$

$$\left(\frac{-15}{20} - \frac{14}{20}\right) \div \left(\frac{3}{10} \times \frac{25}{6}\right)$$

$$\left(\frac{-29}{20}\right) \div \left(\frac{75}{60}\right) \div 15$$

$$\frac{-29}{20} \div \frac{5}{4}$$

$$\frac{-29}{20} \times \frac{4}{5} = \frac{-116}{100} = \frac{-29}{25}$$