Fractions

Review

If $12 \div 3 = 4$ then what is $2 \div 3$? It's a number, but not an integer and we often write it as a **fraction** $\frac{2}{3}$

The top number is called the **numerator**

The bottom number is called the **denominator**

Remember: denominators of fractions cannot be zero

$\frac{a}{b} = a \div b$ as long as $b \neq 0$

$\frac{0}{a} = 0$ as long as $a \neq 0$

$\frac{a}{a} = 1$ as long as $a \neq 0$

$\frac{-a}{b}$ and $\frac{a}{-b}$ are both equal to $-(\frac{a}{b})$

$\frac{-a}{-b} = \frac{a}{b}$

Add and subtract fractions by writing them with a **common denominator** $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$

Multiplication of fractions $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$

Division of fractions $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$

Exponents $(\frac{a}{b})^n = \frac{a^n}{b^n}$

Questions:

Source: Art of Problem Solving *Prealgebra* Chapter 4

1. Simplify each of the following fractions

   Question 4.1

   a. $\frac{0}{7}$ b. $\frac{5}{5}$ c. $\frac{2}{1}$ d. $\frac{12}{6}$ e. $\frac{-12}{3}$ f. $\frac{22+13}{-4-3}$

2. Compute $\frac{1+5+9+13+17+21}{6}$.

Question 4.1.3

3. If $x = \ -12$ and $y = 4$, find the value of $xy - \frac{x}{y}$.

Question 4.1.5

4. Calculate the following:

Question 4.14

a. What is $\frac{2}{3} \times 90$? b. What is $\frac{3}{4}\ of\ \frac{11}{8}$?

5. Maya starts with 160 pennies. She gives $\frac{3}{5}$ of her pennies to her brother Mitch. Mitch then gives $\frac{3}{4}$ of the pennies he receives to his mother. How many pennies does Mitch give to his mother?

   Question 4.15

6. What is:

   Questions 4.19, 4.20, 4.21

   a. $\frac{2}{7} \div \frac{9}{5}$ b. $\frac{\frac{14}{3}}{\frac{-2}{9}}$ c. $32\ is\ \frac{2}{5}\ of\ what\ number?$

7. Each panel of a fencing material is $\frac{20}{3}$ feet long. How many panels do I need to build a 60 foot fence?

   Question 4.22

8. Multiplying a number by $\frac{3}{4}$ and then dividing the result by $\frac{3}{5}$ has the same effect as multiplying the original number by what number?

Questions 4.3.7/AMC 8

9. Compute each of the following:

Question 4.1.1

a. $(\frac{3}{5})^{2}$ b. $(-\frac{2}{7})^{0}$ c. $(\frac{4}{9})^{-2}$

d. $(\frac{-3}{5})^{5}$ e. $\frac{1}{(\frac{1}{5})^{3}}$

10. If c and d are not zero, then write $\frac{40c^{3}d^{2}}{16c^{5}d}$ in simplest form.

Question 4.33

11. Which one of the following numbers is less than its reciprocal?

Question 4.6.3/AMC 8

$$-2, \quad -1, \quad 0, \quad 1, \quad 2$$

12. Megan puts $\frac{3}{4}$ cup of sugar in an empty bowl. When she's not looking, her son takes $\frac{1}{2}$ cup of sugar from the bowl. When Megan notices that some sugar has been removed, she adds another $\frac{2}{3}$ cup of sugar to the bowl. How much sugar is now in the bowl?

Question 4.44

13. How much greater is $\frac{2003}{25} + 25$ than $\frac{2003+25}{25}$?

Question 4.7.3

14. Convert to a mixed number

Question 4.48

a. $\frac{7}{2}$ b. $\frac{137}{12}$

15. A woman begins her work at 10:20am and estimates that it will take $5\frac{9}{10}$ hours to finish. At what time does she expect to finish?

Question 4.59/MATHCOUNTS

16. Maya starts with 400 pennies. She then gives $\frac{3}{5}$ of her pennies to her brother Mitch, and then gives $\frac{3}{4}$ of her remaining pennies to her mother. How many pennies does Maya have left?

Question 4.73

17. I climb half the steps in a staircase. Next I climb one-third of the remaining steps. Then I climb one-eighth of the rest and stop to catch my breath. What is the least possible number of steps in the staircase?

Questions 4.87