

Math 45 Handout for 1.5 Adding, Subtracting, Multiplying, and Dividing Rational Numbers (Fractions & Decimals)

Objectives:

1. Add, subtract, multiply and divide fractions.
2. Add, subtract, multiply and divide decimals.

SOLUTIONS

You should already know all of these problems from Math 35. If you are having trouble, get tutoring help right away from the Math Center (room 426), the ASC (room 420), or Ms. Carey's office hours.

Find the product, and write in lowest terms, if necessary.

$$1) \frac{14}{15} \cdot \frac{6}{35} = \frac{2}{15} \cdot \frac{6}{5} \quad (\text{reduce by } 7)$$

$$= \frac{2}{5} \cdot \frac{2}{5} \quad (\text{reduce by } 3)$$

$$= \boxed{\frac{4}{25}}$$

$$2) 3 \cdot \frac{49}{15} = \frac{3}{1} \cdot \frac{49}{15} \quad (\text{write } 3 = \frac{3}{1})$$

$$= \frac{1}{1} \cdot \frac{49}{5} \quad (\text{reduce by } 3)$$

$$= \boxed{\frac{49}{5}}$$

$$3) -\frac{16}{56} \cdot \frac{7}{8} = -\frac{2}{7} \cdot \frac{7}{8} \quad (\text{reduce by } 8)$$

$$= -\frac{2}{1} \cdot \frac{1}{8} \quad (\text{reduce by } 7)$$

$$= -\frac{1}{1} \cdot \frac{1}{4} \quad (\text{reduce by } 2)$$

$$= \boxed{-\frac{1}{4}}$$

$$4) \frac{24}{5} \cdot \left(-\frac{20}{7}\right) = \frac{24}{1} \cdot \frac{-4}{7} \quad (\text{reduce by } 5)$$

$$= \boxed{-\frac{96}{7}} \quad (\text{pos} \cdot \text{neg} = \text{neg})$$

$$5) -\frac{1}{13} \cdot \left(-\frac{4}{7}\right) = \boxed{+\frac{4}{91}} \quad (\text{neg} \cdot \text{neg} = \text{pos})$$

Solve the problem.

6) If Sam spends $\frac{3}{8}$ of his life exercising, how

many hours does he spend exercising each week?

his life $\Rightarrow$ each week $\Leftrightarrow$ hours
step 1: How many hours in one week?
 $1 \text{ week} \left(\frac{7 \text{ days}}{1 \text{ week}} \right) \left(\frac{24 \text{ hrs}}{1 \text{ day}} \right) = 168 \text{ hrs/week}$

step 2: "of" means multiply: $\frac{3}{8}$ of 168
 $= \frac{3}{8} \cdot \frac{168}{1} \quad (\text{reduce by } 8) = \frac{3}{1} \cdot \frac{21}{1} = \boxed{63 \text{ hrs}}$

step 3: write answer with units.

Find the reciprocal of the number.

$$7) \frac{5}{8} \quad \boxed{\frac{8}{5}}$$

reciprocal: "flip the fraction over"
 write numerator in denominator
 and denominator as numerator.

Find the quotient, and write in lowest terms, if necessary.

$$8) \frac{12}{10} \div \frac{15}{8} = \frac{12}{10} \cdot \frac{8}{15} \quad \text{step 1: multiply by reciprocal of 2nd fraction}$$

$$= \frac{6}{5} \cdot \frac{8}{15} \quad \text{step 2: Reduce or divide out common factors (divide out 2, and 3)}$$

$$= \frac{2}{5} \cdot \frac{8}{5}$$

$$= \boxed{\frac{16}{25}} \quad \text{step 3: Multiply numerators + multiply denominators.}$$

$$9) -\frac{1}{7} \div 5$$

$$= -\frac{1}{7} \div \frac{5}{1}$$

$$= -\frac{1}{7} \cdot \frac{1}{5}$$

$$= \boxed{-\frac{1}{35}}$$

$$10) 15 \div \left(-\frac{5}{3}\right)$$

$$= \frac{15}{1} \cdot \frac{-3}{5}$$

$$= \frac{3}{1} \cdot \frac{-3}{1}$$

$$= \boxed{-9}$$

$$11) -\frac{7}{5} \div \left(-\frac{10}{13}\right)$$

$$= -\frac{7}{5} \cdot \frac{-13}{10}$$

$$= \boxed{\frac{91}{50}}$$

$$12) -\frac{1}{9} \div (-5)$$

$$= -\frac{1}{9} \cdot \frac{-5}{1}$$

$$= -\frac{1}{9} \cdot \frac{-1}{5}$$

$$= \boxed{\frac{1}{45}}$$

$$13) -9 \div \left(-\frac{4}{5}\right)$$

$$= -9 \cdot \frac{-5}{4}$$

$$= \boxed{\frac{45}{4}}$$

(rewrite $5 = \frac{5}{1}$)

(multiply by reciprocal)

(multiply fractions)

(write $15 = \frac{15}{1}$)

(multiply by reciprocal)

(reduce by 5)

Note: $-\frac{9}{1}$ is not fully reduced.

(multiply by reciprocal)

(neg $\cdot$ neg = pos)

(write $-5 = \frac{-5}{1}$)

(multiply by reciprocal)

(multiply fractions)

(write $-9 = \frac{-9}{1}$)

(multiply by reciprocal)

(neg $\cdot$ neg = pos)

(multiply fractions)

Find the sum or difference, and write in lowest terms, if necessary.

$$14) -\frac{3}{4} + \frac{3}{8} = \frac{-3 \cdot 2}{4 \cdot 2} + \frac{3}{8}$$

$$= \frac{-6}{8} + \frac{3}{8}$$

$$= \frac{-6+3}{8} = \boxed{\frac{-3}{8}}$$

$$15) -\frac{7}{8} + \left(-\frac{1}{2}\right) = \frac{-7}{8} + \frac{-1 \cdot 4}{2 \cdot 4}$$

$$= \frac{-7}{8} - \frac{4}{8}$$

$$= \boxed{\frac{-11}{8}}$$

$$16) -\frac{2}{3} - \frac{1}{2}$$

$$= \frac{-2 \cdot 2}{3 \cdot 2} - \frac{1 \cdot 3}{2 \cdot 3}$$

$$= \frac{-4}{6} - \frac{3}{6} = \frac{-4-3}{6} = \boxed{\frac{-7}{6}}$$

$$17) -\frac{1}{8} - \left(\frac{5}{64}\right)$$

$$= \frac{-1 \cdot 8}{8 \cdot 8} - \frac{5}{64}$$

$$= \frac{-8}{64} - \frac{5}{64} = \frac{-8-5}{64} = \boxed{\frac{-13}{64}}$$

$$18) -\frac{5}{2} - (1)$$

$$= \frac{-5}{2} - \frac{1 \cdot 2}{1 \cdot 2}$$

$$= \frac{-5-2}{2} = \boxed{\frac{-7}{2}}$$

$$19) \frac{3}{5} - 5$$

$$= \frac{3}{5} - \frac{5 \cdot 5}{1 \cdot 5}$$

$$= \frac{3}{5} - \frac{25}{5} = \frac{3-25}{5} = \boxed{\frac{-22}{5}}$$

$$20) 4 - \left(-\frac{2}{3}\right) = \frac{4}{1} + \left(+\frac{2}{3}\right)$$

$$= \frac{4 \cdot 3}{1 \cdot 3} + \frac{2}{3}$$

$$= \frac{12}{3} + \frac{2}{3} = \frac{12+2}{3} = \boxed{\frac{14}{3}}$$

$$21) \frac{1}{7} - \frac{1}{13} \quad (7 \cdot 13 = 91)$$

$$= \frac{1 \cdot 13}{7 \cdot 13} - \frac{1 \cdot 7}{13 \cdot 7}$$

$$= \frac{13}{91} - \frac{7}{91} = \frac{13-7}{91} = \boxed{\frac{6}{91}}$$

$$22) \frac{30}{13} - \frac{9}{13} - \frac{12}{13} \quad (\text{already has C.D.})$$

$$= \frac{30-9-12}{13}$$

$$= \frac{21-12}{13}$$

$$= \boxed{\frac{9}{13}}$$

step 1: Find the lowest common denominator (CD) (least common multiple)

step 2: Multiply numerator & denominator of each fraction by factor missing from denominator

step 3: Add or subtract numerators, with their signs.

step 4: Write new numerator over common denominator (unchanged)

step 5: Reduce final result if necessary.

$$23) -\frac{5}{3} + \left(-\frac{1}{3}\right) + \frac{2}{9} \quad CD = 9$$

$$= \frac{-5 \cdot 3}{3 \cdot 3} + \frac{-1 \cdot 3}{3 \cdot 3} + \frac{2}{9}$$

$$= \frac{-15}{9} - \frac{3}{9} + \frac{2}{9}$$

$$= \frac{-15-3+2}{9} = \frac{-18+2}{9} = \boxed{\frac{-16}{9}}$$

Perform the indicated operations.

$$24) -(-0.66) + 0.69$$

$$= 0.66 + 0.69$$

$$= \boxed{1.35}$$

$$25) 5.1 + (-5.4) + (-3.3)$$

$$= 5.1 - 5.4 - 3.3$$

$$= -0.3 - 3.3 = \boxed{-3.6}$$

$$26) 0.54 - (-0.49)$$

$$= 0.54 + 0.49$$

$$= \boxed{1.03}$$

$$27) -12.3 - (-11.5)$$

$$= -12.3 + 11.5$$

$$= \boxed{-0.8}$$

$$28) 49.1 - 11.72 - (-6.3) + 15.48$$

$$= 49.1 - 11.72 + 6.3 + 15.48$$

$$= \boxed{59.16}$$

$$29) 14.79 \times 0.0070$$

$$= \boxed{0.10353}$$

$$30) 3.2 \times (-7.20)$$

$$= \boxed{-23.04}$$

$$31) \frac{6.3832}{2.02} \cdot \frac{100}{100} = \frac{638.32}{202}$$

$$= \boxed{3.16}$$

$$32) \frac{-1.4}{0.07} \cdot \frac{100}{100} = \frac{-140}{7}$$

$$= \boxed{-20}$$

use your calculator! You should have a key for subtract and a different key $\boxed{+/-}$ or $\boxed{(-)}$ for making a negative number.