First Set of Homework for Math 05

Nikos Apostolakis

Please note: You should fully justify your answers.

1 Review of fractions

1. Replace the question marks with natural numbers so that the resulting equations are true:
   (a) $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{10}{20} = \frac{15}{30}$
   (b) $\frac{3}{5} = \frac{12}{20} = \frac{6}{10} = \frac{60}{100} = \frac{21}{35}$
   (c) $\frac{0}{3} = \frac{0}{4} = \frac{0}{7}$

2. Write each fraction in the simplest form:
   (a) $\frac{9}{15}$ $\frac{3}{5}$
   (b) $\frac{10}{24}$ $\frac{5}{12}$
   (c) $\frac{18}{60}$ $\frac{3}{10}$
   (d) $\frac{11}{66}$ $\frac{1}{6}$
   (e) $\frac{21}{30}$ $\frac{7}{10}$

3. Can you find a natural number to replace the question mark so that the following equation is true? How about if you are allowed to use rational numbers?

$$\frac{2}{5} = \frac{?}{3}$$

   Answer. It's not possible to find such a natural number. For, 3 is neither a divisor nor a multiple of 5. If we are allowed to use rational numbers, we can replace the question mark with 1.2. □

4. Perform the following multiplications and divisions. Give your answers in the simplest possible form:
   (a) $\frac{2}{3} \cdot \frac{5}{7}$ $\frac{10}{21}$
   (b) $\frac{7}{10} \cdot \frac{5}{21}$ $\frac{1}{6}$
   (c) $\frac{70}{12} \cdot \frac{28}{77}$ $\frac{70}{33}$
   (d) $\frac{2}{5} \div \frac{5}{6}$ $\frac{12}{25}$
   (e) $\frac{3}{11} \div \frac{12}{33}$ $\frac{3}{4}$
   (f) $\frac{\frac{2}{5}}{\frac{3}{7}}$ $\frac{14}{5}$

5. Perform the following additions and subtractions. Give your answers in the simplest possible form:
   (a) $\frac{4}{7} + \frac{3}{7}$ 1
   (b) $\frac{2}{3} + \frac{3}{4}$ $\frac{17}{12}$
   (c) $\frac{1}{2} + \frac{3}{5}$ $\frac{11}{10}$
   (d) $3 + \frac{3}{5}$ $\frac{18}{5}$
   (e) $\frac{1}{4} + \frac{7}{12}$ $\frac{5}{6}$
   (f) $\frac{2}{15} + \frac{3}{10} + \frac{4}{5}$ $\frac{37}{30}$
   (g) $\frac{5}{6} + \frac{3}{4} + \frac{11}{12}$ $\frac{5}{2}$
   (h) $\frac{5}{8} - \frac{3}{8}$ $\frac{1}{4}$
   (i) $\frac{1}{2} - \frac{1}{3}$ $\frac{1}{6}$
   (j) $\frac{17}{24} - \frac{5}{16}$ $\frac{19}{48}$
   (k) $7 - \frac{10}{3}$ $\frac{11}{3}$
6. Find the perimeter and the area of the rectangle in Figure 1

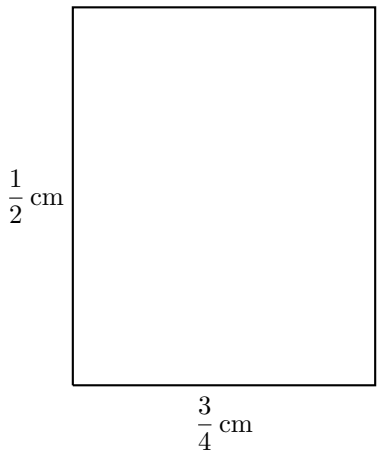

Figure 1: The rectangle of Question 6

Answer. The perimeter is $\frac{5}{2}$ cm. The area is $\frac{3}{8}$ cm^2 □

7. Put the appropriate symbol ($<$, $>$, or $=$) in the blank so that we get a true statement:
   (a) $\frac{3}{5}$ $<$ $\frac{4}{5}$

(b) $\frac{5}{7} > \frac{5}{8}$

(c) $\frac{2}{5} < \frac{3}{4}$

(d) $\frac{3}{5} = \frac{9}{15}$

(e) $\frac{7}{9} > \frac{2}{3}$

2 Signed numbers

1. Simplify the following expressions:
   (a) $-(-3)$ 3
   (b) $-(-(-5))$ -5
   (c) $|-5|$ 5
   (d) $-|-3|$ 3
   (e) $|-(-(-7)|$ 7
2. Put the appropriate symbol ($<$, $>$, or $=$) in the blank so that we get a true statement:
   (a) $-7 < 3$
   (b) $-8 > -9$
   (c) $|-8| < |-9|$
   (d) $3 = -(-3)$
   (e) $|-4| > -5$
   (f) $3 = |-3|$
3. Perform the indicated operations:
   (a) $12+(-5)$ 7
   (b) $-13+7$ -6
   (c) $-3+(-4)$ -7
   (d) $-\frac{2}{3}+\frac{1}{2}$ $-\frac{1}{6}$
   (e) $\frac{7}{9}-2$ $-\frac{11}{9}$
   (f) $\frac{3}{5}-\frac{5}{6}$ $-\frac{7}{30}$
   (g) $5-8$ -3
   (h) $-3-4$ -7
   (i) $2-(-21)$ 23
   (j) $-7-(-12)$ 5
   (k) $-\frac{3}{5}-\frac{2}{5}$ -1
   (l) $\frac{2}{7}-\left(-\frac{12}{7}\right)$ 2
   (m) $-\frac{1}{3}-\frac{1}{6}$ $-\frac{1}{2}$
   (n) $3-6-(-9)$ 6

(o) $-7-(-8)-2$ -1

4. The temperature dropped from $12°$ F to $-3°$ F. What was the drop in temperature?

   Answer. The drop in temperature was $15°$ F. □

5. An elevator started at the 32nd floor. It then went down 11 floors, then up 7 floors and then down 6 floors. At what floor is the elevator?

   Answer. The elevator is at the 22nd floor. □