

MA201 Test 3 Review **Solutions**

Practice Problems

1. Order the following rational numbers from least to greatest.

$$-\frac{2}{3}, 1\frac{3}{4}, -\frac{1}{6}, \frac{1}{6}, 2, \frac{-22}{12}$$

$$\frac{-22}{12}, -\frac{2}{3}, -\frac{1}{6}, \frac{1}{6}, 1\frac{3}{4}, 2$$

2. Find three rational numbers between  $\frac{2}{3}$  and  $\frac{5}{7}$ .

$$\frac{2}{3} = \frac{56}{84}$$

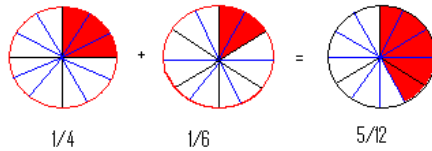
and

$$\frac{5}{7} = \frac{60}{84}$$

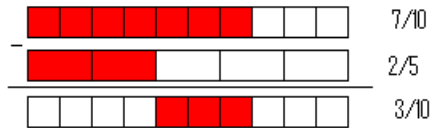
So  $\frac{57}{84}$ ,  $\frac{58}{84}$ , and  $\frac{59}{84}$  are all between  $\frac{2}{3}$  and  $\frac{5}{7}$ .

3. For the following, explain how to compute the problem using the indicated conceptual model.

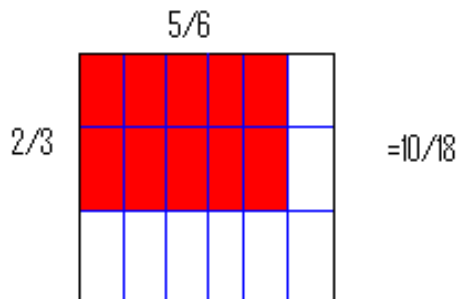
- (a) Model  $\frac{1}{4} + \frac{1}{6}$  using colored regions.



- (b) Model  $\frac{7}{10} - \frac{2}{5}$  using fraction strips.



- (c) Model  $\frac{2}{3} \cdot \frac{5}{6}$  using a rectangular array.



4. Use a conceptual model (i.e. draw a diagram) to show how to solve the following problem. Explain your picture using complete sentences.

Each quart of soup calls for  $\frac{2}{3}$  cup of pinto beans. How many quarts of soup can be made with 3 cups of beans?

1	2	4
1	3	4
2	3	5

We take our 3 cups of beans and divide each into three pieces. For every two of these thirds, we can make one quart of soup. Therefore, we can make 4 full quarts of soup. The last third of beans can make half a quart of soup. So we can get  $4\frac{1}{2}$  cups of soup.

5. The length of a day on Neptune is about 16 hours. The Neptunian children were doing arithmetic on their 16 hour clock. Help them solve the following problems.

(a)  $13 +_{16} 7$

4

(b)  $5 -_{16} 12$

9

(c)  $4 \times_{16} 6$

8

- (d) What is the additive identity on the Neptunian clock?

16

6. Mark the following statements True or False

- (a)  $\frac{8}{36}$  and  $\frac{2}{9}$  are equivalent fractions.

True.

- (b) The integers are closed under addition, subtraction, multiplication, and division.

False. Not closed under division.

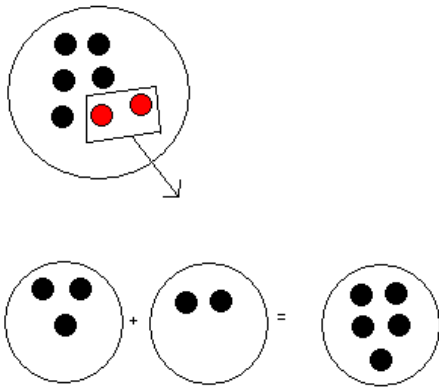
- (c) If the rational numbers  $x$  and  $y$  are additive inverses of each other, then  $x \times y = 1$ .

False. If  $x$  and  $y$  are additive inverses, then  $x + y = 0$ .

- (d) If  $x$  is negative, then  $|x| = -x$ .

True.

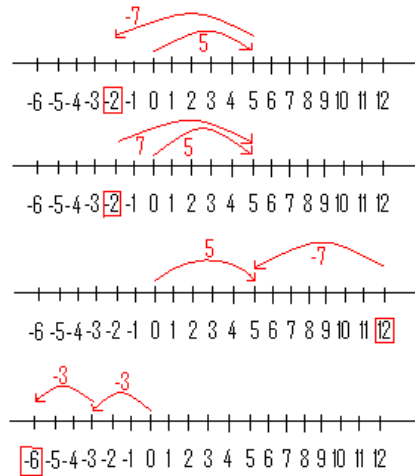
7. Explain, using complete sentences and color counters, why  $3 - (-2)$  is the same as  $3 + 2$ .



In order to model  $3 - (-2)$ , we need to represent the number 3 using at least two red counters. The first picture shows this. Now we remove 2 red counters and are left with 5 black counters. Modeling  $3 + 2$  is done simply by modeling 3 with three black counters and 2 with two black counters. Putting these together, we get 5 black counters. Thus, we can see that  $3 - (-2)$  is the same as  $3 + 2$ .

8. Use a number line to model the following problems.

- (a)  $5 + (-7)$
- (b)  $5 - 7$
- (c)  $5 - (-7)$
- (d)  $2 \times -3$



9. Replace  $\frac{5}{6}$  and  $\frac{7}{9}$  by equivalent fractions with the least common denominator.

$$\frac{5}{6} = \frac{15}{18}$$

and

$$\frac{7}{9} = \frac{14}{18}$$

10. Use the GCD to find the simplest form of the fraction  $\frac{24}{60}$ .  
GCD(24, 60) = 12 so

$$\frac{24}{60} = \frac{2 \cdot 12}{5 \cdot 12} = \frac{2}{5}$$