



## Properties of Rational Numbers

**Distributive property of multiplication:** For, any three rational numbers  $\frac{a}{b}$ ,  $\frac{c}{d}$  and  $\frac{e}{f}$ , the distributive property is

$$\frac{a}{b} \times \left( \frac{c}{d} + \frac{e}{f} \right) = \left( \frac{a}{b} \times \frac{c}{d} \right) + \left( \frac{a}{b} \times \frac{e}{f} \right)$$

1) Which of the following demonstrates the distributive property of multiplication over addition for any three rational numbers  $\frac{p}{q}$ ,  $\frac{r}{s}$ , and  $\frac{t}{v}$ ?

a)  $\frac{p}{q} \times \left( \frac{r}{s} + \frac{t}{v} \right) = \left( \frac{p}{q} + \frac{r}{s} \right) \times \left( \frac{p}{q} + \frac{t}{v} \right)$

b)  $\frac{p}{q} + \left( \frac{r}{s} \times \frac{t}{v} \right) = \left( \frac{p}{q} + \frac{r}{s} \right) \times \frac{t}{v}$

c)  $\frac{p}{q} \times \left( \frac{r}{s} + \frac{t}{v} \right) = \left( \frac{p}{q} \times \frac{r}{s} \right) + \left( \frac{p}{q} \times \frac{t}{v} \right)$

d)  $\frac{p}{q} \times \left( \frac{r}{s} \times \frac{t}{v} \right) = \left( \frac{p}{q} \times \frac{r}{s} \right) \times \frac{t}{v}$

2) Which expression demonstrates the distributive property of multiplication for rational numbers  $\frac{-2}{3}$ ,  $\frac{5}{9}$  and  $\frac{8}{11}$ ?

a)  $-\frac{2}{3} \times \left( \frac{1}{9} + \frac{7}{11} \right) = \left( -\frac{2}{3} + \frac{1}{9} \right) \times \left( -\frac{2}{3} + \frac{7}{11} \right)$

b)  $\left( \frac{-2}{3} \times \frac{1}{9} \right) + \frac{7}{11} = \left( \frac{-2}{3} \right) + \left( \frac{1}{9} \times \frac{7}{11} \right)$

c)  $\left( \frac{-2}{3} + \frac{1}{9} \right) \times \frac{7}{11} = \frac{-2}{3} \times \left( \frac{1}{9} + \frac{7}{11} \right)$

d)  $\frac{-2}{3} \times \left( \frac{1}{9} + \frac{7}{11} \right) = \left( \frac{-2}{3} \times \frac{1}{9} \right) + \left( \frac{-2}{3} \times \frac{7}{11} \right)$



3) Identify the properties illustrated by the following

a)  $\left(\frac{-5}{8} \times \frac{-1}{9}\right) = \left(\frac{-1}{9} \times \frac{-5}{8}\right) = \text{_____}$

b)  $\frac{1}{2} \times \left(\frac{-1}{3} + \frac{4}{5}\right) = \left(\frac{1}{2} \times \frac{-1}{3}\right) + \left(\frac{1}{2} \times \frac{4}{5}\right) = \text{_____}$

c)  $\frac{p}{q} + \left(\frac{r}{s} + \frac{t}{v}\right) = \left(\frac{p}{q} + \frac{r}{s}\right) + \frac{t}{v} = \text{_____}$

d)  $\frac{-7}{5} \times 1 = \frac{-7}{5} = \text{_____}$

e)  $\frac{-3}{2} + \frac{3}{2} = 0 = \text{_____}$

f)  $\frac{6}{7} - 0 = \frac{6}{7} = \text{_____}$

g)  $\left(\frac{1}{3} \times \frac{1}{10}\right) = \frac{1}{30} = \text{_____}$

4) The product of a rational number and its reciprocal is \_\_\_\_\_

5) Zero has no reciprocal a) yes b) no

6) The subtraction of rational numbers follows commutative

property and associative property. a) yes b) no

7)  $\frac{4}{9} \div \left(\frac{4}{9}\right) = \frac{4}{9} \times \frac{9}{4} = ?$  a) 1 b)  $\frac{-4}{9}$  c) 0 d)  $\frac{4}{9}$

8) Division follows closure property, for every non-zero rational

number  $\frac{c}{d}$ ,  $\left(\frac{a}{b} \div \frac{c}{d}\right)$  is closed. a) yes b) no

9) The numbers \_\_\_ and \_\_\_ are their own reciprocals

a)  $\frac{a}{b}, 1$  b)  $\frac{a}{b}, \frac{-a}{b}$  c) 0,  $\frac{a}{b}$  d)  $\frac{a}{b}, \frac{b}{a}$