Codingal

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

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3) Identify the properties illustrated by the following

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

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

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

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

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

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

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

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) $\frac{a}{b}, \frac{b}{a}$

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