TEACHERS FORUM®

QUESTION BANK

(solved)

Class VIII

MATHEMATICS

SUBJECT EXPERTS

CONTENTS

1 RATIONAL NUMBERS

NCERT SOLUTIONS

EXERCISE - 1.1

1. Using appropriate properties find:

(i) $-\frac{2}{3}\times\frac{3}{5}+\frac{5}{2}-\frac{3}{5}\times\frac{1}{6}$

(ii) $\frac{2}{5}\times\left(\frac{3}{-7}\right)-\frac{1}{6}\times\frac{3}{2}+\frac{1}{14}\times\frac{2}{5}$

Ans. (i) $-\frac{2}{3}\times\frac{3}{5}+\frac{5}{2}-\frac{3}{5}\times\frac{1}{6}$

$=-\frac{2}{3}\times\frac{3}{5}-\frac{3}{5}\times\frac{1}{6}+\frac{5}{2}$

[Using associative property]

$=\frac{3}{5}\left(\frac{-2}{3}-\frac{1}{6}\right)+\frac{5}{2}$

[Using distributive property]

$=\frac{3}{5}\left(\frac{-4-1}{6}\right)+\frac{5}{2}=\frac{3}{5}\times\frac{-5}{6}+\frac{5}{2}$

$=-\frac{1}{2}+\frac{5}{2}=\frac{-1+5}{2}=\frac{4}{2}=2$

(ii) $\frac{2}{5}\times\left(\frac{3}{-7}\right)-\frac{1}{6}\times\frac{3}{2}+\frac{1}{14}\times\frac{2}{5}$

$=\frac{2}{5}\times\left(\frac{-3}{7}\right)+\frac{1}{14}\times\frac{2}{5}-\frac{1}{6}\times\frac{3}{2}$

[Using associative property]

$=\frac{2}{5}\times\left(\frac{-3}{7}+\frac{1}{14}\right)-\frac{1}{4}$

[Using distributive property]

$=\frac{2}{5}\times\left(\frac{-6+1}{14}\right)-\frac{1}{4}=\frac{2}{5}\times\frac{-5}{14}-\frac{1}{4}$

$=\frac{-1}{7}-\frac{1}{4}=\frac{-4-7}{28}=\frac{-11}{28}$

2. Write the additive inverse of each of the following:

(i) $\frac{2}{8}$ (ii) $\frac{-5}{9}$ (iii) $\frac{-6}{-5}$ (iv) $\frac{2}{-9}$ (v) $\frac{19}{-6}$

Ans. (i) Additive inverse of $\frac{2}{8}$ is $\frac{-2}{8}$.

(ii) Additive inverse of $\frac{-5}{9}$ is $\frac{5}{9}$.

(iii) Additive inverse of $\frac{-6}{-5}$ is $\frac{-6}{5}$.

(iv) Additive inverse of $\frac{2}{-9}$ is $\frac{2}{9}$.

(v) Additive inverse of $\frac{19}{-6}$ is $\frac{19}{6}$.

3. Verify that $-(-x)=x$ for: (i) $x=\frac{11}{15}$ (ii) $x=-\frac{13}{17}$

Ans. (i) Put $x=\frac{11}{15}$ in $-(-x)=x$,

$-\left(-\frac{11}{15}\right)=\frac{11}{15}\Rightarrow\frac{11}{15}=\frac{11}{15}$

$\Rightarrow$ L.H.S = R.H.S. Hence, verified.

(ii) Put $x = \frac{-13}{17}$ in $-(-x) = x$,

$$-\left\{-\left(\frac{-13}{17}\right)\right\} = \frac{-13}{17} \Rightarrow \frac{-13}{17} = \frac{-13}{17}$$

$\Rightarrow$ L.H.S. = R.H.S. Hence, verified.

4. Find the multiplicative inverse of the following :

(i) - 13 (ii) $\frac{-13}{19}$ (iii) $\frac{1}{5}$ (iv) $\frac{-5}{8} \times \frac{-3}{7}$ (v) $-1 \times \frac{-2}{5}$ (vi) -1

Ans. (i) Multiplicative inverse of -13 is $\frac{-1}{13}$ (ii) Multiplicative inverse of $\frac{-13}{19}$ is $\frac{-19}{13}$.

(iii) Multiplicative inverse of $\frac{1}{5}$ is 5.

(iv) $.\frac{-5}{8} \times \frac{-3}{7} = \frac{15}{56}$ .Multiplicative inverse of $\frac{-5}{8} \times \frac{-3}{7}$ is $\frac{56}{15}$.

(v) Multiplicative inverse of $-1 \times \frac{-2}{5} = \frac{2}{5}$ is $\frac{5}{2}$.

(vi) Multiplicative inverse of -1 is $\frac{1}{-1}$.

5. Name the property under multiplication used in each of the following:

(i) $\frac{-4}{5} \times 1 = 1 \times \frac{-4}{5}$ (ii) $-\frac{13}{17} \times \frac{-2}{7} = \frac{-2}{7} \times \frac{-13}{17}$ (iii) $\frac{-19}{29} \times \frac{29}{-19} = 1$

Ans. (i) Multiplicative identity. (ii) Commutative property.

(iii) Multiplicative Inverse property

6. Multiply $\frac{6}{13}$ by the reciprocal of $\frac{-7}{16}$.

Ans. The reciprocal of $\frac{-7}{16}$ is $\frac{-16}{7}$.

According to the question, $\frac{6}{13} \times \left(\frac{-16}{7}\right) = \frac{-96}{91}$

7. Tell what property allows you to compute $\frac{1}{3} \times \left(6 \times \frac{4}{3}\right)$ as $\left(\frac{1}{3} \times 6\right) \times \frac{4}{3}$.

Ans. Associative property of multiplication, a × (b × c) = (a × b) × c.

8. Is $\frac{8}{9}$ the multiplicative inverse of $-1\frac{1}{8}$? Why or why not?

Ans. Multiplicative inverse of a rational number a is $\left(\frac{1}{a}\right)$, if $a \times \frac{1}{a} = 1$.

So, $\frac{8}{9} \times \left(-1\frac{1}{8}\right) = \frac{8}{9} \times \frac{-9}{8} = -1$

But its product must be positive 1.

Therefore, $\frac{8}{9}$ is not the multiplicative inverse of $\left(-1\frac{1}{8}\right)$.

9. Is 0.3 the multiplicative inverse of $3\frac{1}{3}$? Why or why not?

Ans. $0.3 \times 3\frac{1}{3} = \frac{3}{10} \times \frac{10}{3} = 1$. Therefore, 0.3 is the multiplicative inverse of $3\frac{1}{3}$.

10. Write:

(i) The rational number that does not have a reciprocal.

(ii) The rational numbers that are equal to their reciprocals.

(iii) The rational number that is equal to its negative.

Ans. (i) 0 (ii) 1 and -1 (iii) 0

11. Fill in the blanks:

(i) Zero has _____ reciprocal.

(ii) The numbers _____ and _____ are their own reciprocals.

(iii) The reciprocal of -5 is _____.

(iv) Reciprocal of $\frac{1}{x}$, where $x \neq 0$ is _____.

(v) The product of two rational numbers is always a _____.

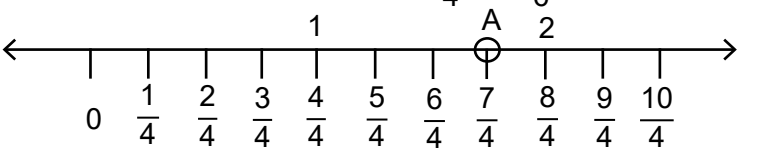
(vi) The reciprocal of a positive rational number is _____

Ans. (i) No (ii) 1, -1 (iii) $\frac{-1}{5}$ (iv) x (v) Rational Number (vi) Positive

EXERCISE 1.2

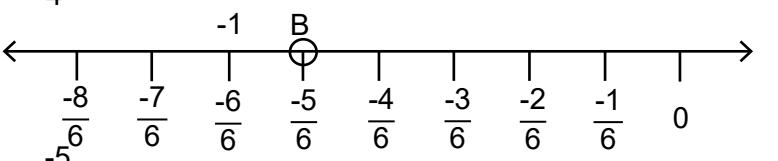
1. Represent these numbers on the number line: (i) $\frac{7}{4}$ (ii) $\frac{-5}{6}$

Ans. (i) $\frac{7}{4} = 1\frac{3}{4}$



Here, A represents $\frac{7}{4}$

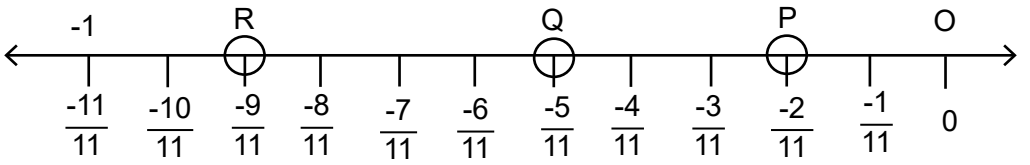
(ii) $\frac{-5}{6}$



Here, B represents $\frac{-5}{6}$

2. Represent $\frac{-2}{11}$, $\frac{-5}{11}$, $\frac{-9}{11}$ on the number line.

Ans. Here, P = $\frac{-2}{11}$, Q = $\frac{-5}{11}$ and R = $\frac{-9}{11}$



3. Write five rational numbers which are smaller than 2.

Ans. $\frac{2}{3}, \frac{2}{4}, \frac{2}{5}, \frac{2}{6}$ and so on.

4. Find ten rational numbers between $\frac{-2}{5}$ and $\frac{1}{2}$.

Ans. Given rational numbers are $\frac{-2}{5}$ and $\frac{1}{2}$

Here, L.C.M. of 5 and 2 is 10.

$\therefore \frac{-2}{5} \times \frac{2}{2} = \frac{-4}{10}$ and $\frac{1}{2} \times \frac{5}{5} = \frac{5}{10}$

Again, $\frac{-4}{10} \times \frac{2}{2} = \frac{-8}{20}$ and $\frac{5}{10} \times \frac{2}{2} = \frac{10}{20}$

$\therefore$ Ten rational number between $\frac{-2}{5}$ and $\frac{1}{2}$ are $\frac{-7}{20}, \frac{-6}{20}, \frac{-5}{20}, \frac{-4}{20}, \frac{-3}{20}, \frac{-2}{20}, \frac{-1}{20}, 0, \frac{1}{20}, \frac{2}{20}$.

5. Find five rational numbers between: (i) $\frac{2}{3}$ and $\frac{4}{5}$ (ii) $\frac{-3}{2}$ and $\frac{5}{3}$ (iii) $\frac{1}{4}$ and $\frac{1}{2}$

Ans. (i) $\frac{2}{3}$ and $\frac{4}{5}$ L.C.M. of 3 and 5 is 15.

$\therefore \frac{2}{3} \times \frac{5}{5} = \frac{10}{15}$ and $\frac{4}{5} \times \frac{3}{3} = \frac{12}{15}$

Again $\frac{10}{15} \times \frac{4}{4} = \frac{40}{60}$ and $\frac{12}{15} \times \frac{4}{4} = \frac{48}{60}$

$\therefore$ Five rational numbers between $\frac{2}{3}$ and $\frac{4}{5}$ are $\frac{41}{60}, \frac{42}{60}, \frac{43}{60}, \frac{44}{60}, \frac{45}{60}$.

(ii) $\frac{-3}{2}$ and $\frac{5}{3}$ L.C.M. of 2 and 3 is 6.

$\therefore \frac{-3}{2} \times \frac{3}{3} = \frac{-9}{6}$ and $\frac{5}{3} \times \frac{2}{2} = \frac{10}{6}$

$\therefore$ Five rational numbers between $\frac{-3}{2}$ and $\frac{5}{3}$ are $\frac{1}{6}, \frac{2}{6}, \frac{3}{6}, \frac{4}{6}, \frac{5}{6}$

(iii) $\frac{1}{4}$ and $\frac{1}{2}$ L.C.M. of 4 and 2 is 4.

$\therefore \quad \frac{1}{4} \times \frac{1}{1} = \frac{1}{4}$ and $\frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$

Again $\frac{1}{4} \times \frac{6}{6} = \frac{6}{24}$ and $\frac{2}{4} \times \frac{6}{6} = \frac{12}{24}$

$\therefore$ Five rational numbers between $\frac{1}{4}$ and $\frac{1}{2}$ are $\frac{7}{24}, \frac{8}{24}, \frac{9}{24}, \frac{10}{24}, \frac{11}{24}$.

6. Write 5 rational numbers greater than -2.

Ans. Five rational numbers greater than -2 are:

-1, 0, 1, 2, 3 [Other rational numbers are also possible]

7. Find ten rational numbers between $\frac{3}{5}$ and $\frac{3}{4}$.

Ans. The given rational numbers are $\frac{3}{5}$ and $\frac{3}{4}$

L.C.M. of 5 and 4 is 20.

$\therefore \quad \frac{3}{5} \times \frac{4}{4} = \frac{12}{20}$ and $\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$

Again $\frac{12}{20} \times \frac{4}{4} = \frac{48}{80}$ and $\frac{15}{20} \times \frac{4}{4} = \frac{60}{80}$

$\therefore$ Ten rational numbers between $\frac{3}{5}$ and $\frac{3}{4}$ are:

$\frac{49}{80}, \frac{50}{80}, \frac{51}{80}, \frac{52}{80}, \frac{53}{80}, \frac{54}{80}, \frac{55}{80}, \frac{56}{80}, \frac{57}{80}, \frac{58}{80}$

ADDITIONAL QUESTIONS AND ANSWERS

Choose the correct answer :-

1. A number which can be expressed as $\frac{p}{q}$ where p and q are integers and $q \neq 0$ is

(a) natural number. (b) whole number. (c) integer. (d) rational number.

Ans. (d) rational number.

2. The numerical expression $\frac{3}{8} + \frac{(-5)}{7} = \frac{-19}{56}$ shows that

(a) rational numbers are closed under addition.

(b) rational numbers are not closed under addition.

(c) rational numbers are closed under multiplication.

(d) addition of rational numbers is not commutative.

Ans. (b) We have $\frac{3}{8} + \frac{(-5)}{7} = \frac{-19}{56}$.

It shows that rational numbers are closed under addition.

$\left[\frac{3}{8}$ and $\frac{(-5)}{7}$ are rational number & their sum is $\frac{-19}{56}$ which is also a rational number$\right]$

3. Which of the following is not true?

(a) rational numbers are closed under addition.

(b) rational numbers are closed under subtraction.

(c) rational numbers are closed under multiplication.

(d) rational numbers are closed under division.

Ans. (d) Rational numbers are not closed under division. As, 1 and 0 are the rational numbers but 1/0 is not defined.

4. Which of the following expressions shows that rational numbers are associative under multiplication.

(a) $\frac{2}{3} \times \left(\frac{-6}{7} \times \frac{3}{5}\right) = \left(\frac{2}{3} \times \frac{-6}{7}\right) \times \frac{3}{5}$ (b) $\frac{2}{3} \times \left(\frac{-6}{7} \times \frac{3}{5}\right) = \left(\frac{2}{3} \times \frac{-6}{7}\right)$

(c) $\frac{2}{3} \times \left(\frac{-6}{7} \times \frac{3}{5}\right) = \left(\frac{3}{5} \times \frac{2}{3}\right) \times \frac{-6}{7}$ (d) $\left(\frac{2}{3} \times \frac{-6}{7}\right) \times \frac{3}{5} = \left(\frac{-6}{7} \times \frac{2}{3}\right) \times \frac{3}{5}$

Ans. (a) $a \times (b \times c) = (a \times b) \times c$

Hence, the given expression shows that rational numbers are associative under multiplication.

5. Zero (0) is

(a) the identity for addition of rational numbers.

(b) the identity for subtraction of rational numbers.

(c) the identity for multiplication of rational numbers.

(d) the identity for division of rational numbers.

Ans. (a) Zero (0) is the identity for addition of rational numbers.

If a is a rational number. Then, $a + 0 = 0 + a = a$

6. One (1) is

(a) the identity for addition of rational numbers.

(b) the identity for subtraction of rational numbers.

(c) the identity for multiplication of rational numbers.

(d) the identity for division of rational numbers.

Ans. (c) One (1) is the identity for multiplication of rational numbers.

If a is a rational number, then, $a \times 1 = 1 \times a = a$

7. Multiplicative inverse of a negative rational number is

(a) a positive rational number. (b) a negative rational number.

(c) 0 (d) 1

Ans. (b) a negative rational number.

8. If $x + 0 = 0 + x = x$, which is a rational number, then 0 is called

(a) identity for addition of rational numbers. (b) additive inverse of x.

(c) multiplicative inverse of x. (d) reciprocal of x.

Ans. (a) identity for addition of rational numbers.

9. $-(-x)$ is same as

(a) $-x$ (b) x (c) $\frac{1}{x}$ (d) $\frac{-1}{x}$

Ans. (b) $-(-x) = x$

Negative of negative rational number is equal to positive rational number.

10. The reciprocal of –1 is

(a) 1 (b) –1 (c) 0 (d) Not defined

Ans. (b) The reciprocal of -1 is the number itself.

11. The reciprocal of 0 is

(a) 1 (b) –1 (c) 0 (d) Not defined

Ans. (d) The reciprocal of 0 is not defined.

12. If y be the reciprocal of rational number x, then the reciprocal of y will be

(a) x (b) y (a) $\frac{x}{y}$ (d) $\frac{y}{x}$

Ans. (a) x

13. The reciprocal of $\frac{-3}{8} \times \left(\frac{-7}{13}\right)$ is

(a) $\frac{104}{21}$ (b) $\frac{-104}{21}$ (c) $\frac{21}{104}$ (d) $\frac{-21}{104}$

Ans. (a) $-\frac{3}{8} \times \left(\frac{-7}{13}\right) = \frac{21}{104}$. So, the multiplicative inverse of $\frac{21}{104}$ is $\frac{104}{21}$.

14. Which of the following is an example of distributive property of multiplication over addition for rational numbers.

(a) $-\frac{1}{4} \times \left\{\frac{2}{3} + \left(\frac{-4}{7}\right)\right\} = \left[-\frac{1}{4} \times \frac{2}{3}\right] + \left[-\frac{1}{4} \times \left(\frac{-4}{7}\right)\right]$

(b) $-\frac{1}{4} \times \left\{\frac{2}{3} + \left(\frac{-4}{7}\right)\right\} = \left[\frac{1}{4} \times \frac{2}{3}\right] - \left(\frac{-4}{7}\right)$

(c) $-\frac{1}{4} \times \left\{\frac{2}{3} + \left(\frac{-4}{7}\right)\right\} = \frac{2}{3} + \left(-\frac{1}{4}\right) \times \frac{-4}{7}$

(d) $-\frac{1}{4} \times \left\{\frac{2}{3} + \left(\frac{-4}{7}\right)\right\} = \left\{\frac{2}{3} + \left(\frac{-4}{7}\right)\right\} - \frac{1}{4}$

Ans. (a) We know that, the distributive property of multiplication over addition for rational numbers can be expressed as $a \times (b + c) = ab + ac$, where a, b and c are rational numbers.

15. $\frac{x + y}{2}$ is a rational number

(a) Between x and y (b) Less than x and y both.

(c) Greater than x and y both. (d) Less than x but greater than y.

Ans. (a) Between x and y

16. A number of the form $\frac{p}{q}$ is said to be a rational number if

(a) p and q are integers. (b) p and q are integers and $q \neq 0$

(c) p and q are integers and $p \neq 0$ (d) p and q are integers and $p \neq 0$ also $q \neq 0$.

Ans. (b) p and q are integers and $q \neq 0$

II. Fill in the blanks :-

17. The additive inverse of $\frac{-7}{19}$ is _____.

Ans. $\frac{7}{19}$. We know that, if a and b are the additive inverse of each other, then $a + b = 0$

18. To get the product 1, we should multiply $\frac{8}{21}$ by _____.

Ans. $\frac{21}{8}$

19. The reciprocal of any rational number $\frac{p}{q}$, where p and q are integers & $q \neq 0$, is _____.

Ans. $\frac{q}{p}$

20. The reciprocal of $\frac{2}{5} \times \left(\frac{-4}{9}\right)$ is _____.

Ans. $\frac{-45}{8}$

21. If x be any rational number then $x + 0$ is equal to _____.

Ans. x

Answer the Following

22. Verify the closure for the following additions. $\frac{3}{11} + \frac{2}{33}$

Ans. $\frac{3}{11} + \frac{2}{33} = \frac{(3 \times 3) + (2 \times 1)}{33} = \frac{9 + 2}{33} = \frac{11}{33}$.

$\frac{11}{33}$ is a rational number. Thus, closure property is verified.

23. Verify the commutative property for the following additions $\frac{5}{6} + \frac{8}{11}$

Ans. $\frac{5}{6} + \frac{8}{11} = \frac{(5 \times 11) + (8 \times 6)}{66} = \frac{55 + 48}{66} = \frac{103}{11}$

Now, $\frac{8}{11} + \frac{5}{6} = \frac{(8 \times 6) + (5 \times 11)}{66} = \frac{48 + 55}{66} = \frac{103}{11}$

Thus, $\frac{5}{6} + \frac{8}{11} = \frac{8}{11} + \frac{5}{6}$ So, commutative property is verified.

24. Find the additive inverses of : (i) $\frac{3}{8}$ (ii) $\frac{-4}{11}$ (iii) 0 (iv) $\frac{-9}{-13}$

Ans. (i) $\frac{-3}{8}$ (ii) $\frac{4}{11}$ (iii) 0 (iv) $\frac{-9}{13}$

25. Verify the property $x \times y = y \times x$ for the given values of x and y $x = \frac{2}{3}, y = \frac{3}{7}$

Ans. LHS : $x \times y = \frac{2}{3} \times \frac{3}{7} = \frac{2}{7}$; RHS : $y \times x = \frac{3}{7} \times \frac{2}{3} = \frac{2}{7}$.

LHS = RHS. Thus, verified.

26. Write the additive inverse of each the following: (i) $\frac{-7}{5}$ (ii) $\frac{-3}{-4}$

Ans. (i) The additive inverse of $\frac{-7}{5} = \frac{7}{5}$

(ii) The additive inverse of $\frac{-3}{-4} = -\left(\frac{3}{4}\right)$

27. Find the multiplicative inverse of $\frac{-6}{5} \times \frac{8}{-3}$

Ans. $\frac{-6}{5} \times \frac{8}{-3} = \frac{(-6) \times 8}{5 \times (-3)} = \frac{-48}{-15} = \frac{16}{5}$. The multiplicative inverse of $\frac{16}{5} = \frac{5}{16}$.

28. Find the value of the following

(i) $\frac{4}{9} \div \frac{-5}{9}$ (ii) $2\frac{3}{7} \div (-4)$ (iii) $\frac{-5}{6} \div \frac{7}{12}$

Ans. (i) $\frac{4}{9} \div \frac{-5}{9} = \frac{4}{9} \times \frac{9}{-5} = \frac{4 \times 9}{9 \times (-5)} = \frac{-4}{5}$

(ii) $2\frac{3}{7} \div (-4) = \frac{17}{7} \div (-4) = \frac{17}{7} \times \frac{1}{-4} = \frac{-17}{28}$

(iii) $\frac{-5}{6} \div \frac{7}{12} = \frac{-5}{6} \times \frac{12}{7} = \frac{-10}{7}$

✍ SELF ASSESSMENT TEST

1. A number which can be expressed as $\frac{p}{q}$ where p and q are integers and $q \neq 0$ is

   (a) natural number (b) whole number (c) integer (d) rational number

2. The additive inverse of $\frac{-7}{19}$ is

   (a) $\frac{-7}{19}$ (b) $\frac{7}{19}$ (c) $\frac{19}{7}$ (d) $\frac{-19}{7}$

3. The reciprocal of any rational number $\frac{p}{q}$, where p and q are integers and $q \neq 0$, is

   (a) $\frac{p}{q}$ (b) 1 (c) 0 (d) $\frac{q}{p}$

4. $-\frac{3}{8} + \frac{1}{7} = \frac{1}{7} + \left(\frac{-3}{8}\right)$ is an example to show that

   (a) addition of rational numbers is commutative.

   (b) rational numbers are closed under addition.

   (c) addition of rational number is associative.

   (d) rational numbers are distributive under addition.

5. The reciprocal of 1 is _____.

6. Between two given rational numbers, we can find _____ rational numbers.

7. The multiplicative inverse of $-1\frac{1}{7}$ is _____.

8 By what number should we multiply $5\frac{2}{3}$ to get $3\frac{1}{2}$?

✍ ANSWERS

1. (d) rational number 2. (b) $\frac{7}{19}$ 3. (d) $\frac{q}{p}$

4. (a) $a + b = \frac{3}{8} + \frac{1}{7} = \frac{-21 + 8}{56} = -\frac{13}{56}$ And $b + a = \frac{1}{7} + \frac{-3}{8} = \frac{8 - 21}{56} = -\frac{13}{56}$

   ie. $a + b = b + a$. So, addition is commutative for rational numbers.

5. 1 6. Infinitely many. 7. $-\frac{8}{7}$

8 Let the required number be x.

Then, $5\frac{2}{3} \times (x) = 3\frac{1}{2}$.

$\Rightarrow x = 3\frac{1}{2} \div 5\frac{2}{3} = \frac{7}{2} \div \frac{17}{3} = \frac{7}{2} \times \frac{3}{17} = \frac{21}{34}$

Therefore, $5\frac{2}{3}$ is to be multilplied by $\frac{21}{34}$ to get $3\frac{1}{2}$.

◊◊◊◊◊◊