### **Rational Numbers: Exercise 9.1**

**Q.1 List five rational numbers between:** (i) -1 and 0 (ii) -2 and -1(iii) (-4/5) and (-2/3)(iv)(-1/2) and (2/3)*Sol:* Five rational numbers between: (i) Given: -1 and 0 Firstly, we converting each of rational numbers as a denominator 5 + 1 = 6,  $-1 = (-1 \times 6)/6 = (-6/6)$ And  $0 = (0 \times 6)/6 = 0/6$ So, five rational numbers between (-6/6) and (0/6): (-6/6) < (-5/6) < (-4/6) < (-3/6) < (-2/6) < (-1/6) < (0/6)Thus, five rational numbers between -1 and 0: (-5/6) < (-4/6) < (-3/6) < (-2/6) < (-1/6)(ii) Given: -2 and -1 Firstly, we converting each of rational numbers as a denominator 5 + 1 = 6,  $-2 = (-2 \times 6)/6 = (-12/6)$ And  $-1 = (-1 \times 6)/6 = (-1/6)$ So, five rational numbers between (-12/6) and (-1/6): (-12/6) < (-11/6) < (-10/6) < (-9/6) < (-8/6) < (-7/6) < (-6/6) Or(-12/6) < (-11/6) < (-10/6) < (-9/6) < (-8/6) < (-7/6) < (-1)Thus, five rational numbers between -2 and -1: (-11/6) < (-9/6) < (-8/6) < (-7/6)(iii) Given: (-4/5) and (-2/3)Firstly, we converting each of rational numbers as a denominator  $5 \times 3 = 15$ , (-4/5) = (-4x3)/(5x3) = -(12/15)And (-2/3) = (-2x5)/(3x5) = -(10/15)Since, there is only one rational number between -(12/15) and -(10/15). So, we need to take their equivalent rational numbers. (-12/15) = (-12x3)/(15x3) = (-36/45)And  $(-10/15) = (-10x_3)/(15x_3) = (-30/45)$ So, five rational numbers between (-36/45) and (-30/45): (-36/45) < (-35/45) < (-34/45) < (-33/45) < (-32/45) < (-31/45) < (-30/45)Thus, five rational numbers between (-4/5) and (-2/3): (-35/45) < (-34/45) < (-33/45) < (-32/45) < (-31/45)(iv) Given: (-1/2) and (2/3) Firstly, we converting each of the rational numbers in their equivalent rational numbers.  $(-1/2) = (1x18)/(2 \times 18) = 18/36$ And  $(2/3) = (2 \times 12)/(3 \times 12) = 24/36$ So, five rational numbers between 18/36 and 24/36: 18/36 < 19/36 < 20/36 < 21/36 < 22/36 < 23/36 < 24/36 Thus, five rational numbers between (-1/2) and (2/3): 19/36 < 20/36 < 21/36 < 22/36 < 23/36

 Q.2 Write four more rational numbers in each of the following patterns:

 (i) (-3/5), (-6/10), (-9/15), (-12/20) ...

 (ii) (-1/6), (2/-12), (3/-18), (4/-24).....

 (iv) (-2/3), (2/-3), (4/-6), (6/-9).....

**Sol:** Four more rational numbers in the following patterns: (i) Given: (-3/5), (-6/10), (-9/15), (-12/20) ... We can see the pattern: (-3/5) = (-3x1)/(5x1) (-6/10) = (-3x2)/(5x2) (-9/15) = (-3x3)/(5x3) (-12/20) = (-3x4)/(5x4)So, four more rational numbers: (-3x5)/(5x5) = -15/25 (-3x6)/(5x6) = -18/30 (-3x7)/(5x7) = -21/35 (-3x8)/(5x8) = -24/40Thus, four more rational numbers: (-15/25), (-18/30), (-21/35) and (-24/40).

(ii) Given: (-1/4), (-2/8), (-3/12)... We can see the pattern: (-1/4) = (-1x1)/(4x1)(-2/8) = (-1x2)/(4x2)(-3/12) = (-1x3)/(4x3)So, four more rational numbers:

(-1x4)/(4x4) = -4/16(-1x5)/(4x5) = -5/20(-1x6)/(4x6) = -6/24(-1x7)/(4x7) = -7/28Thus, four more rational numbers: (-4/16), (-5/20), (-6/24) and (-7/28).

#### **(iii) Given:** (-1/6), (2/-2), (3/-18), (4/-24).....

We can see the pattern: (-1/6) = (-1x1)/(6x1) (2/-12) = (-2/12) = (-1x2)/(6x2) (3/-18) = (-3/18) = (-1x3)/(6x3) (4/-24) = (-4/24) = (-1x4)/(6x4)So, four more rational numbers: (-1x5)/(6x5) = -5/30 (-1x6)/(6x6) = -6/36 (-1x7)/(6x7) = -7/42 (-1x8)/(6x8) = -8/48Thus, four more rational numbers: (-5/30), (-6/36), (-7/42) and (-8/48).

(iv) Given: (-2/3), (2/-3), (4/-6), (6/-9)..... We can see the pattern: (-2/3) = (-2x1)/(3x1)(2/-3) = (2x1)/(-3x1)(4/-6) = (-4/6) = (-2x2)/(3x2)(6/-9) = (-6/9) = (-2x3)/(3x3)So, four more rational numbers: (-2x4)/(3x4) = (-8/12)(-2x5)/(3x5) = (-10/15)(-2x6)/(3x6) = (-12/18)(-2x7)/(3x7) = (-14/21)Thus, four more rational numbers: (-8/12), (-10/15), (-12/18) and (-14/21).

# Q.3 Give four rational numbers equivalent to:(i) (-2/7)(ii) (5/-3)(iii) (4/9)Sol: Four rational numbers equivalent to:

#### (i) Given: (-2/7)

So, four rational number equivalent to (-2/7) are: = (-2x2)/(7x2), (-2x3)/(7x3), (-2x4)/(7x4), (-2x5)/(7x5) = (-4/14), (-6/21), (-8/21), (-10/35)

#### (ii) Given: (5/-3)

So, four rational number equivalent to (5/-3) are: = (5×2)/ (-3×2), (5×3)/(-3×3), (5×4)/(-3×4), (5×5)/(-3×5) = (10/-6), (15/-9), (20/-12), (25/-15)

#### (iii) Given: (4/9)

So, four rational number equivalent to (4/9) are: = (4×2)/(9×2), (4×3)/(9×3), (4×4)/(9×4), (4×5)/(9×5) = (8/18), (12/27), (16/36), (20/45)

#### Q.4 Draw the number line and represent the following rational numbers on it: (i) (3/4) (ii) (-5/8) (iii) (-7/4) (iv) (7/8) Sol:

#### (i) Given: 3/4

Since, <sup>3</sup>/<sub>4</sub> lie between the 0 and 1. So,



Point P shows, fraction <sup>3</sup>/<sub>4</sub> on number line.

#### (ii) Given: (-5/8)

Since, 5/8 lie between the 0 and -1. So,

Point P shows, fraction -5/8 on number line.

#### (iii) Given: (-7/4)

Since, 5/8 lie between the -1 and -2.

Point P shows, fraction -7/4 on number line.

(iv) Given: (7/8)

Since, 5/8 lie between the 0 and 1.

Point P shows, fraction 7/8 on number line.

Q.5 The points P, Q, R, S, T, U, A and B on the number line are such that, TR = RS = SU and AP = PQ = QB. Name the rational numbers represented by P, Q, R and S.

|  | USRT                        |                                |                                   |                          | APQB                         |                                  |                      |               |
|--|-----------------------------|--------------------------------|-----------------------------------|--------------------------|------------------------------|----------------------------------|----------------------|---------------|
| -4 -3  | -2                          | -1                             | 0                                 | 1                        | 2                            | 3                                | 4                    | $\rightarrow$ |
| <b>Sol: Given:</b> TR = RS = SU  | and AP                      | = PO = 0                       | OB                                |                          | -                            |                                  |                      |               |
| Since, distance between poi  | ints A ar                   | d B = 1                        | unit                              |                          |                              |                                  |                      |               |
| So, $\overrightarrow{AP} = \overrightarrow{PQ} = \overrightarrow{QB} = (1/3)$                                    |                             |                                |                                   |                          |                              |                                  |                      |               |
| So, $P = 2 + (1/3) = \{(2x3) +$  | 1}/3                        |                                |                                   |                          |                              |                                  |                      |               |
| = 7/3  |                             |                                |                                   |                          |                              |                                  |                      |               |
| $Q = 2 + (2/3) = {(2x3) + 2}$  | /3                          |                                |                                   |                          |                              |                                  |                      |               |
| = 8/3  |                             |                                |                                   |                          |                              |                                  |                      |               |
| Since, distance between poi  | ints U ar                   | dT = 1                         | unit.                             |                          |                              |                                  |                      |               |
| So, $TR = RS = SU = (1/3)$   |                             |                                |                                   |                          |                              |                                  |                      |               |
| $S = -2 + (1/3) = \{(-2x3) + 1\}$  | /3                          |                                |                                   |                          |                              |                                  |                      |               |
| = -5/3   | <b>)</b> (                  |                                |                                   |                          |                              |                                  |                      |               |
| $R = -2 + (2/3) = \{(-2x3) + 2$  | 2}/3                        |                                |                                   |                          |                              |                                  |                      |               |
| = -4/3   |                             |                                |                                   |                          |                              |                                  |                      |               |
|  |                             |                                |                                   |                          |                              |                                  |                      |               |
|  |                             |                                |                                   |                          |                              |                                  |                      |               |
| Q.6 Which of the follow<br>(i) (-7/21) and (3/9)<br>(iv) (-3/5) and (-12/20)<br>(vii) (-5/-9) and (5/-9)<br>Sol: | ing pai<br>(ii) (<br>(v) (8 | rs repr<br>-16/20)<br>8/-5) an | esent the<br>and (20<br>id (-24/1 | e same ra<br>/-25)<br>5) | ational n<br>(iii)<br>(vi) ( | umber?<br>(-2/-3) a<br>(1/3) and | nd (2/3)<br>  (-1/9) |               |
| (1) Given: $(-7/21)$ and $(3/9)$   | <del>)</del> )              |                                |                                   |                          |                              |                                  |                      |               |
| by simplifying, $(7/21) = (1/2)$   |                             |                                |                                   |                          |                              |                                  |                      |               |
| (-7/21) - (-1/3)<br>And $(2/0) - (1/2)$  |                             |                                |                                   |                          |                              |                                  |                      |               |
| From above calculation   |                             |                                |                                   |                          |                              |                                  |                      |               |
| $(-1/3) \neq (1/3)$  |                             |                                |                                   |                          |                              |                                  |                      |               |
| $S_{0}, (-7/21) \neq (3/9)$  |                             |                                |                                   |                          |                              |                                  |                      |               |
| Thus, the given pair does no   | ot show                     | the same                       | e rational                        | number.                  |                              |                                  |                      |               |
|  |                             |                                |                                   |                          |                              |                                  |                      |               |
| (ii) Given: (-16/20) and (2  | 20/-25)                     |                                |                                   |                          |                              |                                  |                      |               |
| By simplifying,  |                             |                                |                                   |                          |                              |                                  |                      |               |
| (-16/20) = -4/5  |                             |                                |                                   |                          |                              |                                  |                      |               |
| And $(20/-25) = -4/5$  |                             |                                |                                   |                          |                              |                                  |                      |               |
| -4/5 = -4/5  |                             |                                |                                   |                          |                              |                                  |                      |               |
| From above calculation, Thus $(16/92) = (22/32)$   |                             |                                |                                   |                          |                              |                                  |                      |               |
| Thus, $(-10/20) = (20/-25)$  | the com                     | o rotions                      | lnumber                           |                          |                              |                                  |                      |               |
| rnus, me given pair snows  | ule saill                   | e rationa                      | u numper                          | •                        |                              |                                  |                      |               |

(iii) Given: (-2/-3) and (2/3)By simplifying, (-2/-3) = (2/3)And (2/3) = (2/3)From above calculation, (-2/-3) = (2/3)Thus, the given pair shows the same rational number.

## (iv) Given: (-3/5) and (-12/20) By simplifying,

by simplifying, (-3/5) = (-3/5)And (-12/20) = (-3/5)From above calculation, (-3/5) = (-3/5)So, (-3/5) = (-12/20)Thus, the given pair shows the same rational number.

#### (v) Given: (8/5) and (-24/15)

By simplifying, (8/-5) = (-8/5)And (-24/15) = (-8/5)From above calculation, (-8/5) = (-8/5)So, (8/5) = (-24/15)Thus, the given pair shows the same rational number.

#### (vi) Given: (1/3) and (-1/9)

By simplifying, (1/3) = (1/3)And (-1/9) = (-1/3)From above calculation,  $(1/3) \neq (-1/3)$ So,  $(1/3) \neq (-1/9)$ Thus, the given pair does not show the same rational number.

(vii) Given: (-5/-9) and (5/-9)By simplifying, (-5/-9) = (5/9)And (5/-9) = (-5/9)From above calculation,  $(5/9) \neq (-5/9)$ So,  $(-5/-9) \neq (5/-9)$ Thus, the given pair does not show the same rational number.

Q.7 Rewrite the following rational numbers in the simplest form: (i) -8/6 (ii) 25/45 (iii) -44/72 (iv) -8/10

#### Sol:

(i) Given: -8/6Simplifying the fraction by dividing numerator and denominator by 2. -8/6 = -4/3

#### (ii) Given: 25/45

Simplifying the fraction by dividing numerator and denominator by 5. 25/45 = 5/9

#### (iii) Given: -44/72

Simplifying the fraction by dividing numerator and denominator by 4. -44/72 = -11/18 (iv) Given: -8/10 Simplifying the fraction by dividing numerator and denominator by 2. -8/10 = -4/5

**Q.8** Fill in the boxes with the correct symbol out of >, <, and =.

(i) (-5/7) [ ] (2/3) (ii) (-4/5) [ ] (-5/7) (iii) (-7/8) [ ] (14/-16)(iv) (-8/5) [ ] (-7/4) (v) (1/-3) [ ] (-1/4) (vi) (5/-11) [ ] (-5/11)(vii) o [ ] (-7/6)Sol: (i) Given: (-5/7) [ ] (2/3)LCM of denominators of 7 and 3 is 21. Now, we convert the denominators of given fractions in to LCM i.e. 21, (-5/7) = (-5x3)/(7x3) = -15/21And (2/3) = (2x7)/(3x7) = 14/21So, from above calculation, (-5/7) [ < ] (2/3)

(ii) Given: (-4/5) [] (-5/7)LCM of denominators of 5 and 7 is 35. Now, we convert the denominators of given fractions in to LCM i.e. 35, (-4/5) = (-4x7)/(5x7) = -28/35And (-5/7) = (-5x5)/(7x5) = -25/35So, from above calculation, -28/35 [<] -25/35(-4/5) [<] (-5/7)

(iii) Given: (-7/8) [ ] (14/-16)LCM of denominators of 8 and 16 is 16. Now, we convert the denominators of given fractions in to LCM i.e. 16, (-7/8) = (-7x2)/(8x2) = -14/16And (14/-16) = (-14/16)So, from above calculation, (-7/8) [ = ] (14/-16)

(iv) Given: (-8/5) [] (-7/4)LCM of denominators of 5 and 4 is 20. Now, we convert the denominators of given fractions in to LCM i.e. 20, (-8/5) = (-8x4)/(5x4) = -32/20And (-7/4) = (-7x5)/(4x5) = -35/20So, from above calculation, -32/20 [>] -35/20(-8/5) [>] (-7/4)

**(v)** Given: (1/-3) [ ] (-1/4)LCM of denominators of 3 and 4 is 12. Now, we convert the denominators of given fractions in to LCM i.e. 12, (1/-3) = (-1x4)/(3x4) = -4/12And  $(-1/4) = (-1x_3)/(4x_3) = -3/12$ So, from above calculation, (-4/12) < (-3/12)(1/-3) [<] (-1/4)

(vi) Given: (5/-11) [](-5/11) By simplifying, (5/-11) = -(5/11)And (-5/11) = -(5/11)So, from above calculation, (5/-11) [=] (-5/11)

(vii) Given: 0 [ ](-7/6) So, 0 [ > ] (-7/6)

Q.9 Which is greater in each of the following: (i) (2/3), (5/2) (ii) (-5/6), (-4/3) (v)  $-3\frac{2}{7}, -3\frac{4}{5}$ 

(iv) (-1/4), (1/4)

#### Sol:

(i) Given: (2/3), (5/2) LCM of denominators of 3 and 2 is 6. Now, we convert the denominators of given fractions in to LCM i.e. 6, (2/3) = (2x2)/(3x2) = 4/6And (5/2) = (5x3)/(2x3) = 15/6So, from above calculation, (4/6) < (15/6)Thus, (2/3) < (5/2)

**(ii) Given:** (-5/6), (-4/3) LCM of denominators of 6 and 3 is 6. Now, we convert the denominators of given fractions in to LCM i.e. 6, (-5/6) = (-5x1)/(6x1) = -5/6And (-4/3) = (-4x2)/(3x2) = -8/6So, from above calculation, (-5/6) > (-8/6)Thus, (-5/6) > (-4/3)

(iii) Given: (-3/4), (2/-3) LCM of denominators of 4 and 3 is 12. Now, we convert the denominators of given fractions in to LCM i.e. 12, (-3/4) = (-3x3)/(4x3) = -9/12And (2/-3) = (2x4)/(-3x4) = -8/12So, from above calculation, (-9/12) < (-8/12)Thus, (-3/4) < (2/-3)

(iv) Given: (-1/4), (1/4) Since positive number is greater than negative number. So, (-1/4) < (1/4)

(iii) (-3/4), (2/-3)

(v) Given: 
$$-3\frac{2}{7}, -3\frac{4}{5}$$

Firstly we convert the from mix fraction to improper fraction. So, (-23/7), (-19/5) LCM of denominators of 7 and 5 is 35. Now, we convert the denominators of given fractions in to LCM i.e. 35, (-23/7) = (-23x5)/(7x5) = -115/35And (-19/5) = (-19x7)/(5x7) = -133/35So, from above calculation, (-115/35) > (-133/35)

Thus,  $-3\frac{2}{7} > -3\frac{4}{5}$ 

Q.10 Write the following rational numbers in ascending order: (i) (-3/5), (-2/5), (-1/5) (b) (-1/3), (-2/9), (-4/3) (c) (-3/7), (-3/2), (-3/4) Sol: Ascending order of the rational numbers:

(a) Given: (-3/5), (-2/5), (-1/5) Since, given rational numbers are in like fraction. So, (-3/5) < (-2/5) < (-1/5)

(b) Given: (-1/3), (-2/9), (-4/3)LCM of denominators of 3, 9 and 3 is 9. Now, we convert the denominators of given fractions in to LCM i.e. 9, (-1/3) = (-1x3)/(3x3) = -3/9, (-2/9) = (-2x1)/(9x1) = -2/9And (-4/3) = (-4x3)/(3x3) = -12/9So, from above calculation, (-12/9) < (-3/9) < (-2/9)Thus, (-4/3) < (-1/3) < (-2/9)

(c) Given: (-3/7), (-3/2), (-3/4)LCM of denominators of 7, 2 and 4 is 28. Now, we convert the denominators of given fractions in to LCM i.e. 28, (-3/7) = (-3x4)/(7x4) = -12/28, (-3/2) = (-3x14)/(2x14) = -42/28And (-3/4) = (-3x7)/(4x7) = -21/28So, from above calculation, (-42/28) < (-21/28) < (-12/28)Thus, (-3/2) < (-3/4) < (-3/7)