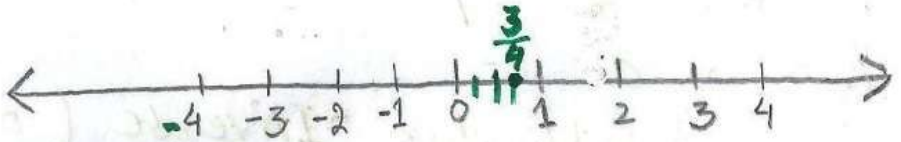
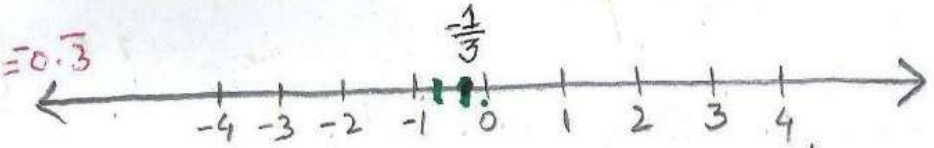
Exercise 1.1

Q1:- Represent each number on the number line

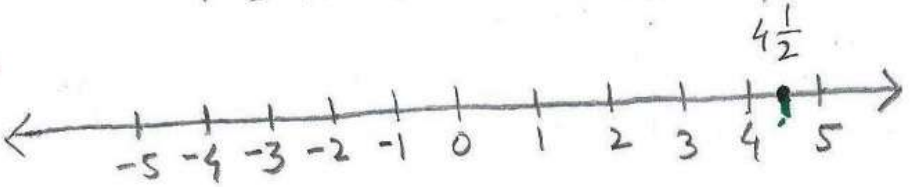
i):- $\frac{3}{4} = 0.75$



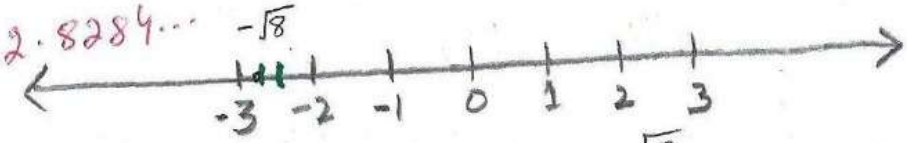
ii):- $-\frac{1}{3} = -0.333\ldots = -0.\overline{3}$



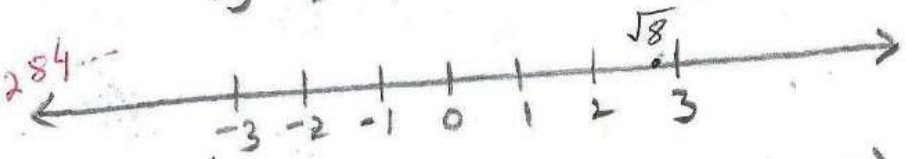
iii):- $4\frac{1}{2} = \frac{9}{2} = 4.5$



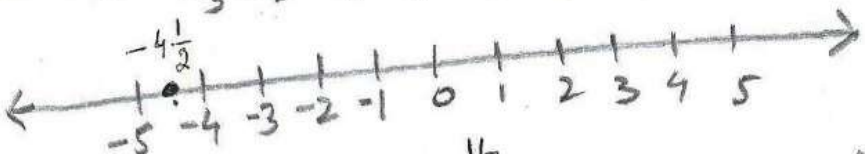
iv):- $-\sqrt{8} = -2\sqrt{2} = -2.8284\ldots$



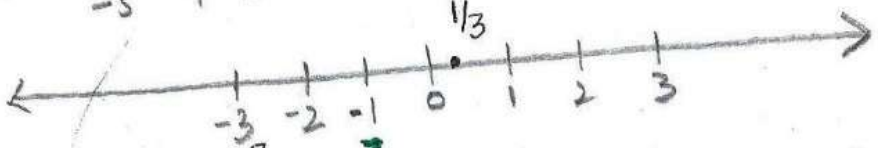
v):- $\sqrt{8} = 2\sqrt{2} = 2.8284\ldots$



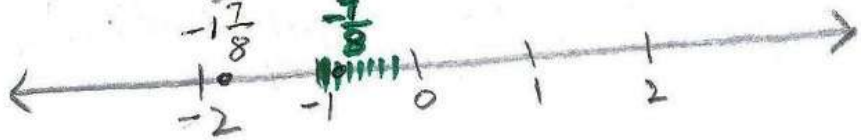
vi):- $-4\frac{1}{2} = -\frac{9}{2}$



vii):- $\frac{1}{3} = 0.333\ldots = 0.\overline{3}$



viii):- $-\frac{7}{8} = -0.875$



Q2:- Identify the property that justifies

i):- $1 \times (y-2) = y-2$ Multiplicative Identity i.e. 1

$1 \times a = a \times 1 = a$

ii):- $(0.2)5 = 1$ Multiplicative Inverse $\left(0.2 = \frac{0\cdot2}{10} = \frac{1}{5}\right)$

i.e. $\frac{1}{5} \times 5 = 1$

$a \cdot \frac{1}{a} = \frac{1}{a} \cdot a = 1$ OR $ab = ba = 1$

iii):- $(x+2)+y = y+(x+2)$ $a+b = b+a$

Commutative law with respect to addition

iv):- $-(3b)+(3b) = 0$ Additive Inverse

$(a)+(-a) = -a+a = 0$ (0 is called additive identity)

v):- $(x+5)-1 = x+(5-1)$ $(a+b)+c = a+(b+c)$

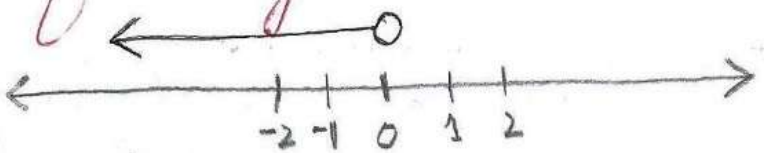
Associative law with respect to addition

vi):- $-3(2-y) = -6+3y$ $a(b-c) = ab-ac$

Left distributive law of multiplication over subtraction

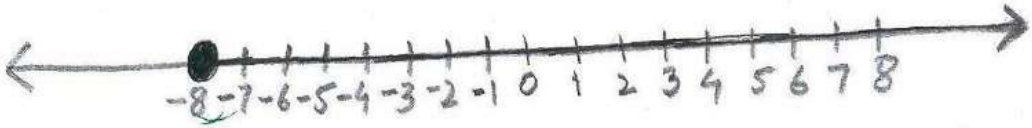
Q3:- Represent the following on the number line.

i):- $x < 0$



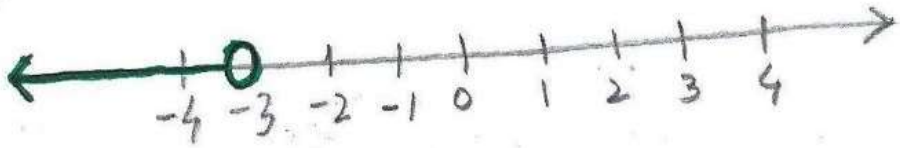
ii):- $-3 < x < 3$

iii):- $x \geq -8$

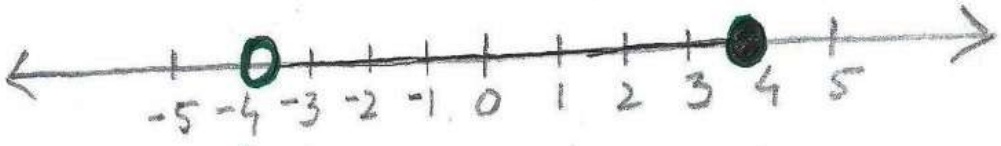


iv):- $x > 0$

v):- $x < -3$



vi):- $-4 < x \leq 4$



Q4:- Identify the properties (laws) of equality and inequality of real numbers that justifies the statement.

i):- $9x = 9x$ Reflexive property i.e. $a = a$

ii):- If $x + 2 = y$ and $y = 2x + 3$, then $x + 2 = 2x + 3$ Transitive

NOT Symmetric but i.e. If $a = b \wedge b = c$ then $a = c$

e.g If Age of Ali = Age of Umer and Age of Umer = Age of Raza

Then Age of Ali = Age of Raza.

iii):- If $2x + 3 = y$, then $y = 2x + 3$

Symmetric If $a = b$, then $b = a$

circle is symmetric at 360°

iv):- If $3 < 4$ then $-3 > -4$ Multiplicative property

If $a < b$ then $-a > -b$ Also If $a > b$ then $-a < -b$

v):- If $2y + 2w = p$ and $p = 50$, then $2y + 2w = 50$

Transitive i.e: If $a = b$ and $b = c$, then $a = c$

vi):- If $x + 4 > y + 4$, then $x > y$ [Right Cancellation law w.r.t addition]

If $a + c > b + c$, then $a > b$

vii):- If $2 < 5$ and $5 < 9$, then $2 < 9$ Transitive

If $a < b$ and $b < c$, then $a < c$

If Age of Ali < Age of umer and Age of umer < My age then Age of Ali < My age.

viii):- If $-18 < -16$, then $9 > 8$

$$-18 < -16 \Rightarrow \frac{-18}{-2} > \frac{-16}{-2} \Rightarrow 9 > 8$$

Cancellation law w.r.t multiplication

Exercise 1.2

Q1:- By using the property of product and quotient rule for radicals, write each expression as a singal radical and simplify

i):- $\sqrt[3]{6} \cdot \sqrt[3]{6} = \sqrt[3]{6 \cdot 6} = \sqrt[3]{6^2} = (6^2)^{\frac{1}{3}} = (6)^{2 \times \frac{1}{3}} = 6^{\frac{2}{3}}$

ii):- $\sqrt[5]{4} \cdot \sqrt[5]{8} = \sqrt[5]{4 \times 8} = \sqrt[5]{32} = (2^5)^{1/5} = (2)^{5 \times \frac{1}{5}} = 2$

$\sqrt[5]{4} \cdot \sqrt[5]{8} = \sqrt[5]{4 \times 8} = \sqrt[5]{32} = \sqrt[5]{2^5} = 2$

iii):- $\sqrt[4]{x} \cdot \sqrt[4]{x^3} = \sqrt[4]{x \cdot x^3} = \sqrt[4]{x^{1+3}} = \sqrt[4]{x^4} = x$

iv):- $\sqrt{10} \cdot \sqrt[3]{11}$ Since Index of the radicals are different, so product rule is not possible.

v):- $\frac{\sqrt[4]{x^7}}{\sqrt[4]{x^5}} = \sqrt[4]{\frac{x^7}{x^5}} = \sqrt[4]{x^7 \cdot x^{-5}} = \sqrt[4]{x^{7-5}} = (x^2)^{\frac{1}{4}} = x^{2\times\frac{1}{4}} = x^{\frac{1}{2}} = \sqrt{x}$

Positive Square roots are called principal Square roots.
$\sqrt{x}$ is called principal Square root of x. i.e $\sqrt{25} = 5$
Entire $\sqrt{x}$ is called radical (Square radical)
$\sqrt{\ }$ is radical sign and x is called radicand.

vi):- $\frac{\sqrt[3]{5000}}{\sqrt[3]{5}} = \sqrt[3]{\frac{5000}{5}} = \sqrt[3]{1000} = \sqrt[3]{10^3} = 10$

vii):- $\frac{\sqrt[2]{500}}{\sqrt[2]{5}} = \sqrt{\frac{500}{5}} = \sqrt{100} = \sqrt{10^2} = 10$

viii):- $\sqrt[2]{10} \cdot \sqrt[3]{7}$ Due to different index of radicals, product rule is not possible.

(v):- $(1000)^{1/3} = \sqrt[3]{1000} = \sqrt[3]{10^3} = 10$

(vi):- $\left(\frac{1}{39}\right)^{-\frac{1}{2}} = (39)^{1/2} = \sqrt{39}$

Q3:- Write each radical expression as an equivalent exponential expression and simplify if possible.

i):- $\left(\sqrt[3]{5}\right)^2 = (5^{\frac{1}{3}})^2 = (5)^{\frac{1}{3}\times 2} = 5^{\frac{2}{3}}$

ii):- $\left(\sqrt[4]{10}\right)^8 = (10^{\frac{1}{4}})^8 = (10)^{\frac{1}{4}\times 8} = 10^2 = 100$

iii):- $-\left(\sqrt[3]{6}\right)^6 = -\left[(6)^{\frac{1}{3}}\right]^6 = -(6)^{\frac{1}{3}\times 6} = -(6)^2 = -36$

iv):- $\left(\sqrt[3]{6}\right)^6 = \left[(6)^{\frac{1}{3}}\right]^6 = (6)^{\frac{1}{3}\times 6} = (6)^2 = 36$

(v):- $-(\sqrt[3]{5})^2 = -(5^{\frac{1}{3}})^2 = -(5)^{\frac{1}{3}\times 2} = -5^{\frac{2}{3}}$

(vi):- $-(\sqrt[4]{10})^8 = -(10^{\frac{1}{4}})^8 = -(10)^{\frac{1}{4}\times 8} = -(10)^2 = -100$

$(-\sqrt[4]{10})^8 = (-1)^8(\sqrt[4]{10})^8 = 1\,(10^{\frac{1}{4}})^8 = (10)^{\frac{1}{4}\times 8} = 10^2 = 100$

$(-\sqrt[7]{10})^7 = (-1)^7(\sqrt[7]{10})^7 = (-1)(10) = -10$

Q4:- Use the properties of exponents to simplify each of the following.

i):- $\dfrac{16^{\frac{1}{5}} \cdot 16^{\frac{1}{4}}}{16^{-\frac{3}{10}}} = 16^{\frac{1}{5}+\frac{1}{4}} \cdot 16^{\frac{3}{10}} = 16^{\frac{4+5}{20}} \cdot 16^{\frac{3}{10}} = 16^{\frac{9}{20}} \cdot 16^{\frac{3}{10}}$

$= 16^{\frac{9}{20}+\frac{3}{10}} = 16^{\frac{9+6}{20}} = 16^{\frac{15}{20}} = 16^{\frac{3}{4}} = 16^{\frac{1}{4}\times 3} = (16^{\frac{1}{4}})^3 = (\sqrt[4]{16})^3$

$= \left(\sqrt[4]{2^4}\right)^3 = 2^3 = 8$

ii):- $7^{-\frac{1}{3}}\left(7^{\frac{5}{3}} - 7^{\frac{4}{3}}\right) = 7^{-\frac{1}{3}} \cdot 7^{\frac{5}{3}} - 7^{-\frac{1}{3}} \cdot 7^{\frac{4}{3}} = 7^{-\frac{1}{3}+\frac{5}{3}} - 7^{-\frac{1}{3}+\frac{4}{3}}$

$= 7^{\frac{-1+5}{3}} - 7^{\frac{-1+4}{3}} = 7^{\frac{4}{3}} - 7^{\frac{3}{3}} = 7^{\frac{4}{3}} - 7^{1} = 7^{\frac{4}{3}} - 7$

iii):- $\dfrac{2^{\frac{2}{3}} \cdot 2^{\frac{1}{7}}}{2^{\frac{1}{2}}} = 2^{\frac{2}{3}+\frac{1}{7}-\frac{1}{2}} = 2^{\frac{14+3}{21}-\frac{1}{2}} = 2^{\frac{17}{21}-\frac{1}{2}} = 2^{\frac{34-21}{42}} = 2^{\frac{13}{42}}$

iv):- $\dfrac{3^{-\frac{1}{2}} \cdot 3^{\frac{1}{2}}}{3^{\frac{1}{2}}} = 3^{-\frac{1}{2}} = \dfrac{1}{3^{\frac{1}{2}}} = \dfrac{1}{\sqrt{3}}$

v):- $\left[\frac{36^{\frac{1}{2}} \cdot 6^{\frac{1}{2}}}{8^{\frac{1}{2}} \cdot 27^{\frac{1}{2}}}\right]^3 = \left[\left(\frac{36 \times 6}{8 \times 27}\right)^{\frac{1}{2}}\right]^3 = \left(\frac{\overset{1}{\cancel{36}} \times \overset{6}{\cancel{6}}}{\underset{2}{\cancel{8}} \times \underset{3}{\cancel{27}}}\right)^{\frac{1}{2} \times 3}$

$= (1)^{3/2} = 1$

vi):- $\left(\frac{2187\, a^5\, b^{17}}{a^{12} \cdot b^3}\right)^{\frac{1}{7}} = \left(3^7\, a^5\, b^{17} \cdot a^{-12} \cdot b^{-3}\right)^{\frac{1}{7}}$

$= \left(3^7\, a^{5-12}\, b^{17-3}\right)^{\frac{1}{7}} = \left(3^7\, a^{-7}\, b^{14}\right)^{\frac{1}{7}} = (3^7)^{\frac{1}{7}} \cdot (a^{-7})^{\frac{1}{7}} \cdot (b^{14})^{\frac{1}{7}}$

$= 3^{7 \times \frac{1}{7}} \cdot a^{-7 \times \frac{1}{7}} \cdot b^{14 \times \frac{1}{7}} = 3^1 a^{-1} \cdot b^2 = \frac{3b^2}{a}$

(viii):-

$$\sqrt[4]{\frac{a^3}{b^3}} \times \sqrt[4]{\frac{b^3}{c^3}} \times \sqrt[4]{\frac{c^3}{a^3}} = \sqrt[4]{\left(\frac{a}{b}\right)^3} \times \sqrt[4]{\left(\frac{b}{c}\right)^3} \times \sqrt[4]{\left(\frac{c}{a}\right)^3}$$

$$= \left(\frac{a}{b}\right)^{3\times\frac{1}{4}} \times \left(\frac{b}{c}\right)^{3\times\frac{1}{4}} \times \left(\frac{c}{a}\right)^{3\times\frac{1}{4}} = \left(\frac{a}{b}\right)^{\frac{3}{4}} \times \left(\frac{b}{c}\right)^{\frac{3}{4}} \times \left(\frac{c}{a}\right)^{\frac{3}{4}}$$

$$= \left(\frac{a}{b} \times \frac{b}{c} \times \frac{c}{a}\right)^{3/4} = (1)^{3/4} = 1$$

Q5:- Use suitable laws of exponents to show that

$$\left(\frac{x^p}{x^q}\right)^{p+q} \times \left(\frac{y^q}{y^r}\right)^{q+r} \times \left(\frac{z^r}{z^p}\right)^{r+p} \times x^{q^2} \times y^{r^2} \times z^{p^2}$$

$$= x^{p^2} \times y^{q^2} \times z^{r^2}$$

$$L.H.S = \left(\frac{x^p}{x^q}\right)^{p+q} \times \left(\frac{y^q}{y^r}\right)^{q+r} \times \left(\frac{z^r}{z^p}\right)^{r+p} \times x^{q^2} \times y^{r^2} \times z^{p^2}$$

$$= (x^{p-q})^{p+q} \times (y^{q-r})^{q+r} \times (z^{r-p})^{r+p} \times x^{q^2} \times y^{r^2} \times z^{p^2}$$

$$= x^{(p-q)(p+q)} \times y^{(q-r)(q+r)} \times z^{(r-p)(r+p)} \times x^{q^2} \times y^{r^2} \times z^{p^2}$$

$$= x^{p^2-q^2} \times y^{q^2-r^2} \times z^{r^2-p^2} \times x^{q^2} \times y^{r^2} \times z^{p^2}$$

$$= x^{p^2-q^2+q^2} \times y^{q^2-r^2+r^2} \times z^{r^2-p^2+p^2}$$

$$= x^{p^2} * y^{q^2} \times z^{r^2}$$

$$= R.H.S$$

Q2:- Last week Wajid drove 283.4 Km on 16.2 litres of petrol. He says that he averaged about 1.75 Km/liter. Is his answer reasonable ? Explain. NO

Wajid drove 283.4 Km on 16.2 litres

$$\text{Kilometers in 1 litre} = \frac{283.4}{16.2} = 17.494 \approx 17.5$$

But wajid is saying about 1.75 Km per litre.

At the rate of 1.75 Km per litre he will have to drive 28.35 Kms with the help of 16.2 litres.

Because $1.75 \times 16.2 = 28.35$

Q3:- Salma bought 3.2 yard of fabric for a total price of Rs 139.2 . How much did the fabric cost per yard.

Total price of 3.2 yard fabric = 139.2 Rs

$$\text{Price of one yard fabric} = \frac{139.2}{3.2} = 43.5 \text{ Rs}$$

Q4:- Momina walks 3.5 Km/h. She took 12 h walk.
How far did she walk.

Walk in 1 hour = 3.5 Km
Walk in 12 hours = 3.5 x 12 = 42 Km

Q5:- The hicking club went on a 7 day trip. Each day they hicked between 5.5 and 7.5 miles. It is reasonable to assume that clubbing the days the club hicked.

a):- Less than 3.5 miles b):- Between 35 and 55 miles
c):- Equally 55 miles d):- More than 55 miles.

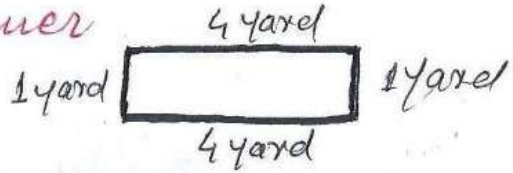
Each day they hicked between 5.5 and 7.5 miles.
=> After 7 day they hicked between 5.5x7 and 7.5x7 miles
i.e they hicked between 38.5 and 52.5 miles
less than 35, more than 55 and equal to 55 miles are not the possibilites. Menee between 35 and 55 miles is reasonable.

Q6:- For a class party the students council purchased 42 baloons at Rs 1.85 each. What is the total amount the student council paid for the baloons.

Price of each baloon = 1.85 Rs

Price of 42 baloons = $42 \times 1.85 = 77.7$ Rs

Q7:- A group of friends made 4-yard long rectangular banner. They paid Rs 3.75 per yard for the fabric and Rs 9 for the firm to go around the banner, 10 yard perimeter. What was the width of the banner



Length of rectangular banner = 4 yard

Perimeter of rectangular banner = 10 yard

Perimeter of Rectangle = 2 (length + width)

$10 = 2$ (length + width)

$\frac{10}{2} = 4 + \text{Width}$

$5 - 4 = \text{width}$

Width = 1 yard

Width = 1 yard

Area of banner = $4 \times 1 = 4$ square yards

Total cost for fabric = $3.75 \times 4 = 15$ Rs

Q8:- A shoe factory has an asset for Rs 20,00,000 of which $\frac{3}{5}$ is the capital and rest is the debt. Find the amount of capital and Debt.

Total amount = 20,00,000 Rs

$$\text{Capital} = \frac{3}{5} \times 20,00,000$$

$$= 3 \times 4,00,000$$

$$= 12,00,000 \text{ Rs}$$

$$\text{Asset} = \text{Capital} + \text{debt}$$

$$\text{Debt} = \text{Asset} - \text{Capital}$$

$$= 20,00,000 - 12,00,000$$

$$= 8,00,000 \text{ Rs}$$

Q9:- World lowest temperature in past 100 years was recorded to be $-89.2^{\circ}C$ at Vostok, Antartica on July 21, 1983. Convert this temperature into Fahrenheit and Kelvin Scales ($F = \frac{9}{5}{}^{\circ}C + 32$, $K = {}^{\circ}C + 273$)

$$F = \frac{9}{5}{}^{\circ}C + 32$$

$$= (1.8)(-89.2) + 32 = -160.56 + 32 = -128.56$$

$$K = {}^{\circ}C + 273$$

$$= -89.2 + 273 = 183.8$$

Q10:- A company was penalized by the government act for low quality production. If the company has 3 share holders. Farah, Maryam and Tehreem investing in the ratio of 1:2:3 and the amount of penalty is Rs 4,56,868.97. Find the amount of penalty paid by each of 3 share holders.

Total amount of penalty = 4,56,868.97 Rs

Sum of ratios = 1+2+3 = 6

Amount of penalty paid by Farah = $\frac{1}{6}$ x 4,56,868.97

= 76,144.83 Rs

Amount of penalty paid by Maryam = $\frac{2}{6}$ x 4,56,868.93

= 2 x 76,144.83

= 1,52,289.66 Rs

Amount of penalty paid by Tehreem = $\frac{3}{6}$ x 4,56,868.93

= 3 x 76,144.83

= 2,28,434.49 Rs

Miscellaneous Exercise 1

Q1:- Encircle the correct option in the following

i):- $a(b+c-d)$ equals

(a):- $a(b+c+d)$ (b):- $ac+ab-ad$ (c):- $ab+ac+ad$

(d):- $ab-ac-ad$ option (b) is correct

Explanation:- $a(b+c-d) = ab+ac-ad$ Distributive law

$= ac+ab-ad$ Commutative law

ii):- $a^r \cdot a^{-s} \div a^s$ is

(a):- a^{r-s} (b):- a^{r+2s} (c):- $a^r \cdot a^{2s}$ (d):- $\frac{a^r}{a^{2s}}$

option (d) is correct.

Explanation:- $\frac{a^r \cdot a^{-s}}{a^s} = \frac{a^r}{a^s \cdot a^s} = \frac{a^r}{a^{s+s}} = \frac{a^r}{a^{2s}}$

↑ Base same powers add

(iii):- $\sqrt[n]{ab}$ is equal to

(a) $\sqrt{ab}$ (b):- $n(ab)$ (c):- $(ab)^n$ (d):- $(ab)^{\frac{1}{n}}$

Option (d) is Correct due to definition of nth root.

n is index of the radical.

(iv):- Which number is self-multiplicative inverse?

(a):- 3 (b):- -3 (c):- -1 (d):- 0 Option(C) is Correct.

Explanation:- $(3)(3) = 9 \neq 1$, $(-3)(-3) = 9 \neq 1$

$(-1)(-1) = 1$ (1 is multiplicative identity)

$ab = ba = 1 \Rightarrow$ (a and b are multiplicative inverses of each other).

(v):- If $a > 0$ then $\sqrt{a}$ is

(a):- real (b):- integer (c):- irrational (d):- rational

option (a) is Correction because every integer is rationals & rationals and irrationals are reals!

(vi):- If $a+b=a$, What is the value of b?

(a):- 1 (b):- -1 (c):- a (d):- 0 Option (d) is Correct

Explanation:- $a+b=a$ or $b=a-a$ or $b=0$

Also $a+0=a$ i.e $b=0$

(vii):- If $a \cdot b = 1$, What is the value of b?

(a):- 1 (b):- $\frac{1}{b}$ (c):- $\frac{1}{a}$ (d):- -1 Option (c) is Correct

Explanation:- $a \cdot \frac{1}{a} = 1$ i.e $b = \frac{1}{a}$

Also $a \cdot b = 1$ or $b = \frac{1}{a}$

(viii):- According to reflexive property : $y^2 - 17 = ?$

(a):- y^2+17 (b):- $y-17$ (c):- y^2-17 (d):- $-17-y^2$

option (c) is correct because reflexive property is $a = a$

(ix):- If $a \cdot b = a$ What is value of b?

(a):- $\frac{1}{a}$ (b):- 1 (c):- a (d):- -1 Option b is Correct

Explanation:- $a \cdot b = a$ or $b = \frac{a}{a}$ or $b = 1$

Also $a \cdot 1 = a$ i.e. $b = 1$

(x):- If $a \cdot b = 1$ What is b called.

(a):- Multiplicative inverse of a (b):- Additive identity

(c):- Multiplicative identity (d):- Self-multiplicative inverse

Option (a) is correct due to the definition of multiplicative inverse.

(xi):- Commutative property does not hold with respect to:

(a):- Addition (b):- Multiplication (c):- Subtraction

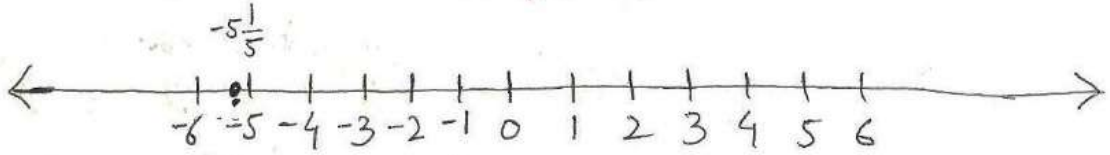
(d):- both (a) and (b) Option (c) is correct.

Explanation:- $1 - 2 \neq 2 - 1$ Here $a + b \neq b + a$

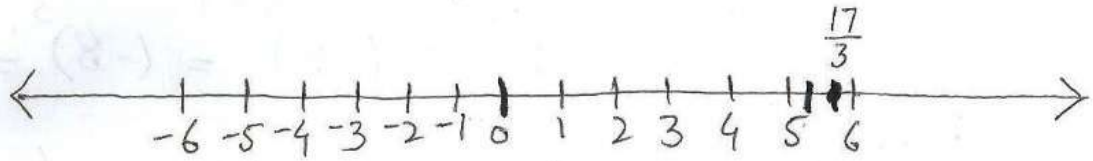
$-1 \neq 1$ i.e $a - b \neq b - a$

Q2:- Represent each number on number line

i):- $-5\frac{1}{5} = -\frac{26}{5} = -5.2$

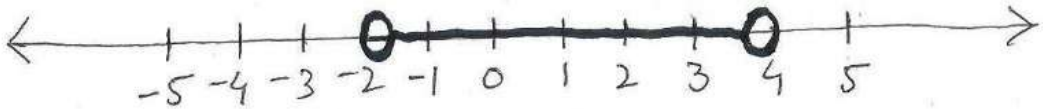


ii):- $\frac{17}{3} = 5.67 = 5\frac{2}{3}$

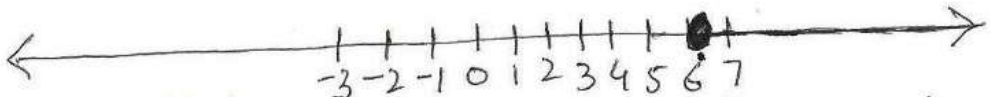


iii):- $-2 < x < 4$

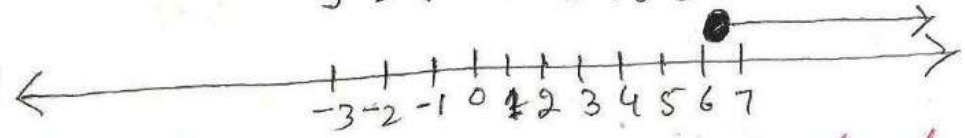
$(-2, 4)$; $]-2, 4[$



iv):- $x \geq 6$



Another way



Q3:- Write each exponential expression as an equivalent radical expression and simplify if possible

Q3(i):- $(-2)^{\frac{4}{5}} = (-2)^{4 \times \frac{1}{5}} = \left[(-2)^4\right]^{\frac{1}{5}} = \sqrt[5]{(-2)^4} = \sqrt[5]{2^4} = \sqrt[5]{16}$

Q3(ii):- $(-27)^{\frac{1}{3}} = \left[-(3)^3\right]^{\frac{1}{3}} = \left[(-1)^3 \cdot (3)^3\right]^{\frac{1}{3}} = \left[(-3)^3\right]^{\frac{1}{3}} = \sqrt[3]{(-3)^3} = -3$

Q3(iii):- $(\sqrt{16})^4 = [(16)^{\frac{1}{2}}]^4 = (16)^{\frac{1}{2}\times 4} = 16^2 = 256$

$(\sqrt[2]{16})^4 = (4)^4 = (2^2)^4 = 2^{2\times 4} = 2^8 = 256$

Q3(iv):- $(\sqrt[3]{-8})^9 = [(-8)^{\frac{1}{3}}]^9 = (-8)^{\frac{1}{3}\times 9} = (-8)^3 = -(8)^3 = -512$

Q3(v):- $(x^{-2})^3 \cdot (x^0)^5 = (x)^{-2\times 3} \cdot (1)^5 = (x)^{-6} \cdot 1 = x^{-6} = \frac{1}{x^6}$

Q4:- Use the properties of exponents to simplify each of the following.

(i):- $\frac{(-2)^3 \cdot (-2)^{-4} \cdot (-2)}{(-2)^3} = (-2)^{-4+1} = (-2)^{-3} = \frac{1}{(-2)^3} = \frac{1}{-8}$

$\frac{(-2)^3 \cdot (-2)^{-4} \cdot (-2)}{(-2)^{-3}} = \frac{(-2)}{(-2)^{-3}} = (-2)^{3-4+1} = (-2)^0 \cdot (-2)^3 = (1)(-8) = -8$

Q4(ii):-

$$\frac{2^{\frac{1}{2}} \cdot 2^{\frac{3}{4}}}{2^{\frac{1}{2}}} \times \frac{3 \cdot 3^{\frac{3}{2}}}{3^{-\frac{1}{2}}}$$

$$= 2^{\frac{3}{4}} \times 3 \cdot 3^{\frac{3}{2}} \cdot 3^{\frac{1}{2}}$$

$$= 2^{\frac{3}{4}} \times 3^{1+\frac{3}{2}+\frac{1}{2}}$$

$$= 2^{\frac{3}{4}} \times 3^{\frac{2+3+1}{2}}$$

$$= 2^{\frac{3}{4}} \times 3^{\frac{6}{2}}$$

$$= 2^{\frac{3}{4}} \times 3^{3}$$

$$= 27 \times 2^{\frac{3}{4}}$$

$$= 27 \times \sqrt[4]{2^3}$$

$$= 27.\sqrt[4]{8}$$

$\frac{3}{4} = 3 \times \frac{1}{4}$

Q5(ii):- Determine if each statement is true or false. If false, give an example of a number that shows the statement is true.

a):- Every rational number is an integer. False

$\frac{1}{2}$ is rational but not an integer

b):- Every real number is an irrational. False

$\frac{1}{2}$ is real but not irrational.

c):- Every irrational number is a real number. True

$\mathbb{R} = \mathbb{Q} \cup \mathbb{Q}'$

(d):- Every integer is a rational number. True

$5 = \frac{5}{1}$

(e):- Every real number is either rational or an irrational number. True ($\mathbb{R} = \mathbb{Q} \cup \mathbb{Q}'$)