Chapter # 2

# REAL NUMBERS AND CO-ORDINATE SYSTEM

## EXERCISE 2.1

***Q.1*** ***Are the following sets closed (i.e, have closure property) with regard to multiplication?***

***(i)*** ***{0, 1}*** ***(ii)*** ***{1, −1}***
***(iii)*** ***{0}*** ***(iv)*** ***{1}***
***(v)*** ***{2, 3}***

***Solution:***

(i) to (iv) Yes (v) No

***Q.2*** ***Which of the sets given in Q.1 are closed with respect to addition?***

***Solution:***

Only (iii)

***Q.3*** ***Are the following sets closed (i.e, have closure property) with respect to:***

***(a)*** ***Addition*** ***(b)*** ***Multiplication***
***(c)*** ***Subtraction*** ***(d)*** ***Division***
***(i)*** ***Q*** ***(ii)*** ***W*** ***(iii)*** ***N***
***(iv)*** ***P*** ***(v)*** ***T***
***(vi)*** ***The set of even integers***
***(vii)*** ***The set of odd integers***

***Solution:***

(a) With respect to Addition (i), (iii), (v) and (vi).
(b) With respect to Multiplication: all sets except (iv)
(c) With respect to Subtration: (i), (v) and (vi).
(d) With respect to Division: None.

**Q.4** ***Check yourself and find that which of the properties of R do the sets Q, Z, W and N possess.***

***Solution:***

| S.No | Properties of Sets | N | Z | I | Q |
|---|---|---|---|---|---|
| 1 | Closure Property w.r.t, Addition | Yes | Yes | Yes | Yes |
| 2 | Cumulative Property w.r.t Addition | Yes | Yes | Yes | Yes |
| 3 | Associative Property of w.r.t Addition | No | Yes | Yes | Yes |
| 4 | Existence of Additive Identity Element | No | No | Yes | Yes |
| 5 | Existence of Additive Inverse Elements | Yes | Yes | Yes | Yes |
| 6 | Closure Property w.r.t Multiplication | Yes | Yes | Yes | Yes |

**Q.5** ***Name the properties used in each of the following equations.***

***(i)*** $3 + 7 = 7 + 3$

***(ii)*** $1/2 + 2/3 = 2/3 + 1/2$

***(iii)*** $(2 + 4) + 6 = 2 + (4 + 6)$

***(iv)*** $(2/5 + 3/7) + 1/4 = 2/5 + (3/7 + 1/4)$

***(v)*** $5 + 0 = 0 + 5 = 5$

***(vi)*** $-2 + 0 = 0 + (-2) = -2$

***(vii)*** $(-1/3) + 1/3 = 1/3 + (-1/3) = 0$

***(viii)*** $\sqrt{2} + (-\sqrt{2}) = 0$

***(ix)*** $4 \times 5 = 5 \times 4$

***(x)*** $1/3 \times 2/5 = 2/5 \times 1/3$

***(xi)*** $(3 \times 7) \times 9 = 3 \times (7 \times 9)$

***(xii)*** $(-2/7 \times 3/7) \times 6 = -2/7 \times (3/7 \times 6)$

***(xiii)*** $3 \times 1 = 1 \times 3 = 3$

***(xiv)*** $-\sqrt{2} \times 1 = 1 \times -\sqrt{2} = -\sqrt{2}$

(xv) $5 \times 1/5 = 1/5 \times 5 = 1$

(xvi) $\left(-\sqrt{3}\right)\left(-\frac{1}{\sqrt{3}}\right) = 1$

(xvii) $3(4+5) = 3 \times 4 + 3 \times 5$

***Solution:***

(i) Cumutative Property w.r.t Addition.
(ii) Cumutative Property w.rt. Addition.
(iii) Associative Property w.r.t Addition.
(iv) Associative Property w.r.t Addition..
(v) Property of Additive Identity Elements.
(vi) Property of Additive Inverse Elements.
(vii) Property of Additive Inverse Elements
(viii) Property of Additive Inverse Elements.
(ix) Cumutative Property w.r.t, Multiplication.
(x) Cumutative Property w.r.t., Muliplication.
(xi) Associative Property w.r.t., Multiplication.
(xii) Associative Property w.r.t., Multiplication.
(xiii) Property of Multiplication Identity.
(xiv) Propety of Multiplicative Inverse.
(xv) Property of Multiplication Inverse.
(xvi) Property of Multiplication of Invere.
(xvii) Distributive Property w.r.t., Addition.

***Q.6 Name the properties, used in the following inequalities.***

(i) $4 > 3 \wedge 7 > 2 \Rightarrow 11 > 5$

(ii) $1/3 < 1/2 \wedge 2/3 < 3/4 \Rightarrow 1 < 5/4$

(iii) $9 > 6 \Rightarrow 12 > 6$

(iv) $3/4 < 2 \Rightarrow 1 < 2\frac{1}{4}$

(v) $6 > 5 \Rightarrow 24 > 20$

(vi) $1/2 < 2/3 \Rightarrow 2 > 3/2$

(vii) $-3 < 5 \Rightarrow 9 > -15$

(viii) $3/4 > 1/5 = -21/4 < -7/5$

**Solution:**

(i) $4 > 3 \wedge 7 > 2 \Rightarrow 4 + 5 > 3 + 2$
(Additive Property of Inequality)

(ii) $1/3 < 1/2 \wedge 2/3 < 3/4 \Rightarrow 1/3 + 2/3 < 1/3 + 3/4$
(Hence Additive Property)

(iii) $9 > 6 \Rightarrow 9 + 3 > 6 + 3$ (Additive Property)

(iv) $3/4 < 2 \Rightarrow 3/4 + 1/4 < 2 + 1/4$ (Additive Property)

(v) $6 > 5 \Rightarrow 6 \times 4 > 5 \times 4$ (Multiplicative Property)

(vi) Multiplicative Property

(vii) Multilicative Property

(viii) Multilicative Property

***Q.7 Find out the fallacy in the solution of the following problem:***

**Solution:**

Let $x = y$

Now $x \cdot x = x \cdot y$

$\therefore$ $x^2 = xy$ $(\because x^2 = xy)$

$\Rightarrow$ $(x - y)(x + y) = y(x - y)$

$\Rightarrow$ $x + y = y \Rightarrow x + x = x$ $(\because x = y)$

$\Rightarrow$ $2x = x$

$\Rightarrow$ $2 = 1$ ?

**Solution:**

Solution of the problems goes on correct upto.

$$(x + y)(x - y) = y(x - y)$$

To get $x + y = y$ both the sides have been divided by $(x - y)$ which is not correct, because $x = y$, so $x - y$ comes equal to zero, and if something is divided by zero the answer will be $x$, (infinity).

That is way the equation become unbalanced and hence the wrong answer $2 = 1$.

# EXERCISE 2.2

**Q.1 Fill in the blanks:**

**(i)** $(a, b) = (2, 3) \Rightarrow$ .....

**(ii)** $(x, 3) = (-1/2, y) \Rightarrow$ .....

**(iii)** $(x + 1/1, y + 2) = (5, 6) \Rightarrow$ .....

**Solution:**

(i) $(a, b) = (2, 3) \Rightarrow a = 2, b = 3$

(ii) $(x, 3) = (-1/2, y) \Rightarrow x = -1/2, y = 3$

(iii) $(x + 1, y+2) = (5, 6) \Rightarrow x + 1 = 5$ and $y + 2 = 6$

$x + 1 = 5$ $\quad$ $y + 2 = 6$

or $\quad x = 5 - 1$ or $\quad y = 6 - 2$

or $\quad x = 4$ or $\quad y = 4$

**Q.2 Find $A \times B$ and $B \times A$ when;**

**(i)** $A = \{1, 2\}, B = \{4, 6, 8\}$

**(ii)** $A = \{a, b\}, B = \{0, -1\}$

**(iii)** $A = \{1\}, B = \{x, y, z, s\}$ **Is $A \times B = B \times A$.**

**Solution:**

(i) $A = \{1, 2\}, B = \{4, 6, 8\}$

$A \times B = \{(1, 4), (1, 6), (1, 8), (2, 4), (2, 6), (2, 8)\}$

$B \times A = \{(4, 1), (4, 2), (6, 1), (6, 2), (8, 1), (8, 2)\}$

(ii) $A = \{a, b\}, B = \{0, -1\}$

$A \times B = \{(a, 0), (a, -1), (b, 0), (b, -1)\}$

$B \times A = \{(0, a), (0, b), (-1, a), (-1, b)\}$

(iii) $A = \{1\}, B = \{x, y, z, s\}$

$A \times B = \{(1, x), (1, y), (1, z), (1, s)\}$

$B \times A = \{(x, 1), (y, 1), (z, 1), (s, 1)\}$

Yes $A \times B = B \times A$.

**Q.3 Find $A \times A$ and $B \times B$ with the sets given in Question No. 2.**

**Solution:**

(i) $A = \{1, 2\}, \quad B = \{4, 6, 8\}$

$A \times A = \{(1, 1), (1, 2), (2, 1), (2, 2)\}$

$B \times B = \{(4, 4), (4, 6), (4, 8), (6, 4), (6, 8), (6, 6)$

$(8, 4), (8, 6), (8, 8)\}$

(ii) $A = \{a, b\}, \quad B = \{0, -1\}$

$A \times A = \{(a, a), (a, b), (b, a) (b, b)\}$

$B \times B = \{(0, 0), (0, -1), (-1, 0), 9(-1, -1)\}$

(iii) $A = \{1\}, B = \{x, y, z, s\}$

$A \times A = \{(1, 1)$

$B \times B = \{(x, x), (x, y), (x, z), (x, s)\}$

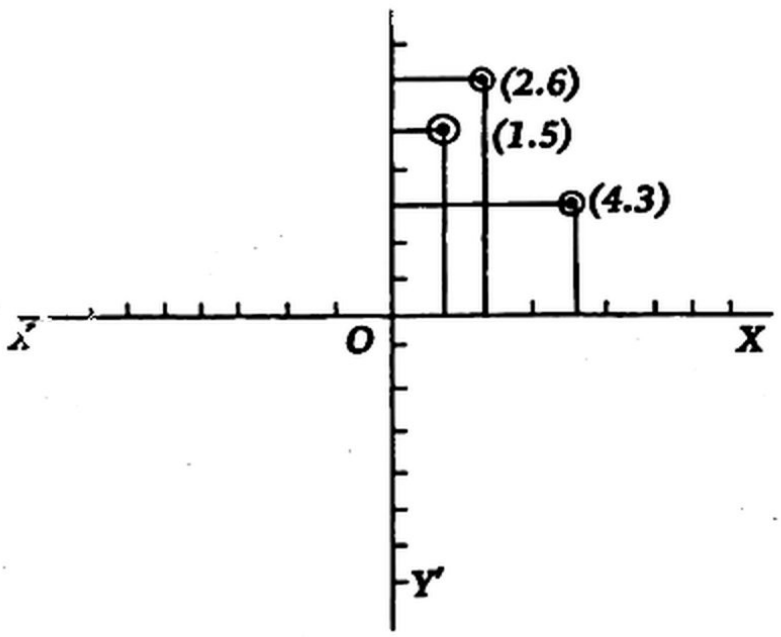
$(y, x), (y, y), (y, z), (y, s),$

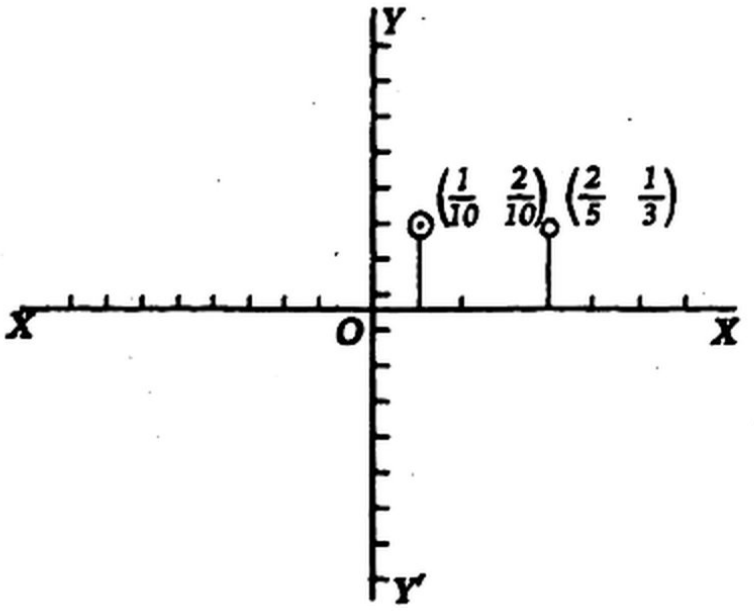
$(z, x), (z, y), (z, z), (z, s),$

$(s, x), (s, y), (s, z) (s, s)\}$

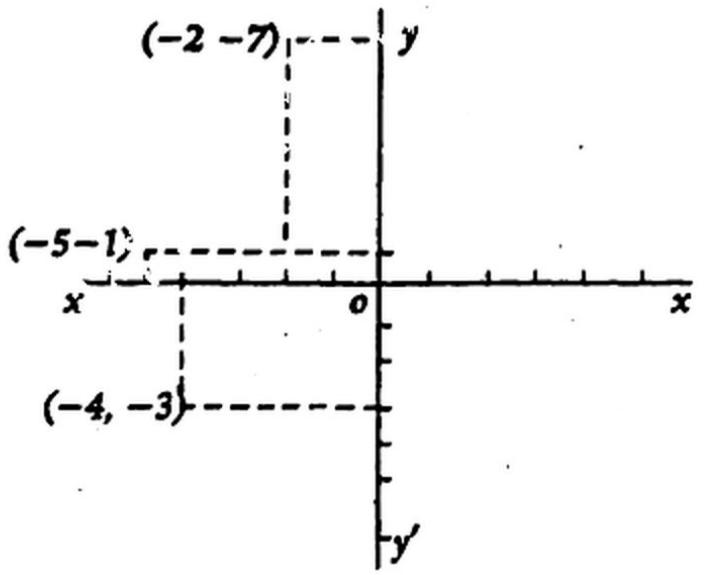
**Q.4 *Draw x-axis and y-axis on a graph paper. Select some suitable units of measurements and represent the following graph.***

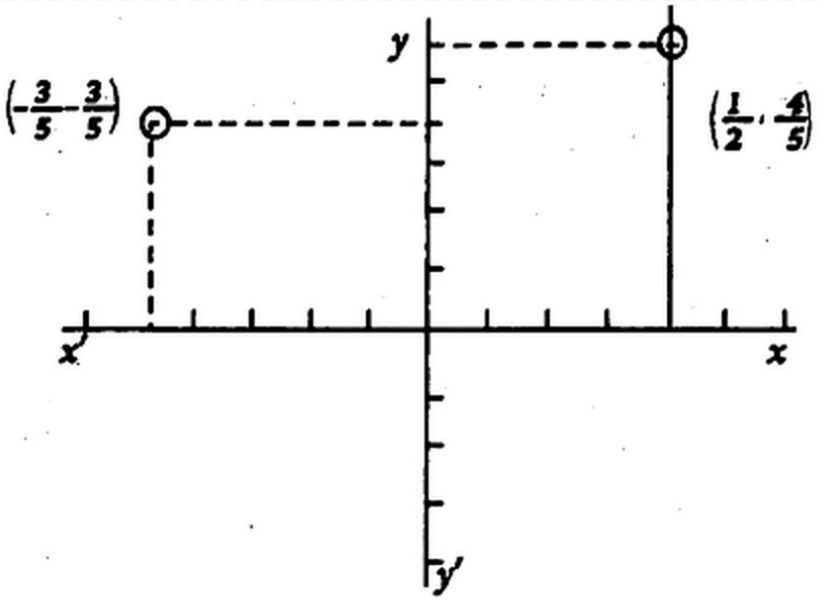
(i) $(2, 6), (4, 3), (1, 5) (1/10, 2/10), \left(\frac{2}{5}, \frac{1}{5}\right)$



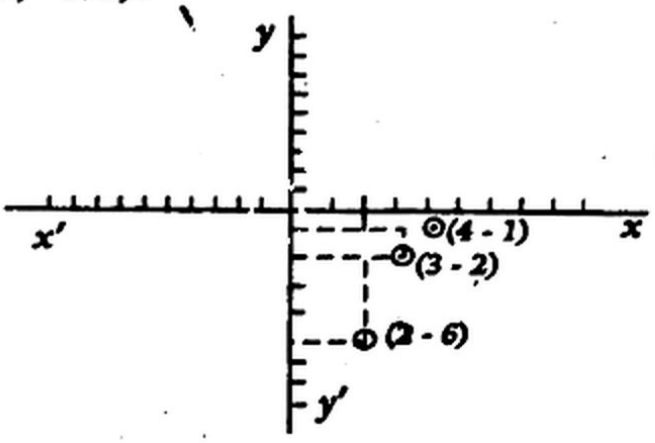


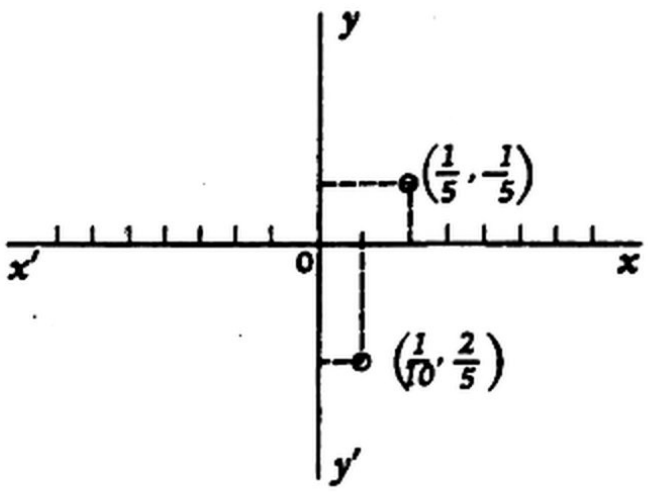

(ii) (−2, 7), (7, −5), (1/2, 4/5), (−3/5, 3/5).



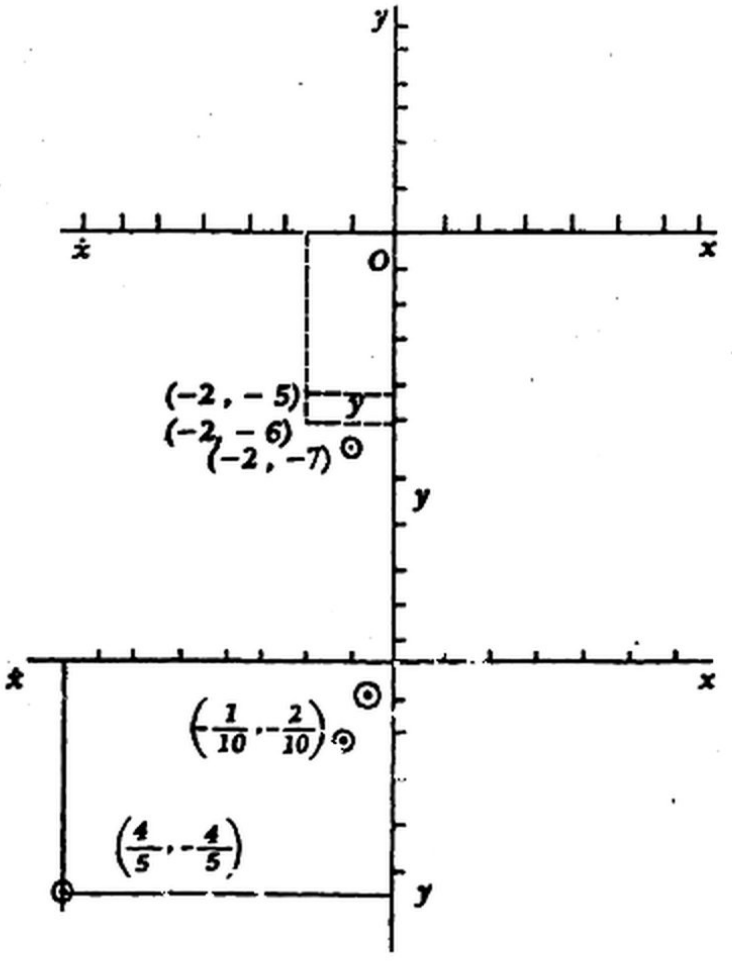



**(iii)** **(3, −2), (4, −1), (2, −6), (1/10, −2/5), (1/5, −1/5).**

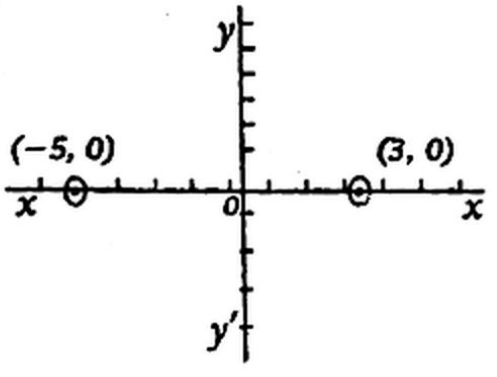


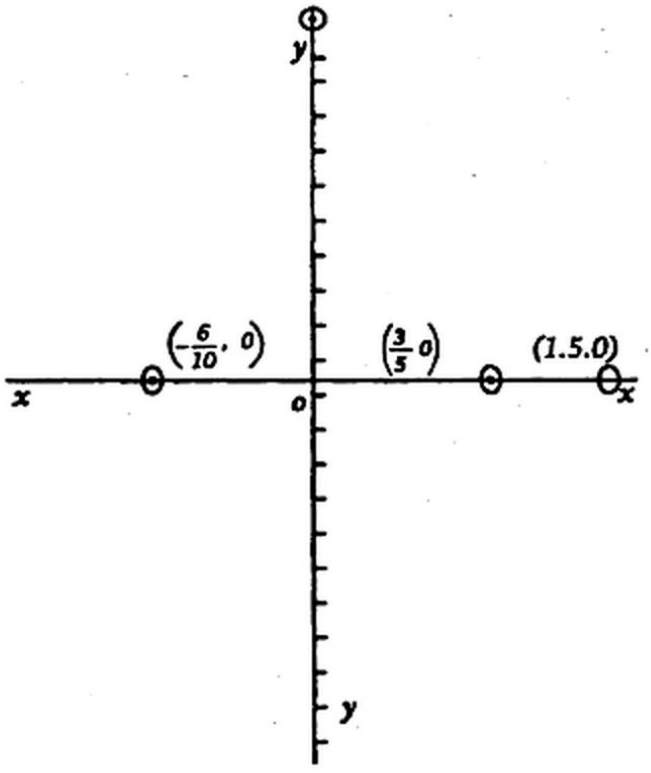



(iv) $(-2, -5)$, $(-2, -6)$, $(-1, -7)$, $(-1/10, -2/10)$, .

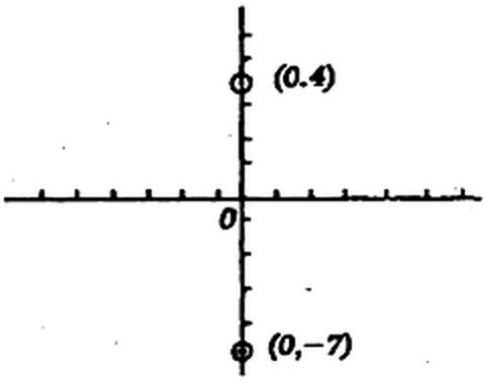


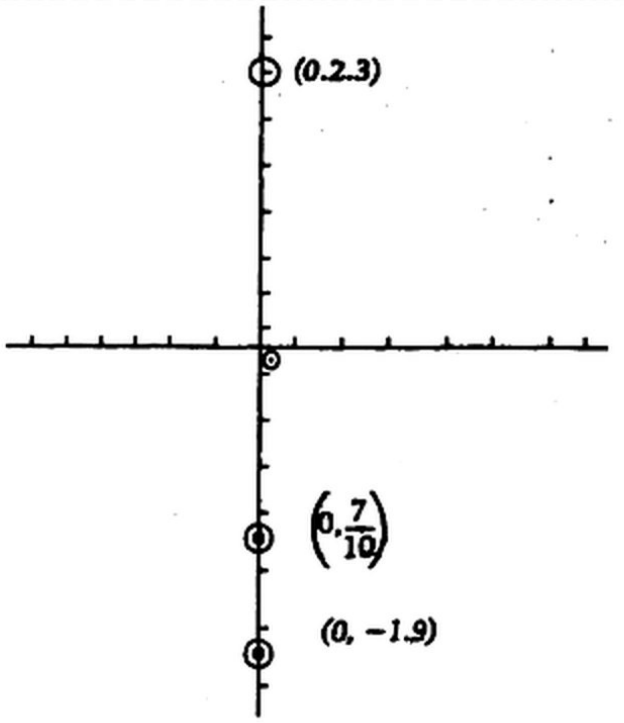

(v) $(3, 0)$, $(-5, 0)$, $(3/5, 0)$, $(-6/10, 0)$, $(1.5, 0)$.



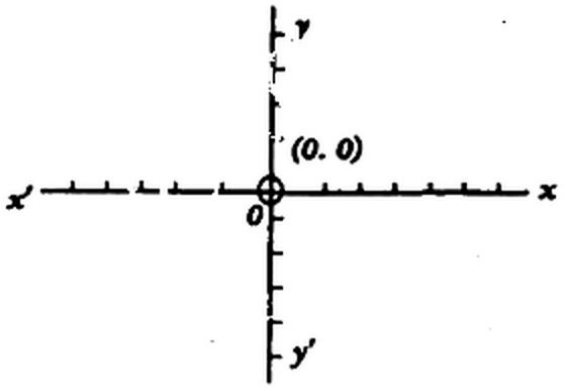



***(vi) (0, 4), (0, −7), (0, 2.3), (0, 1.9), (0, −7/10).***






***(vii) (0, 0)***




***Q.5 In which of the quadrants the following points lie?***

***(2, 7), (1/9, 3/11), (−1.8, −.5),($\sqrt{2}$, −1), ($\sqrt{3}$, $\sqrt{5}$).***
***(−2, 7), (−3/11, −1/9), (−2.7, 4.8), (7, −6.54),***
***(−5.4, 5.4), (−2.3, −2.3), (4.7, $-\sqrt{13}$).***

***Solution:***

In I quandrant:

$(2, 7)$, $(1/9, 3/11)$, $(\sqrt{3}, \sqrt{5})$.

In II quadrant:

$(-1.8, -5)$, $(-2, 7)$, $(-2.7, -4.8)$, $(-5.4, 5.4)$

In III quadrant:

$(\sqrt{2}, -1)$, $(4.7, -\sqrt{13})$

***Q.6 On which axes the following points lie:***

***$(3, 0)$, $(-7, 0)$, $(0. 1/4)$, $(-8, 0)$, $(0, \sqrt{2})$, $(0, -\sqrt{5})$***

***$(0, -3/8)$, $(-6/11, 0)$, $(\sqrt{3}, 0)$ $(-\sqrt{7}, 0)$***

***Solution:***

(1) Following points lie on $(-)x$-axis:

$(\checkmark 3, 0)$

(2) Following points lie on $+y$-axis.

$(0, 3/8)$, $(0, 1/4)$, $(0, \sqrt{2})$

(3) Following points lie on $-x$-axis.

$(-8, 0)$, $(-6/11, 0)$ $(-7, 0)$

(4) Following points lie on $-y$-axis.

$(0, -\sqrt{5})$, $(0, -3/8)$

***Q.7 With the ordinate of the points lying on the x-axis?***

***Solution:***

Ordinate of the points lying on the x-axis is always zero.

***Q.8 What is the abscissa of the points lying on the y-axis?***

***Solution:***

Abscissa points lying on the zero.