Observations of Math Lab Manual Activities for Class 11

1. To represent set theoretic operations using Venn diagrams.

Observations:

1. Coloured portion in Fig. 3.1, represents ___$\boldsymbol{A \cup B}$_____.

2. Coloured portion in Fig. 3.2, represents ___$\boldsymbol{A \cap B}$______.

3. Coloured portion in Fig. 3.3, represents ___$\boldsymbol{A'}$_________.

4. Coloured portion in Fig. 3.4, represents ___$\boldsymbol{B'}$________.

5. Coloured portion in Fig. 3.5, represents ___$\boldsymbol{(A \cap B)'}$___.

6. Coloured portion in Fig. 3.6, represents ___$\boldsymbol{(A \cup B)'}$____.

7. Coloured portion in Fig. 3.7, represents ___$\boldsymbol{B - A}$______.

8. Coloured portion in Fig. 3.8, represents ___$\boldsymbol{A' \cup B}$______.

9. Fig. 3.9, shows that (A ∩ B) = ___$\boldsymbol{\phi}$______.

10. Fig. 3.10, represents A _____⊂______ B.

2. To find the values of sine and cosine functions in second, third and fourth quadrants using given values in the first quadrant.

Observations:

1. Angle made by the needle in one complete revolution is ____$\boldsymbol{2\pi}$ **OR** $\boldsymbol{360^o}$_____.

2. $\cos\frac{\pi}{6} =$ ___$\boldsymbol{\frac{\sqrt{3}}{2}}$___ $= \cos\left(-\frac{\pi}{6}\right)$

$\sin\frac{\pi}{6} =$ ____$\boldsymbol{\frac{1}{2}}$_____ $= \sin(2\pi +$ __$\boldsymbol{\frac{\pi}{6}}$__$)$.

3. sine function is non-negative in ___ **First** ____ and __**Second**__ quadrants.

4. cosine function is non-negative in __**First**__ and __**Fourth**___ quadrants.

3. To prepare a model to illustrate the values of sine function and cosine function for different angles which are multiples of $\frac{\pi}{2}$ & π.

Observations:

1. When radius line of circular plate is at 0º indicating the point A (1,0),

cos 0 = ___**1**___ and sin 0 = ___**0**____.

2. When radius line of circular plate is at 90º indicating the point B (0, 1),

cos $\frac{\pi}{2}$ = ___**0**____ and sin $\frac{\pi}{2}$ = ___**1**____.

3. When radius line of circular plate is at 180º indicating the point C (–1,0),

cos π = ___$\mathbf{-1}$___ and sin π = ____**0**_____.

4. When radius line of circular plate is at 270º indicating the point D (0, – 1)

which means cos $\frac{3\pi}{2}$ = ___**0**____ and sin $\frac{3\pi}{2}$ = ___$\mathbf{-1}$____.

5. When radius line of circular plate is at 360º indicating the point again at A (1,0), cos 2 π = ___**1**____ and sin 2 π = ___**0**_____.

Now fill in the table :

Trigonometric Function	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π	$\frac{5\pi}{2}$	3π	$\frac{7\pi}{2}$	4π
$\sin\theta$	0	1	0	−1	0	1	0	−1	0
$\cos\theta$	1	0	−1	0	1	0	−1	0	1

4. To interpret geometrically the meaning of $i = \sqrt{-1}$ and its integral powers.

Observations:

1. On rotating OA through 90º, $OA_1 = 1 \times i$ = ____i_____.

2. On rotating OA through an angle of 180°, $OA_2 = 1 \times$ _ i _ × _ i _ = __ i^2 __= ___-1___.

3. On rotation of OA through 270º (3 right angles), $OA_3 = 1 \times$ _ i _ × _ i _× _ i _ = _ i^3 _ = _ $-i$ _.

4. On rotating OA through 360º (4 right angles), $OA_4 = 1 \times$ __ i __ × _ i _× __ i __ × __ i __ = __ i^4 _= _ 1 _.

5. On rotating OA through n-right angles $OA_n = 1 \times$ __ i __ × __ i __× __ i __ × __ i __ × ... n times = __ i^n __.

5. To distinguish between a Relation and a Function.

Observations:

1. In Fig. 6.3, ordered pairs are ____$(a, 1), (a, 2), (b, 1), (b, 2), (c, 2)$________.

These ordered pairs constitute a __**Relation**___ but not a ___**Function**___.

2. In Fig. 6.4, ordered pairs are ___$(a, 1), (b, 1), (c, 1)$__. These constitute a ___ **Relation** ____ as well as ___ **Function** ___.

3. In Fig 6.5, ordered pairs are __$(a, 2), (b, 2), (c, 2)$__. These ordered pairs constitute a __ **Relation** __ as well as ___ **Function** ____.

4. In Fig. 6.6, ordered pairs are __$(b, 1), (c, 2)$__. These ordered pairs do not represent __ **Function** __ but represent __ **Relation** __.

6. To plot the graphs of sin x, sin 2x, 2sinx and sin$\frac{x}{2}$, using the same coordinate axes.

Observations:

1. Graphs of sinx and 2sinx are of same shape but the maximum height of the graph of sin x is ___**half**___ the maximum height of the graph of ___$2sinx$____.

2. The maximum height of the graph of sin2x is _____**1**______. It is at x = ____$\frac{\pi}{4}$_____.

3. The maximum height of the graph of 2sinx is _____**2**______ . It is at x = ____$\frac{\pi}{2}$_____ .

4. The maximum height of the graph of sin$\frac{x}{2}$ is ______**1**_____ . It is at $\frac{x}{2}$ = ____$\frac{\pi}{2}$_____ .

5. At x = __0 **and** π______, sinx = 0, at x = ___ $0, \frac{\pi}{2}$ **and** π ____, sin 2x = 0 and at x = ___ 0 **and** 2π ___, sin$\frac{x}{2}$ = 0.

6. In the interval [0, π], graphs of sinx, 2sinx and sin$\frac{x}{2}$ are __**above**___ x-axes and some portion of the graph of sin2x lies ___**below**____ x-axes.

7. Graphs of sinx and sin2x intersect at x = ___$\frac{\pi}{3}$____ in the interval (0, π).

8. Graphs of sinx and sin$\frac{x}{2}$ intersect at x = ____$\frac{2\pi}{3}$____ in the interval (0, π).

7. To construct a Pascal's Triangle and to write binomial expansion for a given positive integral exponent.

Observations:

1. Numbers in the fifth row are ___**1,4,6,4,1**____, which are coefficients of the binomial expansion of ____ **Pascal's Triangle** ______.

2. Numbers in the seventh row are ___**1,6,15,20,15,6,1**____, which are coefficients of the binomial expansion of ___ **Pascal's Triangle** ____.

3. $(a + b)^3$ = _**1**_ a^3 + _**3**_a^2b + _**3**_ab^2 + _**1**_b^3

4. $(a + b)^5$ = _$\boldsymbol{a^5}$_ +_$\boldsymbol{5a^4b}$_+ _$\boldsymbol{10a^3b^2}$_+ _$\boldsymbol{10a^2b^3}$_ + _$\boldsymbol{5ab^4}$_+ _$\boldsymbol{b^5}$_.

5. $(a + b)^6$ =_**1**_a^6 +_**6**_a^5b + _**15**_a^4b^2 + _**20**_a^3b^3 + _**15**_a^2b^4 + _**6**_ab^5 + _**1**_b^6.

6. $(a + b)^8$ = _$\boldsymbol{a^8}$_ +_$\boldsymbol{8a^7b}$_+ _$\boldsymbol{28a^6b^2}$_+ _$\boldsymbol{56a^5b^3}$_ + _$\boldsymbol{70a^4b^4}$_+ _$\boldsymbol{56b^3b^5}$_+ _$\boldsymbol{28a^2b^6}$_ + _$\boldsymbol{8ab^7}$_+ _$\boldsymbol{b^8}$_.

7. $(a + b)^{10}$ = _$\boldsymbol{a^{10}}$_ +_$\boldsymbol{10a^9b}$_+ _$\boldsymbol{45a^8b^2}$_+ _$\boldsymbol{120a^7b^3}$_ + _$\boldsymbol{210a^6b^4}$_+ _$\boldsymbol{252b^5b^5}$_+ _$\boldsymbol{210a^4b^6}$_ + _$\boldsymbol{120a^3b^7}$_+ _$\boldsymbol{45a^2b^8}$_+ _$\boldsymbol{10ab^9}$_+ _$\boldsymbol{b^{10}}$_.

8. To construct different types of conic sections.

Observations:

1. In Fig. 21.2, the transparent plane sheet is __**parallel**___ to the base of the cone. The section obtained is __**Circle**__.

2. In Fig. 21.3, the plane sheet is inclined to __**axis of cone**___. The conic section obtained is ___**ellipse**_____.

3. In Fig. 21.4, the plane sheet is parallel to the ___**generator of cone**_____. The conic section so obtained is ___**parabola**___.

4. In Fig. 21.5, the plane sheet is ___**parallel**____ to the axis. The conic section so obtained is a part of __**a hyperbola**____.

9. Verification of the geometrical significance of the derivative.

Observations:

1. For the curve $x^2 + y^2 = 25$, $\frac{dy}{dx}$ at the point (3, 4) = __$-\frac{3}{4}$__. Value of θ = __$\boldsymbol{tan^{-1}}(-\frac{3}{4})$__ tan θ = ___$-\frac{3}{4}$__ $\frac{dy}{dx}$ at (3, 4) = ___$-\frac{3}{4}$____.

2. For the curve $x^2 + y^2 = 25$, $\frac{dy}{dx}$ at the point $(-4, 3)$ = __$\frac{4}{3}$__, tan α = __$\frac{4}{3}$__ , $\frac{dy}{dx}$ at $(-4, 3)$ = ___$\frac{4}{3}$___.

3. For the curve $(x-3)^2 + y^2 = 25$, $\frac{dy}{dx}$ at the point $(6, 4)$ = __$-\frac{4}{3}$___, Value of θ = __$\boldsymbol{tan^{-1}}\left(-\frac{4}{3}\right)$___ , tan θ = __$-\frac{4}{3}$__, $\frac{dy}{dx}$ at $(6, 4)$ = ___$-\frac{4}{3}$____.

4. For the curve $xy = 4$, $\frac{dy}{dx}$ at $(2, 2)$ = __$\mathbf{-1}$___, θ = __$\boldsymbol{tan^{-1}}(\mathbf{-1})$__ , tan θ = __$\mathbf{-1}$__.

10. To write the sample space, when a coin is tossed once, two times, three times, four times.

Observations:

Number of elements in sample space, when a

1. coin is tossed once = ___**2**___.

2. coin is tossed twice = ___**4**___.

3. coin is tossed three times = ___**8**____.

4. coin is tossed four times = ___**16**____.