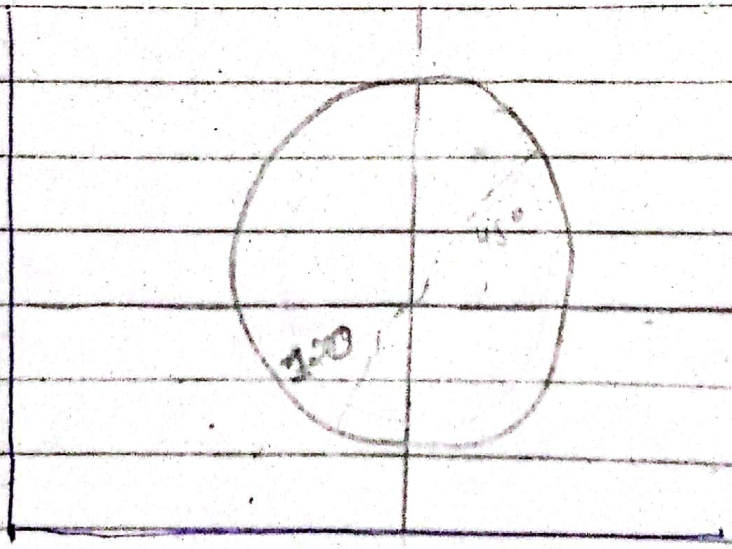
Chapter: 3

Exercise

Question#1

Consider a point P located on the circumference of a unit circle in the standard coordinate plane. Let θ be the angle formed by the positive x-axis and the segment OP, where O is the origin.

i) If $\theta = 45°$, determine whether θ is positive or negative angle?



Here, in above diagram, the $\theta = 45°$, is a positive angle measured counterclockwise from the positive x-axis.

ii) If $\theta = -120°$, determine θ is -ive or +ive?
In a diagram, the $\theta = -120°$ is a negative angle measured clockwise from the positive x-axis.

Question #2.
Identify the type of following angles:

i) $\angle ABC$ measures $90°$
= Right angle
ii) $\angle DEF$ measures $180°$
= Straight angle
iii) $\angle GHI$ measures $45°$
= acute angle
iv) $\angle JKL$ measures $270°$
= reflex angle
v) $\angle GHI$ measures $30°$.
= acute angle

Question #3.
Determine whether the given angles are complementary, supplementary, or neither:
Complementary angles:- Jin Ka Sum $90°$ ho.

Supplementary angles:- Jin Ka Sum $180°$ ho.

i) $\angle PQR = 60^\circ$ and $\angle RST = 30^\circ$

$= 60^\circ + 30^\circ = 90^\circ$

$\Rightarrow$ complementary angle.

ii) $\angle UVW = 80^\circ$ and $\angle UWX = 100^\circ$

$= 80^\circ + 100^\circ = 180^\circ$

$\Rightarrow$ supplementary angle.

iii) $\angle YZA = 45^\circ$ and $\angle ZAB = 45^\circ$

$= 45^\circ + 45^\circ = 90^\circ$

$\Rightarrow$ complementary angle.

iv) $\angle CDE = 120^\circ$ and $\angle DEF = 60^\circ$

$= 120^\circ + 60^\circ = 180^\circ$

$\Rightarrow$ Supplementary angle.

v) $\angle GHI = 90^\circ$ and $\angle HIJ = 90^\circ$

$= 90^\circ + 90^\circ = 180^\circ$

$\Rightarrow$ supplementary angle.

Question #4

Find the missing angle given in followings-

i) In a triangle ΔABC, $\angle A = 50^\circ$, $\angle B = 70^\circ$

Find $\angle C$

$\because$ The Sum of angles of a triangle is 180°

So,

$\angle A = 50^\circ$, $\angle B = 70^\circ$, $\angle C = ?$

$\angle A + \angle B + \angle C = 180^\circ$

$50^\circ + 70^\circ + \angle C = 180^\circ$

$50^\circ + 70^\circ - 180^\circ = -\angle C$

$-60^\circ = -\angle C$

$\Rightarrow \angle C = 60^\circ$

ii) In a quadrilateral ABCD, $\angle A = 90^\circ$, $\angle B = 80^\circ$ and $\angle C = 100^\circ$. find $\angle D$.

∵ The sum of quadrilateral angles is 360°

$\angle A = 90^\circ$, $\angle B = 80^\circ$, $\angle C = 100^\circ$, $\angle D = ?$

$\angle A + \angle B + \angle C + \angle D = 360^\circ$

$90^\circ + 80^\circ + 100^\circ + \angle D = 360^\circ$

$270^\circ + \angle D = 360^\circ$

$\therefore \angle D = 360^\circ - 270^\circ$

$\angle D = 90^\circ$

iii) In a ΔXYZ, $\angle X = 60^\circ$, $\angle Y = 80^\circ$, Find $\angle Z = ?$

$\because \angle X + \angle Y + \angle Z = 180^\circ$

$\Rightarrow 60^\circ + 80^\circ + \angle Z = 180^\circ$

$\Rightarrow 140^\circ + \angle Z = 180^\circ$

$\Rightarrow \angle Z = 180^\circ - 140^\circ$

$\angle Z = 40^\circ$

iv) In a parallelogram PQRS, $\angle P = 50^\circ$, Find $\angle Q$

In a parallelogram, opposite angles are equal, and adjacent angles are supplementary (add up to 180°)

$\angle P = 50^\circ$

Since $\angle P$ and $\angle Q$ are adjacent angles, they are Supplementary.

$\angle P + \angle Q = 180°$

$50° + \angle Q = 180°$

$\angle Q = 180° - 50°$

$\angle Q = 130°$

v) In a quadrilateral WXYZ, $\angle W = 120°$, $\angle X = 70°$ and $\angle Y = 110°$ Find $\angle Z = ?$

~~$\angle X + \angle Y + \angle Z = 360°$~~

$\angle W + \angle X + \angle Y + \angle Z = 360°$

$120° + 70° + 110° + \angle Z = 360°$

$300° + \angle Z = 360°$

$\Rightarrow \angle Z = 360° - 300°$

$\angle Z = 60°$

Question #5

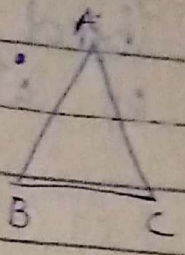
If the measure of one angle in a triangle is 50° and another is 70°, what is the measure of third angle?

In a triangle Sum of angles are 180°.

Therefore,

Let

$\angle A = 50°$, $\angle B = 70°$, $\angle C = ?$



$\angle A + \angle B + \angle C = 180°$

$50° + 70° + \angle C = 180°$

$120° + \angle C = 180°$

$\angle C = 180° - 120°$

$\angle C = 60°$

Question 6(a)

In a right-angled triangle, one of the angles is 30°. Find other two angles.

In a right-angled triangle, one angle is always 90°.

So,

$90° + 30° + \text{other angle} = 180°$

$120° + \text{other angle} = 180°$

$\text{other angle} = 180° - 120°$

$\text{other angle} = 60°$

Question 6(b)

In a triangle, if one angle is twice

the measure of another angle and the third angle is 50°, find the measure of other two angles.

Let the three angles of a triangle be x, $2x$ and $50°$

As we know, sum of all angles in a Δ is $180°$, so

$$x + 2x + 50° = 180°$$

$$3x = 130°$$

$$x = \frac{130°}{3} = 43.33°$$

One angle is $43.33°$

Given that one angle is twice than other so

Another angle $= 2x = 2(43.33°)$

$= 86.67°$

Question #7

In a triangle, if one angle is $60°$ and another is $80°$, find the measure of the third angle.

Let $\angle A = 60°$, $\angle B = 80°$, $\angle C = ?$

$$\angle A + \angle B + \angle C = 180°$$

$$60° + 80° + \angle C = 180°$$

$140^\circ + \angle C = 180^\circ$

$\angle C = 180^\circ - 140^\circ$

$\angle C = 40^\circ$

Question #8

If the supplement of an angle is 120°, what is the measure of the angle itself?

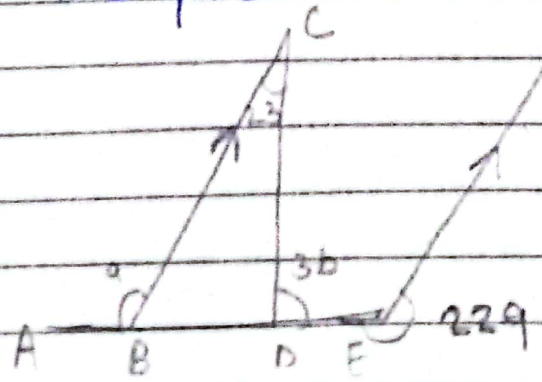
∴ The supplement of an angle is the amount that must be added to the angle to make 180°, if the supplement is 120°, the angle itself is:

$180^\circ - 120^\circ = 60^\circ$

So, the angle is 60°.

Question # 9.

Find the values of unknown angles in the pictures below:



Question #10.

If the measure of an angle is 5° less than half of its complement, find the measure of an angle.

Let the measure of the angle be x degrees.

The complement of an angle is $90° - x$

According to given condition.
The angle is 5° less than half of its complement.

$$x = \frac{1}{2}(90° - x) - 5$$

$$x = \frac{1}{2}(90°) - \frac{1}{2}(x) - 5$$

$$x = 45° - \frac{1}{2}x - 5$$

$$x = 40 - \frac{1}{2}x$$

$$x + \frac{1}{2}x = 40$$

$$\frac{3}{2}x = 40$$

$$x = \frac{40 \times 2}{3}$$

$\Rightarrow x = 26.67^\circ$

Question #11

If two angles are complementary and one measure 40. find other angle measures.

Let x be the another angle

Two angles are complementary means,

one angle + another angle = 90°

So,

$40^\circ + x^\circ = 90^\circ$

$x^\circ = 90^\circ - 40^\circ$

$x^\circ = 50^\circ$

Q #12

If the measure of an angle is 25° less than its supplement, find the measure of the angle.

Let x be the measure of an angle.

Supplement of an angle $= 180^\circ - x$.

According to given condition

$x = (180^\circ - x) - 25^\circ$

$x = 180^\circ - x - 25^\circ$

$x + x = 180^\circ - 25^\circ$

$2x = 155^\circ$

$x = \frac{155^\circ}{2}$

$\therefore x = 77.5^\circ$

Q#13

In a parallelogram, if one angle measures 70°, find the measure of each of the other three angles.

Given:

One angle measures 70°

1. Opposite angle: The angle opposite to the 70° angle is also 70°.

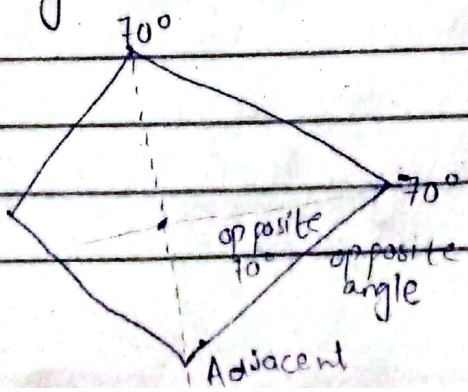
2. Adjacent angles: These angles are supplementary to 70°, so

$$180^\circ - 70^\circ = 110^\circ$$

So, adjacent angles each measure 110°.

=> Two angles measure 70° each.

=> Two angles measures 110° each.



Q #14

In a quadrilateral, the sum of interior angles is 360°. If the three of the angles are 70°, 110°, 90°, what is the fourth angle?

Given that

The sum of quadrilateral interior angles is 360° so,

Let $x°$ be the fourth angle.

$$70° + 110° + 90° + x° = 360°$$

$$\Rightarrow \quad 270° + x = 360°$$

$$x = 360° - 270°$$

$$\Rightarrow \quad x = 90°$$

Q #15

In a rhombus, if one of the angles measures 60°, find the measures of the other three angles.

∴ In a rhombus

1. Opposite angles are equal
2. Adjacent angles are Supplementary (their sum is 180°).

One angle = 60°

1. Opposite angle: The angle opposite 60° is also 60°

2. Adjacent angles: Adjacent angles are supplementary, Thus

$$180° - 60° = 120°$$

=> Two angles measure 60° each and.

=> Two angles measure 120° each

Q#16

In a regular hexagon, find the measure of each interior angle.

∴ A regular hexagon has Six equal sides and six equal angles

$$\text{Measure of each interior angle} = \frac{(n-2) \times 180°}{n}$$

where n is the number of sides.

$$n = 6$$

$$= \frac{(6-2) \times 180°}{6}$$

$$= \frac{720°}{6} = 120°$$

Each interior angle of a regular hexagon measures 120°

Q#17
In a quadrilateral, three angles measure 60°, 110° and 70°. Find the measure of the fourth angle.

In a quadritateral, the sum of angles are 360°
let x be the fourth angle.

$$60^\circ + 110^\circ + 70^\circ + x = 360^\circ$$

$$240^\circ + x = 360^\circ$$

$$x = 360^\circ - 240^\circ$$

$$x = 120^\circ$$

Q#18
In a quadrilateral, if one angle measure 80° and another measure 110°, find the measures of two other angles.

One angle = 80°
another angle = 110°

Let the other two angles be x and y.

$$80^\circ + 110^\circ + x + y = 360^\circ$$

$$x + y = 360^\circ - 190^\circ$$

$$x + y = 170^\circ$$

Without additional information (e.g., whether the quadrilateral is a specific type), x and y can have various values, provided their sum equals 170°.

=> The measure of the other two angles depend on the specific quadrilateral, but their sum must equal 170°.

Q #19.

In a regular octagon, find the measure of each exterior angle.

$$\text{Each exterior angle} = \frac{360^\circ}{n}$$

$n = 8$ (for an octagon)

$= \frac{360^\circ}{8} = 45^\circ$

$\Rightarrow$ Each exterior angle of a regular octagon measures 45°

Q #20
Find the ~~measures~~ volume of each of the following cuboids.

i) Length = 5cm, Breadth = 4cm and Height = 3cm

Volume of cuboid = $L \times B \times H$

$= 5cm \times 4cm \times 3cm$

$= 60\ cm^3$

ii) Length = 15m, Breadth = 10m and Height = 2m

Volume of cuboid $= 15m \times 10m \times 2m$

$= 30\ m^3$

iii) Length = 14cm, Breadth = 50mm and Height = 10cm.

L = 14cm, B = 50mm, H = 10cm

first, we convent mm into cm

$B = \frac{50mm}{10} = 5\,cm$

Volume = 5 x 14 x 10

$= 700cm^3$

#21

Find the volume of the following water tanks:

i) L = 16cm, B = 60cm, H = 20cm

Volume of water tank = L x B x H

= 16cm x 60cm x 20cm

$= 19200cm^3$

ii) L = 6cm, B = 3m and H = 5m

Volume = L x B x H

= 6 x 3 x 5 = $90m^3$

iii) L = 17mm , B = 0.2cm ; H = 12mm
in cubic cm

Length = 17 mm

$= \frac{17}{10} = 1.7$ cm

Height = 12 mm

$= \frac{12}{10} = 1.2$ cm

Breadth = 0.2 cm

Volume = 1.7cm × 1.2cm × 0.2cm

$= 0.408\ cm^3$

Q # 22

A person made a shoe box with length 10cm, breadth 8cm and height 6cm. Find volume of a box.

Volume of a box = 10 cm × 8cm × 6cm

= 480

Q #23
A water tank is 40cm long, 15cm board and 10 cm high. What is its volume in cubic cm?

Volume = 10cm x 40cm x 15cm

= 6000 cm^3

Q #24 (a)
Find the no. of cubical boxes of cubical side 3 cm which can be accomodated in carton of dimensions 15cm x 9cm x 12cm.

Volume of carton = 15cm x 9cm x 12cm

= 1620 cm^3

No. of boxes = $\frac{\text{Volume of carton}}{\text{Volume of cubical box}}$

Volume of cubical box = 3cm x 3cm x 3cm

= 27 cm^3

No. of boxes = $\frac{1620\ cm^3}{27\ cm^3}$ = 60 cm^3

Q #24(b)

A cuboid measured as 60 centimeter by 15 centimeter by 34 centimeter. Find the volume of cuboid.

Volume of cuboid = 60cm x 15cm x 34cm

= 30600 cm^3

Q #25

How many bricks each 25cm long, 10cm wide and 7.5 cm thick will be req. for a wall 20m long, 2m high and 0.75m thick? If bricks sell at Rs. 1200 per thousand what will it costs to build the wall?

Length = 25 cm

Width = 10cm

Thickness = 7.5 cm

The volume of one brick is:

Volume of one brick = L x W x T

= 25cm x 10cm x 7.5cm

= 1875 cm^3

The dimensions of the wall are:

Length = 20m = 2000cm

Height = 2m = 200cm

Thickness = 0.75m = 75cm

The volume of the wall is

$= 2000 \times 200 \times 75$

$= 30,000,000$

$$\text{No. of bricks} = \frac{\text{Volume of wall}}{\text{Volume of one brick}}$$

$$= \frac{30,000,000}{1875}$$

$= 16,000$

The cost of 1000 bricks is Rs. 1200

Therefore, the cost of 16,000 bricks is:

$$\text{Cost of bricks} = \left(\frac{16,000}{1,000}\right) \times 1,200$$

$= 19,200$ Rs.

Number of bricks req = 16000 bri.

Cost to build the wall = Rs. 19,200

Q#26

Identify the type of each line based on its description.

i) A line that passes through two distinct points on a plane.

When a line passes through two distinct points on a plane, the correct term is line segment. A line segment is a part of a line that is bounded by two distinct endpoints.

ii) A line that intersects a circle at exactly one point.

A line that intersects a circle at exactly one point is called a tangent. A tangent to a circle touches the circle at only one point, and at that point it is perpendicular to the radius of the circle

iii) A line that does not intersect with another line in a plane.

This is a parallel line.

iv) A line that intersects with another line in a plane at a right angle.
A line that intersects another line in a plane at a right angle is called a perpendicular line. Perpendicular lines meet at an angle of 90 degrees.

v) A line that lies in the same plane as another line but does not intersect it.
A line that lies in the same plane as another line but does not intersect it is called a parallel line. Parallel lines have the same direction but never meet.

Q#27.
Consider a circle with center O and radius r = 6 units.
i) Find the circumference of a circle
Circumference of circle = $2\pi r$

$= 2\pi(6)$

$= 12\pi$

ii) Find the area of circle.

Area of circle $= \pi r^2$

$= \pi (6)^2$

$= 36\pi$ square.

iii) Determine the length an arc subtended by a central angle of 45°

$$\text{Arc length} = \frac{\theta}{360^\circ} \times 2\pi r$$

where,

θ is the central angle in degree

r is the radius of a circle.

π is approximately 3.1415

$\theta = 45^\circ$, $r = 6$ units

$$\text{Arc length} = \frac{45}{360^\circ} \times 2\pi \times 6$$

$$= \frac{1}{8} \times 12\pi \qquad = \frac{12\pi}{8}$$

$$= \frac{3}{2}\pi$$

$= \frac{3\pi}{4}$ $= 4.7124$ units.

iv) Calculate the area of the sector formed by a central angle of 90°

Area of sector $= \frac{\theta}{360^\circ} \times \pi r^2$

$\theta = 90^\circ$

Area of Sector $= \frac{90^\circ}{360^\circ} \times \pi (8)^2$

$= \frac{1}{4} \times \pi \times 36$

$= 9\pi$ Square

Q #28

Given a circle with center O and radius $r = 8$ units.

i) Find the circumference of circle.

Circumference of circle $= 2\pi r$

$= 2\pi(8)$

$= 16\pi$

ii) Find the area of the circle.

Area of circle $= \pi r^2$

$= \pi (8^2)$

$= 64\pi$ square.

iii) Determine the length of an arc subtended by a central angle of 60°

Length of an arc $= \frac{\theta}{360^\circ} \times 2\pi r$

where $\theta = 60^\circ$

$= \frac{60^\circ}{360^\circ} \times 2\pi (8)$

$= \frac{1}{6} \times 16\pi$

$= \frac{16^8\pi}{6_3}$

$= \frac{8\pi}{3}$ square.

iv) Calculate the area of the sector formed by a central angle of 120°

Area of Sector $= \frac{\theta}{360^\circ} \times \pi r^2$

$\theta = 120^\circ$

Area of Sector $= \frac{120^\circ}{360^\circ} \times \pi (8^2)$

$= \frac{1}{3} \times 64\pi$

$= \frac{64\pi}{3}$ square

#29

Identify the type of each polygon based on its description.

i) A polygon with 4 sides, where all sides are equal in length and all interior angles are right angles.

It is a Square

ii) A polygon with 6 sides, where all sides are equal in length and all interior angles are equal.

It is Regular Hexgon

iii) A polygon with 5 sides, where all sides are equal in length and all interior angles are equal.

It is Regular Pentagon.

iv) A polygon with 3 sides, where all sides are equal in length.

It is Equilateral triangle.

v) A polygon with 8 sides, where no sides are equal in length but all interior angles are equal.

It is a Regular octagon

Q #30

Consider a regular polygon P with n sides, where each side has a length of s units. Given that n = 6 and s = 8 units, find

i) The perimeter of the regular polygon P.

Perimeter of polygon = n x s

$= 6 \times 8$

$= 48^\circ$ ~~marks~~

ii) Find interior angle of polygon P.

$$\text{Interior angle} = \frac{(n-2) \times 180^\circ}{n}$$

where $n = 6$

$$= \frac{(6-2) \times 180^\circ}{6}$$

$$= 120^\circ$$

iii) The measure of each exterior angle of the regular polygon P.

$n = 6$

$$\text{Exterior angle} = \frac{360^\circ}{n}$$

$$= \frac{360^\circ}{6}$$

$$= 60^\circ$$