Exercise 1.1

Q 1 (A) Determine which of the following pairs of angles are Co-terminal.

i) $210°, -150°$

$= 210 - (-150)°$

$= 210 + 150$

$= 360°$

∴ the given pair of angles are Co-terminal.

ii) $360°, -30°$

$= 360 - (-30)$

$= 360 + 30$

$= 390°$

$\neq$ multiple of $360°$

∴ the given pair of angles are Co-terminal.

iii) $-180°, 540°$

$= 540° - (-180°)$

$= 540 + 180$

$= 720°$

$= 2 \times 360°$

∴ the given pair of angles are Co-terminal.

iv) $-405°, 675°$

$= 675° - (-405)°$

$= 675 + 405$

$= 1080$

$= 3 \times 360°$

∴ Given pair of angles are Co-terminal.

v) $860°, 580°$

$= 860 - 580$

$= 280°$

$\neq$ multiple of $360°$

∴ Given pair of angles are Co-terminal.

vi) $900, -900^\circ$

$= 900 - (-900)$

$= 900 + 900$

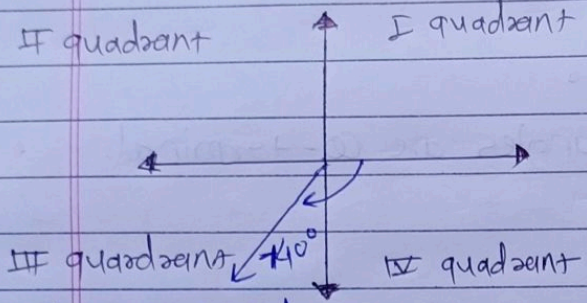
$= 1800^\circ$

$= 5 \times 360^\circ$

∴ The given pair of angles are co-terminal.

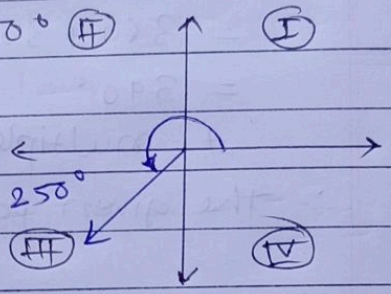
Q I (B) Draw the angles of the following measures and determine their quadrant.

i) -140°



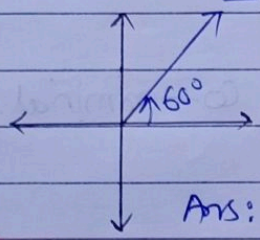
Ans – III quadrant.

ii) 250°



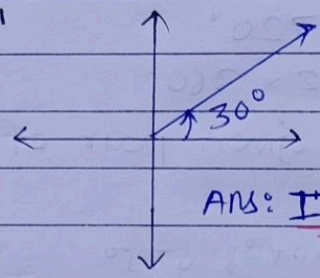
Answer - III quadrant

(iii) $420^\circ = 360^\circ + 60^\circ$



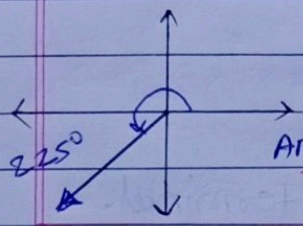
Ans: I quadrant

(iv) $750^\circ = 720 + 30^\circ$



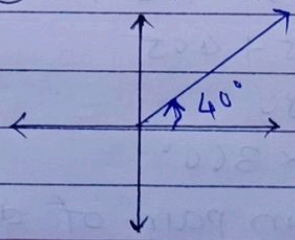
Ans: I quadrant

(v) $945^\circ = 720^\circ + 225^\circ$



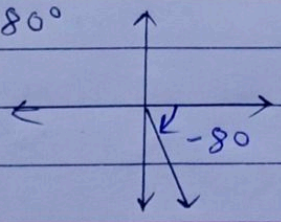
Ans: III quadrant

(vi) $1120 = 1080 + 40^\circ$



Ans: I quadra

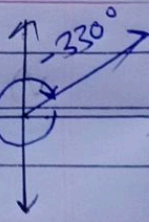
(vii) -80°



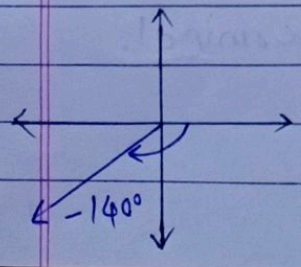
Answer
IV quadrant

(viii) -330°

Answer
I quadrant

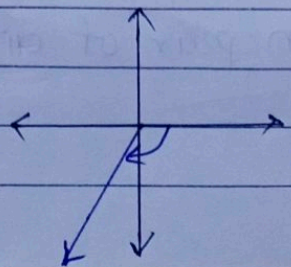


(ix) $-500^\circ = -360^\circ - 140^\circ$



Answer
IV
quadrant

(x) $-820^\circ = -720^\circ - 100^\circ$



Answer
III
quadrant

Q2) Convert the following angles in to radian

i) $85^\circ = \left(\frac{85 \times \pi}{180}\right)^c = \left(\frac{17\pi}{36}\right)^c$

ii) $250^\circ = \left(\frac{250 \times \pi}{180}\right)^c = \frac{25\pi^c}{18}$

iii) $-132^\circ = -132 \times \frac{\pi}{180}^c = \frac{-11\pi}{15}^c$

iv) $65^\circ 30' = 65^\circ + 30'$

$= 65^\circ + \frac{30}{60}^\circ$

$= 65^\circ + 0.5^\circ$

$= 65.5^\circ$

$= \left(65.5 \times \frac{\pi}{180}\right)^c$

$= \frac{655\pi}{1800}$

$= \frac{131\pi^c}{360}$ ... [Divided by 5]

v) $75^\circ 30' = 75.5^\circ$

$= \left(75.5 \times \frac{\pi}{180}\right)^c$

$= \frac{755\pi}{1800}^c$

$= \frac{151\pi}{360}^c$ ... [Divided by 5]

v) $40^\circ 48' = 40^\circ + 48'$

$= 40^\circ + \frac{48}{60}^\circ$

$= 40^\circ + 0.8^\circ$

$= 40.8^\circ$

$= \left(40.8 \times \frac{\pi}{180}\right)^c$

$= \frac{408\pi}{1800}$

$= \frac{51\pi}{225}^c$

Q3) Convert the following angles in degrees.

i) $\frac{7\pi}{12}^c = \left(\frac{7\pi}{12} \times \frac{180}{\pi}\right)^\circ = \frac{7\times180^\circ}{12} = 7\times15 = \underline{105^\circ}$

ii) $\frac{-5\pi}{3} = \left(\frac{-5\pi}{3} \times \frac{180}{\pi}\right)^\circ = -5\times60 = \underline{-300^\circ}$

(iii) $-5^c = \left(-5\times\frac{180}{\pi}\right)^\circ = -\frac{900^\circ}{\pi}$

iv) $\frac{11\pi}{18}^c = \left(\frac{11\cancel{\pi}}{18} \times \frac{180}{\cancel{\pi}}\right)^\circ = 11\times10 = \underline{110^\circ}$

v) $\left(\frac{-1}{4}\right)^c = \left(\frac{-1}{4}\times\frac{180}{\pi}\right)^\circ = \left(\frac{-45}{\pi}\right)^\circ$

Q4) Express the following angles in degree, minute and second

i) $(183.7)^\circ = 183^\circ + 0.7^\circ$

$= 183 + (0.7\times60)'$

$= 183^\circ + \cancel{(4.2)'}\ 42'$

$= \cancel{183^\circ 4' + (0.2)''}$

$= \cancel{183^\circ 4' + (0.2\times60)''}$

$= \cancel{183^\circ 4' 12''}$

$= \underline{183^\circ 42'}$

2) $245.33^\circ = 245^\circ + 0.33^\circ$

$= 245^\circ + (0.33 \times 60)'$

$= 245^\circ + (19.8)'$

$= 245^\circ + 19' + 0.8'$

$= 245^\circ 19' + (0.8 \times 60)''$

$= 245^\circ 19' + 48''$

$= 245^\circ 19' 48''$

3) $\left(\frac{1}{5}\right)^c = \left(\frac{1}{5} \times \frac{180^\circ}{\pi}\right)^\circ$

$= \left(\frac{36}{\pi}\right)^\circ = \frac{36}{\frac{22}{7}} = \frac{36 \times 7}{22} = \frac{18 \times 7}{11}$

$= \left(\frac{126}{11}\right)^\circ$

$= 11.45^\circ$

$= 11^\circ + 0.45^\circ$

$= 11^\circ + (0.45 \times 60)'$

$= 11^\circ + 27'$

$= 11^\circ 27'$

Q5) In $\triangle ABC$, if $m\angle A = \frac{7\pi}{36}^c$, $m\angle B = 120^\circ$ find $m\angle C$ in degree and radian.

→ $m\angle A = \frac{7\pi}{36}^c = \left(\frac{7\pi}{36} \times \frac{180}{\pi}\right)^c = 7 \times 5 = 35^\circ$

$m\angle B = 120^\circ$

$m\angle C = ?$

Sum of all angle of $\triangle$ is 180°

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

$\therefore 35^\circ + 120^\circ + \angle C = 180^\circ$

$\therefore 155^\circ + \angle C = 180^\circ$

$\angle C = 180^\circ - 155$

$\boxed{\angle C = 25^\circ}$

$m\angle C = 25^\circ = 25 \times \frac{\pi}{180}^c = \frac{5\pi}{36}^c$

96) Two angles of a triangle are $\frac{5\pi}{9}^c$ and $\frac{5\pi}{18}^c$ find the degree and radian measure of third angle.

→ Let In $\triangle ABC$, $\angle A = \frac{5\pi}{9}^c = \left(\frac{5\pi}{9} \times \frac{180}{\pi}\right)^\circ = \underline{100^\circ}$

$\angle B = \frac{5\pi}{18}^c = \left(\frac{5\pi}{18} \times \frac{180}{\pi}\right)^\circ = \underline{50^\circ}$

$\angle C = ?$

Sum of all angles of $\triangle$ is 180°

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

$100 + 50 + \angle C = 180$

$150^\circ + \angle C = 180^\circ$

$\angle C = 180^\circ - 150^\circ$

$\boxed{\angle C = 30^\circ}$

$\therefore \angle C = \left(30 \times \frac{\pi}{180}\right)^c = \left(\frac{\pi}{6}\right)^c$

97) In a right angled $\triangle$, the acute angle are in the ratio 4:5. Find the angle of triangle in degree and radian

→ Let In right angled $\triangle ABC$ $\angle A$ and $\angle B$ are acute $\angle C$ is right angle

$\therefore \angle C = 90^\circ$

$\therefore \angle A : \angle B = 4:5$

$\therefore \angle A = 4x$ and $\angle B = 5x$

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

$4x + 5x + 90 = 180$

$9x + 90 = 180$

$9x = 180 - 90$

$9x = 90$

$x = \frac{90}{9}$

$\therefore \boxed{x = 10}$

measure in degree

$\angle A = 4x = 4 \times 10 = \underline{40^\circ}$

$\angle B = 5x = 5 \times 10 = 50^\circ$

$\angle C = 90^\circ$

Measure in radian

$\angle A = \left(40 \times \frac{\pi}{180}\right)^c = \frac{2\pi}{9}^c$

$\angle B = \left(50 \times \frac{\pi}{180}\right)^c = \frac{5\pi}{18}^c$

$\angle C = \left(90 \times \frac{\pi}{180}\right)^c = \frac{\pi}{2}^c$

8) The sum of two angles is $5\pi^c$ and their diff. is 60°. find their measure in degree.

→ Let Greater angle $= x^\circ$

Small angle $= y^\circ$

the sum of two angles $= 5\pi^c$

$$= \left(\frac{5\pi \times 180}{\pi}\right)^\circ$$

$$= 900^\circ$$

$\therefore x + y = 900^\circ \longrightarrow (I)$

Diff. betwn angles $= 60^\circ$

$\therefore x - y = 60^\circ \longrightarrow (II)$

Equation (I) + Equation (II)

$$x + y = 900$$
$$+\ x - y = 60$$
$$2x = 960$$
$$x = \frac{960}{2}$$
$$\boxed{x = 480^\circ}$$

place $x = 480^\circ$ in eqn (I)

$x + y = 900$

$480 + y = 900$

$y = 900 - 480$

$\boxed{y = 420^\circ}$

The measure of angles in degrees $= 480^\circ$ and 420°

9) The measure of the angles of triangles are in the ratio 3:7:8. find their measures in degrees and radian.

→ ~~Let measure of angles~~

Ratio of measure of angles of $\Delta = 3:7:8$

$\therefore$ measure of angles are in degree $= 3x, 7x, 8x$

let in ΔABC, $\angle A = 3x$, $\angle B = 7x$, $\angle C = 8x$

sum of angles of Δ is 180°

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

$\therefore 3x + 7x + 8x = 180^\circ$

$18x = 180^\circ$

$\boxed{x = 10^\circ}$

$\therefore$ measure of angles in degree

$\angle A = 3x = 3 \times 10 = 30^\circ$

$\angle B = 7x = 7 \times 10 = 70^\circ$

$\angle C = 8x = 8 \times 10 = 80^\circ$

Measure of angles are in Radian

$\angle A = \left(\frac{30 \times \pi}{180}\right)^c = \frac{\pi}{6}^c$

$\angle B = \left(\frac{70 \times \pi}{180}\right)^c = \frac{7\pi}{18}^c$

$\angle C = \left(\frac{80 \times \pi}{180}\right)^c = \frac{4\pi}{9}^c$

Q10) The measure of the angles of a triangles are in A.P. and the greatest is 5 times the smallest. find the angles are in degrees and radian.

→ Let in $\triangle ABC$

Measures of angles of $\triangle ABC$ are in A.P

$\therefore \angle A = a-d$

$\angle B = a$

$\angle C = a+d$

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

$\therefore a-d+a+a+d = 180$

$3a = 180$

$\boxed{a = 60°}$

the greatest angle is the 5 times smallest

$\therefore (a+d) = 5(a-d)$

$\therefore a+d = 5a-5d$

$\therefore 60+d = 5\times60-5d$

$\therefore 5d+d = 5\times60-60$

$\therefore 6d = 300-60$

$\therefore 6d = 240$

$\boxed{d = 40}$

measure of angles in degree

$\angle A = a-d = 60-40 = \underline{20°}$

$\angle B = a = \underline{60°}$

$\angle C = a+d = 60+40 = \underline{100°}$

measure of angle in

$\angle A = \left(20\times\frac{\pi}{180}\right)^c = \frac{\pi}{9}\,c$

$\angle B = \left(60\times\frac{\pi}{180}\right)^c = \frac{\pi}{3}\,c$

$\angle C = \left(100\times\frac{\pi}{180}\right)^c = \frac{5\pi}{9}\,c$