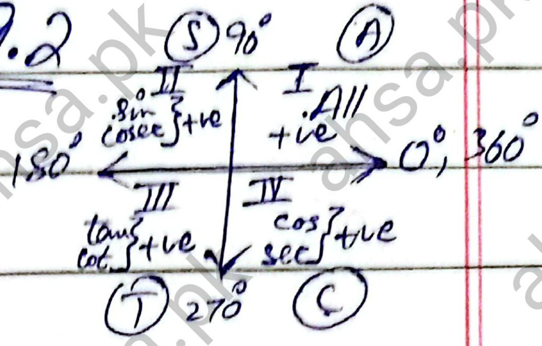
Exercise 9.2



Q1:-

i) $\sin 160°$

$= +ve$

Q2:-

$\sin(-\theta) = -\sin\theta$, $\csc(-\theta) = -\csc\theta$

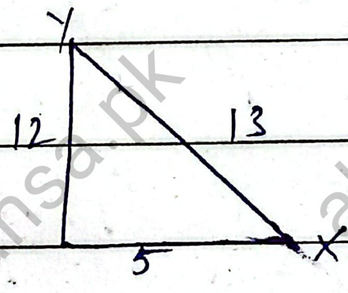
$\cos(-\theta) = \cos\theta$, $\sec(-\theta) = \sec\theta$

$\tan(-\theta) = -\tan\theta$, $\cot(-\theta) = -\cot\theta$

Q3:-

Quadrants

Q4:-



i) $\sin\theta = \frac{12}{13}$

Using Pythagorus Theorem

$(hyp)^2 = (base)^2 + (perp)^2$

$(13)^2 = (base)^2 + (12)^2$

$169 = (base)^2 + 144$

$169 - 144 = (base)^2$

$25 = (base)^2$

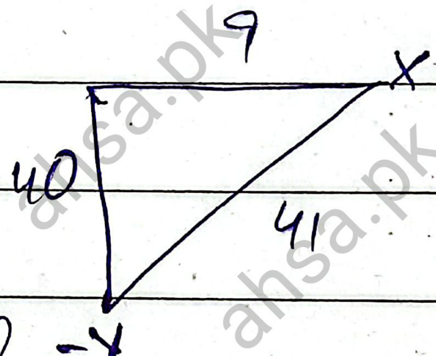
$5 = \text{base}$

$\sin\theta = \frac{12}{13}$, $\operatorname{cosec}\theta = \frac{13}{12}$

$\cos\theta = \frac{5}{13}$, $\sec\theta = \frac{13}{5}$

$\tan\theta = \frac{12}{5}$, $\cot\theta = \frac{5}{12}$

iii) $\cos\theta = \frac{9}{41}$



Using Pythagorus theorem

$(\text{hyp})^2 = (\text{base})^2 + (\text{perp})^2$

$(41)^2 = (9)^2 + (\text{perp})^2$

$1681 = 81 + (\text{perp})^2$

$1681 - 81 = (\text{perp})^2$

$1600 = (\text{perp})^2$

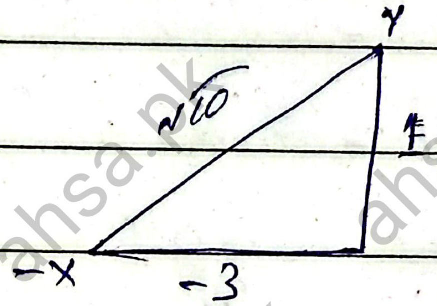
$40 = \text{perp}$

$\sin\theta = \frac{-40}{41}$, $\operatorname{cosec}\theta = -\frac{41}{40}$

$\cos\theta = \frac{9}{41}$, $\sec\theta = \frac{41}{9}$

$\tan\theta = -\frac{40}{9}$, $\cot\theta = -\frac{9}{40}$

iv) $\tan\theta = -\frac{1}{3}$



Using Pythagorus Theorem

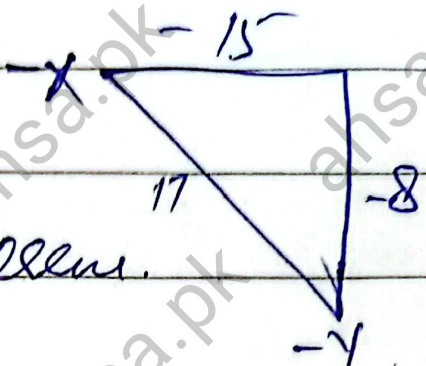
$$(hyp)^2 = (base)^2 + (perp)^2$$
$$(hyp)^2 = (-3)^2 + (1)^2$$
$$(hyp)^2 = 9+1$$
$$(hyp)^2 = 10$$
$$hyp = \sqrt{10}$$

$\sin\theta = \frac{1}{\sqrt{10}}$, $\operatorname{cosec}\theta = \frac{\sqrt{10}}{1}$

$\cos\theta = \frac{-3}{\sqrt{10}}$, $\sec\theta = -\frac{\sqrt{10}}{3}$

$\tan\theta = -\frac{1}{3}$, $\cot\theta = -\frac{3}{1}$

Q5:- $\cot\theta = \frac{15}{8}\,\frac{B}{P}$



Using Pythagorus Theorem.

$(hyp)^2 = (base)^2 + (perp)^2$

$(hyp)^2 = (15)^2 + (8)^2$

$(hyp)^2 = 225 + 64$

$(hyp)^2 = 289$

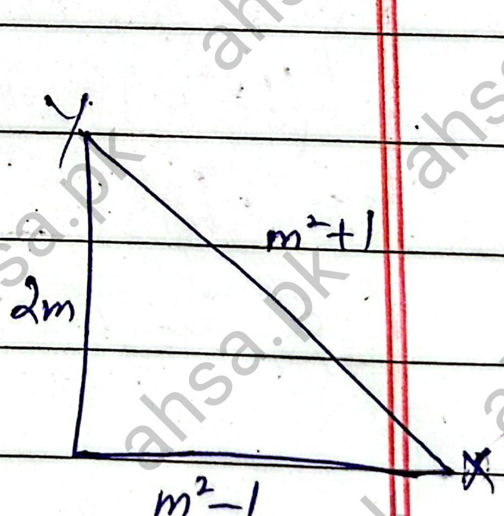
$\sqrt{(hyp)^2} = \sqrt{17^2}$

$hyp = 17$

$\cos\theta = \frac{B}{H} = \frac{-15}{17}$

$\mathrm{cosec}\,\theta = \frac{H}{P} = \frac{17}{-8}$

Q6:- $\mathrm{cosec}\,\theta = \frac{m^2+1}{2m}$



Using Pythagorus Theorem

$(hyp)^2 = (base)^2 + (perp)^2$

$$(m^2+1)^2 = (base)^2 + (2m)^2$$

$$(m^2)^2 + 2(m^2)(1) + (1)^2 = (base)^2 + 4m^2$$

$$m^4 + 2m^2 + 1 - 4m^2 = (base)^2$$

$$m^4 - 2m^2 + 1 = (base)^2$$

$$(m^2-1)^2 = (base)^2$$

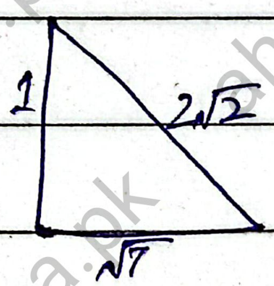
$$m^2 - 1 = base$$

$$\sin\theta = \frac{P}{H} = \frac{2m}{m^2+1}, \quad \operatorname{cosec}\theta = \frac{H}{P} = \frac{m^2+1}{2m}$$

$$\cos\theta = \frac{B}{H} = \frac{m^2-1}{m^2+1}, \quad \sec\theta = \frac{H}{B} = \frac{m^2+1}{m^2-1}$$

$$\tan\theta = \frac{P}{B} = \frac{2m}{m^2-1}, \quad \cot\theta = \frac{B}{P} = \frac{m^2-1}{2m}$$

Q7:- $\tan\theta = \dfrac{1}{\sqrt{7}}$



Using Pythagorous Theorem

$$(hyp)^2 = (base)^2 + (perp)^2$$

$$(hyp)^2 = (\sqrt{7})^2 + (1)^2$$

$$(hyp)^2 = 7 + 1$$

$(hyp)^2 = 8$

$hyp = \sqrt{8}$

$hyp = 2\sqrt{2}$

$\csc\theta = \frac{H}{P} = \frac{2\sqrt{2}}{1} = 2\sqrt{2}$

$\sec\theta = \frac{H}{B} = \frac{2\sqrt{2}}{\sqrt{7}}$

$$\frac{\csc^2\theta - \sec^2\theta}{\csc^2\theta + \sec^2\theta} = \frac{(2\sqrt{2})^2 - \left(\frac{2\sqrt{2}}{\sqrt{7}}\right)^2}{(2\sqrt{2})^2 + \left(\frac{2\sqrt{2}}{\sqrt{7}}\right)^2}$$

$$= \frac{\frac{8}{1} - \frac{8}{7}}{8 + \frac{8}{7}}$$

$$= \frac{\frac{56-8}{\cancel{7}}}{\frac{56+8}{\cancel{7}}}$$

$$= \frac{48}{64} \; (\div 16)$$

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