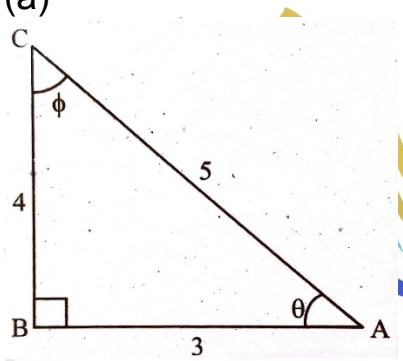
# Exercise 6.2

Q.1 For each of the following right-angled triangles, find the trigonometric ratios

(i) $\sin\ \theta$
(ii) $\cos\ \theta$
(iii)$\tan\theta$
(iv) $\sec\ \theta$
(v) $\text{cosec}\theta$
(vi) $\cot\ \phi$
(vii) $\tan\ \phi$
(viii) $\text{cosec}\phi$
(ix) $\sec\ \phi$
(x) $\cos\ \phi$

Solution:

(a)






(i) $\sin\ \theta$

$$\sin\ \theta = \frac{4}{5}$$

(ii) $\cos\ \theta$

$$\cos\ \theta = \frac{3}{5}$$

(iii) $\boldsymbol{\tan\theta}$

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

(iv) $\sec\ \theta$

$$\sec\ \theta = \frac{5}{3}$$

(v) $\text{cosec}\theta$

$\text{cosec}\theta = \frac{5}{4}$

(vi) $\cot \phi$

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

(vii) $\tan\phi$

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

(viii) $\text{cosec}\phi$

$$\text{cosec}\phi = \frac{5}{3}$$

(ix) $\sec \phi$

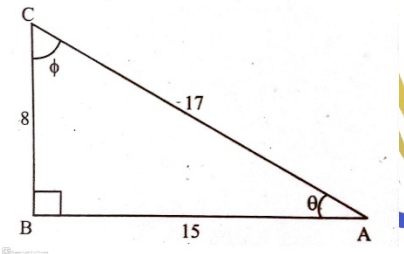
$$\sec \phi = \frac{5}{4}$$

(x) $\cos \phi$

$$\cos \phi = \frac{4}{5}$$

Solution:

(b)






(i) $\sin \theta$

$$\sin \theta = \frac{8}{17}$$

(ii) $\cos \boldsymbol{\theta}$

$$\cos \theta = \frac{15}{17}$$

(iii) $\tan \theta$

$$\tan \theta = \frac{8}{15}$$

(iv) sec 0

$$\sec \theta = \frac{17}{15}$$

(v) $\text{cosec}\theta$

$$\text{cosec}\theta = \frac{17}{8}$$

(vi) $\cot \phi$

$$\cot \phi = \frac{8}{15}$$

(vii) $\tan \phi$

$$\tan \phi = \frac{15}{8}$$

(viii) $\text{cosec}\phi$

$$\text{cosec}\phi = \frac{17}{15}$$

(ix) $\sec \phi$

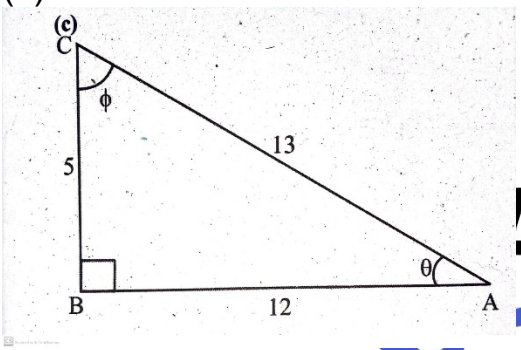
$$\text{cosec}\phi = \frac{17}{8}$$

(x) $\cos \phi$

$$\cos \phi = \frac{8}{17}$$

Solutions:

(c)






(i) $\sin \theta$

$$\sin \theta = \frac{5}{13}$$

(ii) $\cos \theta$

$$\cos \theta = \frac{12}{13}$$

(iii) $\boldsymbol{\tan\theta}$

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

(iv) $\sec \theta$

$$\sec \theta = \frac{13}{12}$$

(v) $\text{cosec}\theta$

$$\text{cosec}\theta = \frac{13}{5}$$

(vi) $\cot \phi$

$$\cot \phi = \frac{5}{12}$$

(vii) **tan**$\phi$

$$\tan \phi = \frac{12}{5}$$

(viii) cosec$\phi$

$$\text{cosec}\phi = \frac{13}{12}$$

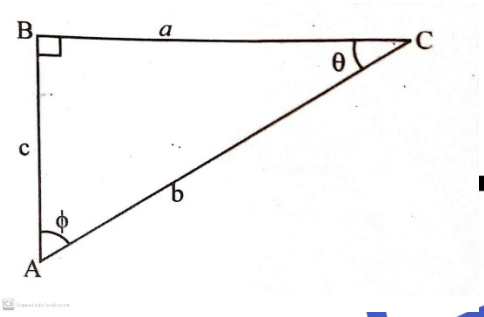
(ix) sec $\phi$

$$\sec \phi = \frac{13}{5}$$

(x) cos $\phi$

$$\cos \phi = \frac{5}{13}$$

Q. 2 For the following right-angled triangles $ABC$ find the trigonometric ratios for which $m\angle A = \phi$ and $m\angle C = \theta$






(i) sin $\theta$

Solution:

$$\sin \theta = \frac{\text{Perp.}}{\text{Hyp.}} = \frac{m\overline{AB}}{m\overline{AC}} = \frac{c}{b}$$

(ii) cos $\theta$

Solution:

$$\cos \theta = \frac{\text{Base}}{\text{Hyp.}} = \frac{\text{m}\,\overline{\text{BC}}}{\text{mAC}} = \frac{a}{\text{b}}$$

(iii) tan $\theta$

Solution:

$$\tan \theta$$

$$\tan \theta = \frac{\text{Perp.}}{\text{Base}} = \frac{\text{m}\,\overline{\text{AB}}}{\text{m}\,\overline{\text{BC}}} = \frac{\text{c}}{a}$$

(iv) sin $\phi$

Solution:

$$\sin \phi$$

$$\sin\phi = \frac{\text{Perp.}}{\text{Hyp.}} = \frac{\text{m}\,\overline{BC}}{\text{m}\,\overline{AC}} = \frac{a}{\text{b}}$$

(v) $\cos\phi$

Solution:

$\cos\phi$

$$\tan\phi = \frac{\text{Base}}{\text{Hyp.}} = \frac{m\,\overline{AB}}{m\,\overline{AC}} = \frac{c}{b}$$

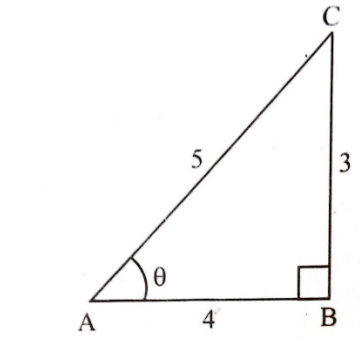
(vi) $\tan\phi$

Solution:

$\tan\phi$

$$\tan\phi = \frac{\text{Perp}}{\text{Base}} = \frac{\text{m}\,\overline{BC}}{\text{m}\,\overline{AB}} = \frac{a}{\text{c}}$$

Q. 3 Considering the adjoining triangle Verify that:






(i) $\sin\theta\text{cosec}\theta = 1$

Solution:

$$\sin\theta\text{cosec}\theta = 1$$

From right angled - triangle ABC

$$\sin\theta = \frac{3}{5}$$

$$\text{cosec}\theta = \frac{5}{3}$$

Multiplying (i) and (ii)

$$\sin\theta\text{cosec}\theta = \frac{3}{5}\times\frac{5}{5}$$

$$\sin\theta\sec\theta = 1 = \text{RHS}$$

(ii) $\cos\theta\sec\theta = 1$

Solution:

$$\cos\theta\sec\theta = 1$$

From right angled - triangle ABC

$$\cos\theta = \frac{4}{5}$$

$$\sec\theta = \frac{5}{4}$$

Multiplying (i) and (ii)

$$\cos\theta \cdot \sec\theta = \frac{4}{5} \times \frac{5}{4}$$

$$\cos\theta \cdot \sec\theta. = 1 = \text{ R.H.S}$$

(iii) $\tan\theta\cot\theta = 1$

Solution:

$$\tan\theta \cdot \cot\theta = 1$$

From right angled - triangle ABC

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

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

Multiplying (i) and (ii)

$$\tan\theta \cot\theta = \frac{3}{4} \times \frac{4}{3}$$

$\tan\theta \cdot \cot\theta = 1$ R.H.S



Q. 4 Fill in the blanks.

Solution:

(i) $\sin 30^\circ = \sin\ (90^\circ - 60^\circ) = \cos 60^\circ$

(ii) $\cos 30^\circ = \cos\ (90^\circ - 60^\circ) = \sin 60^\circ$

(iii) $\tan 30^\circ = \tan\ (90^\circ - 60^\circ) = \cot 60^\circ$

(iv) $\tan 60^\circ = \tan\ (90^\circ - 30^\circ) = \cot 30^\circ$

(v) $\sin 60^\circ = \sin\ (90^\circ - 30^\circ) = \cos 30^\circ$

(vi) $\cos 60^\circ = \cos\ (90^\circ - 30^\circ) = \sin 30^\circ$

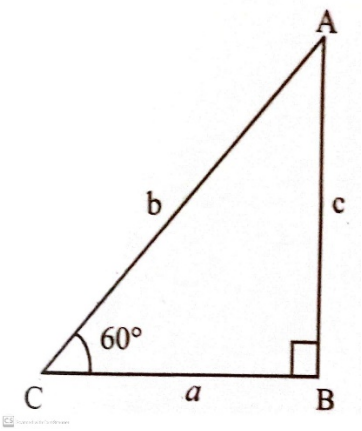
(vii) $\sin 45^\circ = \sin\ (90^\circ - 45^\circ) = \cos 45^\circ$

(viii) $\tan 45^\circ = \tan\ (90^\circ - 45^\circ) = \cot 45^\circ$

(ix) $\cos 45^\circ = \cos\ (90^\circ - 45^\circ) = \sin 45^\circ$

Q. 5 If in a right angled triangle $ABC$, $m\angle B = 90^\circ$ and $C$ is an acute angle of $60^\circ$. Also $\sin m\angle A = \frac{a}{b}$, then find the following trigonometric ratios.

Solution




(i) $\frac{m\overline{BC}}{m\overline{AB}}$

$$\frac{\text{m}\,\overline{\text{BC}}}{\text{m}\,\overline{\text{AB}}} = \frac{a}{\text{c}}$$

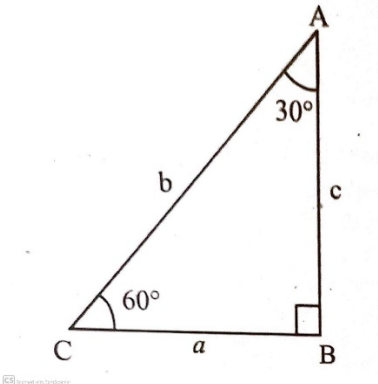
(ii) **cos60**°

$$\cos\ 60^\circ = \frac{a}{b}$$

(iii) tan 60°

$$\tan\ 60^\circ = \frac{c}{a}$$






(iv) $\text{cosec}\frac{\pi}{3} = \text{cosec}60^\circ$

Solution:

$$\text{cosec}\frac{\pi}{3} = \frac{\text{b}}{\text{c}} : \left(\because \frac{\pi}{3} = 60^\circ\right)$$

(v) cot 60°

$$\cot\ 60^\circ = \frac{a}{\text{c}}$$

(vi) **sin**30°

$$\sin\ 30^\circ = \frac{a}{b}$$

(vii) cos 30°

$$\cos 30^\circ = \frac{c}{b}$$

(viii) $\tan \frac{\pi}{6}$

$$\tan 30^\circ = \frac{a}{c}$$

$$\tan \frac{\pi}{6} = \frac{a}{c} \left( \because \frac{\pi}{6} = 30^\circ \right)$$

(ix) $\sec 30^\circ$

$$\sec 30^\circ = \frac{b}{c}$$

(x) $\cot 30^\circ$

$$\text{Cot}30^\circ = \frac{c}{a}$$