Trigonometric Ratios Ex 5.1 Q27

Answer :

Given:

$\tan\theta = \frac{24}{7}$ ..... (1)

To find:

$\sin\theta + \cos\theta$

Now we know $\tan\theta$ is defined as follows

$\tan\theta = \frac{\text{Perpendicular side opposite to}\angle\theta}{\text{Base side adjacent to}\angle\theta}$ ..... (2)

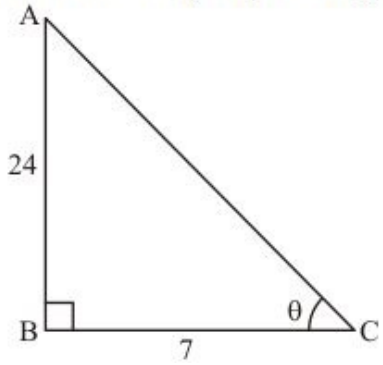
Now by comparing equation (1) and (2)

We get

Perpendicular side opposite to$\angle\theta$ = 24

Base side adjacent to$\angle\theta$ = 7

Therefore triangle representing angle θ is as shown below



Side *AC* is unknown and can be found using Pythagoras theorem

Therefore,

$$AC^2 = AB^2 + BC^2$$

Now by substituting the value of known sides from figure

We get,

$$AC^2 = 24^2 + 7^2$$
$$= 576 + 49$$
$$= 625$$

Now by taking square root on both sides

We get,

$$AC = \sqrt{625}$$
$$= 25$$

Therefore Hypotenuse side AC = 25 …… (3)

Now we know, $\sin\theta$ is defined as follows

$$\sin\theta = \frac{\text{Perpendicular side opposite to}\angle\theta}{\text{Hypotenuse}}$$

Therefore from figure (a) and equation (3)

We get,

$$\sin\theta = \frac{AB}{AC}$$
$$= \frac{24}{25}$$
$$\sin\theta = \frac{24}{25} \quad \text{…… (4)}$$

Now we know, $\cos\theta$ is defined as follows

$$\cos\theta = \frac{\text{Base side adjacent to}\angle\theta}{\text{Hypotenuse}}$$

Therefore from figure (a) and equation (3)

We get,

$$\cos\theta = \frac{BC}{AC}$$
$$= \frac{7}{25}$$
$$\cos\theta = \frac{7}{25} \quad \text{…… (5)}$$

Now we need to find the value of expression $\sin\theta + \cos\theta$

Therefore by substituting the value of $\sin\theta$ and $\cos\theta$ from equation (4) and (5) respectively, we get,

$$\sin\theta + \cos\theta = \frac{24}{25} + \frac{7}{25}$$
$$= \frac{24+7}{25}$$
$$= \frac{31}{25}$$

Hence $\sin\theta + \cos\theta = \frac{31}{25}$

********** END **********