Trigonometric Ratios Ex 5.3 Q10

**Answer :**

Given that: $\sin\theta = \cos(\theta - 45^\circ)$ where $\theta$ and $(\theta - 45^\circ)$ are acute angles

We have to find $\theta$

$$\sin\theta = \cos(\theta - 45^\circ)$$

$$\Rightarrow \cos(90^\circ - \theta) = \cos(\theta - 45^\circ)$$

$$\Rightarrow 90^\circ - \theta = \theta - 45^\circ$$

$$\Rightarrow -2\theta = -135^\circ$$

$$\Rightarrow \theta = \frac{135^\circ}{2}$$

Therefore $\boxed{\theta = 67\frac{1}{2}^\circ}$

Trigonometric Ratios Ex 5.3 Q11

**Answer :**

(i) We have to prove: $\sin\left(\frac{B+C}{2}\right) = \cos\frac{A}{2}$

Since we know that in triangle $ABC$

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

$$\Rightarrow B + C = 180^\circ - A$$

Dividing by 2 on both sides, we get

$$\Rightarrow \frac{B+C}{2} = 90^\circ - \frac{A}{2}$$

$$\Rightarrow \sin\frac{B+C}{2} = \sin\left(90^\circ - \frac{A}{2}\right)$$

$$\Rightarrow \boxed{\sin\frac{B+C}{2} = \cos\frac{A}{2}}$$

Proved

(ii) We have to prove: $\cos\left(\frac{B+C}{2}\right)=\sin\frac{A}{2}$

Since we know that in triangle $ABC$

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

$\Rightarrow B+C=180^\circ-A$

Dividing by 2 on both sides, we get

$\Rightarrow \frac{B+C}{2}=90^\circ-\frac{A}{2}$

$\Rightarrow \cos\frac{B+C}{2}=\cos\left(90^\circ-\frac{A}{2}\right)$

$\Rightarrow \boxed{\cos\frac{B+C}{2}=\sin\frac{A}{2}}$

Proved

Trigonometric Ratios Ex 5.3 Q12

**Answer :**

Given that: $\sin\left(2\theta+45^\circ\right)=\cos\left(30^\circ-\theta\right)$ where $\left(2\theta+45^\circ\right)$ and $\left(30^\circ-\theta\right)$ are acute angles

We have to find $\theta$

So we have

$\sin\left(2\theta+45^\circ\right)=\cos\left(30^\circ-\theta\right)$

$\Rightarrow \sin\left(2\theta+45^\circ\right)=\sin\left[90^\circ-\left(30^\circ-\theta\right)\right]$

$\Rightarrow 2\theta+45^\circ=90^\circ-30^\circ+\theta$

$\Rightarrow \theta=15^\circ$

Hence the value of $\theta$ is $\boxed{\theta=15^\circ}$

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