

Sine and Cosine Formulae and their Applications Ex-10.1 Q1

$$\angle A = 45^{\circ}, \angle B = 60^{\circ} \text{ and } \angle C = 75^{\circ}$$

Using sine rule,

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = k$$

$$\frac{a}{\sin 45} = \frac{b}{\sin 60} = \frac{c}{\sin 75} = k$$

$$\frac{a}{\frac{1}{\sqrt{2}}} = \frac{b}{\frac{\sqrt{3}}{2}} = \frac{c}{\frac{\sqrt{3}+1}{2\sqrt{2}}} = k$$

$$a:b:c=2:\sqrt{6}:(\sqrt{3}+1)$$

Sine and Cosine Formulae and their Applications Ex-10.1 Q2

$$\angle C = 105^{\circ}, \angle B = 45^{\circ}, \alpha = 2$$

From here we can calculate that

 $a \sin B = b \sin A$

$$\Rightarrow$$
 2 sin 45 = b sin 30

$$\Rightarrow 2 \times \frac{1}{\sqrt{2}} = b \times \frac{1}{2}$$

$$\Rightarrow \sqrt{2} = \frac{b}{2}$$

$$\Rightarrow b = 2\sqrt{2}$$

Sine and Cosine Formulae and their Applications Ex-10.1 Q3

$$a = 18, b = 24, c = 30, \angle C = 90^{\circ}$$

$$1et \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{\sin A}{18} = \frac{\sin B}{24} = \frac{\sin 90}{30}$$

$$\frac{\sin A}{18} = \frac{\sin B}{24} = \frac{1}{30}$$

$$\frac{\sin A}{18} = \frac{1}{30} \Rightarrow \sin A = \frac{18}{30} = \frac{3}{5}$$

$$\frac{\sin B}{24} = \frac{1}{30} \Rightarrow \sin B = \frac{24}{30} = \frac{4}{5}$$

$$\therefore \sin A = \frac{3}{5}, \sin B = \frac{4}{5}, \sin C = 1$$

Sine and Cosine Formulae and their Applications Ex-10.1 Q4

$$\frac{a-b}{a+b} = \frac{\tan\left(\frac{A-B}{2}\right)}{\tan\left(\frac{A+B}{2}\right)}$$

Let $a = k \sin A, b = k \sin B$ (Using sine rule)

$$LHS$$

$$= \frac{a - b}{a + b}$$

$$= \frac{k \sin A - k \sin B}{k \sin A + k \sin B}$$

$$= \frac{\sin A - \sin B}{\sin A + \sin B}$$

$$= \frac{2 \cos(\frac{A + B}{2}) \sin(\frac{A - B}{2})}{2 \sin(\frac{A + B}{2}) \cos(\frac{A - B}{2})}$$

$$= \frac{\tan(\frac{A - B}{2})}{\tan(\frac{A + B}{2})} = RHS$$

********* FND *******