Mathematics

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(Chapter – 8) (Introduction to Trigonometry)

(Class X)

Exercise 8.3

Question 1:

Evaluate

(I) $\frac{\sin 18^\circ}{\cos 72^\circ}$

(II) $\frac{\tan 26^\circ}{\cot 64^\circ}$

(III) cos 48° – sin 42°

(IV) cosec 31° – sec 59°

Answer 1:

(I) $\frac{\sin 18^\circ}{\cos 72^\circ} = \frac{\sin(90^\circ - 72^\circ)}{\cos 72^\circ} = \frac{\cos 72^\circ}{\cos 72^\circ} = 1$

(II) $\frac{\tan 26^\circ}{\cot 64^\circ} = \frac{\tan(90^\circ - 64^\circ)}{\cot 64^\circ} = \frac{\cot 64^\circ}{\cot 64^\circ} = 1$

(III) cos 48° – sin 42° = cos (90°– 42°) – sin 42°

= sin 42° – sin 42°

= 0

(iv) cosec 31° – sec 59° = cosec (90° – 59°) – sec 59°

= sec 59° – sec 59°

= 0

Question 2:

Show that

(I) tan 48° tan 23° tan 42° tan 67° = 1

(II) cos 38° cos 52° – sin 38° sin 52° = 0

Answer 2:

(I) tan 48° tan 23° tan 42° tan 67°

= tan (90° – 42°) tan (90° – 67°) tan 42° tan 67°

= cot 42° cot 67° tan 42° tan 67°

= (cot 42° tan 42°) (cot 67° tan 67°)

= (1) (1)

= 1

(II) cos 38° cos 52° − sin 38° sin 52°

= cos (90° − 52°) cos (90°−38°) − sin 38° sin 52°

= sin 52° sin 38° − sin 38° sin 52°

= 0

Question 3:

If tan 2A = cot (A− 18°), where 2A is an acute angle, find the value of A.

Answer 3:

Given that, tan 2A = cot (A− 18°)

cot (90° − 2A) = cot (A −18°)

90° − 2A = A− 18°

108° = 3A

A = 36°

Question 4:

If tan A = cot B, prove that A + B = 90°

Answer 4:

Given that, tan A = cot B

tan A = tan (90° − B)

A = 90° − B

A + B = 90°

Question 5:

If sec 4A = cosec (A− 20°), where 4A is an acute angle, find the value of A.

Answer 5:

Given that, sec 4A = cosec (A − 20°)

cosec (90° − 4A) = cosec (A − 20°)

90° − 4A= A− 20°

110° = 5A

A = 22°

Question 6:

If A, Band C are interior angles of a triangle ABC then show that

$$\sin\left(\frac{B+C}{2}\right)=\cos\frac{A}{2}$$

Answer 6:

We know that for a triangle ABC,

$\angle A + \angle B + \angle C = 180°$

$$\angle B + \angle C = 180° - \angle A$$

$$\frac{\angle B+\angle C}{2}=90°-\frac{\angle A}{2}$$

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

$$=\cos\left(\frac{A}{2}\right)$$

Question 7:

Express sin 67° + cos 75° in terms of trigonometric ratios of angles between 0° and 45°.

Answer 7:

sin 67° + cos 75°

= sin (90° − 23°) + cos (90° − 15°)

= cos 23° + sin 15°