RBSE Board

# TRIGONOMETRY RATIOS

## PREVIOUS YEAR QUESTIONS
[2015-19]

① Show that $\sin 28^\circ \cos 62^\circ + \cos 28^\circ \sin 62^\circ = 1$
[RBSE 2015, PART-B]

Sol Consider,

$$\sin 28^\circ \cos 62^\circ + \cos 28^\circ \sin 62^\circ = 1$$

$$\sin\theta = \cos(90-\theta)$$
$$\cos\theta = \sin(90-\theta)$$

Then,

$$\cos(90-28^\circ)\cos 62^\circ + \sin(90-28^\circ)\sin 62^\circ$$
$$= \cos 62^\circ \cos 62^\circ + \sin 62^\circ \sin 62^\circ$$
$$= \cos^2 62^\circ + \sin^2 62^\circ$$
$$= 1$$

② Find the value of $\frac{\tan 67^\circ}{\tan 23^\circ}$. [RBSE 2015, PART-B]

Sol Cosider,

$$\frac{\tan 67^\circ}{\tan 23^\circ}$$

$$\because \tan\theta = \cot(90-\theta)$$

$$\tan\theta = \frac{\cot(90^\circ - 67^\circ)}{\cot 23^\circ}$$

$$= \frac{\cot 23^\circ}{\cot 23^\circ} = 1$$

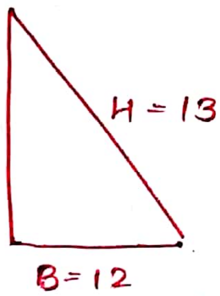
(3) If $\cos A = \frac{12}{13}$, then calculate $\cot A$ [RBSE 2016, PART-A]

Sol$^n$ Given that

| $\sin\theta$ | $\cos\theta$ | $\tan\theta$ |
|---|---|---|
| $\frac{P}{H}$ | $\frac{B}{H}$ | $\frac{P}{B}$ |
| $\operatorname{cosec}\theta$ | $\sec\theta$ | $\cot\theta$ |

$$\cos A = \frac{12}{13} = \frac{B}{H}$$

$$B = 12, \quad H = 13$$




$$H^2 = P^2 + B^2$$

$$P^2 = H^2 - B^2$$

$$= (13)^2 - (12)^2$$

$$= 169 - 144$$

$$P^2 = 25$$

$$P = \sqrt{25} = 5, \quad \text{So,} \quad \cot A = \frac{B}{P} = \frac{12}{5}$$

(4) If $\cos 3A = \sin(A - 34^\circ)$, where A is an acute angle find the value of A.

Sol We have,

$$\cos 3A = \sin(A - 34^\circ)$$

$$\cos 3A = \cos(90 - (A - 34))$$

$$3A = 90 - A + 34$$

$$3A + A = 90 + 34$$

$$4A = 124$$

$$A = \frac{124}{4} = 31$$

$$\boxed{A = 31}$$

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(5) If $\operatorname{cosec} A = \frac{17}{8}$, then calculate $\tan A$ [RBSE 2017-PART-A]

Sol$^n$ simplify the expression,

$$\operatorname{cosec} A = \frac{17}{8} = \frac{H}{B}$$

Using the pythog. th.

$$P^2 = H^2 - B^2$$
$$= (17)^2 - (8)^2$$
$$= 289 - 64$$
$$P^2 = 225$$
$$P = 15$$

Now, $\tan A = \frac{P}{B} = \frac{15}{8}$.

(6) Write the value of $\cos 50° \cdot \operatorname{cosec} 40°$ [RBSE 2018-PART-A]

Sol. Simplify the expression,

$$= \cos 50° \cdot \operatorname{cosec} 40°$$
$$= \cos 50° \operatorname{cosec} (90° - 50°) \quad [\operatorname{cosec}(90-\theta) = \sec \theta]$$
$$= \cos 50° \cdot \sec 50°$$
$$= \cos 50° \times \frac{1}{\cos 50°}$$
$$= 1.$$

Hence the value is 1.

(7) Find the value of $\tan^2 60° + 3\cos^2 30°$ [RBSE 2019- PART-A)

Sol. Simplify the expression,

$$= \tan^2 60° + 3\cos^2 30°$$

$$= (\sqrt{3})^2 + 3\left(\frac{\sqrt{3}}{2}\right)^2$$

$$= 3 + \frac{9}{4} = \frac{12+9}{4} = \frac{21}{4}$$

Hence the value is $\frac{21}{4}$

(8) If $\sin 2A = \cos(A - 18°)$. Find the value of A.

[RBSE 2019- PART-A]

Sol. Simplify the expression,

$$\cos(90 - 2A) = \cos(A - 18°) \quad [\sin 2A = \cos(90 - 2A)]$$

$$90° - 2A = A - 18°$$

$$2A + A = 90 + 18$$

$$3A = 108$$

$$A = \frac{108}{3} = 36°$$

Hence the value is 36°

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