

## MATHS

### BOOKS - ICSE

### TRIGONOMETRY

#### Topic 1 Trigonometric Ratios 3 Marks Questions

1. Given :  $\sin \theta = \frac{p}{q}$ , find  $\cos \theta + \sin \theta$  in terms of p and q.

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2. If  $\operatorname{cosec} \theta = \sqrt{5}$ , find the value of

(i)  $2 - \sin^2 \theta - \cos^2 \theta$

(ii)  $2 + \frac{1}{\sin^2 \theta} - \frac{\cos^2 \theta}{\sin^2 \theta}$

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3. If  $\sec A = \sqrt{2}$ , find the value of :

$$\frac{3 \cos^2 A + 5 \tan^2 A}{4 \tan^2 A - \sin^2 A}$$

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4. In the given figure,  $\angle C = 90^\circ$  and D is mid-point of AC. Find :

(i)  $\frac{\tan \angle CAB}{\tan \angle CDB}$

(ii)  $\frac{\tan \angle ABC}{\tan \angle DBC}$



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5. Given :  $q \tan A = p$ , find the value of :

$$\frac{p \sin A - q \cos A}{p \sin A + q \cos A}$$

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6. In rectangle ABCD, diagonal  $BD = 26$  cm and cotangent of angle  $ABD = 1.5$ . Find the area and the perimeter of the rectangle ABCD.

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7. If  $2 \sin x = \sqrt{3}$ , evaluate

(i)  $4 \sin^3 x - 3 \sin x$

(ii)  $3 \cos x - 4 \cos^3 x$

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8. If  $\operatorname{cosec} A + \sin A = 5\frac{1}{5}$ , find the value of  $\operatorname{cosec}^2 A + \sin^2 A$ .

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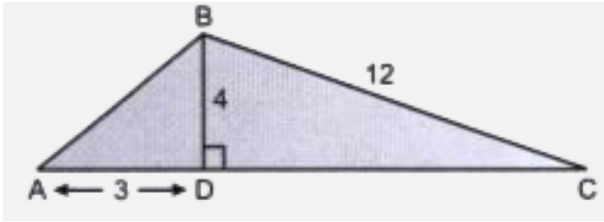
9. If  $13 \sin A = 12$

Find  $\sec A - \tan A$ .

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## Topic 1 Trigonometric Ratios 4 Marks Questions

1. From the following figure, find the values of :



(i)  $\cos A$

(ii)  $\operatorname{cosec} A$

(iii)  $\tan^2 A - \sec^2 A$

(iv)  $\sin C$

(v)  $\sec C$

(vi)  $\cot^2 C - \frac{1}{\sin^2 C}$



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2. Given :  $\cos A = \frac{5}{13}$

Evaluate : (i)  $\frac{\sin A - \cot A}{2 \tan A}$

(ii)  $\cot A + \frac{1}{\cos A}$



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3. If  $\cos A = \frac{1}{2}$  and  $\sin B = \frac{1}{\sqrt{2}}$  , find the value of :

$\frac{\tan A - \tan B}{1 + \tan A \tan B}$  : Here angles A and B from different right triangle



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4. In the following figure :

$AD \perp BC$ ,  $AC = 26$ ,  $CD = 10$ ,  $BC = 42$ ,  $\angle DAC = x$  and  $\angle B = y$

Find the value of :

(i)  $\cot x$

(ii)  $\frac{1}{\sin^2 y} - \frac{1}{\tan^2 y}$

(iii)  $\frac{6}{\cos x} - \frac{5}{\cos y} + 8 \tan y$



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5. In the given, figure triangle ABC is right angled at B. D is the foot of the perpendicular from B to AC. Given that  $BC = 3$  cm and  $AB = 4$  cm. Find :

(i)  $\tan \angle DBC$

(ii)  $\sin \angle DBA$



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6. In the figure, given below, ABC is an isosceles triangle with  $BC = 8$  cm and  $AB = AC = 5$  cm. Find :

(i)  $\sin B$

(ii)  $\tan C$

(iii)  $\sin^2 B + \cos^2 B$

(iv)  $\tan C - \cot B$

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7. Given :  $4 \sin \theta = 3 \cos \theta$ , find the value of :

(i)  $\sin \theta$

(ii)  $\cos \theta$

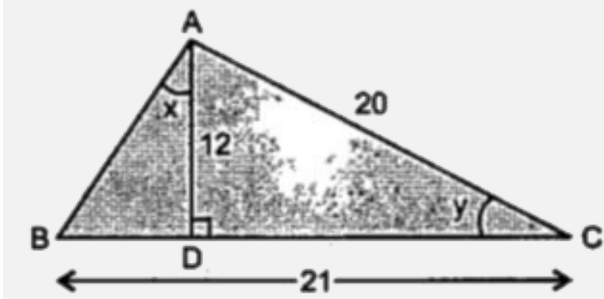
(iii)  $\cot^2 \theta - \operatorname{cosec}^2 \theta$

(iv)  $4 \cos^2 \theta - 3 \sin^2 \theta + 2$

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8. Use the information given in the following figure to evaluate :

$$\frac{10}{\sin x} + \frac{6}{\sin y} - 6 \cot y$$



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## Topic 2 Trigonometric Ratios Of Standard Angles 3 Marks Questions

1. Find the value of :

(i)  $\frac{\tan 45^\circ}{\operatorname{cosec} 30^\circ} + \frac{\sec 60^\circ}{\cot 45^\circ} - \frac{5 \sin 90^\circ}{2 \cos 0^\circ}$

(ii)  $3 \sin^2 30^\circ + 2 \tan^2 60^\circ - 5 \cot^2 45^\circ$

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2. (i) If  $\sec A = \operatorname{cosec} A$  and  $0^\circ \leq A \leq 90^\circ$ , State the value of  $A$ .

(ii) If  $\tan \theta = \cot \theta$  and  $0^\circ \leq \theta \leq 90^\circ$ , State the value of  $\theta$ .

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3. If  $\sqrt{3} = 1.732$ , find (correct to two decimal places) the value of each of the following :

(i)  $\sin 60^\circ$       (ii)  $\frac{2}{\tan 30^\circ}$

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4. If  $A = 30^\circ$ , then Prove that :

(i)  $\sin 2A = 2 \sin A \cos A = \frac{2 \tan A}{1 + \tan^2 A}$

(ii)  $2 \cos^2 A - 1 = 1 - 2 \sin^2 A$

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5. Solve the following equations for A, if :

(i)  $\sin 3A = \frac{\sqrt{3}}{2}$

(ii)  $\sqrt{3} \cot 2A = 1$



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6. If  $\sin 3A = 1$  and  $0 \leq A \leq 90^\circ$ . Find :

(i)  $\sin A$

(ii)  $\cos 2A$

(iii)  $\tan^2 A - \frac{1}{\cos^2 A}$



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7. Solve for x :

(i)  $\cos\left(\frac{x}{2} + 10^\circ\right) = \frac{\sqrt{3}}{2}$

(ii)  $\sin^2 60^\circ + \cos^2(3x - 9^\circ) = 1$



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8. If  $2 \cos(A + B) = 2 \sin(A - B) = 1$ , find the values of A and B.

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9. Solve for x, where  $0 \leq x \leq 90^\circ$   $\sin^2 x + \cos^2 30^\circ = \frac{5}{4}$

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## Topic 2 Trigonometric Ratios Of Standard Angles 4 Marks Questions

1. Prove that :

(i) 
$$\left( \frac{\tan 60^\circ + 1}{\tan 60^\circ - 1} \right)^2 = \frac{1 + \cos 30^\circ}{1 - \cos 30^\circ}$$

(ii)  $3\operatorname{cosec}^2 60^\circ - 2\cot^2 30^\circ + \sec^2 45^\circ = 0$

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2. Prove that :

(i)  $\sin 60^\circ = 2\sin 30^\circ \cos 30^\circ$

(ii)  $4(\sin^4 30^\circ + \cos^4 60^\circ) - 3(\cos^2 45^\circ - \sin^2 90^\circ) = 2$



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3. Evaluate :

(i)  $\frac{\cos 3A - 2 \cos 4A}{\sin 3A + 2 \sin 4A}$ , when  $A = 15^\circ$

(ii)  $\frac{3 \sin 3B + 2 \cos(2B + 5^\circ)}{2 \cos 3B - \sin(2B - 10^\circ)}$ , when  $B = 20^\circ$



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4. If  $A = 30^\circ$ , show that :

(i)  $\frac{1 + \sin 2A + \cos 2A}{\sin A + \cos A} = 2 \cos A$

(ii)  $\frac{\cos^3 A - \cos 3A}{\cos A} + \frac{\sin^3 A + \sin 3A}{\sin A} = 3$



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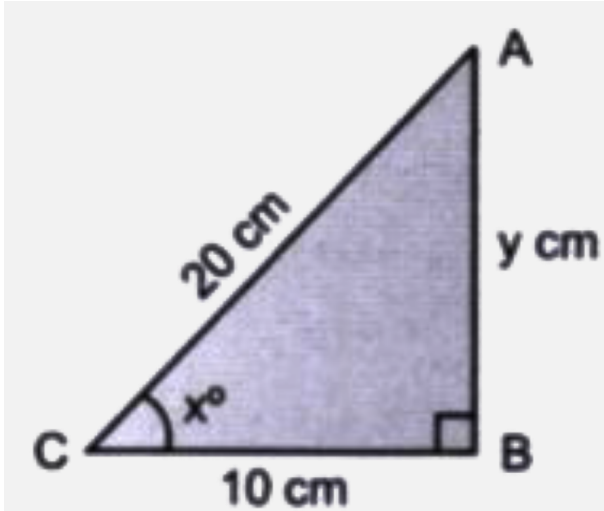
5. Calculate the value of A, if :

(i)  $(\tan A - 1) \cdot (\operatorname{cosec} 3A - 1) = 0$

(ii)  $\cos 3A \cdot (2 \sin 2A - 1) = 0$

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6. From the given figure, find :



(i)  $\cos x^\circ$

(ii)  $x^\circ$

$$(iii) \frac{1}{\tan^2 x^\circ} - \frac{1}{\sin 2x^\circ}$$

(iv) use  $\tan x^\circ$ , to find the value of y



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7. Find the magnitude of angle A, if :

$$(i) 2 \cos^2 A - 3 \cos A + 1 = 0$$

$$(ii) 2 \tan 3A \cos 3A - \tan 3A + 1 = 2 \cos 3A$$



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8. If  $4 \cos^2 x = 3$  and  $x$  is an acute angle find the value of :

$$(i) x$$

$$(ii) \cos^2 x + \cot^2 x$$

$$(iii) \cos 3x$$

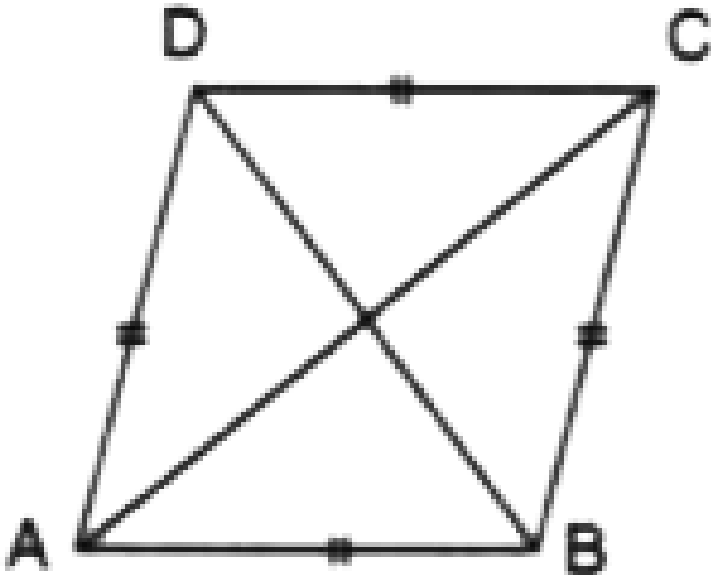
$$(iv) \sin 2x$$



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### Topic 3 Solution Of Right Triangles Angles 3 Marks Questions


1. Find lengths of diagonals AC and BD. Given  $AB = 60$  cm and  $\angle BAD = 60^\circ$ .



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2. In trapezium ABCD, as shown,  $AB \parallel DC$ ,  $AD = DC = BC = 20$  cm and

$\angle A = 60^\circ$  Find :

 (i) length of AB

(ii) distance between AB and DC

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3. In right-angle triangle ABC,  $\angle B = 90^\circ$ . Find the magnitude of angle A. If :

(i) AB is  $\sqrt{3}$  times at BC

(ii) BC is  $\sqrt{3}$  times of AB

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4. A ladder is placed against a vertical tower. If the ladder makes an angle of  $30^\circ$  with the ground and reached upto a height of 15 m of



the tower, find the length of the ladder.

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5. If  $\tan x^\circ = \frac{5}{12}$ ,  $\tan y = \frac{3}{4}$  and  $AB = 48$  m. Find the length of CD.

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6. In the given triangle ABC,  $AD \perp BC$ .  $AB = 13$  cm,  $BD = 5$  cm,  $DC = 4$  cm. Find the value of :

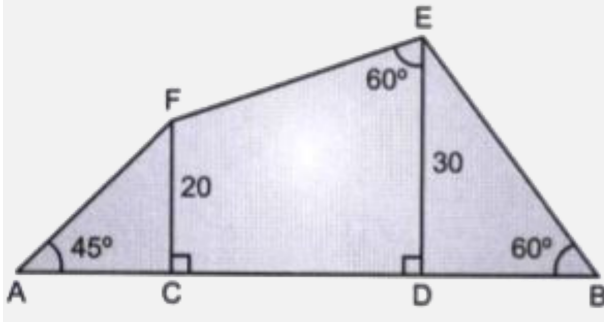


(i) AD

(ii)  $\tan x^\circ + \cot y^\circ$

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1. Find AB.



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2. In the given figure, AB and EC are parallel to each other. Sides AD and BC are 2 cm each and are perpendicular to AB.

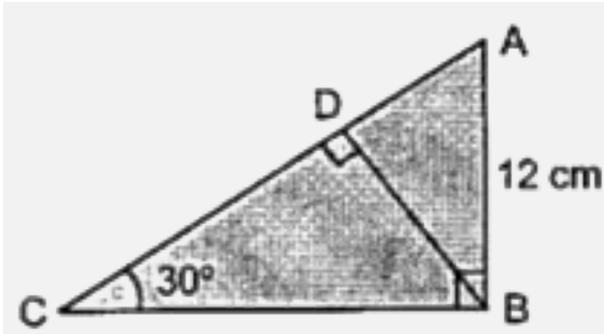


Given that  $\angle AED = 60^\circ$  and  $\angle ACD = 45^\circ$  calculate :

- (i) AB
- (ii) AC
- (iii) AE

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3. Find :



(i)  $BC$

(ii)  $AD$

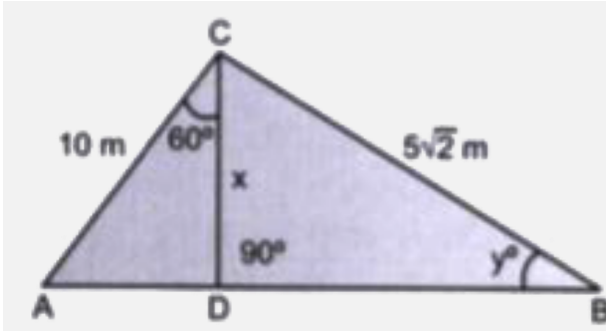
(iii)  $AC$

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4. A kite is attached to a  $100\text{ m}$  long string. Find the greatest height reached by the kite when its string makes an angle of  $60^\circ$  with the travel round.

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5. Evaluate  $x$  and  $y$  from the figure given



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#### Topic 4 Complementary Angles 3 Marks Questions

1. Evaluate :

(i)  $\frac{\cos 55^\circ}{\sin 35^\circ} + \frac{\cot 35^\circ}{\tan 55^\circ}$

(ii)  $\sin 42^\circ \sin 48^\circ - \cos 42^\circ \cos 48^\circ$

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2. Express each of the following in terms of angles between  $0^\circ$  and  $45^\circ$

(i)  $\sin 59^\circ + \tan 63^\circ$

(ii)  $\operatorname{cosec} 68^\circ + \cot 72^\circ$

(iii)  $\cos 74^\circ + \sec 67^\circ$



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3. For triangle ABC, show that :

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

(ii)  $\tan \frac{B+C}{2} = \cot \frac{A}{2}$



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4. Evaluate :

(i)  $3\cos 80^\circ \operatorname{cosec} 10^\circ + 2\sin 59^\circ \sec 31^\circ$

$$(ii) \frac{\cos 70^\circ}{\sin 20^\circ} + \frac{\cos 59^\circ}{\sin 31^\circ} - 8 \sin^2 30^\circ$$

$$(iii) \operatorname{cosec}(65^\circ + A) - \sec(25^\circ - A)$$

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5. With out using tables, evaluate :

$$4 \tan 60^\circ \sec 30^\circ + \frac{\sin 31^\circ \sec 59^\circ + \cot 59^\circ \cot 31^\circ}{8 \sin^2 30^\circ - \tan^2 45^\circ}$$

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6. using trigonometric tables evaluate the following :

$$\frac{\cot 30^\circ}{\sec 30^\circ} + \frac{\operatorname{cosec} 30^\circ}{\tan 45^\circ} - \frac{2 \cos 0^\circ}{\sin 30^\circ} + \cos^2 45^\circ$$

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7. Evaluate without using trigonometric tables :

$$\tan 20^\circ \tan 40^\circ \tan 50^\circ \tan 70^\circ$$



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## Topic 4 Complementary Angles 4 Marks Questions

1. Evaluate :

(i)  $\cos^2 25^\circ - \sin^2 65^\circ - \tan^2 45^\circ$

(ii)  $\left(\frac{\sin 77}{\cos 13}\right)^2 + \left(\frac{\cos 77}{\sin 13}\right)^2 - 2\cos^2 45^\circ$



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2. Show that :

(i)  $\tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ = 1$

(ii)  $\sin 42^\circ \sec 48^\circ + \cos 42^\circ \operatorname{cosec} 48^\circ = 2$



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3. A triangle ABC is right angled at B. Find the value of 
$$\frac{\sec A \cdot \sin C - \tan A \cdot \tan C}{\sin B}$$

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4. In each case given below, find the value of angle A where  $0^\circ \leq A \leq 90^\circ$

(i)  $\sin(90^\circ - 3A) \cdot \csc 42^\circ = 1$

(ii)  $\cos(90^\circ - A) \cdot \sec 77^\circ = 1$

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