CDS 1 2025

LIVE

MATHS

TRIGONOMETRY

CLASS 2

NAVJYOTI SIR

28 Nov 2024 Live Classes Schedule

9:00AM	28 NOVEMBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

NDA 1 2025 LIVE CLASSES

1:00PM	PHYSICS - REFLECTION OF LIGHT - CLASS 1	NAVJYOTI SIR
4:30PM	ENGLISH - COMMONLY USED WORDS - CLASS 2	ANURADHA MA'AM
5:30PM	MATHS - LIMITS & CONTINUITY - CLASS 1	NAVJYOTI SIR

CDS 1 2025 LIVE CLASSES

1:00PM	PHYSICS - REFLECTION OF LIGHT - CLASS 1	NAVJYOTI SIR
4:30PM	ENGLISH - COMMONLY USED WORDS - CLASS 2	ANURADHA MA'AM
7:00PM	MATHS - TRIGONOMETRY - CLASS 2	NAVJYOTI SIR

SSBCrack EXAMS

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SSBCrack EXAMS

TRIGONOMETRIC FORMULAE

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$
$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$
$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$
$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\sin 75^\circ = \sin(45^\circ + 30^\circ)$$

$$= \sin 45^\circ \cos 30^\circ + \cos 45^\circ \sin 30^\circ$$

$$= \left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{\sqrt{2}}\right)\left(\frac{1}{2}\right)$$

$$= \underline{\frac{\sqrt{3}+1}{2\sqrt{2}}}$$

SSBCrack EXAMS

TRIGONOMETRIC FORMULAE

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

$$\cot(A+B) = \frac{\cot A \cot B - 1}{\cot A + \cot B}$$

$$\cot(A-B) = \frac{\cot A \cot B - 1}{\cot B - \cot A}$$

SSBCrack EXAMS

TRIGONOMETRIC FORMULAE

- $\sin(A+B)\sin(A-B)$
  $= \sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A$
- $\cos(A+B)\cos(A-B)$
  $= \cos^2 A - \sin^2 B = \cos^2 B - \sin^2 A$

SSBCrack EXAMS

Q) Match List_I with List_II and select the correct answer using the code given below the lists

	List-I		List-II
A.	tan 15°	1.	$-2-\sqrt{3}$
B.	tan 75°	2.	$2+\sqrt{3}$
C.	tan 105°	3.	$-2+\sqrt{3}$
		4.	$2-\sqrt{3}$ ✓

Codes :

	A	B	C
(a)	4	1	2
(b) ✓	4	2	1
(c)	3	2	1
(d)	2	1	4

A.) $\tan 15°$

$\tan(45° - 30°)$

$$\frac{\tan 45° - \tan 30°}{1 + \tan 45° \tan 30°}$$

$$\frac{1 - \frac{1}{\sqrt{3}}}{1 + \frac{1}{\sqrt{3}}} = \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$$

$$= \frac{\sqrt{3}-1}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$$

$$= \frac{3+1-2\sqrt{3}}{2} = \frac{4-2\sqrt{3}}{2} = 2-\sqrt{3}$$

(*) $\tan 75^\circ = \tan(45^\circ + 30^\circ)$

$$= \frac{1+\frac{1}{\sqrt{3}}}{1-\frac{1}{\sqrt{3}}} = \frac{\sqrt{3}+1}{\sqrt{3}-1} = \frac{1}{2-\sqrt{3}} = \frac{2+\sqrt{3}}{4-3} = 2+\sqrt{3}$$

or, $\tan(90^\circ - 15^\circ) = \cot 15^\circ = \frac{1}{\tan 15^\circ}$

$\tan 105^\circ = \tan(180^\circ - 75^\circ) = -\tan 75^\circ = -(2+\sqrt{3}) = -2-\sqrt{3}$

SSBCrack EXAMS

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	A	B	C
(a)	4	1	2
(b)	4	2	1
(c)	3	2	1
(d)	2	1	4

Ans: (c)

SSBCrack EXAMS

TRIGONOMETRIC FORMULAE

$\sin 2\theta = 2\sin\theta\cos\theta = \dfrac{2\tan\theta}{1+\tan^2\theta}$ ✓

$\sin(\theta+\theta) = \sin\theta\cos\theta + \cos\theta\sin\theta$

$= 2\sin\theta\cos\theta$

$\cos 2\theta = \cos^2\theta - \sin^2\theta = 1 - 2\sin^2\theta$

$= 2\cos^2\theta - 1 = \dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

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

(1) $= \cos^2\theta - \sin^2\theta$

(2) $= 1 - 2\sin^2\theta$

(3) $= 2\cos^2\theta - 1$

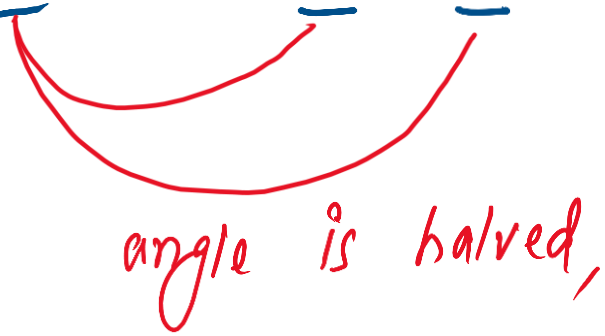
(4) $= \dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

$\cos^2\theta = \dfrac{1}{2}(1+\cos 2\theta), \sin^2\theta = \dfrac{1}{2}(1-\cos 2\theta)$

$\tan 2\theta = \dfrac{2\tan\theta}{1-\tan^2\theta}$

$\cot 2\theta = \dfrac{\cot^2\theta - 1}{2\cot\theta}$

$$\sin 2x = 2\sin x \cos x$$



angle is halved,

$$\sin 4x = 2\sin 2x \cos 2x$$

$$\sin x = 2\sin \frac{x}{2} \cos \frac{x}{2}$$

(similarly for $\cos 2x$, $\tan 2x$ etc.)

SSBCrack EXAMS

Q) What is $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4A}}}$ equal to?

(a) $\cos A$ (b) $\cos(2A)$

(c) $2\cos(A/2)$ (d) $\sqrt{2\cos A}$

$$2+2\cos 4A = 2(1+\cos 4A)$$

$$= 2(2\cos^2 2A)$$

$$= 4\cos^2 2A$$

$$\sqrt{2+2\cos 4A} = \sqrt{4\cos^2 2A} = 2\cos 2A$$

$$\cos 4A = 1 - 2\sin^2 2A$$

$$1 - \cos 4A = 2\sin^2 2A$$

$$\cos 4A = 2\cos^2 2A - 1$$

$$\cos 4A + 1 = 2\cos^2 2A$$

$$2 + 2\cos 2A = 2(1 + \cos 2A)$$

$$= 2(2\cos^2 A)$$

$$= 4\cos^2 A$$

$$\sqrt{2 + 2\cos 2A} = \sqrt{4\cos^2 A} = \underline{2\cos A}$$

$$2 + 2\cos A = 2(1 + \cos A)$$

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

$$= 4\cos^2 \frac{A}{2}$$

$$\sqrt{2 + 2\cos A} = \sqrt{4\cos^2 \frac{A}{2}} = \boxed{2\cos \frac{A}{2}}$$

$$1 + \cos A = 2\cos^2 \frac{A}{2}$$

$$1 - \cos A = 2\sin^2 \frac{A}{2}$$

SSBCrack EXAMS

Q) What is $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 4A}}}$ equal to?

(a) $\cos A$ (b) $\cos(2A)$

(c) $2\cos(A/2)$ (d) $\sqrt{2\cos A}$

Ans: (c)

SSBCrack EXAMS

TRIGONOMETRIC FORMULAE

(i) $\sin 3\theta = 3\sin\theta - 4\sin^3\theta$

(ii) $\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

#(iii) $\tan 3\theta = \dfrac{3\tan\theta - \tan^3\theta}{1 - 3\tan^2\theta}$

(iv) $\cot 3\theta = \dfrac{\cot^3\theta - 3\cot\theta}{3\cot^2\theta - 1} = \dfrac{3\cot\theta - \cot^3\theta}{1 - 3\cot^2\theta}$

$\sin(\theta + 2\theta) = \sin\theta\cos 2\theta + \cos\theta\sin 2\theta$

$= \sin\theta(1 - 2\sin^2\theta) + \cos\theta(2\sin\theta\cos\theta)$

$= \sin\theta - 2\sin^3\theta + 2\sin\theta\cos^2\theta$

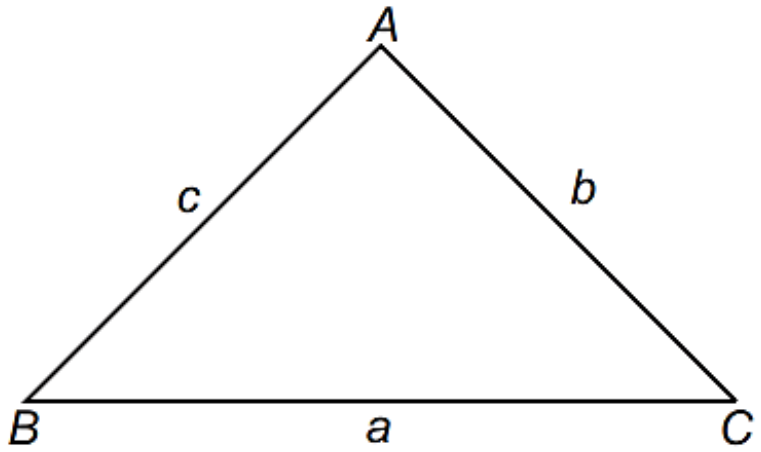
$-2\sin^3\theta + \sin\theta(1 + 2\cos^2\theta)$

$-2\sin^3\theta + \sin\theta(3 - 2\sin^2\theta)$

$= 3\sin\theta - 4\sin^3\theta$

SSBCrack EXAMS

RELATION BETWEEN SIDES AND ANGLE

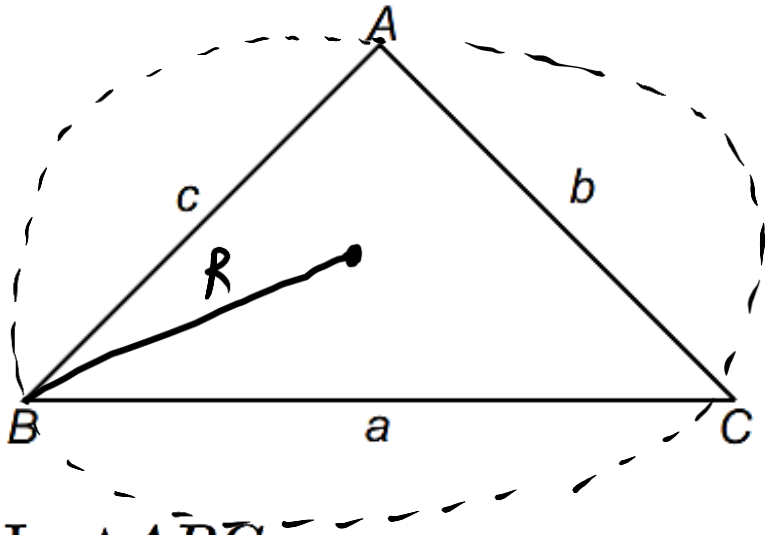


In a ΔABC the length of sides opposite to the angles A, B and C are denoted by a, b and c. Area of a triangle and perimeter of a triangle are denoted by Δ and $2s$, respectively and

$$s = \frac{a + b + c}{2}$$

SSBCrack EXAMS

SINE RULE



In ΔABC,

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} = \frac{1}{2R}$$

$$\left\{ \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R \right.$$

where, R be the radius of circumcircle of the ΔABC.

SSBCrack EXAMS

EXAMPLE

In a ΔABC, $A = 30°$, $b = 8$, $a = 6$, then $B = \sin^{-1} x$, where x is equal to

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$

(c) $\frac{2}{3}$ (d) 1

$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{6}{\sin 30°} = \frac{8}{\sin B} \Rightarrow \sin B = \frac{4}{6} = \frac{2}{3} \Rightarrow B = \sin^{-1}\left(\frac{2}{3}\right)$$

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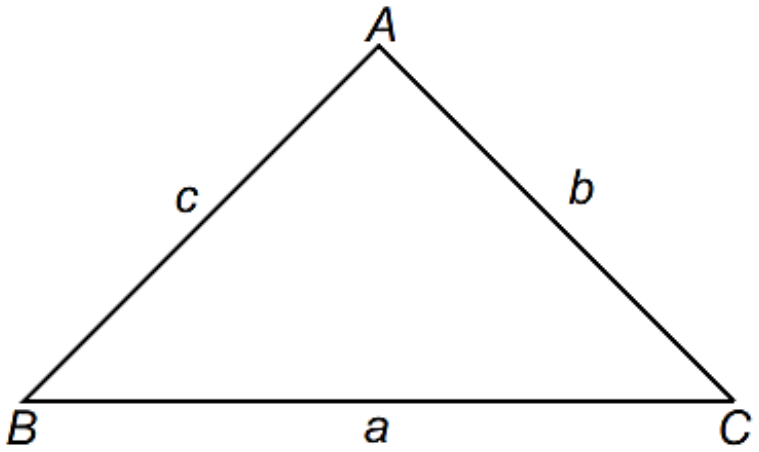
COSINE RULE



In ΔABC,

- If $\angle A = 60°$, then $b^2 + c^2 - a^2 = bc$
- If $\angle B = 60°$, then $a^2 + c^2 - b^2 = ac$
- If $\angle C = 60°$, then $a^2 + b^2 - c^2 = ab$

In ΔABC,

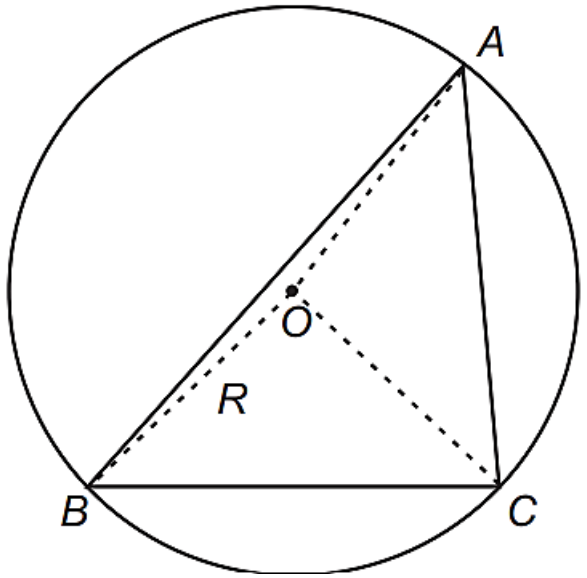
1. $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

2. $\cos B = \dfrac{a^2 + c^2 - b^2}{2ca}$

3. $\cos C = \dfrac{a^2 + b^2 - c^2}{2ab}$

SSBCrack EXAMS

CIRCUMCIRCLE



1. $R = \dfrac{a}{2 \sin A}$

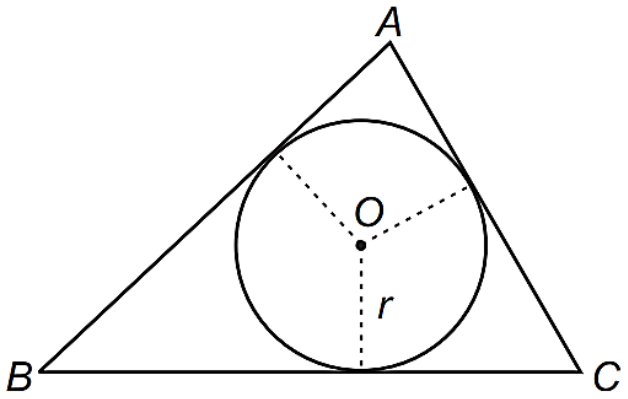
2. $R = \dfrac{b}{2 \sin B}$

3. $R = \dfrac{c}{2 \sin C}$

4. $R = \dfrac{abc}{4\Delta}$ → (area of triangle)

SSBCrack EXAMS

INCIRCLE



$$r = \frac{\Delta}{s}$$

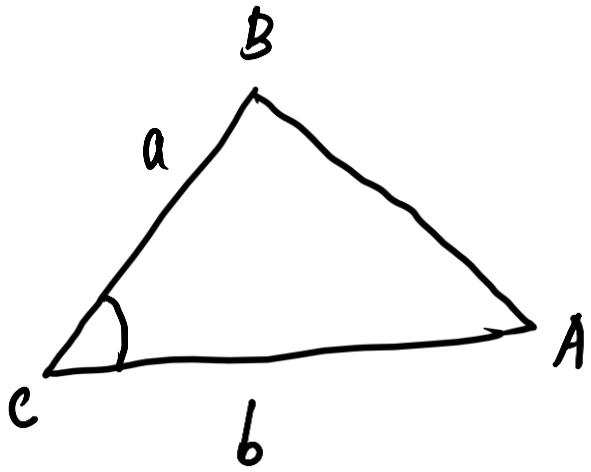
SSBCrack EXAMS

AREA OF TRIANGLE

1. $\Delta = \frac{1}{2} ab \sin C$

2. $\Delta = \frac{1}{2} bc \sin A$

3. $\Delta = \frac{1}{2} ca \sin B$



Length of two sides and angle included between them.

SSBCrack EXAMS

EXAMPLE

In a ΔABC, if $a = 2x$, $b = 2y$ and $\angle C = 120°$, then the area of the triangle is

(a) xy

(b) $xy\sqrt{3}$

(c) $3xy$

(d) $2xy$

CDS 1 2025

LIVE

MATHS

TRIGONOMETRY

CLASS 3

NAVJYOTI SIR