

ONE TWO ACADEMY UNIT TEST - 1
MATHEMATICS(Trigonometry)

Total:- 50 Marks

HSC 1ST YEAR

Answer any 5 the following:-

5 x 5 = 25

2

- 1) If $\tan \frac{\theta}{2} = \sqrt{\frac{1-a}{1+a}} \tan \frac{\phi}{2}$, then prove that $\cos \phi = \frac{\cos \theta - a}{1 - a \cos \theta}$.
- 2) Find $\sin(x - y)$, given that $\sin x = \frac{8}{17}$ with $0 < x < \frac{\pi}{2}$ and $\cos y = -\frac{24}{25}$ with $\pi < y < \frac{3\pi}{2}$.
- 3) The perimeter of a certain sector of a circle is equal to the length of the arc of a semi-circle having the same radius. Express the angle of the sector in degrees, minutes and seconds.
- 4) In a $\triangle ABC$, prove that $(a^2 - b^2 + c^2) \tan B = (a^2 + b^2 - c^2) \tan C$.
- 5) If $A + B + C = 2s$, then prove that $\sin(s - A) \sin(s - B) + \sin s \sin(s - C) = \sin A \sin B$.
- 6) Solve $\sqrt{3} \tan^2 \theta + (\sqrt{3} - 1) \tan \theta - 1 = 0$
- 7) If $A + B = 45^\circ$, show that $(1 + \tan A)(1 + \tan B) = 2$.

Answer then 5 following:- (Question no 13 is compulsory)

5 x 3 = 15

- 8) Explain the different system of measuring angles.
- 9) A rope of length 12 m is given. Find the largest area of the triangle formed by this rope and find the dimensions of the triangle so formed.
- 10) Derive Projection formula from (i) Law of sines, (ii) Law of cosines.
- 11) Prove that $\cos 5\theta = 16 \cos^5 \theta - 20 \cos^3 \theta + 5 \cos \theta$.
- 12) $\left(\frac{5}{7}, \frac{2\sqrt{6}}{7}\right)$ is a point on the terminal side of an angle θ in standard position. Determine the six trigonometric function values of angle θ .
- 13) Show that $\cos 10^\circ \cos 30^\circ \cos 50^\circ \cos 70^\circ = \frac{3}{16}$.
- 14) In any $\triangle ABC$, prove that $a \cos A + b \cos B + c \cos C = \frac{8\Delta^2}{abc}$.

Answer the following:- (Question no 17 is compulsory)

5 x 2 = 10

- 15) The largest side of any triangle is opposite to the largest angle. (Prove)
- 16) Derive area of segment formula
- 17) Find the values of (i) $\sin(-45^\circ)$ (ii) $\cos(-45^\circ)$
- 18) Prove that $\tan(315^\circ) \cot(-405^\circ) + \cot(495^\circ) \tan(-585^\circ) = 2$
- 19) If θ is an acute angle, then find $\sin\left(\frac{\pi}{4} - \frac{\theta}{2}\right)$, when $\sin \theta = \frac{1}{25}$.
- 20) Simplify $\frac{\sin 75^\circ - \sin 15^\circ}{\cos 75^\circ + \cos 15^\circ}$
- 21) Solve $3 \cos^2 \theta = \sin^2 \theta$