Work Sheet --- Trigonometry

Class: X

1) If $\sin\theta = \sqrt{3}/2$ find the values of all other T - ratios .

2) If $\tan\theta = \frac{1}{\sqrt{7}}$, show that $\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \sec^2\theta} = 3/4$

3) If $\tan\theta = \frac{a}{b}$, prove that $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta} = \frac{a^2 - b^2}{a^2 + b^2}$

4) If $\sec(5A)^0 = \operatorname{cosec}(A - 30)^0$ where 5A & $(A - 30)^0$ are acute angles , find the value of tan (3 A) .

5) If A , B & C are the interior angles of $\triangle ABC$, prove that $\tan\left(\frac{B + C}{2}\right) = \cot\left(\frac{A}{2}\right)$

6) If $\angle A = 60^0$ & $\angle B = 30^0$. Verify $\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$

7) Prove the followings :

(a) $\sin\theta \sin(90 - \theta) - \cos\theta \cos(90 - \theta) = 0$

(b) $\frac{\cos(90 - A)\sin(90 - A)}{\tan(90 - A)} = \sin^2 A$

8) Without using trigonometric tables evaluate :

(a) $\frac{1}{4}(\cot^4 30 - \operatorname{cosec}^4 60) + \frac{3}{2}(\sec^2 45 - \tan^2 30) - 5\cos^2 60$. [ans. $\frac{55}{18}$]

(b) $\left(\frac{\tan 20}{\operatorname{cosec} 70}\right)^2 + \left(\frac{\cot 20}{\sec 70}\right)^2 + 2\tan 15 \tan 45 \tan 75$. [ans. 3]

9) Given $A + B = 90^0$

(a) If $\tan A = 3/4$ find cot B . [ans. $3/4$]

(b) If $\cot B = 3/5$ find cot A . [ans. $4/3$]

10) If $\cos\theta + \sin\theta = \sqrt{2}\sin\theta$, show that $\sin\theta - \cos\theta = \sqrt{2}\cos\theta$

11) Prove the following identities :

a) $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

b) $\sqrt{\frac{\sec\theta - 1}{\sec\theta + 1}} + \sqrt{\frac{\sec\theta + 1}{\sec\theta - 1}} = 2\operatorname{cosec}\theta$

c) $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{1 + \sin\theta}{\cos\theta}$

d) $\frac{1}{\operatorname{cosec}\theta - \cot\theta} - \frac{1}{\sin\theta} = \frac{1}{\sin\theta} - \frac{1}{\operatorname{cosec}\theta + \cot\theta}$

e) $\dfrac{\sin\theta}{\cot\theta + \operatorname{cosec}\theta} = 2 + \dfrac{\sin\theta}{\cot\theta - \operatorname{cosec}\theta}$

f) $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} = 2\operatorname{cosec}\theta$

g) $(\operatorname{cosec}\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) = 1$

h) $\dfrac{1+\sec\theta}{\sec\theta} = \dfrac{\sin^2\theta}{1-\cos\theta}$

i) $\dfrac{1+\cos A - \sin^2 A}{\sin A + \sin A\cos A} = \cot A$

j) $\dfrac{\sin\theta + 1 - \cos\theta}{\cos\theta - 1 + \sin\theta} = \dfrac{1+\sin\theta}{\cos\theta}$

k) $\dfrac{\sin^2 A - \sin^2 B}{\cos^2 A\cos^2 B} = \tan^2 A - \tan^2 B$

l) $\dfrac{\cot A + \tan B}{\cot B + \tan A} = \cot A\tan B$

m) $\dfrac{1}{\cos\theta} - \dfrac{1}{\sec\theta + \tan\theta} = \tan\theta$

n) $(\operatorname{cosec}\theta - \cot\theta)^2 = \dfrac{1-\cos\theta}{1+\cos\theta}$

o) $\dfrac{\cos A\operatorname{cosec} A - \sin A\sec A}{\cos A + \sin A}$

$= \operatorname{cosec} A - \sec A$

12) If $7\sin^2\theta + 3\cos^2\theta = 4$, Show that $\tan\theta = 1/\sqrt{3}$

13) If $x = c + a\cos\theta$, $y = d + b\sin\theta$, Prove that $\left(\dfrac{x-c}{a}\right)^2 + \left(\dfrac{y-d}{b}\right)^2 = 1$

14) If $\operatorname{cosec}\theta + \cot\theta = m$, Prove that $\dfrac{m^2-1}{m^2+1} = \cos\theta$

15) If $x = a\sin\theta$, $y = b\tan\theta$, Prove that $\dfrac{a^2}{x^2} - \dfrac{b^2}{y^2} = 1$

16) If $x = r\sin A\cos C$, $y = r\sin A\sin C$ and $z = r\cos A$

Prove that $x^2 + y^2 + z^2 = r^2$

17) If $\sec\theta + \tan\theta = p$, show that $\sin\theta = \dfrac{p^2-1}{p^2+1}$

18) If $\sin\theta + \sin^2\theta = 1$, prove that $\cos^2\theta + \cos^4\theta = 1$

19) If $a\cos\theta - b\sin\theta = c$, prove that

$$a\sin\theta + b\cos\theta = \pm\sqrt{a^2+b^2-c^2}$$

20) If $x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ and

$x\sin\theta = y\cos\theta$, prove that $x^2 + y^2 = 1$

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