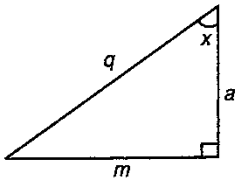
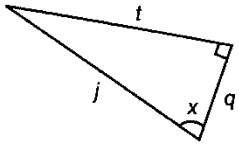
TRIGNOMETRICAL RATIOS

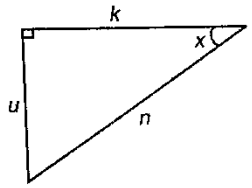
1. Indicate the perpendicular, the hypotenuse and the base(in that order) with respect to the angle marked x.



(i)

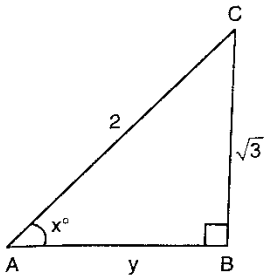


(ii)

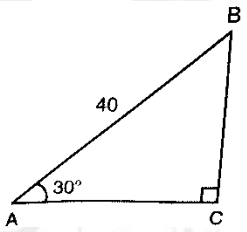


(iii)

2. In each of the figures, in Ex. 1. above use the letters given to write down an expression for:
   (i) sin x, (iii) cosec x (v) sec x
   (ii) cos x (iv) cosec x (vi) cot x
3. Triangle ABC is right-angled at A and AB =3 cm, AC =4cm. Find tan, sin and cos of ∠s B and C.
4. If sin A=$\frac{3}{5}$, prove that tan A + $\frac{1}{\cos A}$ =2, if A is an acute angle.
5. If tan θ =$\frac{p}{q}$, show that $\left(\frac{p\sin\theta - q\cos\theta}{p\sin\theta + q\cos\theta}\right) = \frac{p^2-q^2}{p^2+q^2}$.
6. Evaluate the following expressions:
   (i) $\tan^2 30°$
   (ii) $\cos^4 45°$
   (iii) $\sin^3 30°$
   (iv) $\sin 30° \sec 60°$
   (v) $\tan^2 30°. \cot 45°$
   (vi) $\sqrt{3}\cos^2 45° \operatorname{cosec}^2 60°$
   (vii) $\sin^6 90° - \cos^7 90°$
   (viii) $\sin 30° \cos 45° + \cos 30° \sin 45° + \sin 0° \cos 0°$
   (ix) $2\sin^2 30° \tan 60° - \frac{3\cos^2 60°}{\cos^2 30°} + \cos^3 90° \tan^2 0° + \tan^7 45°$
   (x) $4\tan^2 45° - 8\cos^2 60° + \sin^2 60° + \cos^2 90°$
7. Prove that:
   (i) $\cos 60° = 1 - 2\sin^2 30° = 2\cos^2 30° - 1$;
   (ii) $\frac{\tan 60° - \tan 30°}{1 + \tan 60° \tan 30°} = \tan 30°$;
   (iii) $\frac{\cos 30° + \sin 60°}{1 + \sin 30° - \cos 60°} = \tan 60°$.
8. In the adjoining figure, ABC is a right angled triangle with B as right angle. It is given that AB =y units, BC =$\sqrt{3}$ units, CA =2 units and ∠A =x°. Using trigonometrical ratios. Find (i) x, (ii) tan x, (ii) use cos x to find the value of y.



9. Solve for θ
   (i) $2\sin 2\theta = \sqrt{3}$
   (ii) $2\cos 3\theta = \sqrt{3}$
   (iii) $\sqrt{3}\ \tan 2\theta - 3 = 0$
   (iv) $\cos\theta - \sin\theta = 0$
   (v) $4\sin^2\theta - 1 = 0$, if θ is acute.
10. ABC is a right triangle, right angled at . If A =3o° and AB =40 units, find the remaining two sides and ∠B of △ABC.



11. A balloon is connected to a meteorological station by a cable of length 200 metres inclined at 60° to the horizontal. Determine the height of the balloon from the ground (Assume that there is no slack is no slack is the cable. Given $\sqrt{3}$ 1.73)
12. without using tables, evaluate the following:
   (i) $\frac{\cos 47°}{\sin 43°}$
   (ii) $\frac{\cot 18°}{\tan 72°}$
   (iii) $\frac{\tan 65°}{\cot 25°}$
   (iv) $\frac{sec 27°}{cosec\ 63°}$
13. Express sin 89° + tan 89° in terms of angles between 0° and 45°.
14. without using tables evaluate $\frac{\cot 40°}{\tan 50°} - \frac{1}{2}\left(\frac{\cos 35°}{\sin 55°}\right)$
15. Evaluate, without the use of trigonometric tables:
   (i) $\frac{2\cos 67°}{\sin 23°} - \frac{\tan 40°}{\cot 50°} - \cos 0°$
   (ii) $\frac{\cos 35°}{\sin 55°} - \frac{\sin 11°}{\cos 79°} - \cos 28°\ cosec\ 62°$
   (iii) $\left(\frac{\sin 35°}{\cos 55°}\right)^2 + \left(\frac{\cos 55°}{\sin 35°}\right)^2 - 2\cos 60°$
16. Without using trigonometric tables, evaluate

$$\frac{\sin^2 29° + sin^2 61°}{\cos 29° + \cos^2 61°} + \frac{\sin(90° - \theta)\sin\theta}{\tan\theta} + \frac{\cos(90° - \theta)\cos\theta}{cot\theta}.$$

17. If A,B,C are the interior angles of a triangle, prove that $\tan\frac{(B+C)}{2} = cot\frac{A}{2}$.
18. Without using tables, show that $\tan 7° \tan 23° \tan 60° \tan 67° \tan 83° = \sqrt{3}$.
19. If $\sin\theta + \cos\theta = \sqrt{2}\sin(90° - \theta)$, find $\cot\theta$.