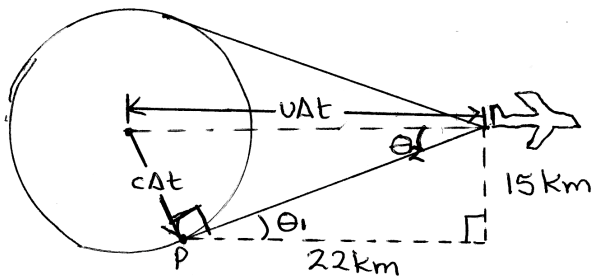


$$\sin \theta = \frac{c_s \Delta t}{u \Delta t} = \frac{c_s}{u}$$

Illustrative example: A supersonic plane flying due east at an altitude of 15 km passes directly over point P. The sonic boom is heard at point P when the plane is 22 km east of point P. What is the speed of the supersonic plane?



the angles $\theta_1 = \theta_2$

$$\tan \theta_1 = \frac{15 \text{ km}}{22 \text{ km}} \quad \theta_1 = 34.3^\circ$$

since $\theta_1 = \theta_2$ and θ_2 is the mach angle

$$\sin \theta = \frac{c \Delta t}{u \Delta t} = \frac{c_s}{u}$$

$$u = \frac{c}{\sin \theta} = \frac{340 \text{ m/s}}{\sin 34.3^\circ}$$

$$= 604 \text{ m/s}$$