Math 002 – Term 072
Recitation Hour (5.1 & 5.2)

Q1) (a) Convert -345° to radian measure. (b) Convert $\frac{3\pi}{10}$ to degree measure.

Solution:

(a) $= -345^{\circ} \cdot \frac{\pi}{180} = -\frac{23\pi}{12}$ radians. (b) $= \frac{3\pi}{10} \cdot \frac{180}{\pi} = 54^{\circ}$

Q2) If α is the complement of the angle $83^{\circ}25'51''$ and β is the supplement of the angle $44^{\circ}6'$, then find the measure of the angle $\alpha + \beta$

Solution:

$\alpha = 90^{\circ} - 83^{\circ}25'51'' = 89^{\circ}59'60'' - 83^{\circ}25'51'' = 6^{\circ}34'9''$ and $\beta = 180^{\circ} - 44^{\circ}6'$

$= 179^{\circ}60' - 44^{\circ}6' = 135^{\circ}54' \implies \alpha + \beta = 6^{\circ}34'9'' + 135^{\circ}54' = 141^{\circ}88'9'' = 142^{\circ}28'9''$

Q3) (a) Find the smallest positive angle coterminal with the angle -750°

(b) Find the exact value of $2\sin^2\frac{\pi}{3} + \tan 45^{\circ}$

Solution:

(a) $= -750^{\circ} + 3(360^{\circ}) = -750^{\circ} + 1080^{\circ} = 330^{\circ}$

(b) $= 2\left(\frac{\sqrt{3}}{2}\right)^2 + 1 = 2\left(\frac{3}{4}\right) + 1 = \frac{3}{2} + 1 = \frac{5}{2}$

Q4) (a) Find the length of the arc that subtends a central angle of 135° in a circle of diameter 40 ft.

(b) A wheel is rotating at 200 revolutions per minute. Find the angular speed of the wheel in radians per second.

Solution:

(a) radius $= r = \frac{40}{2} = 20$ ft , $\theta = 135^{\circ} = \frac{3\pi}{4}$ radians. Arc length $= s = r\theta$, θ in radians

$= (20)\left(\frac{3\pi}{4}\right) = 15\pi$ ft.

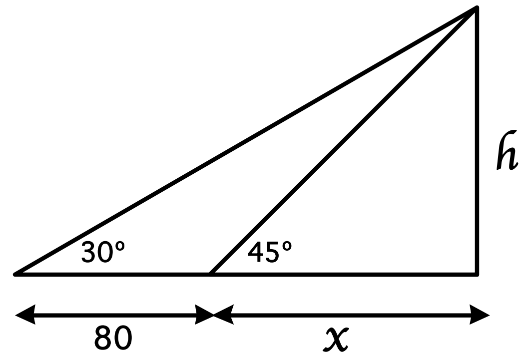
(b) $\omega = \frac{200 \text{ revolutions}}{1 \text{ minute}} = \frac{200\ (2\pi)\text{ radians}}{60 \text{ seconds}} = \frac{20\pi}{3}$ rad/sec

continue

Q5) Find the height of a building if the angle of elevation to the top of the building changes from 30° to 45° as the observer moves a distance of 80 ft toward the building.

Solution:

Only right triangles can be used to find trigonometric functions of acute angles. Now $\tan 45^\circ = \frac{h}{x} \implies 1 = \frac{h}{x} \implies x = h$ and $\tan 30^\circ = \frac{h}{x+80} \implies \frac{1}{\sqrt{3}} = \frac{h}{h+80} \implies \sqrt{3}h = h + 80 \implies \sqrt{3}h - h = 80 \implies (\sqrt{3}-1)h = 80 \implies h = \frac{80}{\sqrt{3}-1} \cdot \frac{\sqrt{3}+1}{\sqrt{3}+1} = \frac{80(\sqrt{3}+1)}{2} = 40(\sqrt{3}+1)$ ft



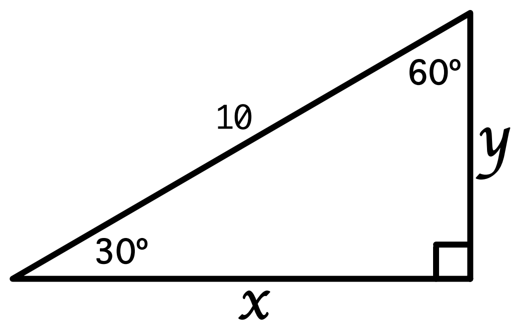
Q6) If the hypotenuse of a $30^\circ - 60^\circ$ right triangle is 10 cm , then find the perimeter of the triangle.

Solution:

$\cos 30^\circ = \frac{\sqrt{3}}{2} = \frac{x}{10} \implies x = \frac{10\sqrt{3}}{2} = 5\sqrt{3}$ cm and

$\sin 30^\circ = \frac{1}{2} = \frac{y}{10} \implies y = \frac{10}{2} = 5$ cm.

Therefore the perimeter $= 5\sqrt{3} + 5 + 10 = 15 + 5\sqrt{3} = 5(3+\sqrt{3})$ cm



Done By: A. Al-Shallali