



Exercise 8.1

Reference Angle

Find reference angle of the following angles

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(i) 125°

$$= 180^\circ - 125^\circ$$

$$= 55^\circ$$

(ii) 138°

$$= 180^\circ - 138^\circ$$

$$= 42^\circ$$

(iii) 111°

$$= 180^\circ - 111^\circ$$

$$= 69^\circ$$

(iv) 142°

$$= 180^\circ - 142^\circ$$

$$= 38^\circ$$

alpha

If theta = 36 degree, Find equivalent angle Beta in the second quadrant for which $\sin \alpha = \sin \theta$

$$= 180^\circ - 36^\circ$$

$$\alpha = \boxed{144^\circ}$$

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If theta = 87 degree, Find equivalent angle Beta in the second quadrant for which $\cos \beta = -\cos \theta$

$$\theta = 87^\circ$$

$$\beta = 180^\circ - 87^\circ$$

$$\beta = 93^\circ$$

Using a reference angle, find the exact values of $\sin 120$ degree, $\cos 120$ degree and $\tan 120$ degree

$$\text{Reference angle of } 120^\circ = 180^\circ - 120^\circ$$

$$= 60^\circ$$

$$\sin 60^\circ = \frac{\sqrt{3}}{2}$$

$$\cos 60^\circ = -\frac{1}{2}$$

$$\tan 60^\circ = -\sqrt{3}$$

Using reference angle, find $\cos 3\pi/4$, $\sin 3\pi/4$, $\tan 3\pi/4$

Converting radian to degree

$$= \frac{3\pi}{4} \times \frac{180}{\pi}$$

$$= 135^\circ$$

$$\sin 135^\circ$$

$$\cos 135^\circ$$

$$\tan 135^\circ$$

$$\text{Reference angle } 135^\circ = 180^\circ - 135^\circ \\ = 45^\circ$$

$$\sin 45^\circ = \frac{\sqrt{2}}{2}$$

$$\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$$

$$\cos 45^\circ = \frac{\sqrt{2}}{2}$$

$$\cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2}$$

$$\tan 45^\circ = 1$$

$$\tan \frac{3\pi}{4} = -1$$

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If $\cos \theta = 0.559$, find

$\cos(180^\circ - \theta)$, $\sin(180^\circ - \theta)$, $\tan(180^\circ - \theta)$

$\sec(180^\circ - \theta)$, $\csc(180^\circ - \theta)$, $\cot(180^\circ - \theta)$

$$\cos \theta = 0.559$$

Using

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\sin^2 \theta + (0.559)^2 = 1$$

$$\sin^2 \theta + 0.312 = 1$$

$$\sin^2 \theta = 1 - 0.312$$

$$\sin^2 \theta = 0.688$$

Taking Square root on b/s

$$\sqrt{\sin^2 \theta} = \sqrt{0.688}$$

$$\sin \theta = 0.829$$

$$\sin(180^\circ - \theta) = \sin \theta$$

$$= 0.829$$

$$\cos(180^\circ - \theta) = -\cos \theta$$

$$= 0.829$$

$$\cos(180^\circ - \theta) = -\cos \theta$$

$$= -0.559$$

$$\tan(180^\circ - \theta) = -\tan \theta$$

$$= -\frac{\sin \theta}{\cos \theta}$$

$$= -\frac{0.829}{0.559}$$

$$= -1.483$$

$$\operatorname{cosec}(180^\circ - \theta) = \operatorname{cosec} \theta$$

$$= \frac{1}{\sin \theta}$$

$$= \frac{1}{0.829}$$

$$= 1.206$$

$$\sec(180^\circ - \theta) = -\sec \theta$$

$$= -\frac{1}{\cos \theta}$$

$$= -\frac{1}{0.559}$$

$$= -1.789$$

$$\cot(180^\circ - \theta) = -\cot \theta$$

$$= -\frac{1}{\tan \theta}$$

$$= -\frac{1}{1.483}$$

$$= -0.674$$

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