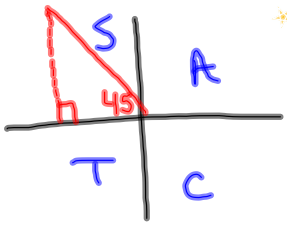
Without a calculator determine the value of...

$$\frac{2\cos 180^\circ + \sin 135^\circ}{\cos^2(-330^\circ)}$$

P.A. (30)



$$\frac{2(-1)+\left(+\frac{\sqrt{2}}{2}\right)}{\left(+\frac{\sqrt{3}}{2}\right)^2}$$

$$\frac{-2+\frac{\sqrt{2}}{2}}{3/4}$$

$$\frac{\frac{-4}{2}+\frac{\sqrt{2}}{2}}{3/4}$$

$$\frac{(-4+\sqrt{2})}{2} \times \frac{4}{3} \rightarrow \frac{-8+2\sqrt{2}}{3}$$

$$\frac{-16+4\sqrt{2}}{6}$$

$$\frac{-8+2\sqrt{2}}{3}$$

or $\frac{2\sqrt{2}-8}{3}$

1. Find ref. angle by looking at charts (triangles)

2. If trig ratio is positive then ref. angle = θ

3. Find where else that trig ratio is (+) or (-)

4. Use CAST and appropriate equation.

Working Backwards

S	A
T	C

$180-\theta$	θ
$180+\theta$	$360-\theta$

Questions from Homework

(11) $\cos\theta = 0.15$ (positive)

$\theta = \cos^{-1}(0.15)$

$\theta = 81.37°$

Quad 1	Quad 4
$81.37°$	$360° - 81.37°$
	$= 278.63°$

$81.37° + 360k, k \in I$

$278.63° + 360k, k \in I$

(12) $\tan^2\theta = 3$

$\tan\theta = \pm\sqrt{3}$

ref $= 60°$

Q1, Q2, Q3, Q4

$\theta = 60°, 120°, 240°, 300°$

* Make sure you include your rules

Solving Trigonometric Equations

Rearrange before solving!

$2\sin\theta = 1$

$\frac{2\sin\theta}{2} = \frac{1}{2}$

$\sin\theta = \frac{1}{2}$

ref = 30°

Quad 1

30°

30° + 360k, k∈I

Quad 2

180° − 30° = 150°

150° + 360k, k∈I

$2\cos\theta + 1 = 0$

$\frac{2\cos\theta}{2} = -\frac{1}{2}$

$\cos\theta = -\frac{1}{2}$

ref = 60

Quad 2

180° − 60° = 120°

120° + 360k, k∈I

Quad 3

180° + 60° = 240°

240° + 360k, k∈I

Solving Trigonometric Equations

Rearrange before solving!

$\sqrt{2} - 2\cos\theta = 0$

$-2\cos\theta = -\sqrt{2}$

$\frac{-2\cos\theta}{-2} = \frac{-\sqrt{2}}{-2}$

$\cos\theta = \frac{\sqrt{2}}{2}$

ref = 45°

Quad 1: 45°

45° + 360k, k∈I

Quad 4: 360° − 45° = 315°

315° + 360k, k∈I

$\sin\theta = 0.32$

$\theta = \sin^{-1}(0.32)$

$\theta = 18.66°$

Quad 1: 18.66°

Quad 2: 180° − 18.66° = 161.34°

Rules

Solving Trigonometric Equations

$\sin^2\theta - 1 = 0$

$\sin^2\theta = 1$

$\sin\theta = \pm 1$

$\theta = 90°, 270°$

$90° + 360°k, k \in I$

$270° + 360°k, k \in I$

Solving Trigonometric Equations

$\sqrt{2}\cos\theta + 1 = 0, \quad -360° \le \theta \le 720°$

restriction

$\frac{\sqrt{2}\cos\theta}{\sqrt{2}} = \frac{-1}{\sqrt{2}}$

$\cos\theta = -\frac{1}{\sqrt{2}}$

ref = 45°

Quad 2	Quad 3
$180° - 45° = 135°$	$180° + 45° = 225°$
$135° - 360° = -225°$	$225° - 360° = -135°$
$135° + 360° = 495°$	$225° + 360° = 585$

$\theta = -225, -135, 135, 225, 495, 585$

Homework

#1-5, omit #4

Solving Trigonometric Equations

$$\cos^2\theta - \frac{1}{2}\cos\theta = 0, \quad -360° \le \theta \le 720°$$

$$\sin^2\theta - \frac{\sqrt{3}}{2}\sin\theta = 0, \quad -360° \le \theta \le 360°$$

$$2\sin^2\theta + \sin\theta - 1 = 0 \qquad 0 \le \theta \le 360$$

$$2\cos^2\theta - 7\cos\theta + 3 = 0,\ 0 \le \theta \le 360$$