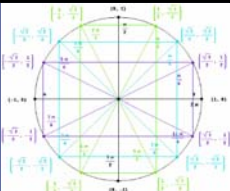Unit 4: Trigonometry

4.4 Solving Linear Trig Equations

Grade 10: sin θ = 0.3216

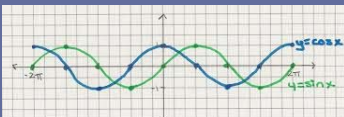$$\sin^{-1}(0.3216) \qquad \theta = 19°$$

Grade 11: CAST

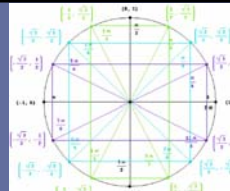$$\frac{S \mid A}{T \mid C} \qquad \theta = 19°, 161°$$

Grade 12: All solutions $0 \le \theta \le 360°$ or $0 \le \theta \le 2\pi$

$$19° \times \frac{\pi}{180°} \qquad\qquad 161° \times \frac{\pi}{180°}$$

$$= \frac{19\pi}{180} \qquad\qquad = \frac{161\pi}{180}$$

Ex.) Solve the following equations $0 \le \theta \le 360°$ and $0 \le \theta \le 2\pi$:

a) $\frac{2\sin\theta}{2} = \frac{-1}{2}$

$$\frac{S \mid A}{\boxed{T \mid C}}$$

$$\sin\theta = \frac{-1}{2} \qquad \boxed{210°, 330°}$$

$$\theta_{ref} = 30° \qquad \boxed{\frac{7\pi}{6}, \frac{11\pi}{6}}$$

b) sin θ = √3 - sin θ

$$+\sin\theta \quad +\sin\theta$$

$$\frac{2\sin\theta}{2} = \frac{\sqrt{3}}{2} \qquad \frac{S \mid A}{T \mid C}$$

$$\sin\theta = \frac{\sqrt{3}}{2} \qquad \boxed{60°, 120°}$$

$$\theta_{ref} = 60° \qquad \boxed{\frac{\pi}{3}, \frac{2\pi}{3}}$$

1

c) $5\cos\theta + 2 = 1 + 3\cos\theta$

$-3\cos\theta -3\cos\theta$

$2\cos\theta + 2 = 1$

$-2 -2$

$2\cos\theta = -1$

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

$\theta_{ref} = 60°$

$\cos^{-1}(1/2) = 120$

S	A
T	C

$\boxed{120°, 240°}$

$\boxed{\dfrac{2\pi}{3}, \dfrac{4\pi}{3}}$

Supplementary

↑ straight line

$180 - 120 = 60$

d) $3\csc\theta - 6 = 0$

$\dfrac{3\csc\theta}{3} = \dfrac{6}{3}$

$\csc\theta = 2$

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

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

$\theta_{ref} = 30°$

S	A
T	C

$\boxed{30°, 150°}$

$\boxed{\dfrac{\pi}{6}, \dfrac{5\pi}{6}}$

Pg. 211 # 1, 3, 5.