If You See…	You Should Think…
A simple trig equation – unit circle Examples (assume $0 \le \theta < 360°$): 1) $\sin\theta = ½$ 2) $\tan\theta = -1$	**Identify solution angles using unit circle diagram.** In example 1), $\theta = 30°, 150°$. In example 2), $\theta = 135°, 315°$.
A simple trig equation – non-unit circle Examples(assume $0 \le \theta < 360°$): 1) $\sin\theta = 0.6$ 2) $\tan\theta = -2$	**Identify solution angles using inverse trig functions.** In example 1), $\theta = \sin^{-1}(0.6) = 36.87°$ (QI). There is also a QII angle $\theta = 143.13°$. In example 2), $\theta = \tan^{-1}(-2) = -63.43°$, which gives a QIV angle $\theta = 280.3°$. There is also a QII angle $\theta = 100.3°$.
Like terms Examples (assume $0 \le \theta < 360°$): $\sin\theta + \sqrt{2} = -\sin\theta$	**Combine like terms.** In the example, add $\sin\theta$ to each side and subtract $\sqrt{2}$ to each side, giving $2\sin\theta = -\sqrt{2} \rightarrow \sin\theta = -\frac{\sqrt{2}}{2} \rightarrow \theta = 225°, 315°$.
A polynomial/quadratic Examples (assume $0 \le \theta < 360°$): $2\sin^2\theta - 3\sin\theta + 1 = 0$	**Factor as with other polynomials/quadratics**. In the example, factor in the same manner as one would factor $2x^2 - 3x + 1 = (2x - 1)(x - 1)$. In this case, the factors are $(2\sin\theta - 1)(\sin\theta - 1) = 0$ $\rightarrow \sin\theta = ½$ and $\sin\theta = 1 \rightarrow \theta = 30°, 150°$, and $90°$.
A mixture of different trigonometric functions - separable Examples (assume $0 \le \theta < 360°$): $\tan\theta\cos\theta + ½\tan\theta = 0$	**Factor if possible into factors involving only single trig frunctions.** In the example, $\tan\theta\cos\theta + ½\tan\theta = \tan\theta(\cos\theta + ½)$. Setting = 0, $\tan\theta(\cos\theta + 1) = 0 \rightarrow \tan\theta = 0$ and $(\cos\theta + ½) = 0$ $\rightarrow \theta = 0°, 180°, 120°$ and $240°$.
A mixture of different trigonometric functions – square term Example (assume $0 \le \theta < 360°$): $2 - 2\cos^2\theta - 3\sin\theta + 1 = 0$	**Convert to a form with a single trig function.** In the example, $2 - 2\cos^2\theta = 2(1 - \cos^2\theta) = 2\sin^2\theta$, giving $2\sin^2\theta - 3\sin\theta + 1 = 0$, which can be solved as above: $\theta = 30°, 150°$, and $90°$.
A mixture of different trigonometric functions – no square term Example (assume $0 \le \theta < 360°$): $\sin\theta = -2\cos\theta$	**Convert to a form with a single trig function.** In the example, divide by $\cos\theta$, giving $\frac{\sin\theta}{\cos\theta} = -2$ or $\tan\theta = -2$, which can be solved as above: $\theta = \tan^{-1}(-2) = -63.43°$, which gives a QIV angle $\theta = 280.3°$. There is also a QII angle $\theta = 100.3°$.
Double angle/multiple angle Examples (assume $0 \le \theta < 360°$): $\sin 2\theta = ½$	**Change the interval and solve as above.** In the example, $0 \le \theta < 360° \rightarrow 0 \le 2\theta < 720°$ $\sin(2\theta) = ½ \rightarrow 2\theta = 30°, 150°$ plus $390°, 410°$ (adding $360°$) $\rightarrow \theta = 15°, 75°$ plus $195°, 205°$.
No square terms, no other options Examples (assume $0 \le \theta < 360°$): $\sin\theta + \cos\theta = 3/2$	**Square each side and look for identities.** In the example, $(\sin\theta + \cos\theta)^2 = \sin^2\theta + \cos^2\theta + 2\sin\theta\cos\theta = 1 + \sin 2\theta$ $\rightarrow \sin 2\theta = ½ \rightarrow$ solve as above