SOLVING TRIGONOMETRIC EQUATIONS USING ANGLE FORMULAE AND THE t-FORMULAE

1 Solve for $0 \leq x \leq 2\pi$:

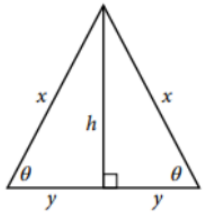
(a) $\sin\left(x+\frac{\pi}{3}\right)=\cos x$ **(b)** $\sin\left(x+\frac{\pi}{6}\right)=\cos\left(\frac{\pi}{6}-x\right)$ **(c)** $2\sin\left(x+\frac{\pi}{6}\right)=\sin x$

2 Solve for $0 \leq x \leq 2\pi$:

(a) $2\cos x = \operatorname{cosec} x$ **(b)** $4\sin x = \sec x$ **(c)** $4\cos x = \sqrt{3}\operatorname{cosec} x$

8 Show that if $a^2 + b^2 < c^2$, the equation $a\cos\theta + b\sin\theta = c$ has no real roots.

9 The equal sides of an isosceles triangle are x cm and the third side is $2y$ cm. The equal angles are each θ and the height of the triangle is h cm, as shown.
If the perimeter of the triangle is four times the height, find the size of the angles of the triangle to the nearest minute.



10 Solve each equation:

(a) $\tan^{-1}\left(\frac{x}{2}\right) - \tan^{-1}\left(\frac{x}{3}\right) = \tan^{-1}\left(\frac{1}{5}\right)$ **(b)** $\tan^{-1}(2x) + \tan^{-1}(3x) = \tan^{-1}(1)$

13 Solve each equation using the t formulae, for $0° \leq \theta \leq 360°$.

(a) $2\sin\theta + \cos\theta = 1$ **(b)** $5\cos\theta + 3\sin\theta = 4$ **(c)** $2\operatorname{cosec}\theta - 4\cot\theta = 3$

16 Solve for $0 \leq \theta \leq \pi$.

(a) $\cos 3\theta = \sin\left(\frac{\pi}{4} - \theta\right)$ **(b)** $\sin 2\theta = \cos\left(\theta - \frac{\pi}{4}\right)$ **(c)** $\cos 2\theta = \sin\left(\theta + \frac{\pi}{4}\right)$

17 Solve for $0 \leq x \leq \pi$.

(a) $\sin 3x + \sin x = 0$ **(b)** $\sin 2x + \cos 3x = 0$ **(c)** $\tan 2x + \cot 3x = 0$