Solving Trigonometric equations

This card sort activity is designed to support students in developing confidence in solving trigonometric equations which involve the use of trigonometric identities.

Depending on the make-up of your group, give out the Equations sets of cards, one set at a time. After matching the cards to produce a worked solution they should work out the values of x in the range $0° \leq x \leq 360°$. It might be useful for students to work in pairs and to choose examples to stick in their notes. They might also want to annotate their solutions.

Take every opportunity to illustrate the curves using a graph drawing software package.

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Equations Set 1:

$3\sin x - 4\cos x = 0$
$4\sin x + 3\cos x = 0$
$4\sin x = 3\cos x$
$4\sin x = \sin x - 4\cos x$

$\tan x = -\frac{3}{4}$
$\tan x = -\frac{4}{3}$
$\tan x = \frac{3}{4}$
$\tan x = \frac{4}{3}$

Equations Set 2:

$\sin^2 x - 2 \sin x \cos x = 0$
$\sin x \cos x - 2 \cos^2 x = 0$
$2\sin^2 x - \sin x \cos x = 0$
$\cos^2 x - 2 \sin x \cos x = 0$

$\sin x (\sin x - 2 \cos x) = 0$
$\sin x (2 \sin x - \cos x) = 0$
$\cos x (\cos x - 2 \sin x) = 0$
$\cos x (\sin x - 2 \cos x) = 0$

$\cos x = 0$	$\tan x = \frac{1}{2}$
$\sin x = 0$	$\tan x = 2$
$\sin x = 0$	$\tan x = \frac{1}{2}$
$\cos x = 0$	$\tan x = 2$

Equations Set 3:

$2\sin^2 x + \sin x - 1 = 0$
$2\sin^2 x - \sin x - 1 = 0$
$2\sin^2 x - 3\sin x + 1 = 0$
$2\sin^2 x + 3\sin x + 1 = 0$

$(2\sin x + 1)(\sin x - 1) = 0$
$(2\sin x - 1)(\sin x - 1) = 0$
$(2\sin x - 1)(\sin x + 1) = 0$
$(2\sin x + 1)(\sin x + 1) = 0$

$\sin x = -\frac{1}{2}$	$\sin x = -1$
$\sin x = -\frac{1}{2}$	$\sin x = 1$
$\sin x = \frac{1}{2}$	$\sin x = -1$
$\sin x = \frac{1}{2}$	$\sin x = 1$

Equations Set 4:

$\sin^2 x - 5\cos^2 x = 2$
$\cos^2 x + 7\sin^2 x = 2$
$6\sin^2 x - 5\cos x - 5 = 0$
$4\cos^2 x + 5\cos x - 2\sin^2 x + 3 = 0$

$6\cos^2 x + 5\cos x - 1 = 0$
$6\cos^2 x + 5\cos x + 1 = 0$
$6\sin^2 x = 1 \quad or \quad 6\cos^2 x = 5$
$6\cos^2 x = -1 \quad or \quad 6\sin^2 x = 7$

$\sin^2 x = \frac{7}{6} \quad or \quad \cos^2 x = -\frac{1}{6}$
$(6\cos x - 1)(\cos x + 1) = 0$
$\sin^2 x = \frac{1}{6} \quad or \quad \cos^2 x = \frac{5}{6}$
$(2\cos x + 1)(3\cos x + 1) = 0$

$\cos x = \frac{1}{6} \quad or \quad \cos x = -1$
No solutions
$\cos x = -\frac{1}{2} \quad or \quad \cos x = -\frac{1}{3}$
$\sin x = \pm\frac{1}{\sqrt{6}} \quad or \quad \cos x = \pm\sqrt{\frac{5}{6}}$