

Pure 20 – Trig Identities, Harder equations

Please **complete** this homework by _____. Start it early. If you can't do a question you will then have time to ask your teacher for help or go to a drop in session.

Section 1 – Review of previous topics. Please complete all questions.

Solve the following equations:

1) $\sin x = 0.5 \quad 0 < x \leq 360^\circ$ 2) $\cos x = -0.5 \quad -180^\circ < x \leq 180^\circ$

3) $0 = \sqrt{3} - \tan x \quad 0 \leq x \leq 360^\circ$ 4) $\sin(2x) = \frac{\sqrt{3}}{2} \quad 0 < x \leq 360^\circ$

Section 2 – Consolidation of this week's topic. Please complete all questions.

1) Simplify the following:

a) $\sin^3(x) + \sin(x)\cos^2(x)$ (3)

b) $\cos^4(x) - \sin^4(x)$ (4)

c) $\sin(x)\tan(x) + \cos(x)$ (4)

2. a) Use an appropriate identity to show that $2 \cos^2 x = 1 + \sin x$ may be written as $2 \sin^2 x + \sin x - 1 = 0$. (3)

b) Hence solve $2 \cos^2 x = 1 + \sin x$ for $0^\circ \leq x \leq 360^\circ$. (4)

3.a) Use an appropriate identity to show that $2 + \cos x = 2 \sin^2 x$ may be written as $2\cos^2 x + \cos x = 0$ (3)

b) Hence solve $2 + \cos x = 2 \sin^2 x$ for $0^\circ \leq x \leq 360^\circ$. (4)

4. a) Use an identity to show that $2 \sin x = 3 \cos x$ may be written as $\tan x = k$, where k is a constant. (3)

b) Hence solve $2 \sin x = 3 \cos x$, for $0 \leq x \leq 360^\circ$, giving your answers to 3.s.f. (3)

5. a) Show that the equation $5 \cos^2 x = 3(1 + \sin x)$ can be written as

$5 \sin^2 x + 3 \sin x - 2 = 0$. (3)

b) Hence solve, for $0 \leq x < 360^\circ$, the equation $5 \cos^2 x = 3(1 + \sin x)$, giving your answers to 1 decimal place where appropriate. (6)

6. a) Solve, for $0 \leq x < 360^\circ$, the equation $\cos(x - 20^\circ) = -0.437$, giving your answers to the nearest degree. (3)
- b) Find the exact values of θ in the interval $0 \leq \theta < 360^\circ$ for which $3 \tan \theta = 2 \cos \theta$. (7)

(Total 50 Marks)

Section 3 – Extension questions. If you are aiming for a top grade, you should attempt these questions.

Solve the following equations:

1. $2\sin(2x) = \cos(2x)$, $0 \leq x \leq 360^\circ$
2. $3\sin^2(3x) - 7\cos(3x) - 5 = 0$, $0 \leq x \leq 180^\circ$