

5.3 Double Angle Formulas Worksheet

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The course material originated from www.jensenmath.ca

1) Express each of the following as a single trig ratio.

a) $2 \sin(5x) \cos(5x)$	b) $\cos^2 \theta - \sin^2 \theta$	c) $1 - 2 \sin^2(3x)$
d) $\frac{2 \tan(4x)}{1 - \tan^2(4x)}$	e) $4 \sin \theta \cos \theta$	f) $2 \cos^2 \frac{\theta}{2} - 1$

2) Express each of the following as a single trig ratio and then evaluate

a) $2 \sin 45^\circ \cos 45^\circ$	b) $\cos^2 30^\circ - \sin^2 30^\circ$	c) $2 \sin \frac{\pi}{12} \cos \frac{\pi}{12}$
d) $\cos^2 \frac{\pi}{12} - \sin^2 \frac{\pi}{12}$	e) $1 - 2 \sin^2 \frac{3\pi}{8}$	f) $2 \tan 60^\circ \cos^2 60^\circ$

3) Use a double angle formula to rewrite each trig ratio

a) $\sin(4\theta)$	b) $\cos(3x)$	c) $\tan x$
d) $\cos(6\theta)$	e) $\sin x$	f) $\tan(5\theta)$

4) Determine the values of $\sin 2\theta$, $\cos 2\theta$, and $\tan 2\theta$, given $\cos \theta = \frac{3}{5}$ and $0 \leq \theta \leq \frac{\pi}{2}$

5) Determine the values of $\sin 2\theta$, $\cos 2\theta$, and $\tan 2\theta$, given $\tan \theta = -\frac{7}{24}$ and $\frac{\pi}{2} \leq \theta \leq \pi$

6) Determine the values of $\sin 2\theta$, $\cos 2\theta$, and $\tan 2\theta$, given $\sin \theta = -\frac{12}{13}$ and $\frac{3\pi}{2} \leq \theta \leq 2\pi$

7) Determine the values of $\sin 2\theta$, $\cos 2\theta$, and $\tan 2\theta$, given $\cos \theta = -\frac{4}{5}$ and $\frac{\pi}{2} \leq \theta \leq \pi$

8) Determine the value of a in the equation $2 \tan x - \tan(2x) + 2a = 1 - \tan(2x) \tan^2 x$

Answer Key

1) a) $\sin(10x)$ b) $\cos(2\theta)$ c) $\cos(6x)$ d) $\tan(8x)$ e) $2 \sin(2\theta)$ f) $\cos \theta$

2) a) $\sin 90^\circ; 1$ b) $\cos 60^\circ; \frac{1}{2}$ c) $\sin \frac{\pi}{6}; \frac{1}{2}$ d) $\cos \frac{\pi}{6}; \frac{\sqrt{3}}{2}$ e) $\cos \frac{3\pi}{4}; -\frac{1}{\sqrt{2}}$ f) $\sin 120^\circ; \frac{\sqrt{3}}{2}$

3) a) $2 \sin(2\theta) \cos(2\theta)$ b) $2 \cos^2(1.5x) - 1$ c) $\frac{2 \tan(0.5x)}{1 - \tan^2(0.5x)}$ d) $\cos^2(3\theta) - \sin^2(3\theta)$ e) $2 \sin(0.5x) \cos(0.5x)$ f) $\frac{2 \tan(2.5\theta)}{1 - \tan^2(2.5\theta)}$

4) $\sin(2\theta) = \frac{24}{25}$, $\cos(2\theta) = -\frac{7}{25}$, $\tan(2\theta) = -\frac{24}{7}$

5) $\sin(2\theta) = -\frac{336}{625}$, $\cos(2\theta) = \frac{527}{625}$, $\tan(2\theta) = -\frac{336}{527}$

6) $\sin(2\theta) = -\frac{120}{169}$, $\cos(2\theta) = -\frac{119}{169}$, $\tan(2\theta) = \frac{120}{119}$

7) $\sin(2\theta) = -\frac{24}{25}$, $\cos(2\theta) = \frac{7}{25}$, $\tan(2\theta) = -\frac{24}{7}$

8) $a = \frac{1}{2}$