Intro to Double Angle Identities

Section 1 — Looking for Patterns

1. Rewrite each expression as a single trigonometric function.

a) $2\sin(20°)\cos(20°)$

b) $2\sin(35°)\cos(35°)$

c) $2\sin(x)\cos(x)$

d) $\cos^2(15°) - \sin^2(15°)$

e) $\cos^2(40°) - \sin^2(40°)$

f) $\cos^2(x) - \sin^2(x)$

g) $2\cos^2(75°) - 1$

h) $2\cos^2(x) - 1$

Section 2 — Choosing the Best Form

2. There are 3 formulas available for ecalculating the value of $\cos(2\theta)$. For each situation, determine which form of $\cos(2\theta)$ would be most useful.

a) Only $\sin\theta$ is known.

b) Only $\cos\theta$ is known.

c) Both $\sin\theta$ and $\cos\theta$ are known.

Section 3 — Applying Double-Angle Identities

3. Given $\sin\theta = \frac{2}{3}$ and θ is in Quadrant I, find:

a) $\sin(2\theta)$

b) $\cos(2\theta)$

c) $\tan(2\theta)$

4. Given $\tan\theta = -\frac{5}{6}$ and $\theta$is in Quadrant II, find:

a) $\sin(2\theta)$

b) $\cos(2\theta)$

c) $\tan(2\theta)$

Section 2 — Building the Double-Angle Identities

5. Starting with the sum identities, derive each formula.

   a) $\sin(2\theta) = 2\sin\theta\cos\theta$

   b) $\cos(2\theta) = \cos^2\theta - \sin^2\theta$

   c) $\cos(2\theta) = 1 - 2\sin^2\theta$

   d) $\cos(2\theta) = 2\cos^2\theta - 1$

Section 5 — Extending the Identities

6. Rewrite as a single trigonometric function: $4\sin\theta\cos\theta$

7. Rewrite as a single trigonometric function: $2\sin(2x)\cos(2x)$

8. Rewrite as a single trigonometric function: $\cos^2(2x) - \sin^2(2x)$

9. Explain how Questions 6–8 are connected to the double-angle identities.