# Answer Key · Lesson 5.5: Double-Angle and Half-Angle Formulas

School Launch · Trigonometry · Unit 5 · Worksheet A · for the parent

Key

**1.** $\frac{240}{289}$; $\frac{161}{289}$

$\sin\theta = \frac{8}{17}$ with $\theta$ acute. Find $\sin 2\theta$ and $\cos 2\theta$.

**2.** $\frac{840}{841}$; $\frac{41}{841}$

$\sin\theta = \frac{20}{29}$ with $\theta$ acute. Find $\sin 2\theta$ and $\cos 2\theta$.

**3.** $\frac{720}{1681}$; $\frac{1519}{1681}$

$\sin\theta = \frac{9}{41}$ with $\theta$ acute. Find $\sin 2\theta$ and $\cos 2\theta$.

**4.** $\frac{24}{25}$; $-\frac{7}{25}$

1. $\sin\theta = \sqrt{1-(\frac{3}{5})^2} = \frac{4}{5}$
2. $\sin 2\theta = 2(\frac{4}{5})(\frac{3}{5}) = \frac{24}{25}$; $\cos 2\theta = 2(\frac{3}{5})^2 - 1 = -\frac{7}{25}$

$\cos\theta = \frac{3}{5}$ with $\theta$ acute. Find $\sin 2\theta$ and $\cos 2\theta$.

**5.** $\frac{120}{169}$; $\frac{119}{169}$

1. $\cos\theta = \sqrt{1-(\frac{5}{13})^2} = \frac{12}{13}$
2. $\sin 2\theta = 2(\frac{5}{13})(\frac{12}{13}) = \frac{120}{169}$; $\cos 2\theta = 1 - 2(\frac{5}{13})^2 = \frac{119}{169}$

$\sin\theta = \frac{5}{13}$ with $\theta$ acute. Find $\sin 2\theta$ and $\cos 2\theta$.

**6.** $\frac{336}{625}$; $\frac{527}{625}$

1. $\cos\theta = \sqrt{1-(\frac{7}{25})^2} = \frac{24}{25}$
2. $\sin 2\theta = 2(\frac{7}{25})(\frac{24}{25}) = \frac{336}{625}$; $\cos 2\theta = 1 - 2(\frac{7}{25})^2 = \frac{527}{625}$

$\sin\theta = \frac{7}{25}$ with $\theta$ acute. Find $\sin 2\theta$ and $\cos 2\theta$.

**7.** $\frac{240}{289}$; $-\frac{161}{289}$

1. $\sin\theta = \sqrt{1-(\frac{8}{17})^2} = \frac{15}{17}$
2. $\sin 2\theta = 2(\frac{15}{17})(\frac{8}{17}) = \frac{240}{289}$; $\cos 2\theta = 2(\frac{8}{17})^2 - 1 = -\frac{161}{289}$

$\cos\theta = \frac{8}{17}$ with $\theta$ acute. Find $\sin 2\theta$ and $\cos 2\theta$.

**8.** $\frac{\sqrt{82}}{82}$

1. $\frac{1-\frac{40}{41}}{2} = \frac{1}{82}$
2. $\sin\frac{\theta}{2} = \sqrt{\frac{1}{82}} = \frac{\sqrt{82}}{82}$

$\cos\theta = \frac{40}{41}$ with $\theta$ acute. Find $\sin\frac{\theta}{2}$ exactly.

**9.** $\frac{4\sqrt{17}}{17}$

1. $\frac{1+\frac{15}{17}}{2} = \frac{16}{17}$
2. $\cos\frac{\theta}{2} = \sqrt{\frac{16}{17}} = \frac{4\sqrt{17}}{17}$

$\cos\theta = \frac{15}{17}$ with $\theta$ acute. Find $\cos\frac{\theta}{2}$ exactly.

**10.** $\frac{5\sqrt{26}}{26}$

1. $\frac{1+\frac{12}{13}}{2} = \frac{25}{26}$
2. $\cos\frac{\theta}{2} = \sqrt{\frac{25}{26}} = \frac{5\sqrt{26}}{26}$

$\cos\theta = \frac{12}{13}$ with $\theta$ acute. Find $\cos\frac{\theta}{2}$ exactly.