A2.A.77: Double Angle Identities 3: Apply the double-angle and half-angle formulas for trigonometric functions

1 If $\sin A = \frac{1}{3}$, what is the value of $\cos 2A$?

1) $-\frac{2}{3}$
2) $\frac{2}{3}$
3) $-\frac{7}{9}$
4) $\frac{7}{9}$

2 If $\cos\theta = \frac{3}{4}$, then what is $\cos 2\theta$?

1) $\frac{1}{8}$
2) $\frac{9}{16}$
3) $-\frac{1}{8}$
4) $\frac{3}{2}$

3 If x is an acute angle, and $\cos x = \frac{4}{5}$, then $\cos 2x$ is equal to

1) $\frac{6}{25}$
2) $\frac{-1}{25}$
3) $\frac{2}{25}$
4) $\frac{7}{25}$

4 If $\sin A = \frac{3}{8}$, what is the value of $\cos 2A$?

1) $-\frac{9}{64}$
2) $\frac{1}{4}$
3) $\frac{23}{32}$
4) $\frac{55}{64}$

5 If x is an acute angle and $\sin x = \frac{12}{13}$, then $\cos 2x$ equals

1) $\frac{25}{169}$
2) $\frac{119}{169}$
3) $-\frac{25}{169}$
4) $-\frac{119}{169}$

6 If θ is an acute angle such that $\sin\theta = \frac{5}{13}$, what is the value of $\sin 2\theta$?

1) $\frac{12}{13}$
2) $\frac{10}{26}$
3) $\frac{60}{169}$
4) $\frac{120}{169}$

7 If x is a positive acute angle and $\sin x = \frac{1}{2}$, what is $\sin 2x$?

1) $-\frac{1}{2}$
2) $\frac{1}{2}$
3) $-\frac{\sqrt{3}}{2}$
4) $\frac{\sqrt{3}}{2}$

8 If $\sin A = \frac{2}{3}$ where $0° < A < 90°$, what is the value of $\sin 2A$?

1) $\frac{2\sqrt{5}}{3}$
2) $\frac{2\sqrt{5}}{9}$
3) $\frac{4\sqrt{5}}{9}$
4) $-\frac{4\sqrt{5}}{9}$

9 If $\sin A = \frac{3}{5}$, find $\cos 2A$.

10 If $\sin A = \frac{2}{3}$, find $\cos 2A$.

11 If θ is in Quadrant II and $\cos\theta = -\frac{3}{4}$, find an exact value for $\sin 2\theta$.

12 $\text{Sin}A = \frac{\sqrt{5}}{3}$ and $\angle A$ is in Quadrant I. Find, in simplest form, the value of $\sin 2A$ and $\cos 2A$.

13 The expression $1 - 2\sin^2 30°$ has the same value as

1) $\sin 60°$
2) $\cos 60°$
3) $\cos 15°$
4) $\sin 15°$

14 The expression $1 - 2\sin^2 45°$ has the same value as

1) $\cos 90°$
2) $\cos 45°$
3) $\sin 90°$
4) $\sin 22\frac{1}{2}°$

15 The expression $2\sin 30°\cos 30°$ has the same value as

1) $\sin 15°$
2) $\cos 60°$
3) $\sin 60°$
4) $\cos 15°$

16 The expression $\cos^2 40 - \sin^2 40$ has the same value as

1) $\sin 20$
2) $\sin 80$
3) $\cos 80$
4) $\cos 20$

17 If θ is an obtuse angle and $\sin\theta = b$, then it can be concluded that

1) $\tan\theta > b$
2) $\cos\theta > b$
3) $\cos 2\theta > b$
4) $\sin 2\theta < b$

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Answer Section

1 ANS: 4

$\cos 2A = 1 - 2\sin^2 A = 1 - 2\left(\frac{1}{3}\right)^2 = 1 - \frac{2}{9} = \frac{7}{9}$

REF: 011311a2

2 ANS: 1

$\cos 2\theta = 2\left(\frac{3}{4}\right)^2 - 1 = 2\left(\frac{9}{16}\right) - 1 = \frac{9}{8} - \frac{8}{8} = \frac{1}{8}$

REF: 081522a2

3 ANS: 4

$\cos 2x = 2\cos^2 x - 1 = 2(\frac{4}{5})^2 - 1 = 2(\frac{16}{25}) - 1 = \frac{32}{25} - \frac{25}{25} = \frac{7}{25}$

REF: fall9905b

4 ANS: 3

$\cos 2A = 1 - 2\sin^2 A = 1 - 2\left(\frac{3}{8}\right)^2 = \frac{32}{32} - \frac{9}{32} = \frac{23}{32}$

REF: 011510a2

5 ANS: 4

$\cos 2x = 1 - 2\sin^2 x = 1 - 2(\frac{12}{13})^2 = 1 - \frac{288}{169} = -\frac{119}{169}$

REF: 010418b

6 ANS: 4

If θ is an acute angle and $\sin\theta = \frac{5}{13}$, $\cos\theta = \frac{12}{13}$. $\sin 2\theta = 2\sin\theta\cos\theta = 2 \cdot \frac{5}{13} \cdot \frac{12}{13} = \frac{120}{169}$.

REF: 060413b

7 ANS: 4

If x is an acute angle and $\sin x = \frac{1}{2}$, $\cos x = \frac{\sqrt{3}}{2}$. $\sin 2x = 2\sin x\cos x = 2 \cdot \frac{1}{2} \cdot \frac{\sqrt{3}}{2} = \frac{\sqrt{3}}{2}$.

REF: 060604b

8 ANS: 3

$\left(\frac{2}{3}\right)^2 + \cos^2 A = 1$

$\cos^2 A = \frac{5}{9}$

$\cos A = +\frac{\sqrt{5}}{3}$, sin A is acute.

$\sin 2A = 2\sin A\cos A$

$= 2\left(\frac{2}{3}\right)\left(\frac{\sqrt{5}}{3}\right)$

$= \frac{4\sqrt{5}}{9}$

REF: 011107a2

9 ANS:

$\frac{7}{25}$

REF: 068817siii

10 ANS:

$\frac{1}{9}$

REF: 088713siii

11 ANS:

$\frac{-3\sqrt{7}}{8}$

REF: 089940siii

12 ANS:

$\frac{4\sqrt{5}}{9}, -\frac{1}{9}$

REF: 088938siii

13 ANS: 2 REF: 068523siii

14 ANS: 1 REF: 089521siii

15 ANS: 3 REF: 069727siii

16 ANS: 3 REF: 089821siii

17 ANS: 4

If θ is an obtuse angle, $\cos\theta$ is negative, $\sin\theta$ is positive, and b is positive. $2\sin\theta\cos\theta$ is negative. $\sin 2\theta = 2\sin\theta\cos\theta$. $\sin 2\theta$ is negative.

REF: 060118b