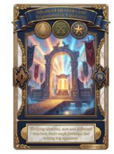
# Advanced Identities and Trigonometric Equations

Verifying identities, sum-and-difference structure, multi-angle formulas, and solving trig equations.

Name ____________________ Date ________________

32 main | 2-up grid | 11 pages | visible side quests

**Completion Reward**



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**1. Which formula is correct?**

A. $\sin(a + b) = \sin(a)\sin(b) + \cos(a)\cos(b)$
B. $\sin(a + b) = \sin(a)\cos(b) + \cos(a)\sin(b)$
C. $\sin(a + b) = \sin(a)\cos(b) - \cos(a)\sin(b)$
D. $\sin(a + b) = \tan(a) + \tan(b)$

1.1. Which formula is correct?

A. $\sin(a + b) = \sin(a)\cos(b) + \cos(a)\sin(b)$
B. $\sin(a + b) = \sin(a)\sin(b) + \cos(a)\cos(b)$
C. $\sin(a + b) = \tan(a) + \tan(b)$
D. $\sin(a + b) = \sin(a) - \sin(b)$

1.2. Which formula is correct?

A. $\cos(a - b) = \cos(a)\cos(b) + \sin(a)\sin(b)$
B. $\cos(a - b) = \cos(a) - \cos(b)$
C. $\cos(a - b) = \sin(a)\cos(b) - \cos(a)\sin(b)$
D. $\cos(a - b) = \tan(a - b)$

1.3. Which setup finds sin(15 degrees)?

A. sin(45 degrees + 30 degrees)
B. sin(45 degrees - 30 degrees)
C. cos(45 degrees + 30 degrees)
D. tan(45 degrees - 30 degrees)

1.4. Which setup finds cos(75 degrees)?

A. cos(45 degrees + 30 degrees)
B. sin(45 degrees + 30 degrees)
C. cos(45 degrees - 30 degrees)
D. tan(45 degrees + 30 degrees)

1.5. Which denominator appears in tan(a + b)?

A. $1 + \tan(a)\tan(b)$
B. $1 - \tan(a)\tan(b)$
C. $\tan(a) + \tan(b)$
D. $\cos(a + b)$

**2. Which formula is correct?**

A. $\cos(a - b) = \cos(a)\cos(b) - \sin(a)\sin(b)$
B. $\cos(a - b) = \sin(a)\cos(b) + \cos(a)\sin(b)$
C. $\cos(a - b) = \cos(a)\cos(b) + \sin(a)\sin(b)$
D. $\cos(a - b) = \tan(a) - \tan(b)$

2.1. Which formula is correct?

A. $\sin(a + b) = \sin(a)\cos(b) + \cos(a)\sin(b)$
B. $\sin(a + b) = \sin(a)\sin(b) + \cos(a)\cos(b)$
C. $\sin(a + b) = \tan(a) + \tan(b)$
D. $\sin(a + b) = \sin(a) - \sin(b)$

2.2. Which formula is correct?

A. $\cos(a - b) = \cos(a)\cos(b) + \sin(a)\sin(b)$
B. $\cos(a - b) = \cos(a) - \cos(b)$
C. $\cos(a - b) = \sin(a)\cos(b) - \cos(a)\sin(b)$
D. $\cos(a - b) = \tan(a - b)$

2.3. Which setup finds sin(15 degrees)?

A. sin(45 degrees + 30 degrees)
B. sin(45 degrees - 30 degrees)
C. cos(45 degrees + 30 degrees)
D. tan(45 degrees - 30 degrees)

2.4. Which setup finds cos(75 degrees)?

A. cos(45 degrees + 30 degrees)
B. sin(45 degrees + 30 degrees)
C. cos(45 degrees - 30 degrees)
D. tan(45 degrees + 30 degrees)

2.5. Which denominator appears in tan(a + b)?

A. $1 + \tan(a)\tan(b)$
B. $1 - \tan(a)\tan(b)$
C. $\tan(a) + \tan(b)$
D. $\cos(a + b)$

**3. Which expression equals sin(2x)?**

A. $2\sin(x)\cos(x)$
B. $\sin^2(x) - \cos^2(x)$
C. $2\tan(x)$
D. $1 - 2\sin^2(x)$

3.1. Which expression equals sin(2x)?

A. $2\sin(x)\cos(x)$
B. $\sin^2(x) - \cos^2(x)$
C. $2\sin(x)$
D. $1 - 2\sin^2(x)$

3.2. Which expression equals cos(2x)?

A. $\sin^2(x) - \cos^2(x)$
B. $\cos^2(x) + \sin^2(x)$
C. $\cos^2(x) - \sin^2(x)$
D. $2\cos(x)$

3.3. Which expression is another form of cos(2x)?

A. $1 - 2\sin^2(x)$
B. $2\sin(x)\cos(x)$
C. $1 + 2\sin^2(x)$
D. $2\cos^2(x) + 1$

3.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. $1 - 2\cos^2(x)$
B. $2\cos^2(x) - 1$
C. $2\sin(x)\cos(x)$
D. $1 - \sin^2(x)$

3.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. $\sin(2x) = 2\sin(x)\cos(x)$
B. $\cos(2x) = \cos^2(x) - \sin^2(x)$
C. $1 + \tan^2(x) = \sec^2(x)$
D. $\sin^2(x) + \cos^2(x) = 1$

**4. Which expression equals cos(2x)?**

A. 2sin(x)cos(x)
B. 1 + 2sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2tan(x)

4.1. Which expression equals sin(2x)?

A. 2sin(x)cos(x)
B. sin^2(x) - cos^2(x)
C. 2sin(x)
D. 1 - 2sin^2(x)

4.2. Which expression equals cos(2x)?

A. sin^2(x) - cos^2(x)
B. cos^2(x) + sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2cos(x)

4.3. Which expression is another form of cos(2x)?

A. 1 - 2sin^2(x)
B. 2sin(x)cos(x)
C. 1 + 2sin^2(x)
D. 2cos^2(x) + 1

4.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. 1 - 2cos^2(x)
B. 2cos^2(x) - 1
C. 2sin(x)cos(x)
D. 1 - sin^2(x)

4.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. sin(2x) = 2sin(x)cos(x)
B. cos(2x) = cos^2(x) - sin^2(x)
C. 1 + tan^2(x) = sec^2(x)
D. sin^2(x) + cos^2(x) = 1

**5. Which denominator appears in tan(a + b)?**

A. 1 + tan(a)tan(b)
B. tan(a) + tan(b)
C. 1 - tan(a)tan(b)
D. cos(a) + cos(b)

5.1. Which formula is correct?

A. sin(a + b) = sin(a)cos(b) + cos(a)sin(b)
B. sin(a + b) = sin(a)sin(b) + cos(a)cos(b)
C. sin(a + b) = tan(a) + tan(b)
D. sin(a + b) = sin(a) - sin(b)

5.2. Which formula is correct?

A. cos(a - b) = cos(a)cos(b) + sin(a)sin(b)
B. cos(a - b) = cos(a) - cos(b)
C. cos(a - b) = sin(a)cos(b) - cos(a)sin(b)
D. cos(a - b) = tan(a - b)

5.3. Which setup finds sin(15 degrees)?

A. sin(45 degrees + 30 degrees)
B. sin(45 degrees - 30 degrees)
C. cos(45 degrees + 30 degrees)
D. tan(45 degrees - 30 degrees)

5.4. Which setup finds cos(75 degrees)?

A. cos(45 degrees + 30 degrees)
B. sin(45 degrees + 30 degrees)
C. cos(45 degrees - 30 degrees)
D. tan(45 degrees + 30 degrees)

5.5. Which denominator appears in tan(a + b)?

A. 1 + tan(a)tan(b)
B. 1 - tan(a)tan(b)
C. tan(a) + tan(b)
D. cos(a + b)

**6. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?**

A. To replace cosine with an expression in sine only
B. To turn the equation into one trig function instead of two
C. To force every solution into Quadrant I
D. To avoid considering interval restrictions

6.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

6.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

6.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

6.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

6.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**7. Which exact value equals sin(75 degrees)?**

A. (sqrt(6) - sqrt(2)) / 4
B. sqrt(3) / 2
C. 1 / 2
D. (sqrt(6) + sqrt(2)) / 4

7.1. Which formula is correct?

A. sin(a + b) = sin(a)cos(b) + cos(a)sin(b)
B. sin(a + b) = sin(a)sin(b) + cos(a)cos(b)
C. sin(a + b) = tan(a) + tan(b)
D. sin(a + b) = sin(a) - sin(b)

7.2. Which formula is correct?

A. cos(a - b) = cos(a)cos(b) + sin(a)sin(b)
B. cos(a - b) = cos(a) - cos(b)
C. cos(a - b) = sin(a)cos(b) - cos(a)sin(b)
D. cos(a - b) = tan(a - b)

7.3. Which setup finds sin(15 degrees)?

A. sin(45 degrees + 30 degrees)
B. sin(45 degrees - 30 degrees)
C. cos(45 degrees + 30 degrees)
D. tan(45 degrees - 30 degrees)

7.4. Which setup finds cos(75 degrees)?

A. cos(45 degrees + 30 degrees)
B. sin(45 degrees + 30 degrees)
C. cos(45 degrees - 30 degrees)
D. tan(45 degrees + 30 degrees)

7.5. Which denominator appears in tan(a + b)?

A. 1 + tan(a)tan(b)
B. 1 - tan(a)tan(b)
C. tan(a) + tan(b)
D. cos(a + b)

**8. Which exact value equals cos(15 degrees)?**

A. (sqrt(6) - sqrt(2)) / 4
B. sqrt(3) / 2
C. (sqrt(6) + sqrt(2)) / 4
D. 1 / 2

8.1. Which formula is correct?

A. sin(a + b) = sin(a)cos(b) + cos(a)sin(b)
B. sin(a + b) = sin(a)sin(b) + cos(a)cos(b)
C. sin(a + b) = tan(a) + tan(b)
D. sin(a + b) = sin(a) - sin(b)

8.2. Which formula is correct?

A. cos(a - b) = cos(a)cos(b) + sin(a)sin(b)
B. cos(a - b) = cos(a) - cos(b)
C. cos(a - b) = sin(a)cos(b) - cos(a)sin(b)
D. cos(a - b) = tan(a - b)

8.3. Which setup finds sin(15 degrees)?

A. sin(45 degrees + 30 degrees)
B. sin(45 degrees - 30 degrees)
C. cos(45 degrees + 30 degrees)
D. tan(45 degrees - 30 degrees)

8.4. Which setup finds cos(75 degrees)?

A. cos(45 degrees + 30 degrees)
B. sin(45 degrees + 30 degrees)
C. cos(45 degrees - 30 degrees)
D. tan(45 degrees + 30 degrees)

8.5. Which denominator appears in tan(a + b)?

A. 1 + tan(a)tan(b)
B. 1 - tan(a)tan(b)
C. tan(a) + tan(b)
D. cos(a + b)

**9. Which expression is another form of cos(2x)?**

A. 1 + 2sin^2(x)
B. 2sin(x)cos(x)
C. 2cos^2(x) + 1
D. 1 - 2sin^2(x)

9.1. Which expression equals sin(2x)?

A. 2sin(x)cos(x)
B. sin^2(x) - cos^2(x)
C. 2sin(x)
D. 1 - 2sin^2(x)

9.2. Which expression equals cos(2x)?

A. sin^2(x) - cos^2(x)
B. cos^2(x) + sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2cos(x)

9.3. Which expression is another form of cos(2x)?

A. 1 - 2sin^2(x)
B. 2sin(x)cos(x)
C. 1 + 2sin^2(x)
D. 2cos^2(x) + 1

9.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. 1 - 2cos^2(x)
B. 2cos^2(x) - 1
C. 2sin(x)cos(x)
D. 1 - sin^2(x)

9.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. sin(2x) = 2sin(x)cos(x)
B. cos(2x) = cos^2(x) - sin^2(x)
C. 1 + tan^2(x) = sec^2(x)
D. sin^2(x) + cos^2(x) = 1

**10. If sin(x) = -1 / 2, what is the reference angle?**

A. pi / 3
B. pi / 6
C. pi / 4
D. 2pi / 3

10.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

10.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

10.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

10.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

10.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**11. Which expression equals sin(105 degrees)?**

A. (sqrt(6) - sqrt(2)) / 4
B. sqrt(3) / 2
C. (sqrt(6) + sqrt(2)) / 4
D. 1 / 2

11.1. What is the principal range of arcsin(x)?

A. [-pi / 2, pi / 2]
B. [0, pi]
C. (-pi, pi)
D. [0, 2pi]

11.2. What is the principal range of arccos(x)?

A. [-pi / 2, pi / 2]
B. [0, pi]
C. (-pi, pi)
D. [0, 2pi]

11.3. Which identity is always true?

A. sin^2(x) + cos^2(x) = 1
B. sin(x) + cos(x) = 1
C. 1 + sec^2(x) = tan^2(x)
D. sin^2(x) - cos^2(x) = 1

11.4. Which statement is true?

A. cos(-x) = -cos(x)
B. sin(-x) = -sin(x)
C. tan(-x) = tan(x)
D. arccos(-x) = arccos(x)

11.5. If sin(theta) = 3/5 and theta is acute, then cos(theta) is:

A. 3/4
B. 4/5
C. 5/3
D. 5/4

**12. To verify sin(x)cos(x) = 1 / 2 sin(2x), what is the best first step?**

A. Square both sides
B. Replace sin(2x) with 2sin(x)cos(x)
C. Divide by tan(x)
D. Replace cos(x) with sec(x)

12.1. sec(x) equals:

A. 1/sin(x)
B. 1/cos(x)
C. sin(x)/cos(x)
D. cos(x)/sin(x)

12.2. 1 + tan^2(x) equals:

A. sin^2(x)
B. cos^2(x)
C. sec^2(x)
D. csc^2(x)

12.3. 1 + cot^2(x) equals:

A. sec^2(x)
B. csc^2(x)
C. sin^2(x)
D. cos^2(x)

12.4. 1 - sin^2(x) can be rewritten as:

A. tan^2(x)
B. cos^2(x)
C. sec^2(x)
D. 1 + cos^2(x)

12.5. Which identity is always true?

A. sin^2(x) + cos^2(x) = 1
B. sin(x) + cos(x) = 1
C. tan(x) + sec(x) = 1
D. sin^2(x) - cos^2(x) = 1

**13. What is the best setup for finding sin(15 degrees)?**

A. Use cos(45 degrees + 30 degrees)
B. Use tan(45 degrees - 30 degrees)
C. Use sin(45 degrees - 30 degrees)
D. Use a half-angle identity on 15 degrees immediately

13.1. What is the principal range of arcsin(x)?

A. [-pi / 2, pi / 2]
B. [0, pi]
C. (-pi, pi)
D. [0, 2pi]

13.2. What is the principal range of arccos(x)?

A. [-pi / 2, pi / 2]
B. [0, pi]
C. (-pi, pi)
D. [0, 2pi]

13.3. Which identity is always true?

A. sin^2(x) + cos^2(x) = 1
B. sin(x) + cos(x) = 1
C. 1 + sec^2(x) = tan^2(x)
D. sin^2(x) - cos^2(x) = 1

13.4. Which statement is true?

A. cos(-x) = -cos(x)
B. sin(-x) = -sin(x)
C. tan(-x) = tan(x)
D. arccos(-x) = arccos(x)

13.5. If sin(theta) = 3/5 and theta is acute, then cos(theta) is:

A. 3/4
B. 4/5
C. 5/3
D. 5/4

**14. What is the best first step to solve cos(2x) = 0?**

A. Divide by cos(x)
B. Replace cos(2x) with sin(2x)
C. Square both sides
D. Solve 2x = pi / 2 + kpi

14.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

14.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

14.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

14.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

14.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**15. To verify (1 - cos(2x)) / 2 = sin^2(x), which identity helps most?**

A. sin(2x) = 2sin(x)cos(x)
B. tan(2x) = 2tan(x) / (1 - tan^2(x))
C. cos(2x) = 1 - 2sin^2(x)
D. sin^2(x) + cos^2(x) = 2

15.1. sec(x) equals:

A. 1/sin(x)
B. 1/cos(x)
C. sin(x)/cos(x)
D. cos(x)/sin(x)

15.2. 1 + tan^2(x) equals:

A. sin^2(x)
B. cos^2(x)
C. sec^2(x)
D. csc^2(x)

15.3. 1 + cot^2(x) equals:

A. sec^2(x)
B. csc^2(x)
C. sin^2(x)
D. cos^2(x)

15.4. 1 - sin^2(x) can be rewritten as:

A. tan^2(x)
B. cos^2(x)
C. sec^2(x)
D. 1 + cos^2(x)

15.5. Which identity is always true?

A. sin^2(x) + cos^2(x) = 1
B. sin(x) + cos(x) = 1
C. tan(x) + sec(x) = 1
D. sin^2(x) - cos^2(x) = 1

**16. A student writes cos(a + b) = cos(a)cos(b) + sin(a)sin(b). What is wrong?**

A. The formula should use tangent
B. The cosine terms should be squared
C. Nothing is wrong
D. The sign should be minus, not plus

16.1. What is the principal range of arcsin(x)?

A. [-pi / 2, pi / 2]
B. [0, pi]
C. (-pi, pi)
D. [0, 2pi]

16.2. What is the principal range of arccos(x)?

A. [-pi / 2, pi / 2]
B. [0, pi]
C. (-pi, pi)
D. [0, 2pi]

16.3. Which identity is always true?

A. sin^2(x) + cos^2(x) = 1
B. sin(x) + cos(x) = 1
C. 1 + sec^2(x) = tan^2(x)
D. sin^2(x) - cos^2(x) = 1

16.4. Which statement is true?

A. cos(-x) = -cos(x)
B. sin(-x) = -sin(x)
C. tan(-x) = tan(x)
D. arccos(-x) = arccos(x)

16.5. If sin(theta) = 3/5 and theta is acute, then cos(theta) is:

A. 3/4
B. 4/5
C. 5/3
D. 5/4

**17. A student solves cos(x) = 1 / 2 on [0, 2pi] with x = pi / 3 and 2pi / 3. What is wrong?**

A. 2pi / 3 has cosine -1 / 2, not 1 / 2
B. pi / 3 is outside the interval
C. Cosine can never equal 1 / 2
D. The student should only give one answer

17.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

17.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

17.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

17.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

17.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**18. A student solving tan(x) = 1 lists x = pi / 4 and 9pi / 4 on [0, 2pi). What is the mistake?**

A. pi / 4 is not a tangent solution
B. 9pi / 4 is outside the interval
C. Tangent has period 2pi
D. The second solution should be 3pi / 4

18.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

18.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

18.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

18.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

18.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**19. Write sin(a - b). Answer as an equation.**

19.1. Which formula is correct?

A. sin(a + b) = sin(a)cos(b) + cos(a)sin(b)
B. sin(a + b) = sin(a)sin(b) + cos(a)cos(b)
C. sin(a + b) = tan(a) + tan(b)
D. sin(a + b) = sin(a) - sin(b)

19.2. Which formula is correct?

A. cos(a - b) = cos(a)cos(b) + sin(a)sin(b)
B. cos(a - b) = cos(a) - cos(b)
C. cos(a - b) = sin(a)cos(b) - cos(a)sin(b)
D. cos(a - b) = tan(a - b)

19.3. Which setup finds sin(15 degrees)?

A. sin(45 degrees + 30 degrees)
B. sin(45 degrees - 30 degrees)
C. cos(45 degrees + 30 degrees)
D. tan(45 degrees - 30 degrees)

19.4. Which setup finds cos(75 degrees)?

A. cos(45 degrees + 30 degrees)
B. sin(45 degrees + 30 degrees)
C. cos(45 degrees - 30 degrees)
D. tan(45 degrees + 30 degrees)

19.5. Which denominator appears in tan(a + b)?

A. 1 + tan(a)tan(b)
B. 1 - tan(a)tan(b)
C. tan(a) + tan(b)
D. cos(a + b)

**20. Write cos(a + b). Answer as an equation.**

20.1. Which formula is correct?

A. sin(a + b) = sin(a)cos(b) + cos(a)sin(b)
B. sin(a + b) = sin(a)sin(b) + cos(a)cos(b)
C. sin(a + b) = tan(a) + tan(b)
D. sin(a + b) = sin(a) - sin(b)

20.2. Which formula is correct?

A. cos(a - b) = cos(a)cos(b) + sin(a)sin(b)
B. cos(a - b) = cos(a) - cos(b)
C. cos(a - b) = sin(a)cos(b) - cos(a)sin(b)
D. cos(a - b) = tan(a - b)

20.3. Which setup finds sin(15 degrees)?

A. sin(45 degrees + 30 degrees)
B. sin(45 degrees - 30 degrees)
C. cos(45 degrees + 30 degrees)
D. tan(45 degrees - 30 degrees)

20.4. Which setup finds cos(75 degrees)?

A. cos(45 degrees + 30 degrees)
B. sin(45 degrees + 30 degrees)
C. cos(45 degrees - 30 degrees)
D. tan(45 degrees + 30 degrees)

20.5. Which denominator appears in tan(a + b)?

A. 1 + tan(a)tan(b)
B. 1 - tan(a)tan(b)
C. tan(a) + tan(b)
D. cos(a + b)

**21. Write sin(2x). Answer as an equation.**

21.1. Which expression equals sin(2x)?

A. 2sin(x)cos(x)
B. sin^2(x) - cos^2(x)
C. 2sin(x)
D. 1 - 2sin^2(x)

21.2. Which expression equals cos(2x)?

A. sin^2(x) - cos^2(x)
B. cos^2(x) + sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2cos(x)

21.3. Which expression is another form of cos(2x)?

A. 1 - 2sin^2(x)
B. 2sin(x)cos(x)
C. 1 + 2sin^2(x)
D. 2cos^2(x) + 1

21.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. 1 - 2cos^2(x)
B. 2cos^2(x) - 1
C. 2sin(x)cos(x)
D. 1 - sin^2(x)

21.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. sin(2x) = 2sin(x)cos(x)
B. cos(2x) = cos^2(x) - sin^2(x)
C. 1 + tan^2(x) = sec^2(x)
D. sin^2(x) + cos^2(x) = 1

**22. Write cos(2x) as a difference of squares. Answer as an equation.**

22.1. Which expression equals sin(2x)?

A. 2sin(x)cos(x)
B. sin^2(x) - cos^2(x)
C. 2sin(x)
D. 1 - 2sin^2(x)

22.2. Which expression equals cos(2x)?

A. sin^2(x) - cos^2(x)
B. cos^2(x) + sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2cos(x)

22.3. Which expression is another form of cos(2x)?

A. 1 - 2sin^2(x)
B. 2sin(x)cos(x)
C. 1 + 2sin^2(x)
D. 2cos^2(x) + 1

22.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. 1 - 2cos^2(x)
B. 2cos^2(x) - 1
C. 2sin(x)cos(x)
D. 1 - sin^2(x)

22.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. sin(2x) = 2sin(x)cos(x)
B. cos(2x) = cos^2(x) - sin^2(x)
C. 1 + tan^2(x) = sec^2(x)
D. sin^2(x) + cos^2(x) = 1

**23. Write tan(2x). Answer as an equation.**

23.1. Which expression equals sin(2x)?

A. 2sin(x)cos(x)
B. sin^2(x) - cos^2(x)
C. 2sin(x)
D. 1 - 2sin^2(x)

23.2. Which expression equals cos(2x)?

A. sin^2(x) - cos^2(x)
B. cos^2(x) + sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2cos(x)

23.3. Which expression is another form of cos(2x)?

A. 1 - 2sin^2(x)
B. 2sin(x)cos(x)
C. 1 + 2sin^2(x)
D. 2cos^2(x) + 1

23.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. 1 - 2cos^2(x)
B. 2cos^2(x) - 1
C. 2sin(x)cos(x)
D. 1 - sin^2(x)

23.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. sin(2x) = 2sin(x)cos(x)
B. cos(2x) = cos^2(x) - sin^2(x)
C. 1 + tan^2(x) = sec^2(x)
D. sin^2(x) + cos^2(x) = 1

**24. Rewrite 2sin(x)cos(x) using a double-angle identity. Answer as an expression.**

24.1. Which expression equals sin(2x)?

A. 2sin(x)cos(x)
B. sin^2(x) - cos^2(x)
C. 2sin(x)
D. 1 - 2sin^2(x)

24.2. Which expression equals cos(2x)?

A. sin^2(x) - cos^2(x)
B. cos^2(x) + sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2cos(x)

24.3. Which expression is another form of cos(2x)?

A. 1 - 2sin^2(x)
B. 2sin(x)cos(x)
C. 1 + 2sin^2(x)
D. 2cos^2(x) + 1

24.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. 1 - 2cos^2(x)
B. 2cos^2(x) - 1
C. 2sin(x)cos(x)
D. 1 - sin^2(x)

24.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. sin(2x) = 2sin(x)cos(x)
B. cos(2x) = cos^2(x) - sin^2(x)
C. 1 + tan^2(x) = sec^2(x)
D. sin^2(x) + cos^2(x) = 1

**25. Rewrite cos^2(x) - sin^2(x) using a double-angle identity. Answer as an expression.**

25.1. Which expression equals sin(2x)?

A. 2sin(x)cos(x)
B. sin^2(x) - cos^2(x)
C. 2sin(x)
D. 1 - 2sin^2(x)

25.2. Which expression equals cos(2x)?

A. sin^2(x) - cos^2(x)
B. cos^2(x) + sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2cos(x)

25.3. Which expression is another form of cos(2x)?

A. 1 - 2sin^2(x)
B. 2sin(x)cos(x)
C. 1 + 2sin^2(x)
D. 2cos^2(x) + 1

25.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. 1 - 2cos^2(x)
B. 2cos^2(x) - 1
C. 2sin(x)cos(x)
D. 1 - sin^2(x)

25.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. sin(2x) = 2sin(x)cos(x)
B. cos(2x) = cos^2(x) - sin^2(x)
C. 1 + tan^2(x) = sec^2(x)
D. sin^2(x) + cos^2(x) = 1

**26. Rewrite 1 - 2sin^2(x) using a double-angle identity. Answer as an expression.**

26.1. Which expression equals sin(2x)?

A. 2sin(x)cos(x)
B. sin^2(x) - cos^2(x)
C. 2sin(x)
D. 1 - 2sin^2(x)

26.2. Which expression equals cos(2x)?

A. sin^2(x) - cos^2(x)
B. cos^2(x) + sin^2(x)
C. cos^2(x) - sin^2(x)
D. 2cos(x)

26.3. Which expression is another form of cos(2x)?

A. 1 - 2sin^2(x)
B. 2sin(x)cos(x)
C. 1 + 2sin^2(x)
D. 2cos^2(x) + 1

26.4. If you want to rewrite cos(2x) using only cosine, which form works?

A. 1 - 2cos^2(x)
B. 2cos^2(x) - 1
C. 2sin(x)cos(x)
D. 1 - sin^2(x)

26.5. To verify sin(x)cos(x) = 1/2 sin(2x), which identity helps most?

A. sin(2x) = 2sin(x)cos(x)
B. cos(2x) = cos^2(x) - sin^2(x)
C. 1 + tan^2(x) = sec^2(x)
D. sin^2(x) + cos^2(x) = 1

**27. Which solution set on [0, 2pi] is correct for sin(x) = 1 / 2?**

A. x = pi / 6 and 7pi / 6
B. x = 5pi / 6 and 7pi / 6
C. x = pi / 6 and 5pi / 6
D. x = 11pi / 6 only

27.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

27.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

27.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

27.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

27.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**28. Which solution set on [0, 2pi] is correct for cos(x) = -sqrt(2) / 2?**

A. x = pi / 4 and 7pi / 4
B. x = pi / 4 and 3pi / 4
C. x = 3pi / 4 and 5pi / 4
D. x = 5pi / 4 and 7pi / 4

28.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

28.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

28.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

28.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

28.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**29. Which solution set on [0, 2pi) is correct for tan(x) = 1?**

A. x = pi / 4 and 3pi / 4
B. x = 3pi / 4 and 7pi / 4
C. x = pi / 4 only
D. x = pi / 4 and 5pi / 4

29.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

29.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

29.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

29.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

29.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**30. Which solution set on [0, 2pi] is correct for 2sin(x) = sqrt(3)?**

A. x = pi / 6 and 5pi / 6
B. x = pi / 3 and 5pi / 3
C. x = pi / 3 and 2pi / 3
D. x = 2pi / 3 and 4pi / 3

30.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

30.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

30.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

30.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

30.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**31. Which solution set on [0, 2pi] is correct for 2cos(x) = -1?**

A. x = 2pi / 3 and 4pi / 3
B. x = pi / 3 and 5pi / 3
C. x = pi / 6 and 11pi / 6
D. x = pi / 3 and 2pi / 3

31.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

31.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

31.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

31.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

31.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

**32. Which solution set on [0, 2pi) is correct for tan(x) = -sqrt(3)?**

A. x = pi / 3 and 4pi / 3
B. x = pi / 6 and 7pi / 6
C. x = 2pi / 3 and 5pi / 3
D. x = 5pi / 6 and 11pi / 6

32.1. Why might you rewrite cos(2x) as 1 - 2sin^2(x) when solving an equation?

A. to turn it into a simpler algebraic equation in sin(x)
B. to remove every angle
C. to make the period pi^2
D. to avoid using identities

32.2. If sin(x) = -1/2, what is the reference angle?

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2

32.3. What is a good first step to solve cos(2x) = 0?

A. set 2x equal to the cosine angles where cosine is 0
B. differentiate both sides
C. divide by x
D. replace cosine with tangent

32.4. Cos(theta) = 0 at which special angle in the first cycle?

A. 0
B. pi / 3
C. pi / 2
D. pi

32.5. If sin(x) = sqrt(2)/2, one special-angle solution is:

A. pi / 6
B. pi / 4
C. pi / 3
D. pi / 2