

# Precalculus - Trigonometric Identities - Quiz

Common Core F-TF.C.8, F-TF.C.9 · [maths-pdf.fr/en/](https://maths-pdf.fr/en/)

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Pick the best answer for 10 questions on trigonometric identities. Explanations name the usual traps, such as dividing away a factor and losing solutions.

**Precalculus** · Common Core State Standards: **F-TF.C.8, F-TF.C.9**

## Questions

### Question 1

Which expression equals  $\sin^2 x + \cos^2 x$ ?

- A.  $\sin 2x$
- B. 1
- C. 0
- D.  $2\sin x \cos x$

### Question 2

Which expression equals  $\tan x$  in terms of sine and cosine?

- A.  $\frac{\cos x}{\sin x}$
- B.  $\sin x \cos x$
- C.  $\frac{1}{\sin x}$
- D.  $\frac{\sin x}{\cos x}$

### Question 3

What is  $\sin 2x$ ?

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

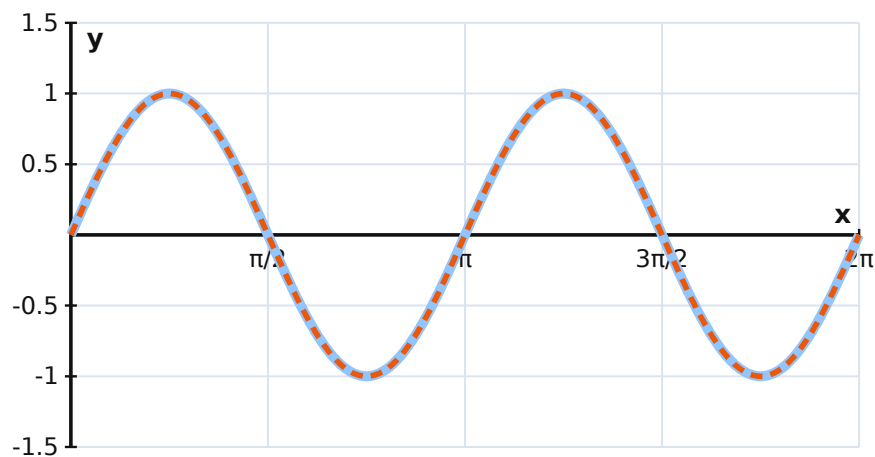
### Question 4

Which is equal to  $\cos 2x$ ?

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

### Question 5

The graphs of two functions coincide. Which identity do they illustrate?



Two coinciding curves.

- A.  $\sin 2x = 2\sin x$
- B.  $\sin 2x = \sin x + \cos x$
- C.  $\sin 2x = 2\sin x \cos x$
- D.  $\sin 2x = \cos 2x$

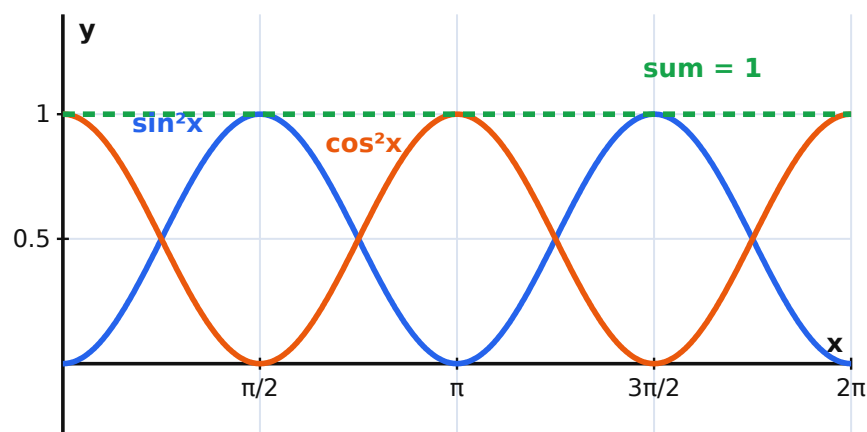
### Question 6

What is  $\sin(A+B)$ ?

- A.  $\sin A + \sin B$
- B.  $\sin A \cos B - \cos A \sin B$
- C.  $\sin A \cos B + \cos A \sin B$
- D.  $\cos A \cos B - \sin A \sin B$

### Question 7

The graph shows  $\sin^2 x$ ,  $\cos^2 x$  and their sum. What is the sum?



Three graphs.

- A. The constant 1
- B. The constant 0
- C.  $\sin 2x$
- D.  $\cos 2x$

### Question 8

Which gives the exact value of  $\sin 15^\circ$ ?

- A.  $\frac{\sqrt{6}-\sqrt{2}}{4}$
- B.  $\frac{\sqrt{6}+\sqrt{2}}{4}$
- C.  $\frac{\sqrt{3}}{2}$
- D.  $\frac{\sqrt{2}-1}{2}$

### Question 9

If  $\sin x = \frac{1}{2}$ , what is  $\cos 2x$ ?

- A.  $\frac{1}{4}$
- B.  $\frac{1}{2}$
- C.  $\frac{\sqrt{3}}{2}$
- D.  $-\frac{1}{2}$

### Question 10

Which is the first step to solve  $\sin 2x = \sin x$ ?

| Equation           | Rewrite                    |
|--------------------|----------------------------|
| $\sin 2x = \sin x$ | $2 \sin x \cos x = \sin x$ |

Rewrite with a double-angle formula.

- A. Divide both sides by  $\sin x$
- B. Replace  $2x$  by  $x$
- C. Take the arcsine of both sides
- D. Write  $2\sin x \cos x - \sin x = 0$  and factor

## Answers

1. **B** - This is the Pythagorean identity.
2. **D** - Tangent is sine divided by cosine; the reciprocal is cotangent.
3. **B** - The double-angle formula for sine is  $2 \sin x \cos x$ .
4. **A** -  $\cos 2x = \cos^2 x - \sin^2 x = 1 - 2 \sin^2 x$ .
5. **C** - The curves  $y = \sin 2x$  and  $y = 2 \sin x \cos x$  are identical.
6. **C** - The sine sum formula has a plus sign between the two products.
7. **A** -  $\sin^2 x + \cos^2 x = 1$  for all  $x$ , the dashed horizontal line.
8. **A** -  $\sin(45 - 30) = (\sqrt{2}/2)(\sqrt{3}/2) - (\sqrt{2}/2)(1/2)$ . A plus sign would give the  $\cos 15$  value.
9. **B** -  $\cos 2x = 1 - 2(1/4) = 1/2$ .
10. **D** - Dividing by  $\sin x$  would lose the solutions where  $\sin x = 0$ . Move everything to one side and factor.

## Remember

- $\sin^2 x + \cos^2 x = 1$  and  $1 + \tan^2 x = 1/\cos^2 x$ .
- $\tan x = \sin x / \cos x$ ;  $\csc$ ,  $\sec$ ,  $\cot$  are reciprocals of  $\sin$ ,  $\cos$ ,  $\tan$ .
- $\sin(A + B) = \sin A \cos B + \cos A \sin B$ ;  $\cos(A + B) = \cos A \cos B - \sin A \sin B$ .
- $\sin 2A = 2 \sin A \cos A$ ;  $\cos 2A = \cos^2 A - \sin^2 A = 1 - 2 \sin^2 A = 2 \cos^2 A - 1$ .
- To verify an identity, work on one side only until it matches the other.