



Precalculus

Topic: Addition and Subtraction Formulas

Instructions

Solve the following problems related to the addition and subtraction formulas for trigonometric functions. Show all work clearly and check your solutions.

Practice Problems

1. Use the addition and subtraction formulas to simplify the following expressions:

(i) $\sin(A + B)$

(iv) $\sin(A - B)$

(ii) $\cos(A + B)$

(v) $\cos(A - B)$

(iii) $\tan(A + B)$

(vi) $\tan(A - B)$

2. Prove the following identities using the addition and subtraction formulas:

(i) $\sin(A + B) = \sin A \cos B + \cos A \sin B$

(ii) $\cos(A + B) = \cos A \cos B - \sin A \sin B$

(iii) $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$

(iv) $\sin(A - B) = \sin A \cos B - \cos A \sin B$

(v) $\cos(A - B) = \cos A \cos B + \sin A \sin B$

3. Use the addition and subtraction formulas to find the exact value of the following expressions:

- (i) $\sin(75^\circ)$
- (ii) $\cos(105^\circ)$
- (iii) $\tan(15^\circ)$
- (iv) $\sin(45^\circ + 30^\circ)$
- (v) $\cos(60^\circ - 45^\circ)$

4. Solve the following trigonometric equations using the addition and subtraction formulas:

- (i) $\sin(A + B) = \frac{\sqrt{2}}{2}$
- (ii) $\cos(A - B) = \frac{1}{2}$
- (iii) $\tan(A + B) = 1$
- (iv) $\sin(2A) = \sin A$
- (v) $\cos(A - B) = -1$

5. Find the values of the following expressions using the addition and subtraction formulas:

- (i) $\sin(120^\circ + 30^\circ)$
- (ii) $\cos(45^\circ - 30^\circ)$
- (iii) $\tan(60^\circ + 45^\circ)$
- (iv) $\sin(45^\circ - 60^\circ)$
- (v) $\cos(90^\circ - 45^\circ)$

6. Verify the following trigonometric identities using the addition and subtraction formulas:

- (i) $\sin(A + B) = \cos(90^\circ - A) \cos(90^\circ - B)$
- (ii) $\cos(A - B) = \cos A \cos B + \sin A \sin B$
- (iii) $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$
- (iv) $\sin(A - B) = \cos(90^\circ - A) \cos(90^\circ - B)$

Multiple-Choice Questions

1. What is the formula for $\sin(A + B)$?

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

2. What is the formula for $\cos(A - B)$?

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

3. What is the formula for $\tan(A + B)$?

- A. $\frac{\tan A + \tan B}{1 - \tan A \tan B}$
- B. $\frac{\tan A - \tan B}{1 + \tan A \tan B}$
- C. $\frac{\tan A + \tan B}{1 + \tan A \tan B}$
- D. $\frac{\tan A \tan B}{1 - \tan A \tan B}$