

Questions: Trigonometric identities (radians)

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Summary

A selection of questions on trigonometric identities, where angles are measured in radians.

Before attempting these questions, it is recommended that you read [Guide: Trigonometric identities \(radians\)](#).

Q1

Using trigonometric identities, find the values of the following expressions:

- 1.1. $2(6 \sin^2(\theta)) + 3(4 \cos^2(\theta)).$
- 1.2. $10(7 \sin^2(\theta)) + 14(5 \cos^2(\theta)).$
- 1.3. $5 \left(\frac{6}{\csc^2(\theta)} \right) + 15 \left(\frac{2}{\sec^2(\theta)} \right).$
- 1.4. $(\cos^2(\theta) - \sin^2(\theta))^2 + 4\sin^2(\theta) \cos^2(\theta)$
- 1.5. $2 \sin(\pi/6) \cos(\pi/12) + 2 \cos(\pi/6) \sin(\pi/12)$
- 1.6. $3 \cos(\pi/4) \cos(\pi/12) - 3 \sin(\pi/4) \sin(\pi/12)$
- 1.7. $\sin(5\pi/6) + \sin(\pi/6)$
- 1.8. $\cos(5\pi/6) + \cos(\pi/6)$

Q2

Simplify the following expressions:

- 2.1. $\tan(\theta) \cos(-\theta)$
- 2.2. $\tan(-\theta) \csc(-\theta) \sec(-\theta)$
- 2.3. $\tan^2(\theta) + \sin^2(\theta) + \cos^2(\theta)$
- 2.4. $\frac{2 \sin(\theta)}{\cos(\theta)(1 - \tan^2(\theta))}$

$$2.5. \quad \frac{\sin(7\theta) + \sin(3\theta)}{\cos(7\theta) - \cos(3\theta)}$$

$$2.6. \quad \frac{\sin(5\theta) - \sin(\theta)}{\cos(5\theta) + \cos(\theta)}$$

Q3

Using trigonometric identities, answer the following questions:

3.1. What is the value of $\cos(-7\pi/6)$?

3.2. What are the values of $\sin(3\pi/4)$ and $\sin(5\pi/4)$?

3.3. If $\sin(5\pi/18)$ has the value 0.766 (to 3 decimal places), what is the value of $\cos(13\pi/18)$ to three decimal places?

Q4

Using trigonometric identities find **exact** values of the following:

3.1. $\sin(\pi/12)$

3.2. $\cos(\pi/12)$

3.3. $\tan(\pi/12)$

3.4. $\sin(5\pi/12)$

3.5. $\cos(5\pi/12)$

3.6. $\tan(5\pi/12)$

After attempting the questions above, please click [this link](#) to find the answers.

Version history and licensing

v1.0: initial version created 08/23 by Dzhemma Ruseva as part of a University of St Andrews STEP project.

- v1.1: edited 05/24 by tdhc, and split into versions for both degrees and radians.

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