

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

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

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## 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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