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)*](../studyguides/trigonometricidentities-radians.qmd)*.*

## Q1

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

1.1. $ 2\left(6sin^{2}\left(θ\right)\right)+3\left(4cos^{2}\left(θ\right)\right)$.

1.2. $ 10\left(7sin^{2}\left(θ\right)\right)+14\left(5cos^{2}\left(θ\right)\right)$.

1.3. $ 5\left(\frac{6}{csc^{2}\left(θ\right)}\right)+15\left(\frac{2}{sec^{2}\left(θ\right)}\right)$.

1.4. $ \left(cos^{2}\left(θ\right)−sin^{2}\left(θ\right)\right)^{2}+4sin^{2}\left(θ\right)cos^{2}\left(θ\right)$

1.5. $ 2sin\left(π/6\right)cos\left(π/12\right)+2cos\left(π/6\right)sin\left(π/12\right)$

1.6. $ 3cos\left(π/4\right)cos\left(π/12\right)−3sin\left(π/4\right)sin\left(π/12\right)$

1.7. $ sin\left(5π/6\right)+sin\left(π/6\right)$

1.8. $ cos\left(5π/6\right)+cos\left(π/6\right)$

## Q2

Simplify the following expressions:

2.1. $ tan\left(θ\right)cos\left(−θ\right)$

2.2 $ tan\left(−θ\right)csc\left(−θ\right)sec\left(−θ\right)$

2.3. $ tan^{2}\left(θ\right)+sin^{2}\left(θ\right)+cos^{2}\left(θ\right)$

2.4. $ \frac{2sin\left(θ\right)}{cos\left(θ\right)\left(1−tan^{2}\left(θ\right)\right)}$

2.5. $ \frac{sin\left(7θ\right)+sin\left(3θ\right)}{cos\left(7θ\right)−cos\left(3θ\right)}$

2.6. $ \frac{sin\left(5θ\right)−sin\left(θ\right)}{cos\left(5θ\right)+cos\left(θ\right)}$

## Q3

Using trigonometric identities, answer the following questions:

3.1. What is the value of $cos\left(−7π/6\right)$?

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

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

## Q4

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

3.1. $ sin\left(π/12\right)$

3.2. $ cos\left(π/12\right)$

3.3. $ tan\left(π/12\right)$

3.4. $ sin\left(5π/12\right)$

3.5. $ cos\left(5π/12\right)$

3.6. $ tan\left(5π/12\right)$

[After attempting the questions above, please click this link to find the answers.](../answers/as-trigonometricidentities-radians.qmd)

## 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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