Your notes

Level 2 Further Maths: revision notes

Trigonometric identities and exact values

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Exact values

- $\sin 30° = 1/2$, $\cos 30° = \sqrt{3}/2$ and $\tan 30° = 1/\sqrt{3}$ (or $\sqrt{3}/3$).
- $\sin 45° = \cos 45° = \sqrt{2}/2$ (or $1/\sqrt{2}$), and $\tan 45° = 1$.
- $\sin 60° = \sqrt{3}/2$, $\cos 60° = 1/2$ and $\tan 60° = \sqrt{3}$.
- $\sin 0° = 0$, $\cos 0° = 1$, $\sin 90° = 1$ and $\cos 90° = 0$.
- Learn them from the two special triangles: half an equilateral triangle with sides 1, $\sqrt{3}$ and 2, and a right-angled isosceles triangle with sides 1, 1 and $\sqrt{2}$.

The two identities

- $\tan\theta \equiv \sin\theta \div \cos\theta$.
- $\sin^2\theta + \cos^2\theta \equiv 1$, which also gives $\sin^2\theta = 1 - \cos^2\theta$ and $\cos^2\theta = 1 - \sin^2\theta$.
- If $\sin\theta = 3/5$ and θ is acute, then $\cos^2\theta = 1 - 9/25 = 16/25$, so $\cos\theta = 4/5$ and $\tan\theta = 3/4$.

Using the identities

- Simplify: $(1 - \sin^2\theta) \div \cos\theta = \cos^2\theta \div \cos\theta = \cos\theta$.
- Prove: $(\sin\theta + \cos\theta)^2 \equiv \sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta \equiv 1 + 2\sin\theta\cos\theta$.
- Solve: $\sin x = 2\cos x$ means $\tan x = 2$, so $x = 63.4°$ and $243.4°$ (to 1 decimal place).

Key terms

Identity	An equation true for every value of the variable, shown by $\equiv$.
Exact value	A value written with fractions or surds, not a rounded decimal.

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Acute angle	An angle less than 90°.
$\sin^2\theta$	$(\sin\theta)^2$, the square of sin θ.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is sin 30°?
2. What is cos 30°?
3. What is tan 45°?
4. What is tan 60°?
5. What is $\sin^2\theta + \cos^2\theta$?
6. What is tan θ identical to?
7. sin θ = 3/5 and θ is acute. What is cos θ?
8. Simplify $(1 - \sin^2\theta)/\cos\theta$.

Answers

1. 1/2
2. √3/2
3. 1
4. √3
5. 1
6. sin θ / cos θ
7. 4/5
8. cos θ

What to do next

Practise 10 questions on this topic

Try 3 exam questions, with mark schemes

Read the lesson, one step at a time

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