Level 2 Further Maths: revision notes

Trigonometric graphs and equations

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The graphs

- y = sin x: starts at 0, reaches 1 at 90°, 0 at 180°, –1 at 270° and 0 at 360°. It repeats every 360°.
- y = cos x: starts at 1, is 0 at 90°, –1 at 180°, 0 at 270° and 1 at 360°. It repeats every 360°.
- y = tan x: 0 at 0°, 180° and 360°. It has **asymptotes** (where it is undefined) at 90° and 270°, and repeats every 180°.
- sin x and cos x always lie between –1 and 1.

Solving equations for 0° to 360°

- Use your calculator for the first solution, then use **symmetry** for the others.
- sin x = k: the solutions are x and 180° – x. sin x = 0.5 gives 30° and 150°.
- cos x = k: the solutions are x and 360° – x. cos x = 0.5 gives 60° and 300°.
- tan x = k: the solutions are x and x + 180°. tan x = 1 gives 45° and 225°.

Negative values

- For negative values, sketch the graph. sin x = –0.5: the calculator gives –30°, which isn't in range, so the solutions are 210° and 330°.
- 2cos x + 1 = 0 means cos x = –0.5, so x = 120° and 240°.
- 5cos x + 2 = 0 means cos x = –0.4, so x = 113.6° and 360° – 113.6° = 246.4° (to 1 decimal place).

Key terms

Period	The interval after which a graph repeats.
Asymptote	A line a graph approaches but never touches.

Your notes

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Amplitude	The height of a wave from its centre line.
Principal value	The first solution given by a calculator.
Symmetry	Using the shape of the graph to find other solutions.

Quick questions

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

1. Solve $\sin x = 0.5$ for $0° \leq x \leq 360°$.
2. Solve $\cos x = 0.5$ for $0° \leq x \leq 360°$.
3. Solve $\tan x = 1$ for $0° \leq x \leq 360°$.
4. Solve $\sin x = -0.5$ for $0° \leq x \leq 360°$.
5. What is the period of $y = \tan x$?
6. What is the maximum value of $\sin x$?
7. Where is $\tan x$ undefined between $0°$ and $360°$?
8. What is $\cos 180°$?

Answers

1. $30°$ and $150°$
2. $60°$ and $300°$
3. $45°$ and $225°$
4. $210°$ and $330°$
5. $180°$
6. 1
7. $90°$ and $270°$
8. -1

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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Your notes