

3.8 The Tangent Function

Name: _____ Class: _____ Date: _____ Total: 9 marks

KEY WORDS vertical asymptotes 垂直渐近线 • period 周期

Objective

Build the skills to answer exam questions on **the tangent function**.

You must be able to:

- state the period and **vertical asymptotes** 垂直渐近线 of $y = \tan x$
- evaluate the tangent at simple angles

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ The tangent function

$$\tan x = \frac{\sin x}{\cos x}.$$

- period π ;
- **vertical asymptotes** where $\cos x = 0$, i.e. $x = \frac{\pi}{2} + n\pi$;
- increasing on each branch.

■ Example

$\tan 0 = 0$, $\tan \frac{\pi}{4} = 1$, and $\tan \frac{\pi}{2}$ is undefined.

2 Practice

2.1 State the period of $y = \tan x$. [1]

2.2 State where $\tan x$ has vertical asymptotes. [1]

2.3 Evaluate $\tan 0$ and $\tan \frac{\pi}{4}$. [2]

3 Exam-style questions

3.1 The period of $y = \tan x$ is [1]

- A π
- B 2π
- C $\frac{\pi}{2}$
- D 4π

3.2 $y = \tan x$ has vertical asymptotes where [1]

- A $\sin x = 0$
- B $\cos x = 0$
- C $\tan x = 0$
- D $x = 0$

3.3 Evaluate each.

(a) $\tan 0$. [1]

(b) $\tan \frac{\pi}{4}$. [1]

(c) State whether $\tan \frac{\pi}{2}$ is defined. [1]

Solutions

2.1 π .

2.2 where $\cos x = 0$, i.e. $x = \frac{\pi}{2} + n\pi$.

2.3 $\tan 0 = 0$; $\tan \frac{\pi}{4} = 1$.

3.1 A.

3.2 B.

3.3 (a) 0. (b) 1. (c) undefined.