

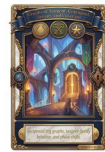
Graphs of Tangent, Cotangent, Secant, and Cosecant

Reciprocal trig graphs, tangent-family behavior, and phase shifts.

Name _____ Date _____

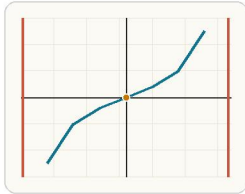
32 main 2-up grid 2 pages

Completion Reward



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1. What is the period of $y = \tan(x)$?



The basic tangent graph has period π and repeats from one asymptote interval to the next.

- A. 2π
- B. $\pi / 2$
- C. π
- D. 1

2. Why does $y = \tan(x)$ have vertical asymptotes?

- A. Because sine is always 0.
- B. Because tangent is always negative.
- C. Because tangent never repeats.
- D. Because $\tan(x) = \sin(x) / \cos(x)$ and cosine can be 0.

3. What is $\sec(x)$?

- A. $1 / \sin(x)$
- B. $\cos(x) / \sin(x)$
- C. $\sin(x) / \cos(x)$
- D. $1 / \cos(x)$

4. What is $\csc(x)$?

- A. $1 / \sin(x)$
- B. $1 / \cos(x)$
- C. $\cos(x) / \sin(x)$
- D. $\sin(x) / \cos(x)$

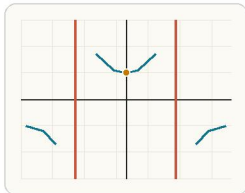
5. What is $\cot(x)$?

- A. $\cos(x) / \sin(x)$
- B. $\sin(x) / \cos(x)$
- C. $1 / \cos(x)$
- D. $1 / \sin(x)$

6. Which statement about $y = \tan(x)$ is true?

- A. It starts at a maximum value of 1.
- B. It is defined for every real x .
- C. It crosses the origin and has repeating vertical asymptotes.
- D. It never changes sign.

7. Why do secant graphs have branches instead of one connected curve?



Secant is the reciprocal of cosine, so the graph separates into branches at the angles where cosine is 0.

- A. Because secant is always positive.
- B. Because secant has no period.
- C. Because secant is undefined where cosine is 0.
- D. Because secant equals tangent squared.

8. What is $\tan(0)$?

- A. 1
- B. -1
- C. undefined
- D. 0

9. At which angle is $y = \tan(x)$ undefined?

- A. $\pi / 4$
- B. 0
- C. $\pi / 2$
- D. $\pi / 6$

10. Where does $\sec(x)$ have a break?

- A. Where $\sin(x) = 0$
- B. Where $\tan(x) = 0$
- C. Where $\cos(x) = 0$
- D. Everywhere $x = 0$

11. Where does $\csc(x)$ have a break?

- A. Where $\cos(x) = 0$
- B. Where $\tan(x) = 0$
- C. Where $\sin(x) = 0$
- D. Everywhere $x = \pi$

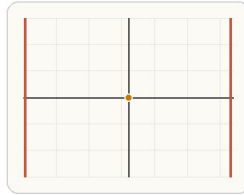
12. Which value equals $\cot(\pi / 4)$?

- A. 0
- B. 1
- C. 2
- D. undefined

13. What sign does $\sec(x)$ have in Quadrant II?

- A. Positive
- B. Zero
- C. Undefined everywhere
- D. Negative

14. What is the best first step when sketching $y = \tan(x)$?



The key structure of tangent comes from its x-intercepts and the vertical asymptotes between repeated branches.

- A. Find the amplitude.
- B. Graph a parabola first.
- C. Reflect across the x-axis immediately.
- D. Mark the vertical asymptotes and the zeros.

15. A student says $\tan(x)$ has period 2π because sine and cosine do. What is the mistake?

- A. Tangent repeats every π , not 2π .
- B. Tangent is not periodic.
- C. Tangent should be treated like cosine only.
- D. Tangent repeats every $\pi/2$.

16. Find $\tan(\pi/4)$. Answer with a number.

17. Find $\tan(0)$. Answer with a number.

18. Find $\sec(\pi/3)$. Answer with a number.

19. Find $\csc(\pi/6)$. Answer with a number.

20. Find $\cot(\pi/4)$. Answer with a number.

21. What is the period of $y = \tan(3x)$? Enter as a decimal. Answer with a number.

22. What is $\sec(\pi)$? Answer with a number.

23. What is $\csc(3\pi/2)$? Answer with a number.

24. Which student correctly finds $\sec(\pi/3)$?

- A. Student B: $\sec(\pi/3) = \cos(\pi/3) = 1/2$.
- B. Student C: $\sec(\pi/3) = \tan(\pi/3) = \sqrt{3}$.
- C. Student D: $\sec(\pi/3)$ is undefined.
- D. Student A: $\cos(\pi/3) = 1/2$, so $\sec(\pi/3) = 2$.

25. State the period of $y = \tan(x)$. Answer with your final expression.

26. State the period of $y = \cot(x)$. Answer with your final expression.

27. State one vertical asymptote of $y = \tan(x)$. Answer with your final expression.

28. Write $\sec(x)$ in terms of cosine. Answer as an equation.

29. Write $\csc(x)$ in terms of sine. Answer as an equation.

30. Write $\cot(x)$ in terms of tangent. Answer as an equation.

31. State another vertical asymptote of $y = \tan(x)$. Answer with your final expression.

32. State the period of $y = \tan(2x)$. Answer with your final expression.