

EXAMPLE 4 Graph a tangent function

Graph one period of the function $y = 2 \tan 3x$.

Solution

The period is $\frac{\pi}{b} = \frac{\pi}{3}$.

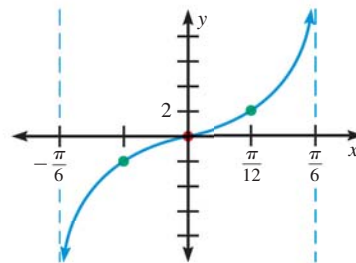
Intercept: $(0, 0)$

Asymptotes: $x = \frac{\pi}{2b} = \frac{\pi}{2 \cdot 3}$, or $x = \frac{\pi}{6}$;

$$x = -\frac{\pi}{2b} = -\frac{\pi}{2 \cdot 3}, \text{ or } x = -\frac{\pi}{6}$$

Halfway points: $(\frac{\pi}{4b}, a) = (\frac{\pi}{4 \cdot 3}, 2) = (\frac{\pi}{12}, 2)$;

$$(-\frac{\pi}{4b}, -a) = (-\frac{\pi}{4 \cdot 3}, -2) = (-\frac{\pi}{12}, -2)$$



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GUIDED PRACTICE for Example 4

Graph one period of the function.

10. $y = 3 \tan x$

11. $y = \tan 2x$

12. $f(x) = 2 \tan 4x$

13. $g(x) = 5 \tan \pi x$

14.1 EXERCISES

HOMEWORK KEY

= **WORKED-OUT SOLUTIONS**
on p. WS1 for Exs. 5, 17, and 31

= **TAKS PRACTICE AND REASONING**
Exs. 15, 24, 25, 31, 34, and 35

= **MULTIPLE REPRESENTATIONS**
Ex. 32

SKILL PRACTICE

- VOCABULARY** Copy and complete: The graphs of the functions $y = \sin x$ and $y = \cos x$ both have a(n) of 2π .
- WRITING** Compare the domains and ranges of the functions $y = a \sin bx$, $y = a \cos bx$, and $y = a \tan bx$ where a and b are positive constants.

EXAMPLE 1
on p. 909
for Exs. 3–14

ANALYZING FUNCTIONS Identify the amplitude and the period of the graph of the function.

