## Unit 6 Lesson 12: Tangent

### 1 Notice and Wonder: An Unusual Function (Warm up)

#### Student Task Statement

What do you notice? What do you wonder?

| $θ$ | $cos\left(θ\right)$ | $sin\left(θ\right)$ | $tan\left(θ\right)$ |
| --- | --- | --- | --- |
| $-\frac{π}{2}$ | 0 | -1 |   |
| $-\frac{π}{3}$ | 0.5 | -0.87 |   |
| $-\frac{π}{6}$ | 0.87 | -0.5 |   |
| 0 | 1 | 0 |   |
| $\frac{π}{6}$ | 0.87 | 0.5 |   |
| $\frac{π}{3}$ | 0.5 | 0.87 |   |
| $\frac{π}{2}$ | 0 | 1 |   |

### 2 A Tangent Ratio

#### Student Task Statement

1. Complete the table. For each positive angle in the table, add the corresponding point and the segment between it and the origin to the unit circle.
* 

| * $θ$
 | * $cos\left(θ\right)$
 | * $sin\left(θ\right)$
 | * $tan\left(θ\right)$
 |
| --- | --- | --- | --- |
| * $-\frac{π}{2}$
 | * 0
 | * -1
 | *
 |
| * $-\frac{π}{3}$
 | * 0.5
 | * -0.87
 | *
 |
| * $-\frac{π}{6}$
 | * 0.87
 | * -0.5
 | *
 |
| * 0
 | * 1
 | * 0
 | *
 |
| * $\frac{π}{6}$
 | * 0.87
 | * 0.5
 | *
 |
| * $\frac{π}{3}$
 | * 0.5
 | * 0.87
 | *
 |
| * $\frac{π}{2}$
 | * 0
 | * 1
 | *
 |
| * $\frac{2π}{3}$
 | *
 | *
 | *
 |
| * $\frac{5π}{6}$
 | *
 | *
 | *
 |
| * $π$
 | *
 | *
 | *
 |
| * $\frac{7π}{6}$
 | *
 | *
 | *
 |
| * $\frac{4π}{3}$
 | *
 | *
 | *
 |
| * $\frac{3π}{2}$
 | *
 | *
 | *
 |
| * $\frac{5π}{3}$
 | *
 | *
 | *
 |
| * $\frac{11π}{6}$
 | *
 | *
 | *
 |
| * $2π$
 | *
 | *
 | *
 |

1. How are the values of $tan\left(θ\right)$ like the values of $cos\left(θ\right)$ and $sin\left(θ\right)$? How are they different?

### 3 The Tangent Function

#### Student Task Statement

Before we graph $y=tan\left(θ\right)$, let’s figure out some things that must be true.

1. Explain why the graph of $tan\left(θ\right)$ has a vertical asymptote at $x=\frac{π}{2}$.
2. Does the graph of $tan\left(θ\right)$ have other vertical asymptotes? Explain how you know.
3. For which values of $θ$ is $tan\left(θ\right)$ zero? For which values of $θ$ is $tan\left(θ\right)$ one? Explain how you know.
4. Is the graph of $tan\left(θ\right)$ periodic? Explain how you know.

#### Images for Activity Synthesis





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