3. Trigonometric and Polar Functions

Starter Quiz ·

AP Precalculus Name: _____ Score: _____

1. For a permitted positive interval P, a periodic pattern repeats when…

   ☐ always increases

   ☐ the whole pattern matches after shifting the input by P

   ☐ never repeats

   ☐ is a straight line

2. For a chosen acute angle in a right triangle, $\sin\theta$ equals…

   ☐ opposite ÷ adjacent

   ☐ opposite ÷ hypotenuse

   ☐ hypotenuse ÷ opposite

   ☐ adjacent ÷ hypotenuse

3. The parent sine graph $y = \sin x$ starts (at $x = 0$) at height…

   ☐ 1, then falls

   ☐ -1, then rises

   ☐ 2, then falls

   ☐ 0, then rises

4. In $y = a\sin(b(x - c)) + d$, the **amplitude** is…

   ☐ b

   ☐ d

   ☐ $|a|$

   ☐ c

5. A **sinusoidal model** is the right choice for data that…

   ☐ grows faster and faster

   ☐ stays perfectly constant

   ☐ decreases toward zero

   ☐ rises and falls in a repeating cycle

6. Unlike sine and cosine, the tangent function has period _____ (not 2π).

7. To list every solution, add whole multiples of the _____ to a first solution.

   _____

8. Secant has a vertical _____ wherever $\cos x = 0$, because you cannot divide by zero.

   _____

9. A point has $r = 2$ and $\theta = 0$. What is its x-coordinate?

   _____

10. The average **rate of change** of r over an interval of θ is $\dfrac{\Delta r}{\Delta \theta}$, the change in radius over the change in _____.

    _____

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Answers ·

AP Precalculus

1. **the whole pattern matches after shifting the input by P**

   A period matches the whole output pattern: f(t+P)=f(t) at every permitted pair of inputs, not just at one pair of points.

2. **opposite ÷ hypotenuse**

   Sine uses the opposite side divided by the hypotenuse. The chosen angle determines which leg is opposite.

3. **0, then rises**

   Since $\sin 0 = 0$, the sine wave begins at the midline and rises to its peak of 1.

4. $|a|$

   The coefficient a stretches the wave vertically, so the **amplitude** is $|a|$.

5. **rises and falls in a repeating cycle**

   Repeating highs and lows – tides, temperatures, daylight hours – call for a **sinusoidal model**.

6. **pi**

   Tangent repeats every π – twice as often as sine or cosine.

7. **period**

   Because sine repeats, adding any multiple of its **period** (2π) gives another solution.

8. **asymptote**

   Since $\sec x = 1/\cos x$, a zero cosine makes secant undefined – a **vertical asymptote**.

9. **2**

   $x = r\cos\theta = 2\cos 0 = 2 \cdot 1 = 2$; and $y = 2\sin 0 = 0$.

10. **angle**

    It measures how fast the radius changes per unit of **angle** – the polar version of a slope.