Pre-Calculus and Global Geography

Mathematics · Answer Key · 10 Questions

1. The elevation of Mount Everest is approximately 8,848 meters. If a climber is at base camp at 5,364 meters, and the horizontal distance to the peak's vertical projection is 4,000 meters, what is the tangent of the angle of elevation from the base camp to the peak?

A) 0.871
B) 1.155
C) 0.742
D) 1.348

2. The prime meridian passes through Greenwich, London (0 degrees longitude). If a point is located at 45 degrees latitude and 45 degrees longitude, what is the distance from the equator in radians, assuming Earth is a sphere with radius R?

A) pi/2
B) pi/4
C) pi/6
D) pi/3

3. The population of Tokyo is approximately 37 million. If the population follows an exponential growth model P(t) = P0 * e^(rt), where r is the growth rate, what represents the 't' in the context of demographic time series?

A) Total population
B) Initial population
C) Time interval
D) Growth constant

4. The Great Barrier Reef spans roughly 2,300 kilometers. If an underwater drone travels along a path modeled by a polar equation r = 2300*sin(theta), what is the maximum radial distance from the origin?

A) 1150 km
B) 4600 km
C) 2300 km
D) 575 km

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5. The Nile River is approximately 6,650 km long. If a surveyor maps a section of the river using a sequence where each segment is 95% of the previous one, this is an example of what type of sequence?

A) Arithmetic
B) Geometric
C) Fibonacci
D) Harmonic

6. At the South Pole, the sun remains below the horizon for months. If the declination of the sun follows the function d(t) = 23.45*sin(360/365 * (t - 80)), what is the amplitude of this trigonometric function?

A) 365
B) 360
C) 80
D) 23.45

7. The circumference of the Earth at the equator is approximately 40,075 km. What is the central angle in radians subtended by an arc length of 10,000 km?

A) pi/2
B) pi/4
C) 1/4
D) 2*pi

8. The surface area of the Sahara Desert is approximately 9,200,000 square kilometers. If you represent this using scientific notation as a * 10^n, what are the values of a and n?

A) 9.2 and 6
B) 0.92 and 7
C) 92 and 5
D) 9.2 and 7

9. The time difference between two cities at different longitudes can be calculated using the function T(delta_lambda) = (delta_lambda / 360) * 24. What type of function is this?

A) Linear
B) Quadratic
C) Exponential
D) Logarithmic

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10. The depth of the Mariana Trench is approximately 11,000 meters. If a pressure sensor measures depth 'd' as a function of pressure 'p' using a logarithmic scale, what is the inverse function?

A) Linear

B) Exponential

C) Power

D) Rational