

MATHEMATICS , SURVEYING, AND TRANSPORTATION ENGINEERING

ENGINEERING MATHEMATICS

A. ALGEBRA

1. Two planes leave manila for a southern city, a distance of 900 km. Plane A travels faster than plane B. Plane A arrives in their destination 2 hours and 15 minutes ahead of plane B. What is the ground speed of plane A? (240 kph)

2. Solve the root of the given equation: (No Solution)

$$\sqrt{2x - 6} + \sqrt{9 - x} = 0$$

3. The height , h, of an arrow shot up the air can be approximated by the equation $h = 128t - 16t^2$ where t is time in seconds. How long does it take for the arrow to reach 240 feet in the air? (5 secs)

4. Compute the p given the equation for h = 2: (25.59)

$$p = 30e^{-0.0795h}$$

5. Find the value of x if $1/4$, $1/6$, $1/x$ and $2/27$ are consecutive terms of geometric progression. (9)

B. TRIGONOMETRY

1. The perimeter of a triangular lot is 771.15 meters. The interior angles are 50° , 60° and 70° Find the length of the side opposite the smallest angle. (83.15 m)

2. Determine the period of the trigonometric function $f(x) = \sin (\pi/6 x)$ (12)

3. If $\tan (A/4) = \cot A$, find A. (72°)

4. Given the cosine function equal to $60/61$, find $\csc \theta$. ($61/11$)

5. A man finds the angle of elevation of the top of a tower to be 30° . He walks 85 m nearer the tower and finds its angle of elevation to be 60° . What is the height of the tower? (73.61 m)

C. ANALYTIC GEOMETRY

1. What is the length of the latus rectum $x^2 = 20y$? (20)

2. Nuclear cooling towers are typically built in the shape of a hyperboloid. The cross section of a cooling tower forms a hyperbola. The cooling tower shown in the figure is 450 ft tall and modeled by the equation $x^2/8100 - y^2/16900 = 1$. Find the diameter of the top of the cooling tower to the nearest foot. (275 ft)