Applications using Trigonometry and Similar Triangles

Linda Tansil
Department of Mathematics
Southeast Missouri State University

ltansil@semo.edu
Changing Lanes

The Annoying Lane Swerver

![Diagram](image)

$75 \text{ mph}$

$\cos \theta = \frac{A}{H}$

$\cos 32^\circ = \frac{A}{75}$

$A = 75 \cos 32^\circ \approx 63.6 \text{ mph}$
The polite gradual lane changer

\[ \cos \theta = \frac{A}{H} \]

\[ \cos 22^\circ = \frac{A}{75} \]

\[ A = 75 \cos 22^\circ \approx 69.5 \text{ mph} \]
City of Mesa - Development Services

ENGINEERING TECHNICIAN II

POSITION DESCRIPTION

Classification Responsibilities: An Engineering Technician II performs paraprofessional engineering work, including technical and skilled drafting assignments. This class performs related duties as required.

Distinguishing Features: (By Assignment)

An Engineering Technician II performs basic and intermediate traffic engineering tasks and functions at full performance regarding the resolution of visibility concerns and other traffic safety issues.

QUALIFICATIONS

Education and Experience: Requires graduation from high school or GED and any combination of training, education, and experience equivalent to two years experience in paraprofessional engineering (civil or traffic by assignment) work.

Mental: Interprets blueprints and work plans. Applies the techniques of drafting to produce neat, precise, and well-balanced drawings. Prioritizes work assignments. Comprehends and makes inferences from “as-buils,” written procedures, and specifications. Conducts research to properly identify land and utility data and plans.

Performs mathematical calculations, statistical computations, and applies fractions, percentages, ratios and proportions, algebra, geometric constructions, and the essentials of trigonometry.

Performs detailed engineering records research and applies research to ensure the precision, accuracy, and completion of computerized engineering maps.
Career: Traffic Technicians
http://www.iseek.org/sv/13000.jsp?id=100472

Hiring Practices
Employers prefer to hire traffic technicians who have a high school diploma or GED. Some employers require two years of experience or an associate degree.

Employers look for technicians who have good communication skills. Since they interview the public, technicians must be good at asking questions and listening. Technicians also must be able to convey their findings in reports to their supervisors.

Mathematics
Pre-Algebra
Algebra
Geometry
Advanced Algebra courses

Trigonometry
Advanced Geometry courses
Advanced Trigonometry courses
Pre-Calculus
Calculus
Probability and Statistics
Wages
Wage information for traffic technicians in Minnesota is not available

Nationally, the median wage for traffic technicians is $2,640 per month ($15.22 per hour). Half of all traffic technicians earn between $2,010 and $3,570 per month ($11.60 and $20.61 per hour).
Mass of the balloon: 0.0066 kg

Weight of the balloon = $F_{\text{gravity}} = mg$
$= (0.0066 \text{ kg}) (9.8 \text{ m/s}^2) = 0.006468 \text{ N}$

Distance (balloon to midpoint) = $0.16 \text{ m}$

$F_e = \frac{kq_1q_2}{r^2}$

and since we'll have to assume $q_1 \approx q_2$ we have

$k_{\text{air}} = 8.93 \times 10^9 \frac{\text{Nm}^2}{\text{C}^2}$

Using simple trig,

$\tan \theta = \frac{F_e}{F_W}$
Solving for $F_e$ we get

$$F_e = F_G \tan \theta$$

$$F_e = (0.006468 \text{ N}) \ \tan 15^\circ = 0.001733$$

$$q = \sqrt{\frac{F_e r^2}{k}} = \sqrt{\frac{(0.001733)(0.16)}{8.93 \times 10^9}} = 7.04 \times 10^{-8} \text{ Coulombs}$$

Number of lost electrons

$$= q \ (6.25 \times 10^{18} \ \text{electrons} / \text{C})$$

$$= (7.04 \times 10^{-8}) \ 6.25 \times 10^{18}$$

$$= 4.4 \times 10^{11} \ \text{electrons}$$
Amplitude peak is at 170 Volts.

120 Volts as measured by Voltmeters is the RMS Voltage $= \frac{170}{\sqrt{2}}$