SHEET (1)

VEHICLE CHARACTERISTICS

1. A truck has a weight of 11,000 Ibs, horsepower of 300, motor efficiency of 95%, and a frontal area of 40 ft^2.
   a) Calculate the truck acceleration on a +2.0% grade at a speed of 50 mph.
   b) If an extra weight of 24,000 pounds is loaded, what will be the maximum speed of the truck on a grade +4.0%?

Equations

$R_a = 0.0017 A.u^2$ $R_r = \left(\frac{17.9}{2000}\right) w + 1.39u - 10.2$ $R_g = w.g$ $HP = \frac{F.u}{375}$	**Where:** R_a: Air resistance(lb) R_r: Rolling resistance (lb) R_g: Grade resistance(lb) HP: Horse power (HP) A: Frontal Area (ft^2) u: Speed (mph) w: Weight (lb) g: Grade F: Force (lb)

2. Calculate the stopping sight distance required on a highway for a design speed of 90 kph, assuming that the perception and reaction time is 3 seconds and the coefficient of longitudinal friction (f_L) is 0.32. If the pavement becomes wet so that (f_L) is reduced to 0.22, what will be the required stopping sight distance? In this case if a stretch of the same road has 2.5 % gradient, determine the stopping sight distance on this stretch for each direction of flow? Comment on your results.
3. A directional sign is provided on a road before an exit ramp so that drivers can react to the sign and decelerate to an exit having speed of 40 kph. If the operating speed on that road is 90 kph and the driver can recognize the sign at a distance of 50 m upstream of the sign position. Determine how far the sign should be located from the exit point? (perception and reaction time = 2.5 sec and coefficient of longitudinal friction = 0.3)
4. To stop his car, a vehicle traveling at 90 kph on upgrade requires 12 m less than another vehicle traveling at the same speed but down the same grade. If the friction coefficient is 0.3, determine the percent grade and the braking distance for the down grade case.