

TEST YOUR SKILL

Solutions begin on page 68.

1. A dump truck skids 217 feet [66.1 m] on a dry asphalt surface. Using a drag factor of 0.51, calculate the speed of the truck at the start of skid.
2. The acceleration of a car was tested. It was found that the car went 150 feet [45.7 m] in 3.9 seconds. What was the average acceleration of the car? Approximately how fast was the car going at the end of the test?
3. A car (V-2) is stopped at a red light when it is struck in the rear corner by another car (V-1). V-1 weighs 3025 pounds [1372 kg] and V-2 weighs 2807 pounds [1276 kg]. After impact V-1 travels 20 feet [6.1 m] at a drag factor of 0.76; V-2 travels 43 feet [13.1 m] at a drag factor of 0.47. Determine the impact speed of V-1.
4. A school bus is stopped near a blind curve to discharge passengers. A car travelling 70 mph [113 kph] comes around the curve and its driver attempts to stop. If the sight distance is 300 feet [91.4 m], the reaction time is 1.15 second, and the stopping drag factor is 0.65, can the car be stopped in time?
5. An automobile begins to yaw on a banked curve. The critical speed scuff mark laid down by the outside front tire was measured with a 60 foot [18.3 m] chord and found to have a middle ordinate of 20.5 inches [52 cm]. The LEVEL coefficient of friction is 0.74. Along the scuff mark the surface is banked 2%. Determine the speed of the vehicle.
6. The driver of school bus brings her vehicle to a stop when she sees emergency lights in the distance. A stolen auto fleeing from police slams head-on into the stopped bus. The vehicles remain together from impact to rest. According to the car's collision data recorder, the car was travelling approximately 63 mph [102 kph] when it struck the bus. The car weighed 3770 pounds [1710 kg] and the school bus weighted 17,650 pounds [8006 kg]. Calculate the Delta V's for both vehicles.

7. A heavy truck involved in a collision is found in seventh gear. The gear ratio is 2.57; the drive axle ratio is 3.44. Radius of the drive wheels is 26 inches [66 cm]. The minimum speed of the engine is 700 RPM; the engine is governed at 2200 RPM. Determine the maximum and minimum speeds of the truck.

8. According to a NHTSA NCAP crash test, 1994 Volvo 940 struck a full length rigid barrier at 29.6 mph and ended up with 17.3 inches of crush (average) across the front. Using a threshold of measurable damage of 7 mph, determine the Campbell equation for the front of this vehicle. Calculate the 'A', 'B', and 'G' stiffness coefficients that would be used in the CRASH computer program for the Volvo's front. Use the curb weight of 3205 lb. and a damage width of 63.9 inches.

9. Eastbound V-1 is struck broadside at an intersection by southbound V-2. Given the data below, calculate V-1 and V-2's speed at impact.

	V-1	V-2
Curb Weight:	3072 lb [1393 kg]	3719 lb [1687 kg]
Driver Weight:	220 lb [100 kg]	160 lb [73 kg]
Passengers' Weight:	-----	70 lb [32 kg]
Cargo Weight:	40 lb [18 kg]	100 lb [45 kg]
Travel direction at impact:	East	South
Travel direction after impact:	S 24° E	S 18° E
Travel dist. post impact:	33 ft [10.0 m]	45 ft [13.7 m]
Drag factor:	0.60	0.45

