TEA-M-S
TESTS OF ENGINEERING APTITUDE, MATHEMATICS AND SCIENCE

January Monthly Math Challenge Solutions
Middle School Level

Question 1:

An automobile is traveling at 22.5 m/sec when the brakes are applied. The car decelerates at a rate of 2.5 m/s^2 for 5.0 sec. What is the speed of the car at the end of 5.0 sec?

Question 2:

The same automobile travels through North Dakota at a speed of 60 mph when they cross the border to Canada. They see a speed limit sign which indicates the speed limit is 60 (kilometers/hour). If they maintain their original speed, how much are they exceeding the speed limit (in km/hour)?

Question 3:

If the driver realizes they are exceeding the speed limit and decelerates to a complete stop, how long does it take to stop if the driver decelerates at a rate of 19,320 $km/hour^2$?

Question 1: 10.0 m/sec

Problem 1 uses typical equations of motion. Given:

$v_0 = 22.5$ m/s
$a = -2.5$ m/s^2
$t = 5.0$ sec

$v = v_0 + at = 22.5m/s + (-2.5m/s^2)(5\ sec) = 10$ m/sec

Question 2: 36.6 km/hr

60 mph = 96.56 km/hour, therefore, they are exceeding the speed limit by

36.6 km/hr

Question 3: 18 sec

$v = v_0 + at$ $v = 0$ $v_0 = 96.6$ $a = -19320$ $t = (v-v0)/a = 96.6/19320 = 0.005$ hour = 18 sec