

# Problem #1

An airplane accelerates down a runway at  $3.20 \text{ m/s}^2$  for  $32.8 \text{ s}$  until it finally lifts off the ground.

Determine the distance traveled before take-off.



## Problem #2

A car starts from rest and accelerates uniformly over a time of 5.21 seconds for a distance of 110 m. Determine the acceleration of the car.

## Problem #3

A race car accelerates uniformly from  $18.5 \text{ m/s}$  to  $46.1 \text{ m/s}$  in  $2.47$  seconds. Determine the acceleration of the car and the distance traveled.

## Problem #4

A bullet leaves a rifle with a muzzle velocity of 521 m/s. While accelerating through the barrel of the rifle, the bullet moves a distance of 0.840 m. Determine the acceleration of the bullet (assume a uniform acceleration).

# Problem #5

Rocket-powered sleds are used to test the human response to acceleration. If a rocket-powered sled is accelerated to a speed of  $444 \text{ m/s}$  in  $1.8$  seconds, then what is the acceleration and what is the distance that the sled travels?

# Problem #6

A bike accelerates uniformly from rest to a speed of  $7.10 \text{ m/s}$  over a distance of  $35.4 \text{ m}$ . Determine the acceleration of the bike.

# Problem #7

An engineer is designing a runway for an airport. Several planes will use the runway and the engineer must design it so that it is long enough for the largest planes to become airborne before the runway ends. If the largest plane accelerates at  $3.30 \text{ m/s}^2$  and has a takeoff speed of  $88.0 \text{ m/s}$ , then what is the minimum allowed length for the runway?

# Problem #8

A car traveling at  $22.4 \text{ m/s}$  skids to a stop in  $2.55 \text{ s}$ . Determine the skidding distance of the car (assume uniform acceleration).



# Problem #9

It was once recorded that a Jaguar left skid marks that were 290 m in length. Assuming that the Jaguar skidded to a stop with a constant acceleration of  $-3.90 \text{ m/s}^2$ , determine the speed of the Jaguar before it began to skid.

# Problem #10

A plane has a takeoff speed of  $88.3 \text{ m/s}$  and requires  $1365 \text{ m}$  to reach that speed. Determine the acceleration of the plane and the time required to reach this speed.