AP Physics | Kinematics – Acceleration | Mr. McMullen

Name _____ Date _____ Period _____

Acceleration Practice Problem Set 2

Answer the following questions on a separate sheet of paper. Remember the steps in solving physics problems.

1. An airplane starts from rest and undergoes a uniform acceleration of +3.00 m/s^2 for 30.0 seconds before leaving the ground. What is its displacement during the 30.0 seconds?

2. A jet plane traveling at 88.0 m/s lands on a runway and accelerated uniformly to rest in 11.0 seconds. Find:
   a. Its acceleration.
   b. The distance traveled during this time.

3. The Tokyo express in uniformly accelerated from rest at +1.00 m/s2 for 1.00 minute. How far does it travel during this time?

4. Starting from rest, a racing car has a displacement of 200. m in the first 5.00 seconds of uniform acceleration. What is the car's acceleration?

5. In an emergency, a driver initially traveling at 21.0 m/s brings a car to a full stop in 8.00 seconds.
   a. What is the cars acceleration?
   b. How far does it travel before stopping?

① $v_1 = 0$, $a = 3.00\ m/s^2$, $t = 30.0\ s$

$d = v_1 t + \frac{1}{2} a t^2 = (0)(30.0\ s) + \frac{1}{2}(3.00\ m/s^2)(30.0\ s)^2$

$d = 1350\ m$

② $v_1 = 88.0\ m/s$, $v_2 = 0$, $t = 11.0\ sec$

A) $a = \frac{v_2 - v_1}{t} = \frac{0 - 88.0\ m/s}{11.0\ sec} = -8.00\ m/s^2$

B) $d = v_1 t + \frac{1}{2} a t^2 = (88\ m/s)(11.0\ s) + \frac{1}{2}(-8.00\ m/s^2)(11.0\ s)^2$

$d = 484\ m$

③ $v_1 = 0$, $a = 1\ m/s^2$, $t = 1\ min = 60\ s$

$d = v_1 t + \frac{1}{2} a t^2 = (0)(60\ s) + \frac{1}{2}(1\ m/s^2)(60\ s)^2 = 1.80 \times 10^3\ m$

④ $v_1 = 0$, $d = 200.\ m$, $t = 5.00\ s$

$d = v_1 t + \frac{1}{2} a t^2$

$a = \frac{2(d - v_1 t)}{t^2} = \frac{2((200\ m) - (0)(5))}{(5.00\ s)^2} = 16.0\ m/s^2$

⑤ $v_1 = 21.0\ m/s$, $v_2 = 0$, $t = 8.00\ s$

A) $a = \frac{v_2 - v_1}{t} = \frac{0 - 21.0\ m/s}{8.00\ s} = -2.62\ m/s^2$

B) $d = v_1 t + \frac{1}{2} a t^2 = (21.0\ m/s)(8.00\ s) + \frac{1}{2}(-2.625\ m/s^2)(8.00\ s)^2 = 84.0\ m$