Name SOLUTIONS Date _____

Review Problems For Test 2 MP 1

$d = vt$ $v_f = v_i + at$ $d = v_i t + (1/2)at^2$

1) A car is travelling at a constant speed of 70 m/s. How many hours will it take for the car to travel 2500 kilometers? There are 1000 m for every kilometer.

$v = 70 m/s$

$d = 2500 Km \times \frac{1000 m}{Km}$

$d = 2500000 m$

$d = vt$

$2500000 = 70t$

$\frac{2500000}{70} = t$

$35714 s = t$

$35714 s \times \frac{1 hour}{3600 s}$

$\frac{35714}{3600} = 9.9 hours$

2) A train is initially moving at 45 m/s. It accelerates at a rate of (-) 1.2 m/s^2 for 10 s. What is its new speed?

$V_i = 45 m/s$

$a = (-) 1.2 m/s^2$

$t = 10 s$

$V_f = ?$

$V_f = V_i + at$

$V_f = 45 + (-1.2)(10)$

$V_f = 45 + (-12)$

$V_f = 33 m/s$

What was the initial speed of the train in miles per hour (mph)?

$\frac{45 meters}{second} \times \frac{3600 s}{1 hour} \times \frac{1 mile}{1609 meters}$

$\frac{162000}{1609} = 101 mph$

$d = vt$ $\quad v_f = v_i + at$ $\quad d = v_i t + (1/2)at^2$

3) A pumpkin is dropped off the roof of a building that is 140 m tall. How long will it take to land?

$v_i = 0 m/s$
$d = 140m$
$a = 9.8 m/s^2$
$t = ?$

$d = v_i t + \frac{1}{2}at^2$
$140 = (0)(t) + \frac{1}{2}(9.8)t^2$
$140 = 0 + 4.9t^2$
$140 = 4.9t^2$
$\frac{140}{4.9} = t^2$
$28.57 = t^2$
$\sqrt{28.57} = t$
$5.3s = t$

4) An object starts at rest. It travels 300 m in 1 minute and 12 s. What was its acceleration?

$v_i = 0 m/s$
$d = 300m$
$t = 72s$
$a = ?$

$d = v_i t + \frac{1}{2}at^2$
$300 = 0(72) + \frac{1}{2}a(72)^2$
$300 = 0 + \frac{1}{2}a(5184)$
$300 = 2592a$
$\frac{300}{2592} = a = .116 m/s^2$

5) A race car accelerates at 2.5 m/s² for 6.0 s. Its new speed is 32 m/s. What was its initial speed?

$a = 2.5 m/s^2$
$t = 6s$
$v_f = 32 m/s$
$v_i = ?$

$v_f = v_i + at$
$32 = v_i + (2.5)(6)$
$32 = v_i + 15$
$32 - 15 = v_i = 17 m/s$

What distance did it travel?

$d = vt$
$d = \left(\frac{17+32}{2}\right)6$
$d = (24.5)(6)$
$d = 147m$

OR

$d = v_i t + \frac{1}{2}at^2$
$d = (17)(6) + \frac{1}{2}(2.5)(6)^2$
$d = 102 + 45$
$d = 147m$

6) An object had an average speed of 124 m/s. Its initial speed was 40 m/s. What was its final speed?

$V_{AVG} = 124 \frac{m}{s}$

$V_i = 40 \frac{m}{s}$

$V_F = ?$

$$V_{AVG} = \frac{V_i + V_F}{2}$$

$$124 = \frac{40 + V_F}{2}$$

$$124(2) = 40 + V_F$$

$$248 = 40 + V_F$$

$$248 - 40 = V_F = \boxed{208 \frac{m}{s}}$$

7) A person is 40 m above a point where a truck will soon be. The person would like to drop a package onto the truck. If the truck is 120 m away and moving at 15 m/s, how long should the person wait before dropping the package? Show all of your work for credit. Use one decimal point for these calculations.

DROPPING TIME

$d = 40m$

$V_i = 0 m/s$

$a = 9.8 m/s^2$

$t = ?$

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

$$40 = (0)t + \frac{1}{2}(9.8) t^2$$

$$40 = 0 + 4.9 t^2$$

$$40 = 4.9 t^2$$

$$\frac{40}{4.9} = t^2$$

$$8.16 = t^2$$

$$\sqrt{8.16} = t = \boxed{2.9 s}$$

TRUCK TIME

$d = 120m$

$V = 15 m/s$

$t = ?$

$$d = vt$$

$$120 = 15t$$

$$\frac{120}{15} = t$$

$$\boxed{8s} = t$$

WAIT TIME

$8 - 2.9 = \boxed{5.1 s}$

Answers: 1) 9.9 hours 2) 33 m/s 101 mph 3) 5.3 s 4) 0.116 m/s^2 5) 17 m/s 147 m 6) 208 m/s 7) 5.1 s