| **Kinematics Practice 4** | Name _____ |
|---|---|
| | $d = vt$ $\quad v_f = v_i + at$ $\quad d = v_i t + (1/2)at^2$ $\quad g = 9.8\ m/s^2$ |
| | **Show all your work** |

1) A person is walking at 2 m/s. They reach a new speed of 4.5 m/s in a time of 5 s. What was their acceleration?

$v_i = 2\ m/s$
$v_f = 4.5 m/s$
$t = 5s$
$a = ?$

$v_f = v_i + at$
$4.5 = 2 + a(5)$
$4.5 - 2 = a(5)$
$2.5 = a(5)$
$2.5/5 = a = \boxed{0.5\ m/s^2}$

2) A car started from rest and accelerated at 5 m/s$^2$. How far did it travel in 12 s?

$v_i = 0 m/s$
$a = 5 m/s^2$
$t = 12s$
$d = ?$

$d = v_i t + \frac{1}{2} a t^2$
$d = (0)t + \frac{1}{2}(5)(12)^2$
$d = 0 + 2.5(144)$
$d = \boxed{360 m}$

3) In a garage, a car battery falls off a shelf. It hits the floor 0.51 s later. How high was the shelf?

$v_i = 0 m/s$
$a = 9.8 m/s^2$
$t = .51 s$
$d = ?$

$d = v_i t + \frac{1}{2} a t^2$
$d = (0)(t) + \frac{1}{2}(9.8)(.51)^2$
$d = 0 + 4.9(.51)^2$
$d = \boxed{1.27 m}$

What was the speed of the battery as it hit the floor?

$v_f = v_i + at$
$v_f = 0 + (9.8)(.51)$
$v_f = \boxed{5 m/s}$

$d = vt$ $v_f = v_i + at$ $d = v_i t + (1/2)at^2$ $g = 9.8\ m/s^2$

4) A car is travelling at 52 mph (miles per hour). How far does it travel in 43 minutes?

$v = 52\ mph$

$t = 43\ min \times \frac{1\ hour}{60\ min}$

$t = \frac{43}{60} = .72\ hours$

$d = vt$

$d = (52)(.72)$

$\boxed{d = 37.4\ miles}$

5) You will design this problem. Fill in the missing information. Solve the problem.

A Kangaroo (noun) is moving at a speed of 5 (number) m/s. It accelerates at a rate of 3 (number) m/s² for 7 (number) s. What is the new speed of the Kangaroo?

$v_i = 5\ m/s$

$a = 3\ m/s^2$

$t = 7s$

$v_f = ?$

$v_f = v_i + at$

$v_f = 5 + (3)(7)$

$v_f = 5 + 21$

$\boxed{v_f = 26\ m/s}$

$d = vt$ $v_f = v_i + at$ $d = v_i t + (1/2)at^2$ $g = 9.8\ m/s^2$

6) You will also design this problem. Write out a word problem where you give the initial speed, final speed and time and ask for the acceleration. Then, solve the problem.

An elephant is moving at 2m/s and accelerates to 10m/s in 8s. What is the elephants acceleration?

$V_i = 2\ m/s$

$V_f = 10\ m/s$

$t = 8s$

$a = ?$

$V_f = V_i + at$

$10 = 2 + a(8)$

$10 - 2 = a(8)$

$8 = a(8)$

$\frac{8}{8} = \boxed{1\ m/s^2}$

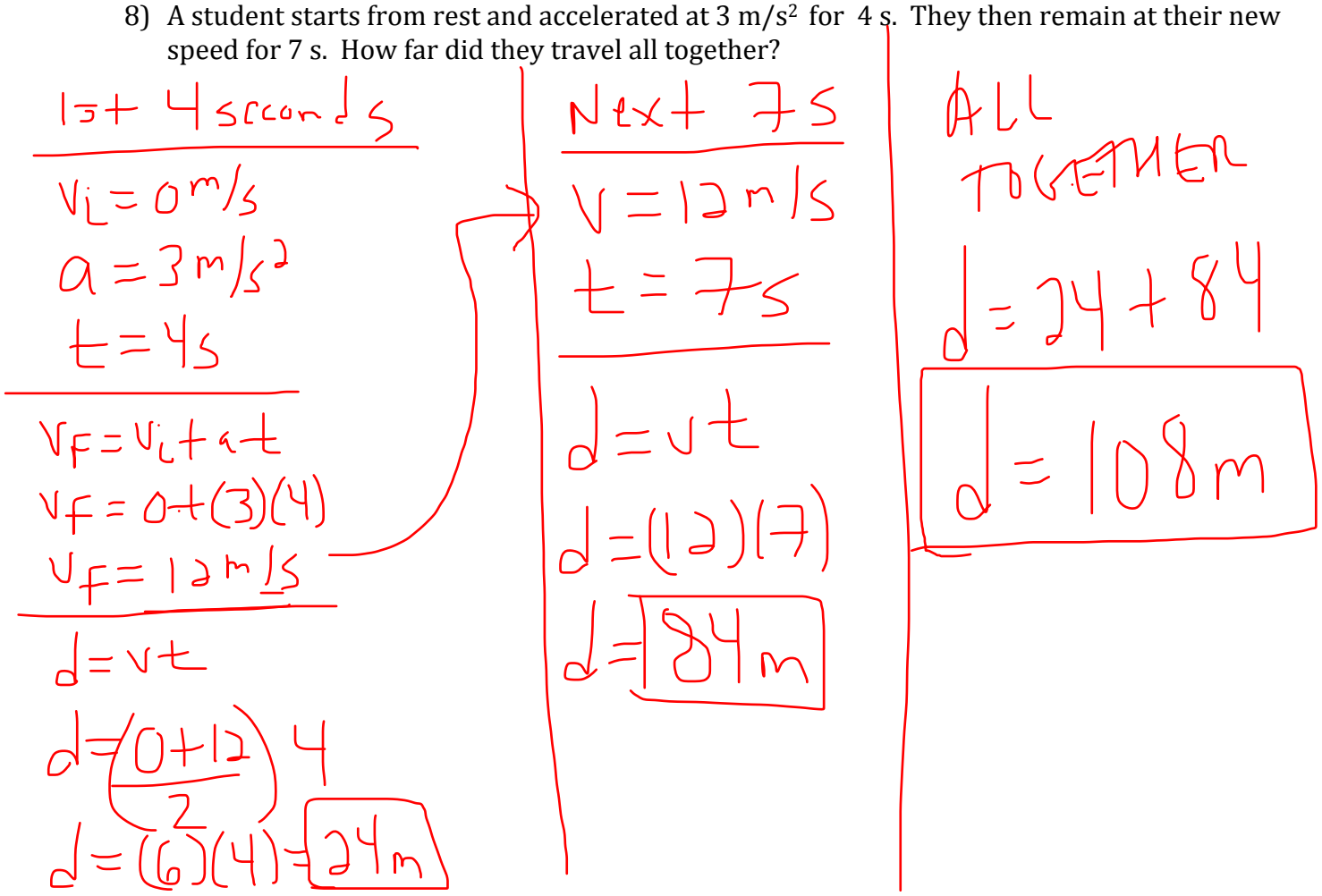
7) A Monroe student runs 10 yards in 3.87 s. A yard is 3 feet. There are 5280 feet in a mile. What was the student's speed in mph (miles per hour)?

$$\frac{10\ yards}{3.87s} \times \frac{3600s}{hour} \times \frac{3\ feet}{yard} \times \frac{1\ mile}{5280\ feet} =$$

$$\boxed{5.3\ mph}$$

$d = vt$ $v_f = v_i + at$ $d = v_i t + (1/2)at^2$ $g = 9.8\ m/s^2$

8) A student starts from rest and accelerated at 3 $m/s^2$ for 4 s. They then remain at their new speed for 7 s. How far did they travel all together?




9) On another planet, a space vehicle battery falls off the shelf of a garage. It falls a distance of 25 m in 8 s. What is the acceleration due to gravity on this planet?

$d = 25m$
$t = 8s$
$v_i = 0\ m/s$
$a = ?$

$d = v_i t + \frac{1}{2}at^2$
$25 = 0(8) + \frac{1}{2}a(8)^2$
$25 = 0 + \frac{1}{2}a(64)$
$25 = 32a$
$\frac{25}{32} = a = .78\ m/s^2$

Answers: 1) 0.5 $m/s^2$ 2) 360 m 3) 1.27 m 5 s 4) about 37 miles 5) answers will vary 6) answers will vary 7) 5.3 mph 8) 108 m 9) 0.78 $m/s^2$