N, E +

Science 10 W, S − Name: Key

Acceleration – **Show your Work!!!**

1. A car is traveling east at 4 m/s. The car accelerates for 5 s and finishes at a velocity of 13 m/s. What is the car's acceleration?

$v_i = 4\frac{m}{s}$, $v_f = 13\frac{m}{s}$, $t = 5s$, $a = ?$

$\Delta v = v_f - v_i = 13 - 4 = 9\frac{m}{s}$

$a = \frac{\Delta v}{t} = \frac{9\frac{m}{s}}{5s} = 1.8\frac{m}{s^2}$

2. A runner is running east at 2 m/s. The runner accelerates to 13.3 m/s in 32 s. What is the runner's acceleration?

$a = ?$

$\Delta v = v_f - v_i = 13.3\frac{m}{s} - 2\frac{m}{s} = 11.3\frac{m}{s}$

$t = 32s$

$a = \frac{\Delta v}{t} = \frac{11.3\frac{m}{s}}{32s} = .35\frac{m}{s^2}$

3. A walker is at rest. The walker starts accelerating north at .42 m/s^2 for 54 s. What is the walker's final velocity?

$a = .42\frac{m}{s^2}$

$\Delta v = ?$

$t = 54s$

$\Delta \vec{v} = a \cdot t$

$= (.42)(54) = 22.68\frac{m}{s}$

4. A cheetah is at rest. The cheetah starts accelerating north at 8 m/s^2 for 12 s. What is the cheetah final velocity in km/hr?

$a = 8\frac{m}{s^2}$

$\Delta v = ?$

$t = 12s$

$\Delta v = a \cdot t$

$= (8\frac{m}{s^2})(12s)$

$= (96\frac{m}{s})(\frac{1\,km}{1000m})(\frac{3600s}{1h})$

$= 345.6\frac{km}{hr.}$

5. A penguin starts swimming from rest. The penguin accelerates at 4.3 m/s^2 right and finishes with a velocity of 32 m/s. How long did it take the penguin to reach 32 m/s?

$a = 4.3 \frac{m}{s^2}$

$\Delta V = 32 \frac{m}{s}$

$t = ?$

$t = \frac{V}{a} = \frac{32 \frac{m}{s}}{4.3 \frac{m}{s^2}} = 7.4\,s$

6. A rolling ball is at a constant velocity of +3 m/s. The ball undergoes an acceleration of +4.3 m/s^2 for 3.4 s. What is the ball's final velocity?

$a = 4.3 \frac{m}{s^2}$

$\Delta V = V_f - V_i = V_f - 3$

$t = 3.4\,s$

$\Delta V = a \Delta t$

$V_f - 3 = (4.3)(3.4)$

$V_f = 17.62 \frac{m}{s}$

7. A rock is moving through the air at 4.3 m/s. The rock has an acceleration of 8.9 m/s^2. If the rock is accelerated for 8.2 s, what is the rock's final velocity?

$a = 8.9 \frac{m}{s^2}$

$\Delta V = V_f - V_i = V_f - 4.3$

$t = 8.2\,s$

$\Delta V = a \Delta t$

$V_f - 4.3 = (8.9)(8.2)$

$V_f = 77.28 \frac{m}{s}$

8. An object undergoes an acceleration of 2 m/s^2 to the right for 3.2 s and finishes with a velocity 54 m/s. What was the object's starting velocity in both m/s and km/hr?

$a = 2 \frac{m}{s^2}$

$\Delta V = V_f - V_i = 54 - V_i$

$t = 3.2\,s$

$\Delta V = a \Delta t$

$54 - V_i = (2)(3.2)$

$V_i = 47.6 \frac{m}{s}$

$\left(\frac{47.6\,m}{1\,s}\right)\left(\frac{1\,km}{1000\,m}\right)\left(\frac{3600\,s}{1\,h}\right) = 171.36 \frac{km}{hr}$