2.1

February 19, 2020

1 Topic 2.1 - Motion

Formula booklet: four SUVAT equations

velocity

$$v = u + at$$

displacement

$$s = ut + \frac{1}{2}at^2$$

timeless

$$v^2 = u^2 + 2as$$

average displacement

$$s = \frac{(v+u)t}{2}$$

1.0.1 Question 1

A fly travels along the x-axis. His starting point is $x = -8.0m$ and his ending point is $x = -16m$. His flight lasts 2.0 seconds. What is his velocity?

Given - $x_i = -8.0m$ - $x_f = -16m$ - $t = 2s$

Formula - $\Delta x = x_f - x_i$ - $v = \frac{\Delta x}{t}$

Solution - $\Delta x = x_f - x_i = -16 - (-8) = -8m$ - $v = \frac{\Delta x}{t} = \frac{-8}{2} = -4\frac{m}{s}$

Answer: The velocity of the fly is $-4\frac{m}{s}$.

[1]:
```
x_i = -8.0      # initial point in m
x_f = -16       # final point in m
t   =  2        # time to travel the distance in s

x =  x_f - x_i # displacement in m
v = x / t      # velocity
print('The velocity of the fly is', v, 'm/s.')
```

```
The velocity of the fly is -4.0 m/s.
```

1.0.2 Question 2

A car traveling at $48ms^{-1}$ is brought to a stop in 3.0 seconds. What is its acceleration?

Given - $u = 48\frac{m}{s}$ - $t = 3s$ - $v = 0$

Formula velocity - $v = u + at$

Solution - Since $v = 0$ the formula rearranges: - $-u = at$ or $a = -\frac{u}{t} = -\frac{48}{3} = -16\frac{m}{s^2}$

Answer: The acceleration of the car is $-16\frac{m}{s^2}$.

[2]:
```
v = 0        # final velocity - implicit - stop or zero
u = 48       # initial velocity
t = 3        # time to stop

a = -u / t  # acceleration is change in velocity over time
print('The acceleration of the car is',a,'m/s²')
```

```
The acceleration of the car is -16.0 m/s²
```

[ ]:
```

```