## 1. Δx, Δy, t, $v_i$, $v_f$, or a?

t 2 sec — Δx Δy How far...
V 3 m/s — a 4 m/s² — V How fast...
Δx 6 m right — t How long did it take? — Δy How high...

**2.** *A person swims to the other end of a 20 m long pool and back.* What is their displacement? 0m ($x_i = x_f$)

**3.** *A rock falls 15 m.*
Is this vertical or horizontal motion?
What is the displacement of the rock? −15m

**4.** *A car moving 12 m/s stops in 3 seconds.*
$V_f$ = 0m/s

**5.** *You throw a rock into the air and catch it as it returns.*
What is the displacement of the rock? 0m

## 6. *Choose the correct kinematic equation for the following:*

Variables:
a = 2 m/s²
$V_i$ = 6 m/s
$V_f$ = −6 m/s
Δx = ____

What's missing from the list: t

So use this equation: $V_f^2 = V_i^2 + 2a\Delta x$

Variables:
a = 4 m/s²
t = 10 s
$V_f$ = −2 m/s
Δx = ____

What's missing from the list: $V_i$

So use this equation: $\Delta x = (V_f t) - (\frac{1}{2} a t^2)$

Variables:
a = −3m/s²
$V_i$ = 6 m/s
$V_f$ = −12 m/s
t = ____

What's missing from the list: Δx

So use this equation: $V_f = V_i t + at$

**7.** *In 10 seconds a car accelerates 4m/s² to 60 m/s. How fast was the car going before it accelerated?*

Variables:
a 4m/s²
Δx ____
$V_f$ 60m/s
$V_i$ ?
t 10s

Equation and Solve:
$a = \frac{V_f - V_i}{t}$
$60\text{m/s} - V_i = 4\text{m/s}^2 \cdot 10\text{s}$
$60 - V_i = 40$
$V_i = 20\text{m/s}$

**8.** *A object moving 2 m/s experiences an acceleration of 3m/s² for 8 seconds. How far did it move in that time?*

Variables:
a 3m/s²
Δx ?
$V_f$ ____
$V_i$ 2m/s
t 8s

Equation and Solve:
$\Delta x = V_i t + (\frac{1}{2} a t^2)$
$\Delta x = 2\text{m/s} \cdot 8\text{s} + \frac{1}{2} 3\text{m/s}^2 \cdot (8\text{s})^2$
$\Delta x = 16 + 96$
$\Delta x = 112\text{m}$

**9.** *An object at rest starts accelerating. If it travels 40 meters to end up going 20 m/s, what was its acceleration?*

Variables:
a ?
Δx 40m
$V_f$ 20m/s
$V_i$ 0m/s
t ____

Equation and Solve:
$V_f^2 = V^2 + (2a\Delta x)$
$(20\text{m/s})^2 = 0\text{m/s} + 2a \cdot 40\text{m}$
$400 = 2a \cdot 40$
$10 = 2a$ $a = 5\text{m/s}^2$

**10.** *A model rocket climbs 200 m in 4 seconds. If was moving 10 m/s to begin with, what is its final velocity?*

Variables:
a ____
Δy 200m
$V_f$ ?
$V_i$ 10m/s
t 4s

Equation and Solve:
$\Delta y = \frac{1}{2}(V_i + V_f) t$
$200\text{m} = \frac{1}{2}(10\text{m/s} + V_f) 4\text{s}$
$200 = (10 + V_f) 2$
$100 = 10 + V_f$ $V_f = 90\text{m/s}$

**11.** *A car stops in 120 m. If it has an acceleration of −5m/s², how long did it take to stop?*

a −5m/s²
Δx 120m
$V_f$ ____
$V_i$ 0m/s
t ?

$\Delta x = (V_i t) + \frac{1}{2} a t^2$
$120\text{m} = (0\text{m/s} t) + \frac{1}{2} \cdot 5\text{m/s}^2 (t^2)$
$120 = 2.5 t^2$
$48 = t^2$
$t = 6.93\text{s}$

**12.** *An object drops 20 m from a cliff. If it started at rest and is going 20 m/s just before it hits the ground, what is its acceleration?*

a ?
Δy −20m
$V_f$ 20m/s²
$V_i$ 0m/s
t ____

$V_f^2 = V_i^2 + (2a\Delta y)$
$(20\text{m/s})^2 = (0\text{m/s})^2 + (2a \cdot -20\text{m})$
$400 = 2a \cdot -20$
$-20 = 2a$ $a = -10\text{m/s}^2$