1. Draw picture.
2. Axes.
3. Initial & final events.
4. Variable table
5. Choose equation & solve.
6. Check answer's sign & magnitude.

(1) $\Delta x = \frac{1}{2}(V_i + V_f)\Delta t$

(2) $V_f = V_i + a\Delta t$

(3) $\Delta x = V_i \Delta t + \frac{1}{2}a(\Delta t)^2$

(4) $\Delta x = V_f \Delta t - \frac{1}{2}a(\Delta t)^2$

(5) $V_f^2 = V_i^2 + 2a\Delta x$

1. A car moving at 10m/s hits the brakes 100m before a wall. It stops *right* before colliding. How long were the brakes applied? Assume the acceleration is constant.

Δx	
v_{ix}	
v_{fx}	
a_x	
Δt	

2. A car slows down at -4 m/s^2 until it is moving at 17m/s to the right. The car travels 30m during its acceleration. How long does the car accelerate?

Δx	
v_{ix}	
v_{fx}	
a_x	
Δt	

NOTES:
You will get two possible solutions, but only one makes sense.

3. A ball is dropped two meters above the ground.
(a) How fast is it moving when it hits the ground?
(b) How long does it take to hit the ground?

Δy	
v_{iy}	
v_{fy}	
a_y	
Δt	

NOTES:
- Work on one question at a time.
- For the first question, find the DKDC variable as usual.
- When you solve the second equation, there is no DKDC variable, so you can choose whichever equation you like.

4. I throw a ball in the air at 5m/s.
(a) How long until it reaches the top of its flight?

Δy	
v_{iy}	
v_{fy}	
a_y	
Δt	

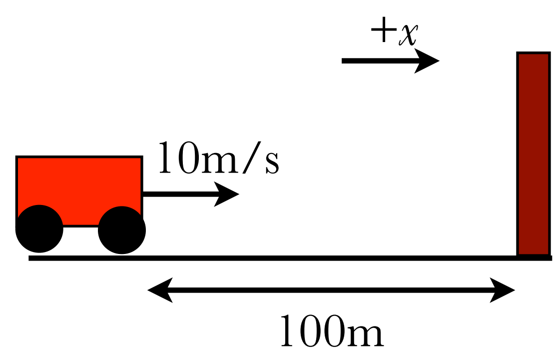
(b) How long does it take to hit your hand again?

Δy	
v_{iy}	
v_{fy}	
a_y	
Δt	

NOTES:
For (b), let the initial event be the moment it leaves your hand, and the final event be the moment it returns to your hand.

1. A car moving at 10m/s hits the brakes 100m before a wall. It stops *right* before colliding. How long were the brakes applied? Assume the acceleration is constant.

Δx	100m
v_{ix}	10 m/s
v_{fx}	0 m/s
a_x	DKDC
Δt	NEED



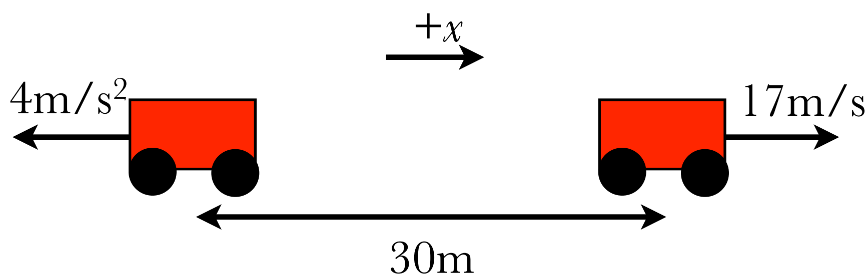
initial event:
car starts slowing down
final event:
car stops right at the wall

$$\Delta x = \frac{1}{2}(v_{ix} + v_{fx})\Delta t$$

$$100 = 5\Delta t \implies \Delta t = \boxed{20\text{ s}}$$

2. A car slows down at -4 m/s^2 until it is moving at 17m/s to the right. The car travels 30m during its acceleration. How long does the car accelerate?

Δx	30m
v_{ix}	DKDC
v_{fx}	17 m/s
a_x	-4 m/s^2
Δt	NEED



initial event:
car starts slowing down
final event:
car is moving at 17m/s

$$\Delta x = v_f \Delta t - \frac{1}{2} a (\Delta t)^2$$

$$0 = 2(\Delta t)^2 + 17\Delta t - 30 = (x + 10)(2x - 3)$$

$$\Delta t = \frac{-17 \pm \sqrt{17^2 - 4(2)(-30)}}{2(2)} = \{-10\,\mathrm{s}, 1.5\,\mathrm{s}\}$$

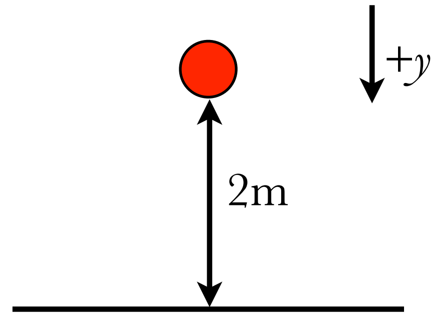
Only the positive solution makes sense.

NOTES:
You will get two possible solutions, but only one makes sense.

3. A ball is dropped two meters above the ground.
(a) How fast is it moving when it hits the ground?
(b) How long does it take to hit the ground?

(a)

Δy	2m
v_{iy}	0 m/s
v_{fy}	NEED
a_y	$+9.8\ m/s^2$
Δt	DKDC



initial event:
The ball is dropped.
final event:
The ball hits the ground.

$$v_f^2 = v_i^2 + 2a\Delta y$$

$$v_f = \sqrt{0 + 2(9.8)(2)} = \boxed{6.26\,\mathrm{m/s}}$$

(b) Choose the simplest equation.

$$\Delta y = \frac{1}{2}(v_i + v_f)\Delta t$$

$$\Delta t = \frac{\Delta y}{\frac{1}{2}(v_i + v_f)} = \frac{2}{\frac{1}{2}(0 + 6.26)} = \boxed{0.64\,\mathrm{s}}$$

NOTES:
- Work on one question at a time.
- For the first question, find the DKDC variable as usual.
- When you solve the second equation, there is no DKDC variable, so you can choose whichever equation you like.