

Learn to Identify the Variables!

Symbol	Name	Unit
d	Displacement	m
v_i	Initial Velocity	m/s
v_f	Final Velocity	m/s
a	Acceleration	m/s/s or m/s²
t	Time	s

10 m/s →



$t = 0$

30 m/s →



$t = 5 \text{ s}$

A motorcycle, moving at 10 m/s, begins to speed up, reaching 30 m/s after 5 seconds. What was the motorcycle's acceleration?

10 m/s →



$t = 0$

30 m/s →



$t = 5 \text{ s}$

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The first step is to identify the variables!

- Which variables are GIVEN?
- Which variable is being ASKED FOR?
- Which variable is NEVER MENTIONED?

10 m/s →



$t = 0$

30 m/s →



$t = 5 \text{ s}$

A motorcycle, moving at 10 m/s, begins to speed up, reaching 30 m/s after 5 seconds. What was the motorcycle's acceleration?

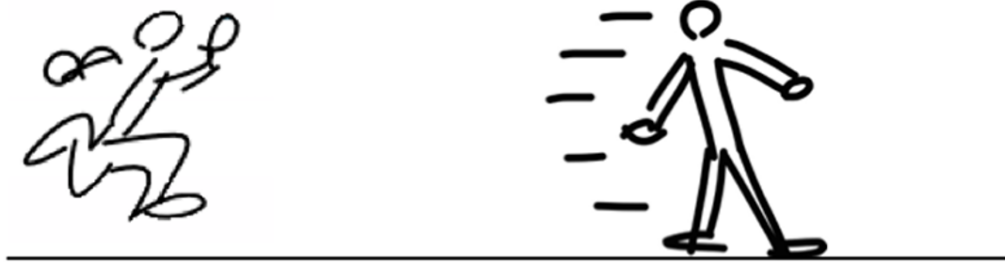
$V_i = 10 \text{ m/s}$ (Given)

$V_f = 30 \text{ m/s}$ (Given)

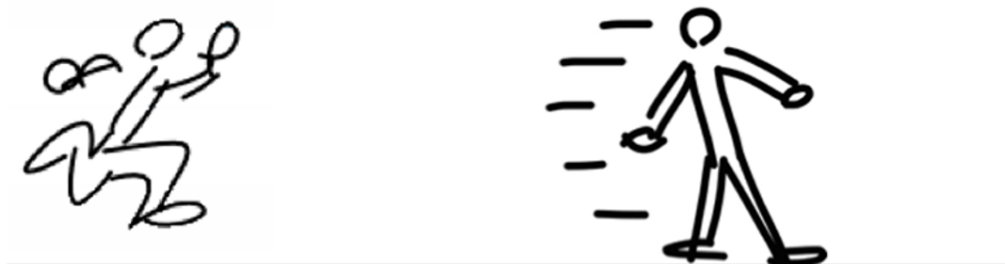
$t = 5 \text{ s}$ (Given)

$a = ?$ (Asked for)

d (Never mentioned)



A student is running in the halls at 6 m/s and sees the principle. They stop running and skid to a halt 4 seconds later. How far did the student skid?



A student is running in the halls at 6 m/s and sees the principle. They stop running and skid to a halt 4 seconds later. How far did the student skid?

$V_i = 6 \text{ m/s}$ (Given)

$V_f = 0 \text{ m/s}$ (Given, “skid to a halt”)

$t = 4 \text{ s}$ (Given)

a (Never mentioned)

$d = ?$ (Asked for, “How far did the student skid?”)

Now, how do we solve for the unknowns in the above problem? We need to use one of these four equations!

1. $V_f = V_i + at$

2. $d = V_i t + \frac{1}{2}at^2$

3. $d = \frac{1}{2}(V_f + V_i)t$

4. $V_f^2 = V_i^2 + 2ad$

Looking at these equations, which of the five variable is NOT utilized in each?

1. $V_f = V_i + at$ ← No displacement “d”

2. $d = V_i t + \frac{1}{2} at^2$ ← No final velocity “Vf”

3. $d = \frac{1}{2} (V_f + V_i) t$ ← No acceleration “a”

4. $V_f^2 = V_i^2 + 2ad$ ← No time “t”

Solving Kinematic Problems!

- Which variables are GIVEN?**
- Which variable is being ASKED FOR?**
- Which variable is NEVER MENTIONED?**
- Look through the equations. For the variable that was NEVER MENTIONED, use the equation where that same variable is NOT UTILIZED!**
- Plug in and solve.**
- Write answers with correct units!**

10 m/s →



$t = 0$

30 m/s →



$t = 5 \text{ s}$

A motorcycle, moving at 10 m/s, begins to speed up, reaching 30 m/s after 5 seconds. What was the motorcycle's acceleration?

$V_i = 10 \text{ m/s}$ (Given)

$V_f = 30 \text{ m/s}$ (Given)

$t = 5 \text{ s}$ (Given)

$a = ?$ (Asked for)

d (Never mentioned)

Choose the appropriate equation.

We see that displacement " d " is NEVER MENTIONED! Therefore, which of the four equations is displacement " d " NOT UTILIZED?

10 m/s →



$t = 0$

30 m/s →



$t = 5 \text{ s}$

A motorcycle, moving at 10 m/s, begins to speed up, reaching 30 m/s after 5 seconds. What was the motorcycle's acceleration?

$V_i = 10 \text{ m/s}$ (Given)

$V_f = 30 \text{ m/s}$ (Given)

$t = 5 \text{ s}$ (Given)

$a = ?$ (Asked for)

d (Never mentioned)

Equation 1:

$$V_f = V_i + at$$

10 m/s →



$t = 0$

30 m/s →



$t = 5 \text{ s}$

A motorcycle, moving at 10 m/s, begins to speed up, reaching 30 m/s after 5 seconds. What was the motorcycle's acceleration?

Equation 1:

$$V_f = V_i + at$$

$$30 = 10 + a(5)$$

$$a = 4 \text{ m/s/s}$$



A student is running in the halls at 6 m/s and sees the principle. They stop running and skid to a halt 4 seconds later. How far did the student skid?

$V_i = 6 \text{ m/s}$ (Given)

$V_f = 0 \text{ m/s}$ (“skid to a halt”)

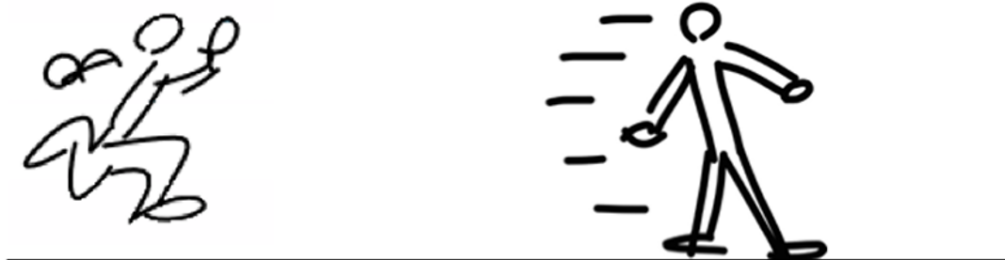
$t = 4 \text{ s}$ (Given)

a (Never mentioned)

$d = ?$ (Asked for, “How far did the student skid?”)

Choose the appropriate equation.

We see that “ a ” is NEVER MENTIONED! Therefore, which of the four equations is “ a ” NOT UTILIZED?



A student is running in the halls at 6 m/s and sees the principle. They stop running and skid to a halt 4 seconds later. How far did the student skid?

$V_i = 6 \text{ m/s}$ (Given)

Equation 3:

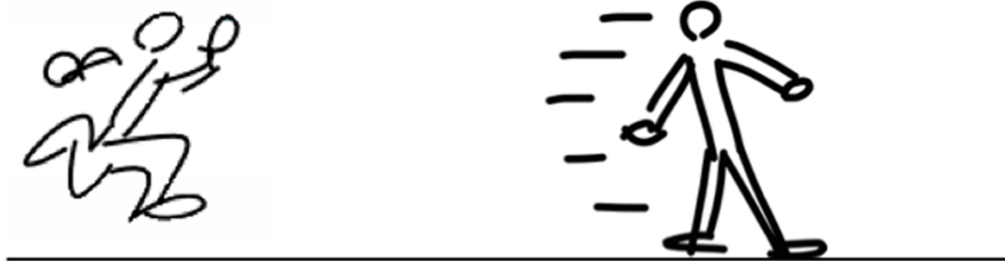
$V_f = 0 \text{ m/s}$ (“skid to a halt”)

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

$t = 4 \text{ s}$ (Given)

a (Never mentioned)

$d = ?$ (Asked for, “How far did the student skid?”)



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Equation 3:

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

$$d = \frac{1}{2}(0 + 6)4$$

$$d = 12 \text{ m}$$