June 3, Week 1

Physics 151, Dr. Mark Morgan-Tracy

Today: Chapter 1, Position, Displacement, and Velocity

Please Register your Clicker.

Homework Assignment #1 - Available on class webpage, Due this Friday, June 6.

Motion

Mechanics - Study of how and why objects move.

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Where the object is located at every time = Position

How fast and in what direction the object is going at every time = Velocity

Whether the object is speeding up or slowing down at every time = Acceleration

Motion Diagrams

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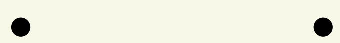

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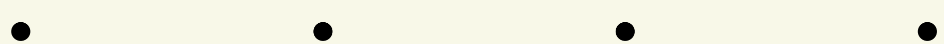

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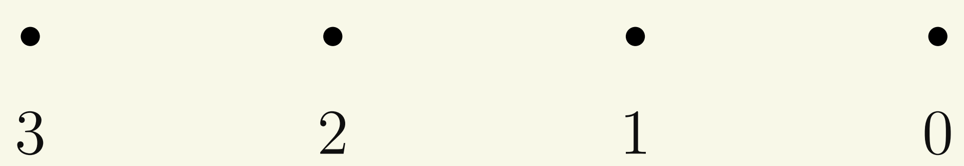

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$\bullet$	$\bullet$	$\bullet$	$\bullet$
3	2	1	0

Later we'll include arrows to indicate direction of motion

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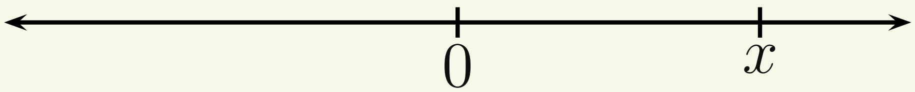
What You'll See:



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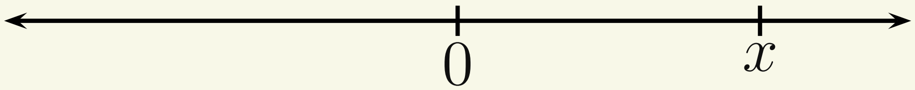

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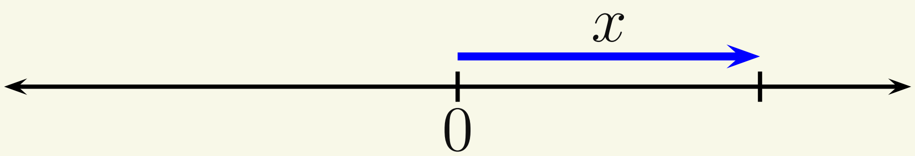

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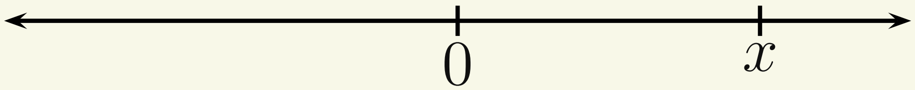

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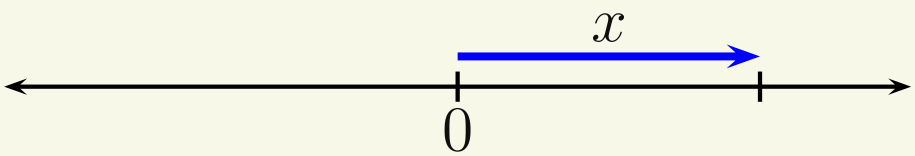

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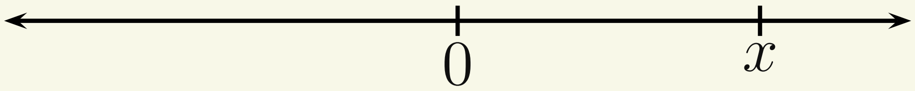

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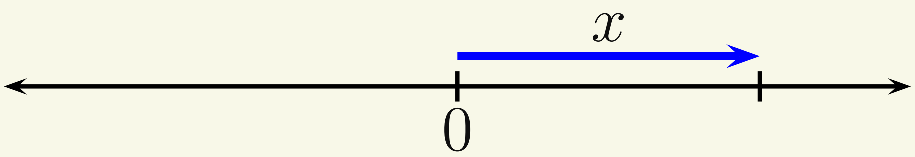

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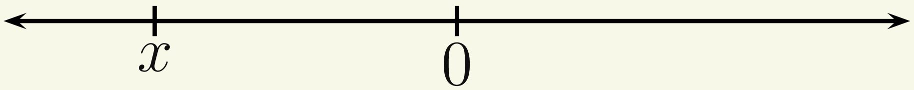

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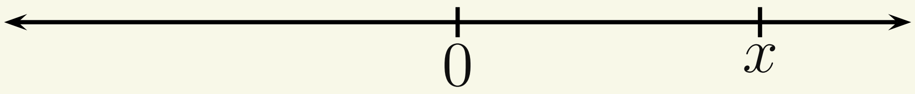

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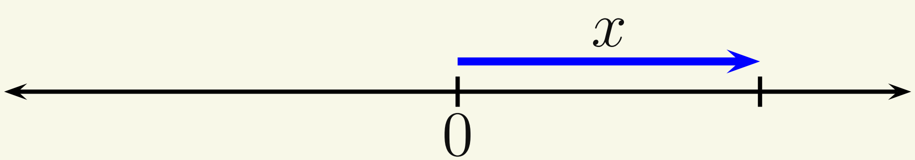

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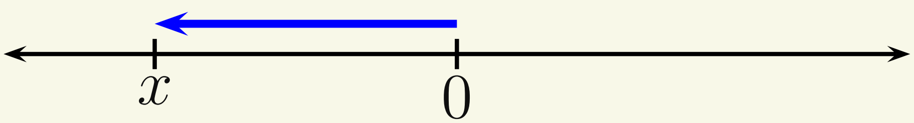

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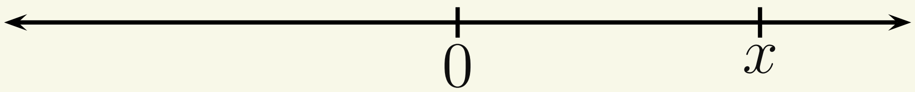

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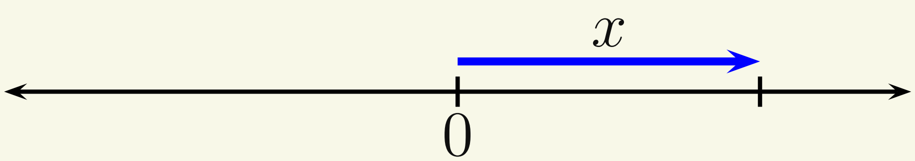

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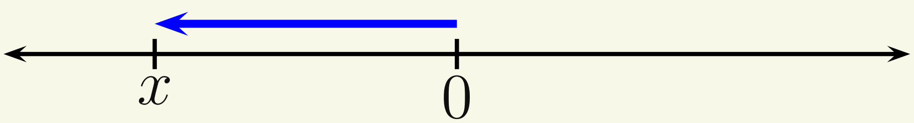

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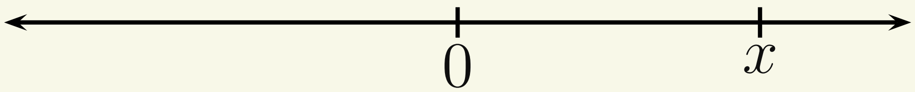

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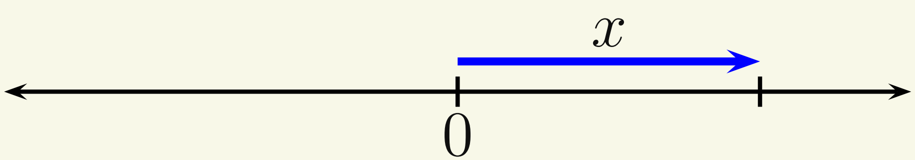

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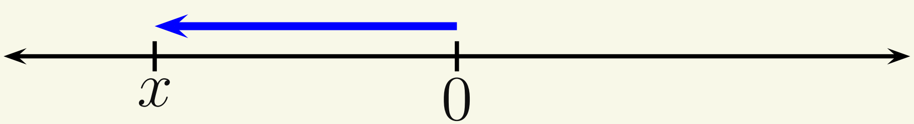

Usual Convention:

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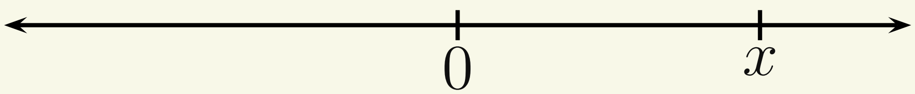

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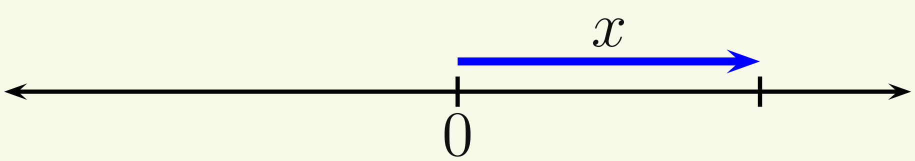

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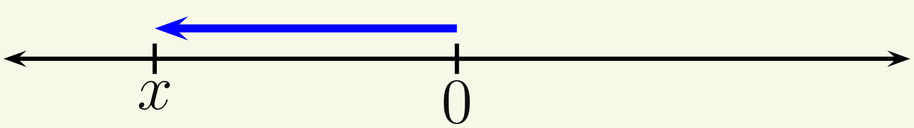

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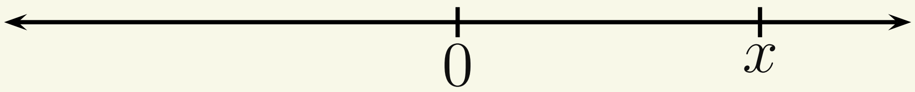

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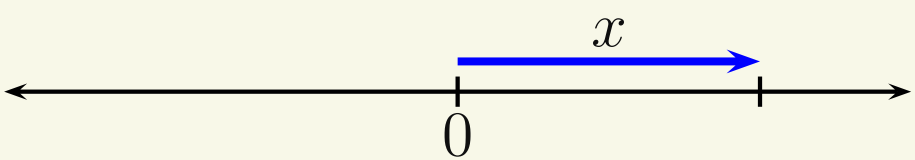

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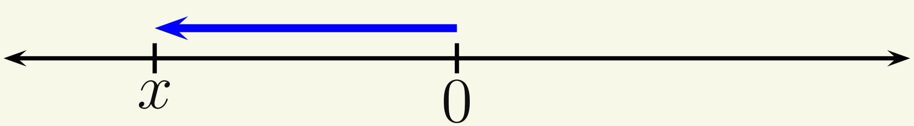

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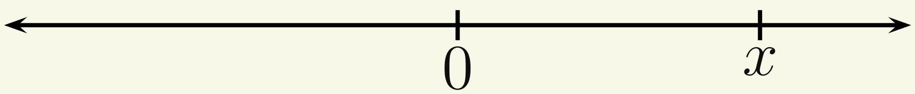

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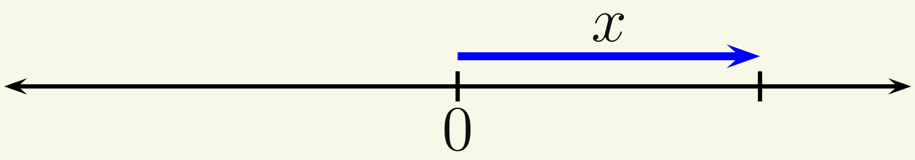

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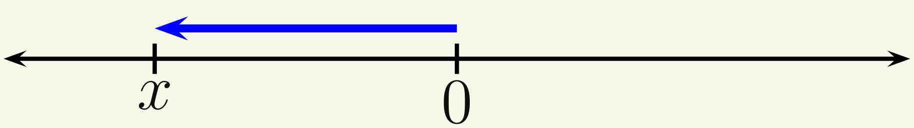

Usual Convention:

Positive:	To the right
Negative:	

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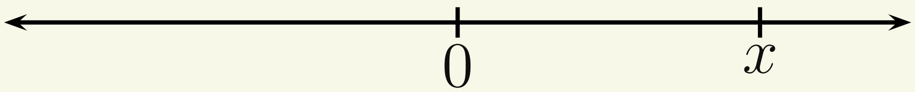

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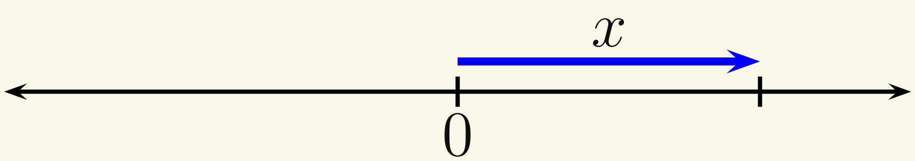

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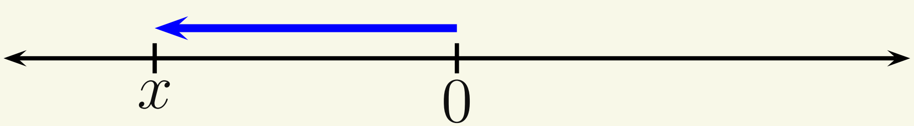

Usual Convention:

Positive:	To the right
Negative:	To the left

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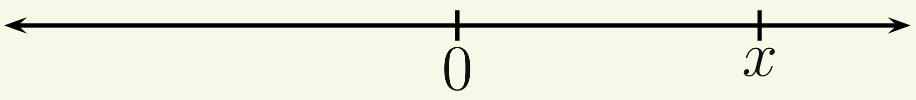

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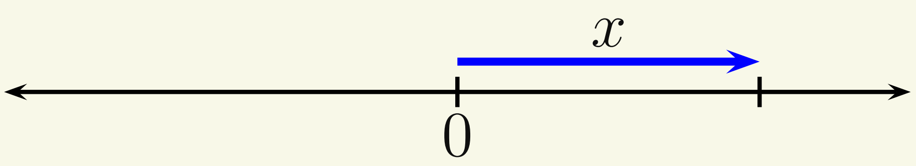

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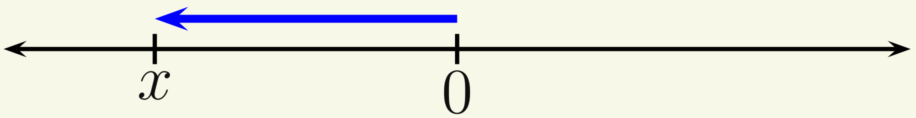

Usual Convention:

Positive:	To the right	Up
Negative:	To the left	

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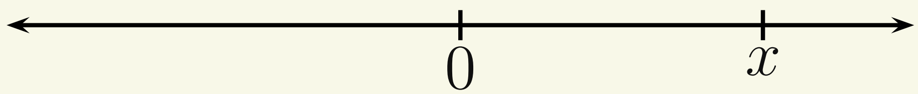

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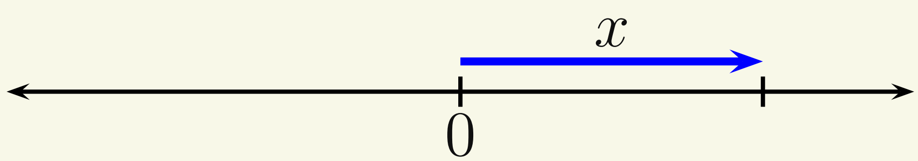

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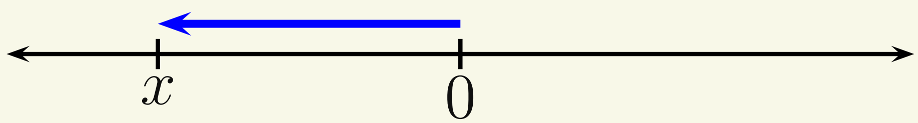

Usual Convention:

Positive:	To the right	Up
Negative:	To the left	Down

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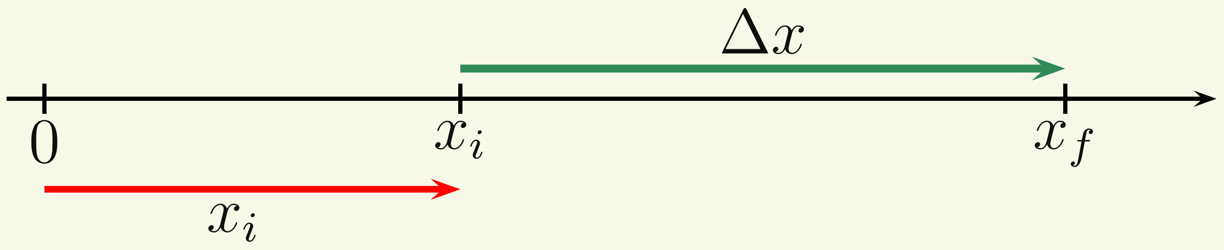

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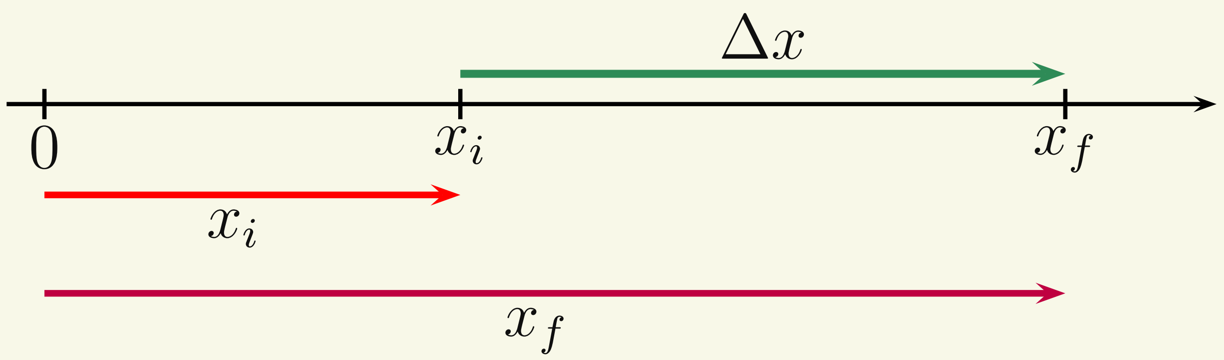

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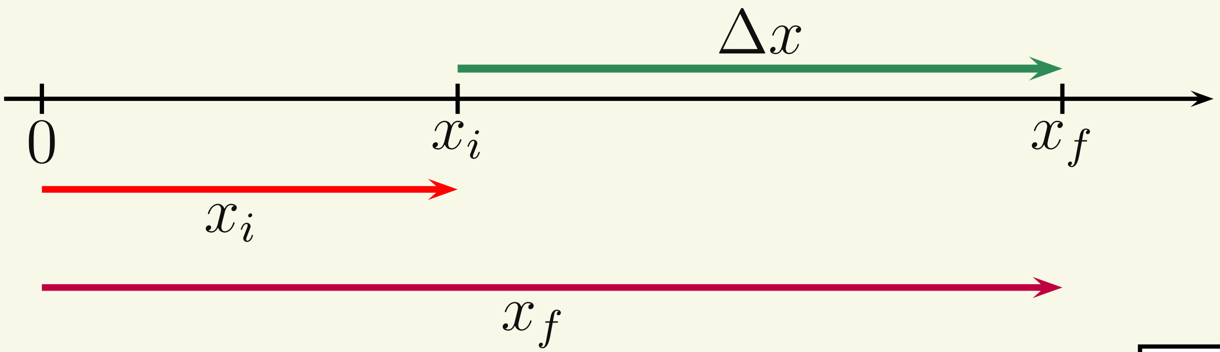

$$\boxed{\Delta x = x_f - x_i}$$

Displacement Exercise

An eagle is flying $4\,m$ above a lake when it spies a fish that is $35\,cm$ below the surface. If the eagle dives straight down and grabs the fish, what the eagle's displacement? Use the typical convention that up is positive.

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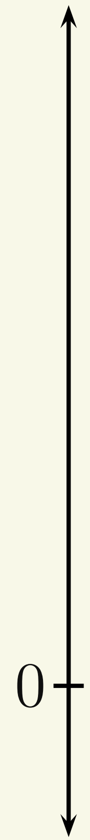

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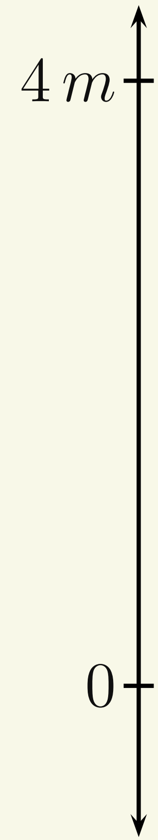

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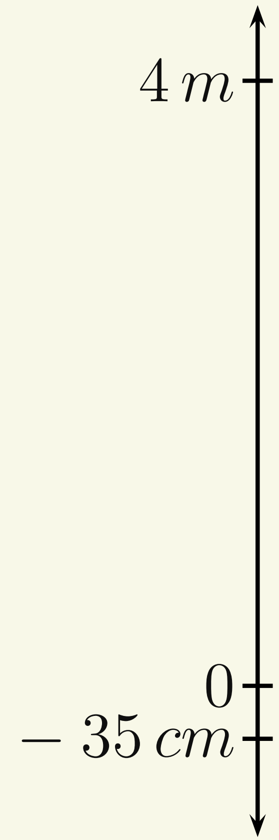

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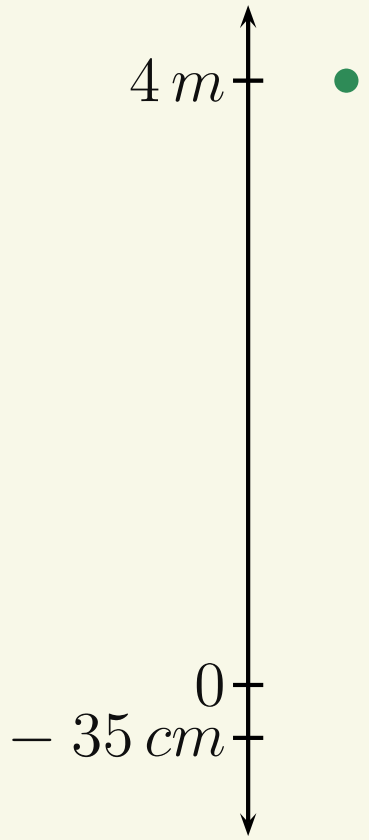

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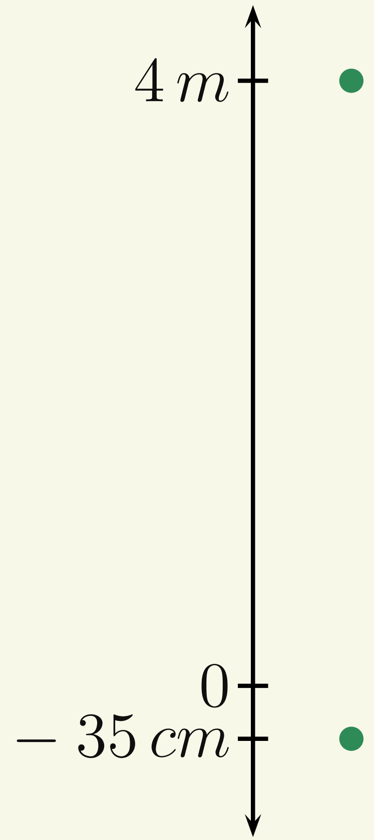

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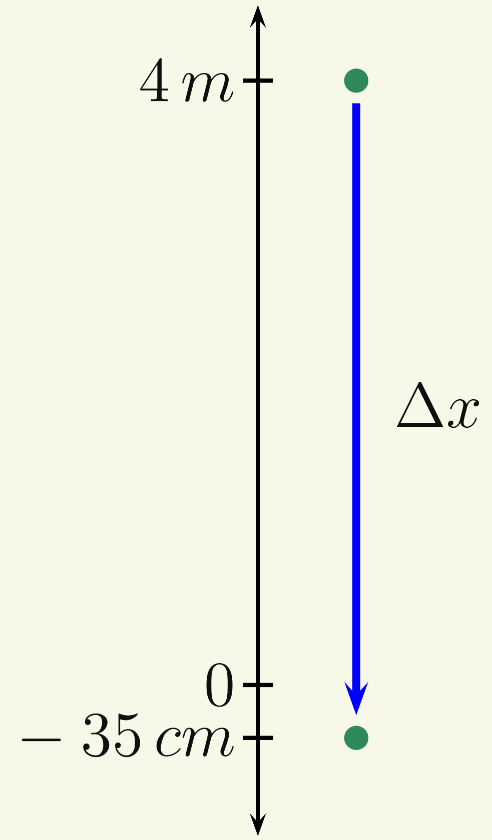

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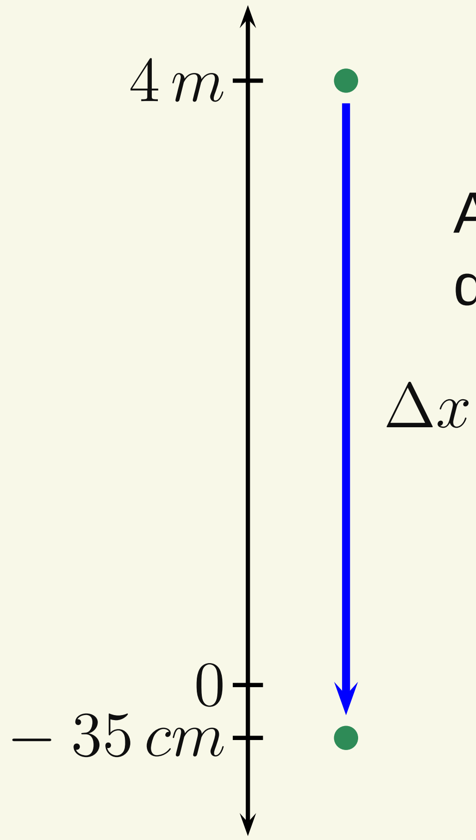

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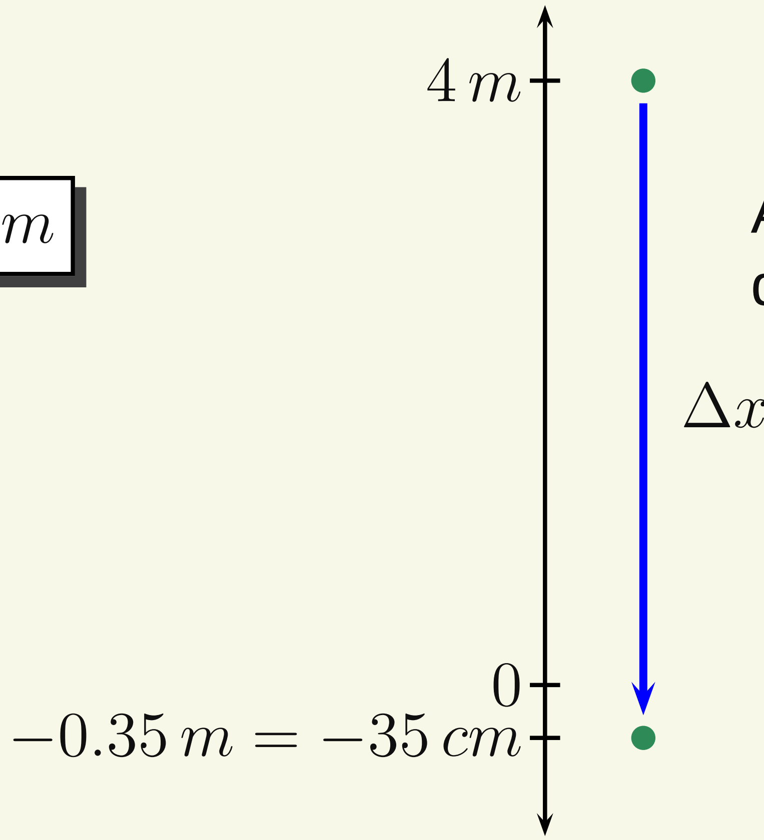

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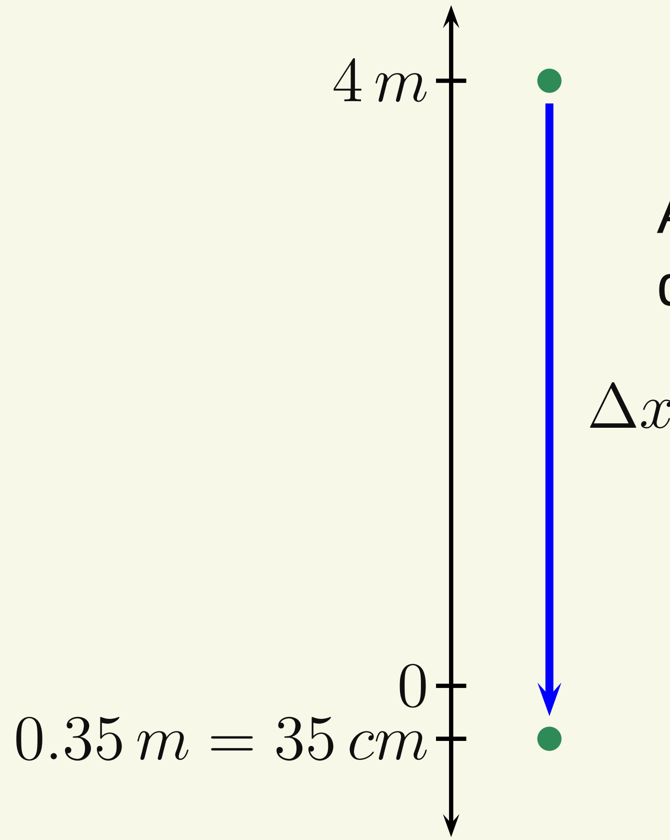
When adding or subtracting, quantities must have the same unit



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Distance

Distance, d = always positive number which gives how far an object has traveled.

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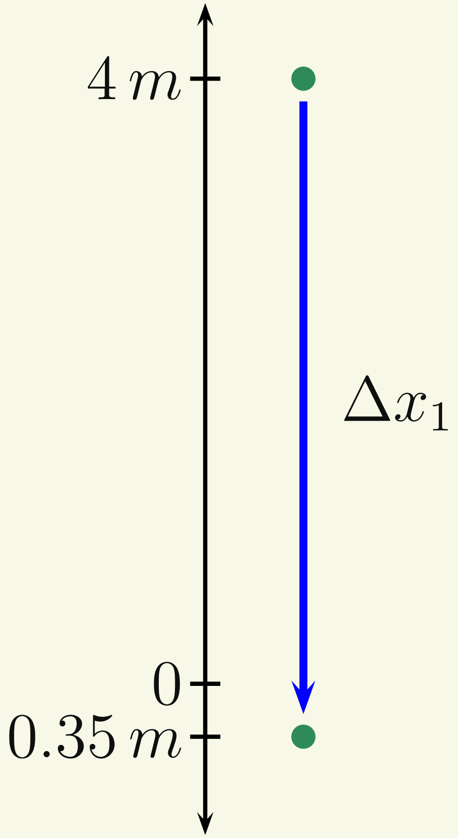

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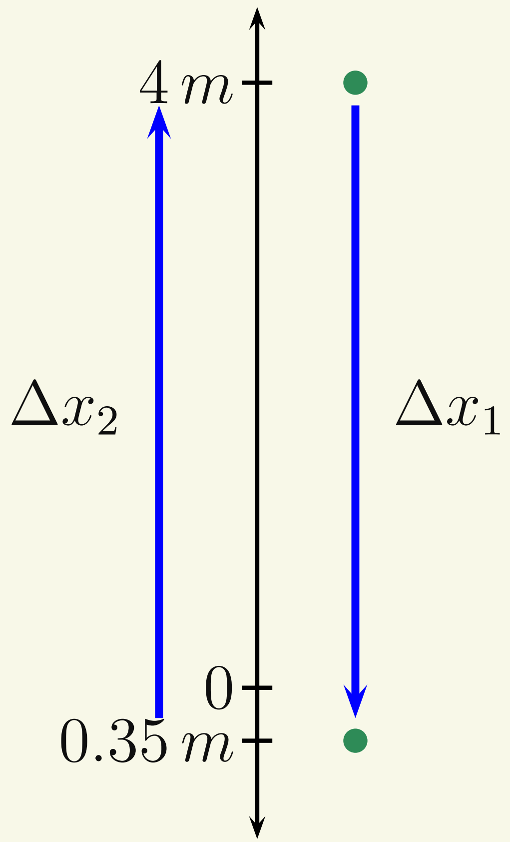

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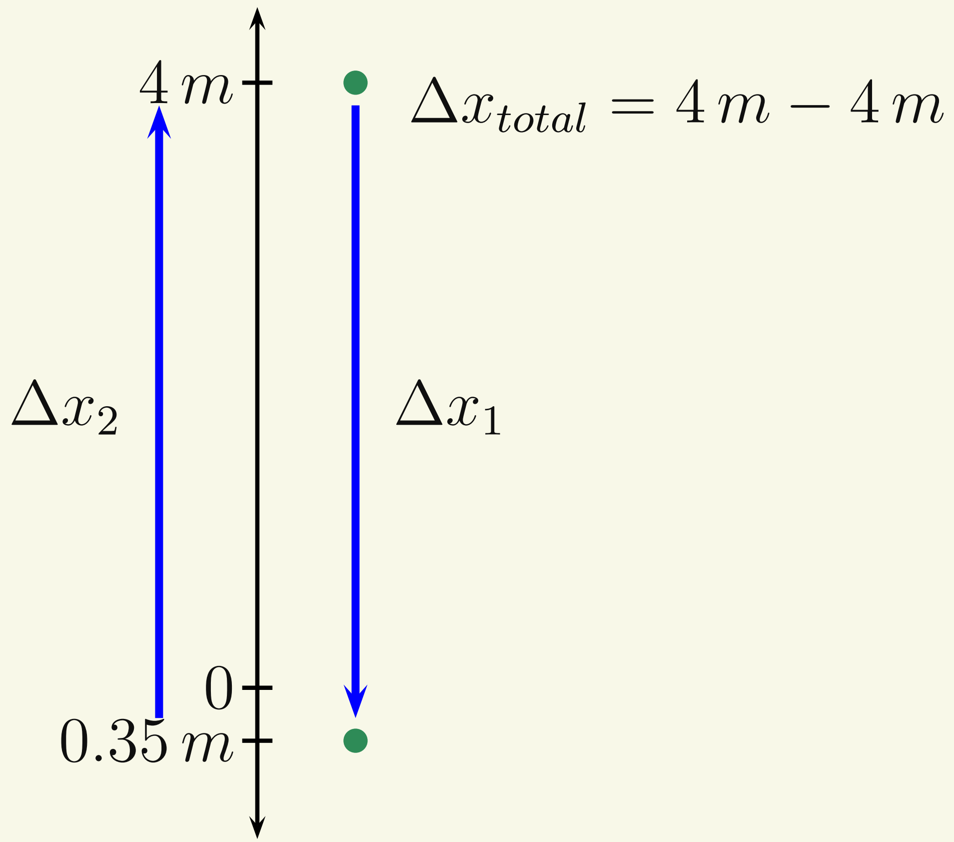

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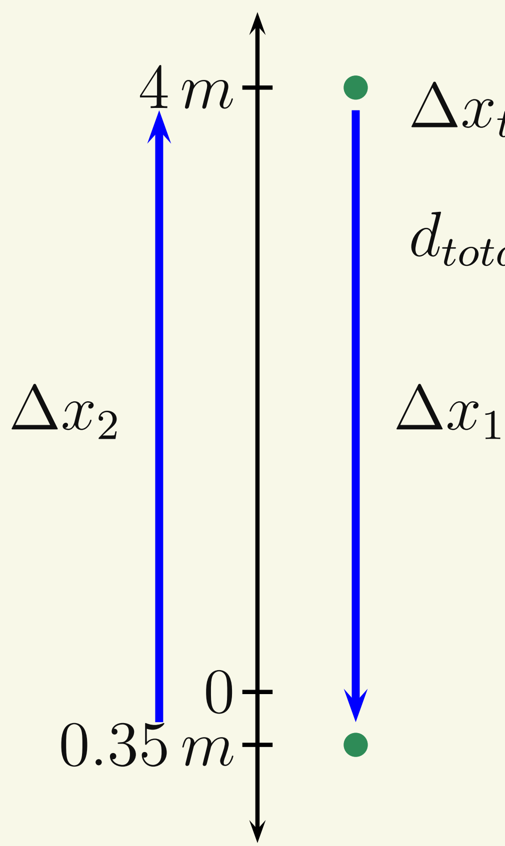

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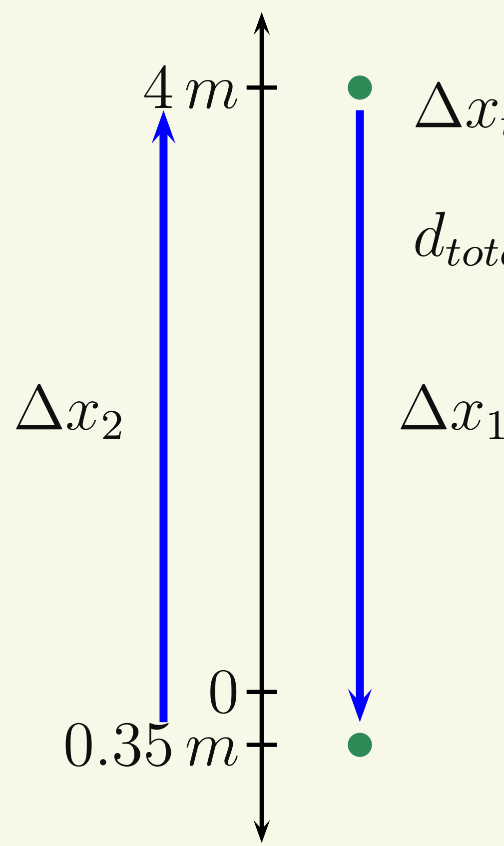

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Total displacement doesn't depend on what happens during the motion. Distance does.

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For an object in uniform motion: $v = \dfrac{displacement}{elapsed\,time} = \dfrac{\Delta x}{\Delta t}$

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$v = \dfrac{\Delta x}{\Delta t} \Rightarrow$ the smaller the time for a given Δx, the larger the velocity.

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Let units help you! $\dfrac{100\,m}{20\,m/s} = 5\ (m)\left(\dfrac{s}{m}\right) = 5\,s$

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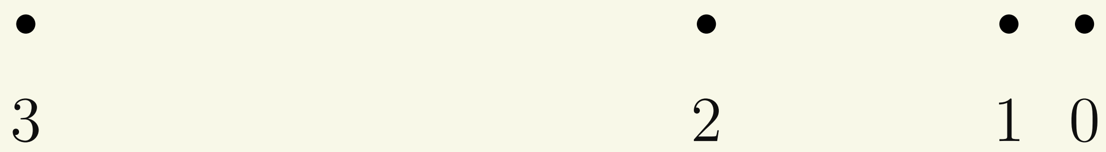

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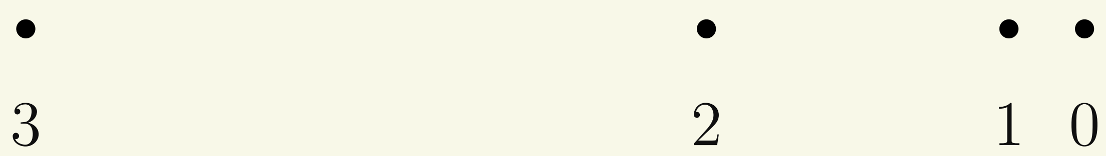

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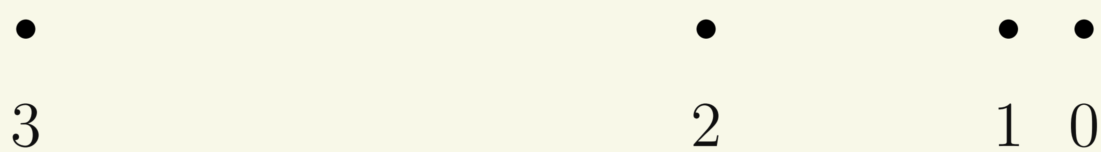

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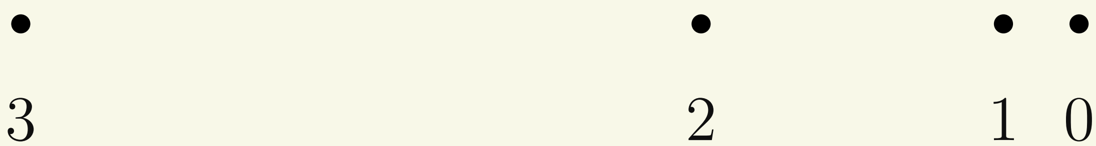

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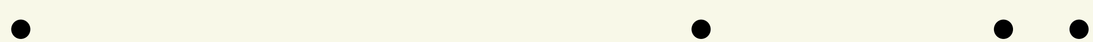

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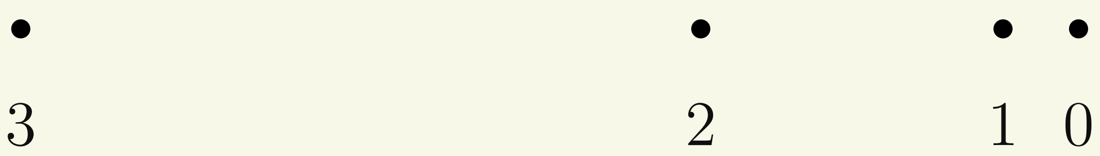

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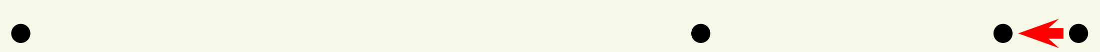

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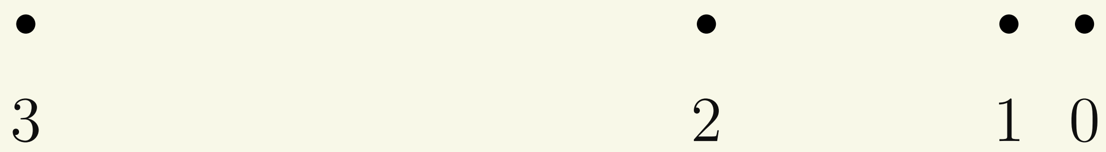

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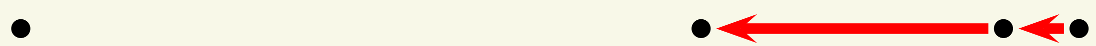

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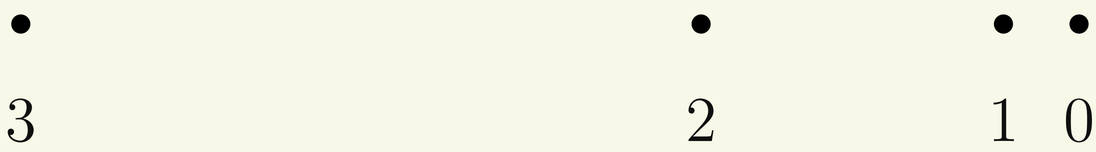

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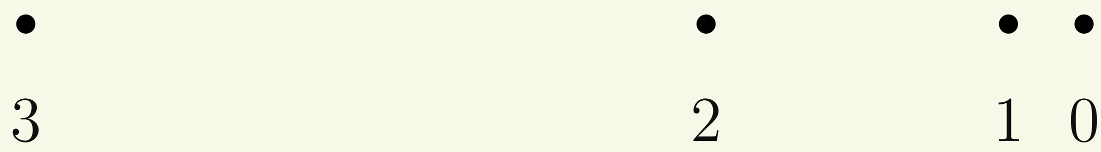

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Increasing arrow length $\Rightarrow$ speeding up

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- kilo (k) $= 1000 = 10^3$

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To make more convenient units, the S. I. system has a uniform system of prefixes that act as multipliers of powers of ten.

- kilo (k) $= 1000 = 10^3$
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- giga (G) $= 10^9$
- tera (T) $= 10^{12}$

S. I. Prefixes

To make more convenient units, the S. I. system has a uniform system of prefixes that act as multipliers of powers of ten.

- centi (c) $= 0.01 = 10^{-2}$

- kilo (k) $= 1000 = 10^3$
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- micro (μ) $= 10^{-6}$
- nano (n) $= 10^{-9}$
- pico (p) $= 10^{-12}$