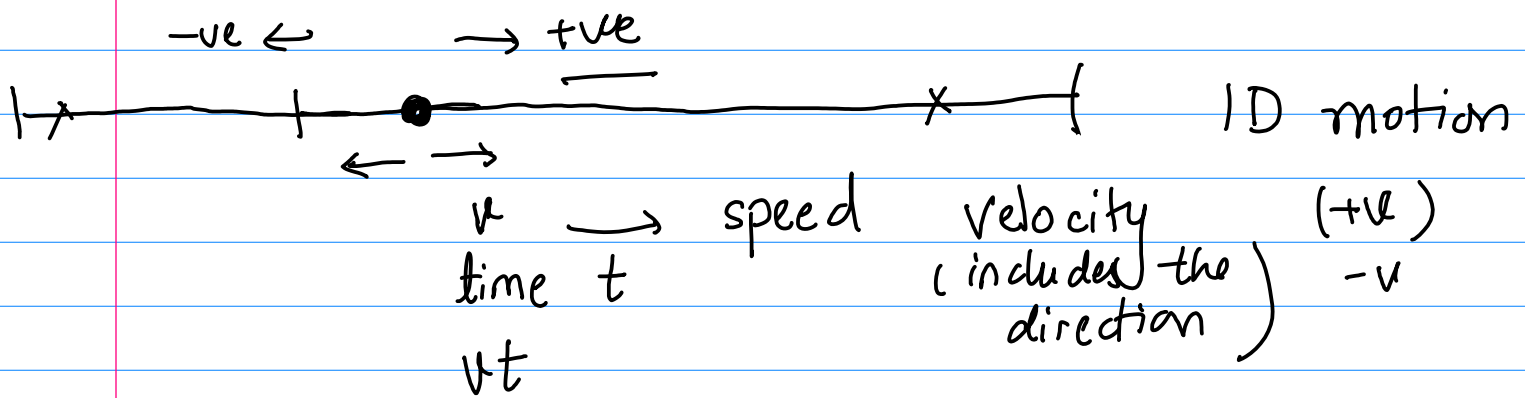
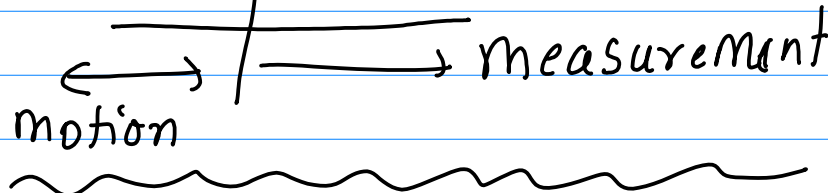
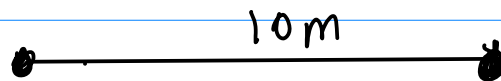


Kinematics



$v = +5 \text{ m/s}$
 $t = 2 \text{ s}$

dist = Speed \times time interval



$5 + 2 \times 0.5$

$v = (5 + 2t) \text{ m/s}$
 $t = 2 \text{ s}$

$\left\{ \begin{array}{l} 5 \text{ m/s} \times 1 \text{ s} \\ 5 \times 0.5 = 2.5 \end{array} \right.$

$d = 1$

t	v	s → distance/displacement
0	5	0
1	7	5
2	9	7

$+s \rightarrow 12 \text{ m}$

$d = 0.5$

t	v	s
0	5	0
0.5	6	2.5
1.0	7	3
1.5	8	3.5
2.0	9	4

13 m

$$v = 5 + 2t$$

$$t = 2.8$$

$d = 0.25$

t	v	s
0	5	0
0.25	5.5	1.25
0.5	6	1.375
0.75	6.5	1.5
1.0	7	1.625
1.25	7.5	1.75
1.5	8	1.875
1.75	8.5	2
2.0	9	2.125

0.1
0.01
...

0.0

15.75 m

better answer

LEIBNIZ / ISAAC NEWTON

$d = 0.5$

t	$v = 5 + 2t$	s
0	5	0
d	$5 + 2d$	$5d$
$2d$	$5 + 2(2d) = 5 + 4d$	$(5 + 2d)d = 5d + 2d^2$
$3d$	$5 + 2(3d) = 5 + 6d$	$(5 + 4d)d = 5d + 4d^2$
$4d$	$5 + 2(4d) = 5 + 8d$	$(5 + 6d)d = 5d + 6d^2$
$5d$	$5 + 2(5d) = 5 + 10d$	$(5 + 8d)d = 5d + 8d^2$
$6d$	$5 + 2(6d) = 5 + 12d$	$(5 + 10d)d = 5d + 10d^2$
		$(5 + 12d)d = 5d + 12d^2$

$$s = 5d + (5d + 2d^2) + (5d + 4d^2) + (5d + 6d^2) + \dots$$

$\left(\frac{2}{\Delta t} \right)$ many times we are creating a table entry.

$$\left(\frac{2}{\Delta t} \right) \rightarrow \frac{2}{0.5} \rightarrow \frac{2}{1/2} = 4$$

$$\left(\frac{2}{\Delta t} \right) \rightarrow \frac{2}{0.25} \rightarrow \frac{2}{1/4} = 8$$

$\left(\frac{T}{\Delta t} \right)$ no. of table entries

$$\begin{aligned}
 1+2+3 &= 6 \\
 3+4 &= 7 \\
 4+5 &= 9 \\
 1+2+3+4 &= 10
 \end{aligned}$$

$$\left(5 \times \frac{T}{\Delta t} \right)$$

$$\left(1+2+3+\dots+n \right) = \frac{n(n+1)}{2}$$

$$1+2+3+4 = 10$$

$$S = 5T$$

$S = \text{speed} \times \text{time}$
 distance

$$\frac{2d^2 + 4d^2 + 6d^2 + 8d^2 + 10d^2 + 12d^2 + \dots}{(T/d) \text{ times}}$$

$$2d^2 + 4d^2 + 6d^2 + 8d^2 + 10d^2 + 12d^2 \dots$$

$$2d^2 (1 + 2 + 3 + 4 + \dots) \left(\frac{T}{d} \right)$$

$\left(\frac{T}{d} \right)$ times

$$2d^2 \times \frac{1}{2} \left(\frac{T}{d} \right) \left(\frac{T}{d} + 1 \right) \times (T) \left(\frac{T}{d} \right)$$

$$S = 5T + \frac{T(T+d)}{2}$$

$$= \frac{5 \times 2}{2} + \frac{2(2+1)}{2}$$

$$= 16$$

$$2d^2 \left(\left(\frac{T}{d} - 1 \right) \left(\frac{T}{d} \right) \right)$$

$$2d^2 \left(\frac{T-d}{T} \right) T$$

speed at time t
initial speed

$$v = u + at$$

$$(v = 5 + 2t)$$

acceleration

$$S = 5T + \frac{T(T-d)}{2}$$

displacement
distance

interval between
frames of
animation

$$S = 5T + \frac{T(T+d)}{2}$$

$$d = 1 \quad T = 2s$$

$$S = 5 \times 2 + \frac{2(2+1)}{2}$$

$$= 12$$

$$d = 0.5 \quad T = 2s$$

$$S = 5 \times 2 + \frac{2(2+0.5)}{2}$$

$$= 12.5$$

$$13$$

$$d = 0.25 \quad T = 2s$$

$$S = 5 \times 2 + \frac{2(2-0.25)}{2}$$

$$= 10 + 2(0.75)$$

$$10 + 3.5$$

$$13.5$$

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

starting speed

amount of time

acceleration

The diagram shows the equation $s = ut + \frac{1}{2}at^2$ enclosed in a blue rectangular box. A blue arrow points from the left towards the box. A blue arrow points from the box towards the text 'drive missile'. Red arrows and labels identify the variables: 'starting speed' points to 'u', 'amount of time' points to 't', and 'acceleration' points to 'a'. A red line connects the 't' and 't^2' terms, and another red line connects the 'a' and 'a^2' terms, illustrating the relationship between the variables and their powers.