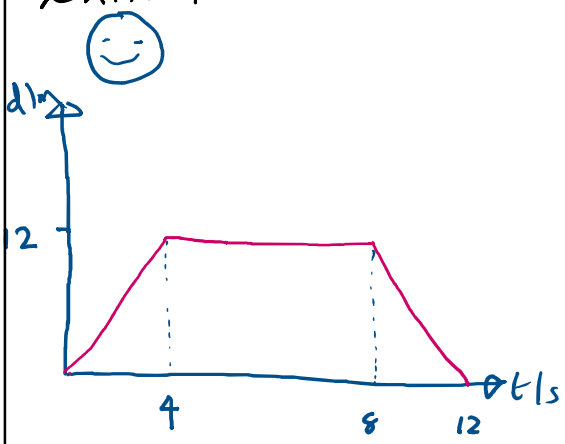
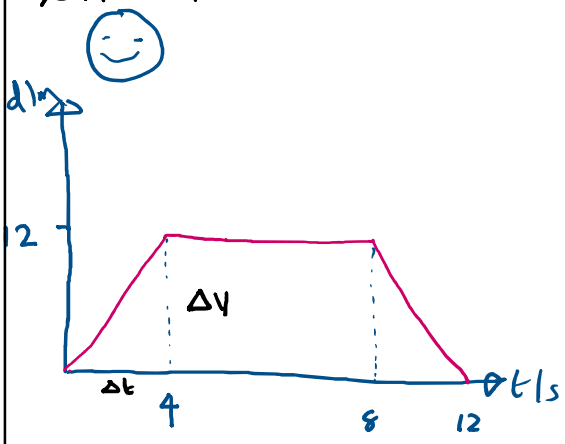
EXAMPLE



41

EXAMPLE

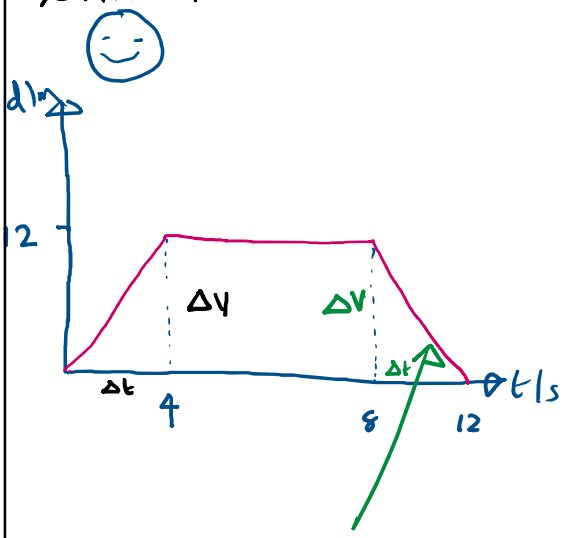


0-4 : $vel = \frac{\Delta y}{\Delta t} = \frac{12}{4} = 3 m/s$

4-8 : $v = \frac{\Delta y}{\Delta t} = \frac{0}{4} = 0$: rest

42

EXAMPLE



0-4 : $vel = \frac{\Delta y}{\Delta t} = \frac{12}{4} = 3\,m/s$

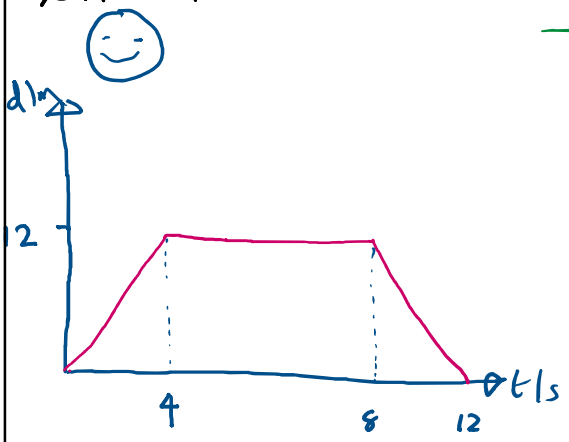
4-8 : $v = \frac{\Delta y}{\Delta t} = \frac{0}{4} = 0$: rest

8-12 : $v = \frac{\Delta y}{\Delta t} = \frac{-12}{4} = -3\,m/s$

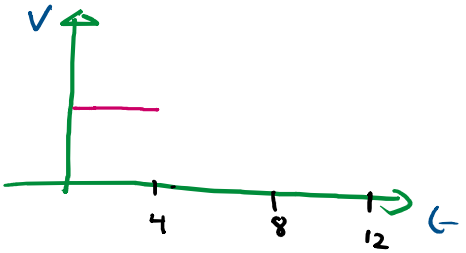
Object comes back to where it started from.

43

EXAMPLE

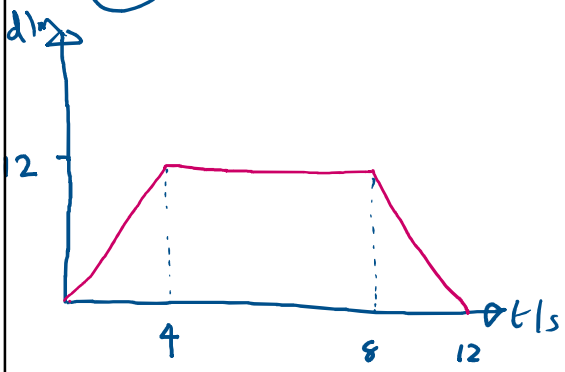


t	0-4	4-8	8-12
v	3	0	-3

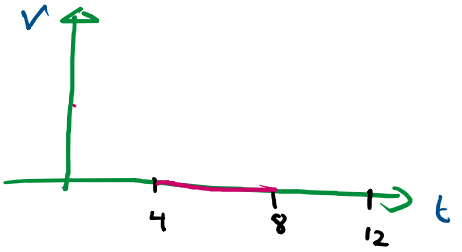


44

EXAMPLE

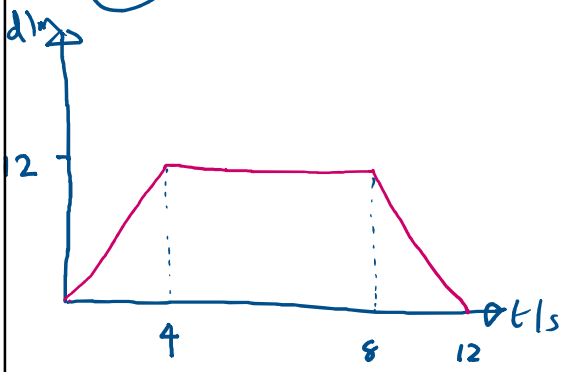


t	0-4	4-8	8-12
v	3	0	-3

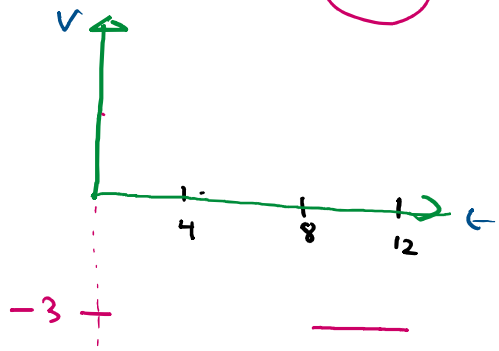


45

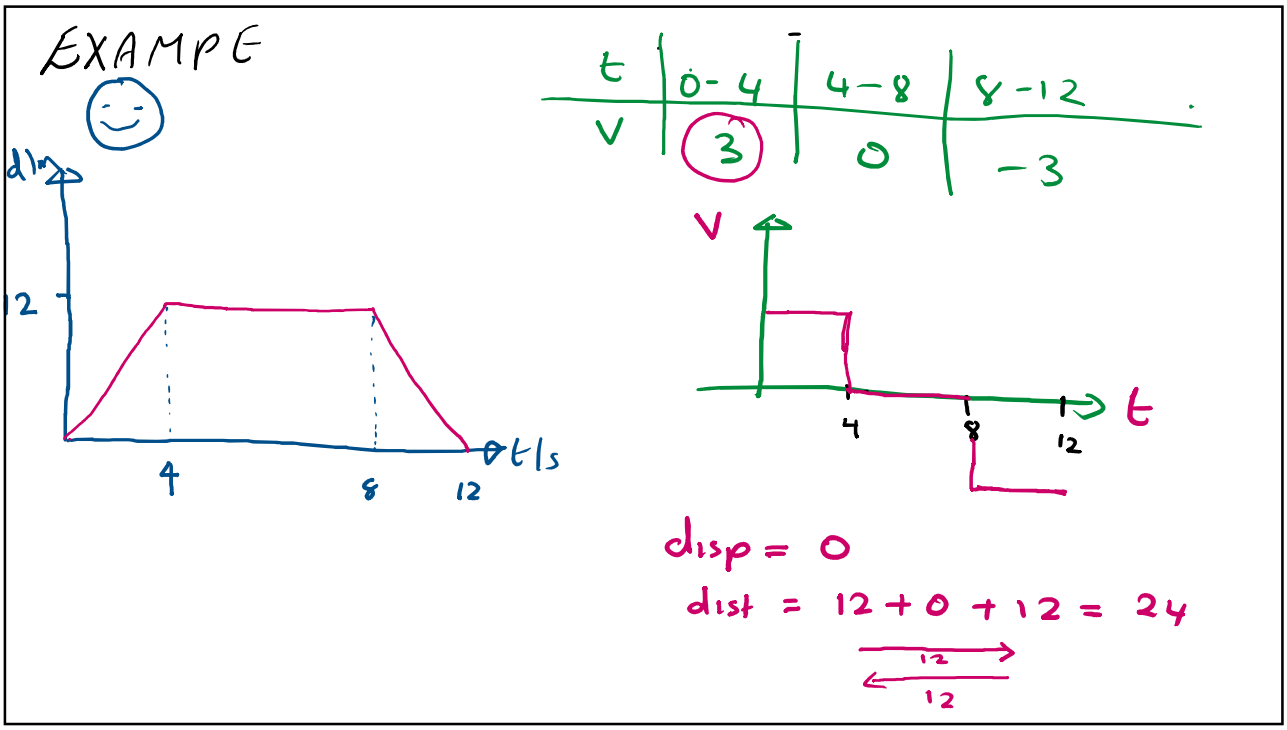
EXAMPLE

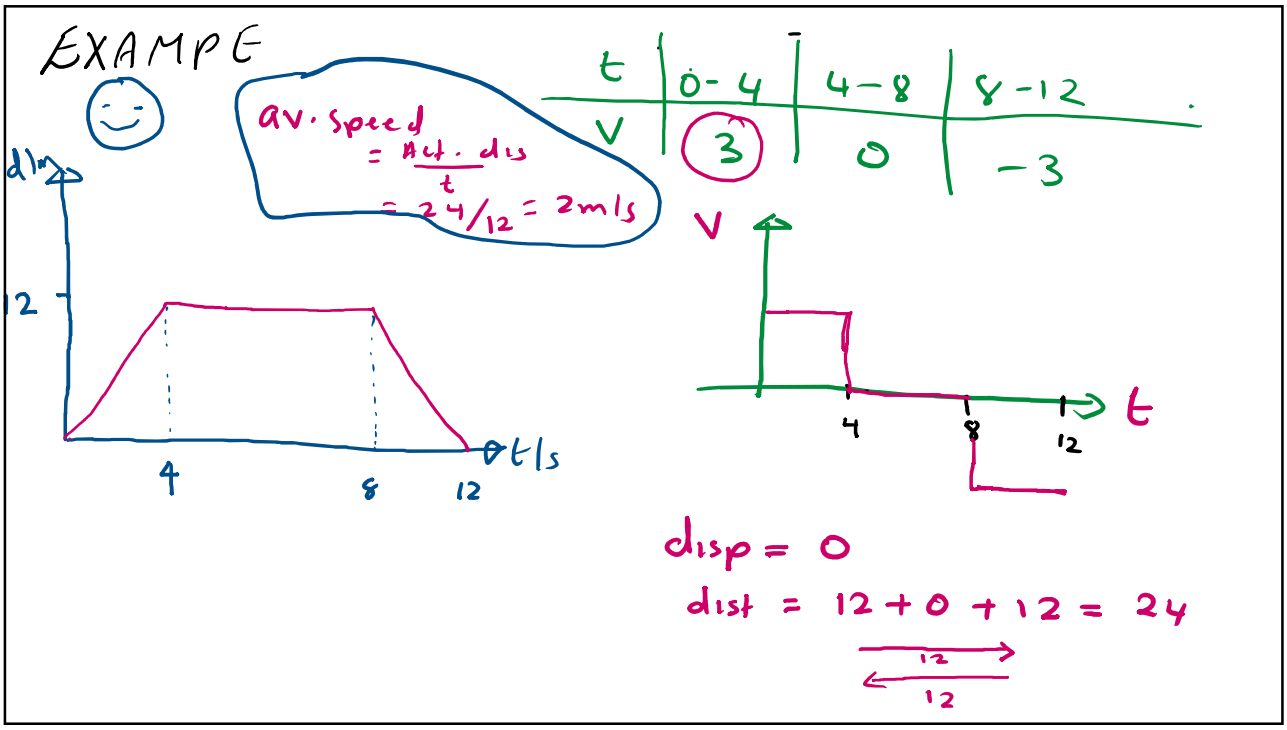


t	0-4	4-8	8-12
v	3	0	-3

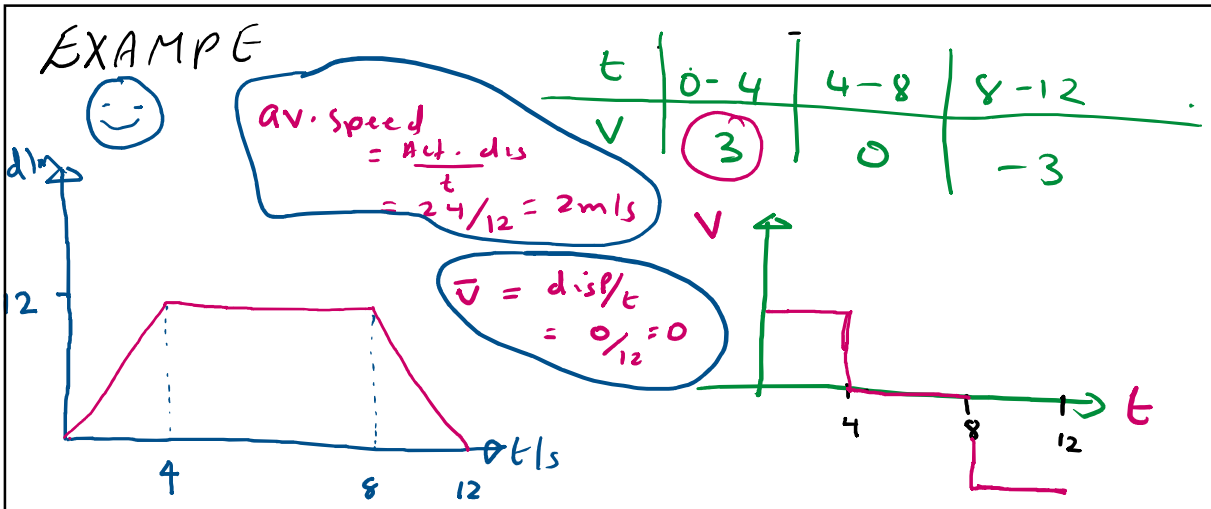


46


EXAMPLE
d/m
12
4
8
12
t/s
t | 0-4 | 4-8 | 8-12
v | 3 | 0 | -3
v
t
4
8
12
disp = 0
dist = 12 + 0 + 12 = 24
12
12


EXAMPLE
av. speed
= tot. dis / t
= 24/12 = 2m/s
d/m
12
4
8
12
t/s
t | 0-4 | 4-8 | 8-12
v | 3 | 0 | -3
v
t
4
8
12
disp = 0
dist = 12 + 0 + 12 = 24
12
12

EXAMPLE



t	0-4	4-8	8-12
v	3	0	-3

disp = 0

dist = 12 + 0 + 12 = 24

12 → ← 12

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Velocity – time graph.

1. Velocity plotted on the vert. axis represents velocity moving away from the start point.
2. Time plotted on the horizontal axis represents time taken since the start.

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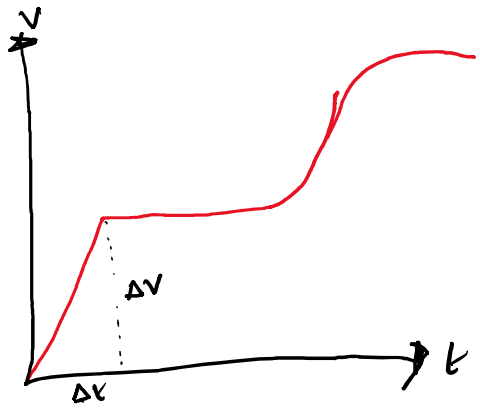

3. Since acc = $\frac{\text{change in vel}}{\text{time}}$

$= \frac{\Delta v}{\Delta t}$

gradient of the v-t graph is acceleration

4. The steeper the slope the larger is the acc.

5. Straight line with constant gradient represents Const. acceleration

6. A curved line represents Changing acc

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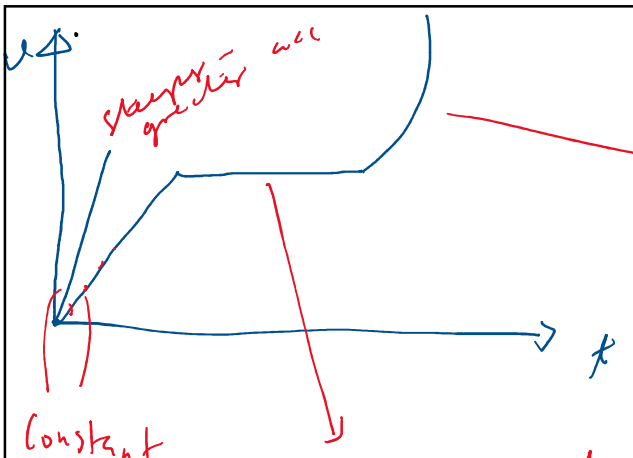

Zero gradient = Zero acc = Constant vel.

Increasing gradient → Increasing acc

$a = \frac{v-u}{t}$

$= \frac{v-v}{t} = 0$

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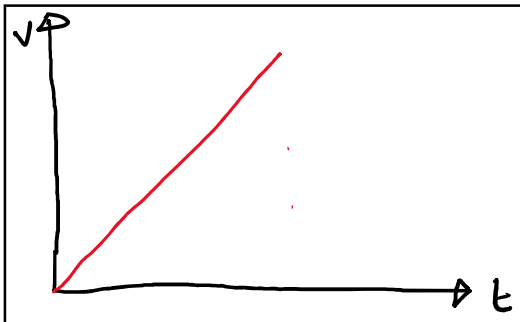
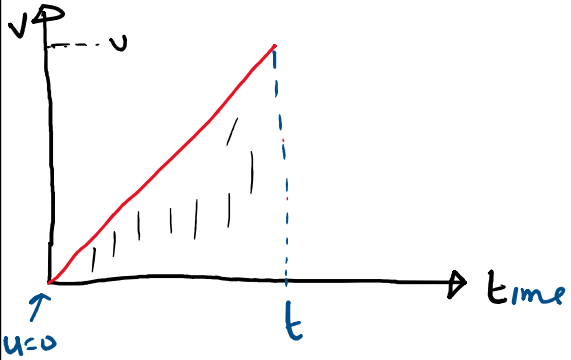


Find the area under the graph.

53

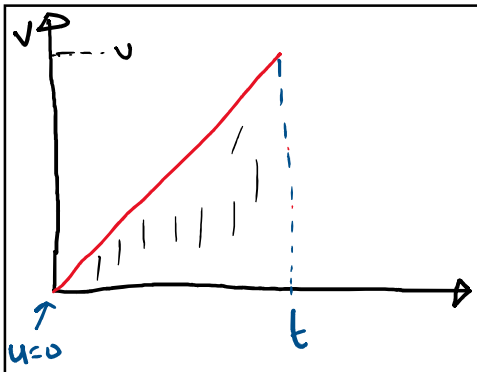


Find the area under the graph.

Area = $\frac{1}{2}$ × base × heig

$= \frac{1}{2} t v$

54



Find the area under the graph.

But $v = u + at$

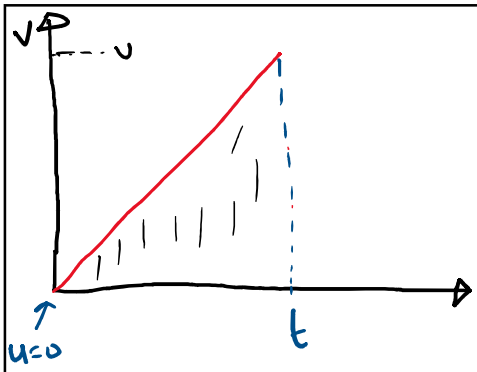
$= 0 + at$

$v = at$

Area $= \frac{1}{2} \times$ base $\times$ heig

$= \frac{1}{2} t v$

55



Find the area under the graph.

But $v = u + at$

$= 0 + at$

$v = at$

Area $= \frac{1}{2} \times$ base $\times$ heig

$= \frac{1}{2} t v$

$A = \frac{1}{2}(t)(at)$

$A = \frac{1}{2} at^2$

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Same as displacement

$$S = ut + \frac{1}{2}at^2$$

$u = 0$

$$S = \frac{1}{2}at^2$$

Area under the v-t graph is displacement

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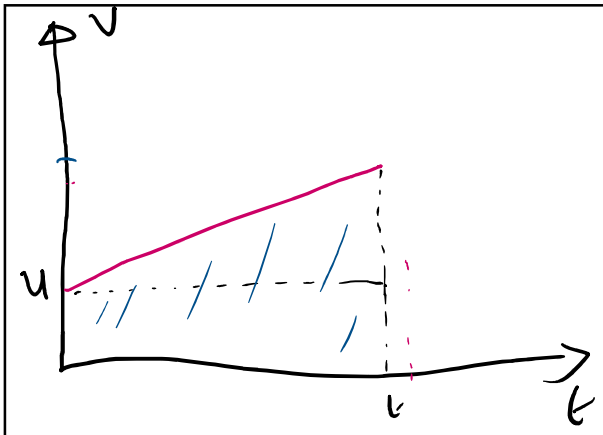

$$\text{Area} = \frac{1}{2}(\text{Sum of } \|) \times h$$

$$= \frac{1}{2}(u+v)\,t$$

$$= \frac{1}{2}ut + \frac{1}{2}vt$$

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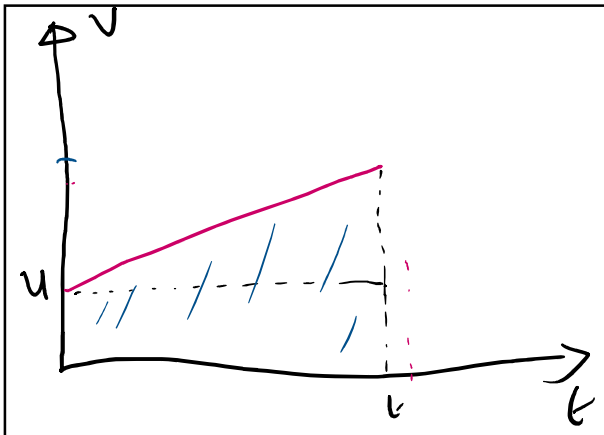


Area $= \frac{1}{2}$ (Sum of ||) $\times h$

$= \frac{1}{2}(u+v)\,t$

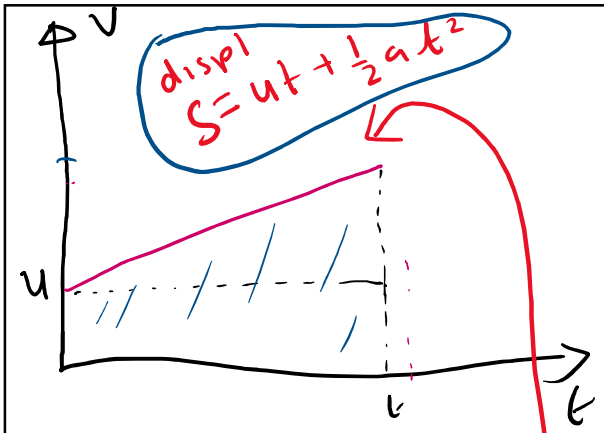
$= \frac{1}{2}ut + \frac{1}{2}vt$

But $v = u + at$

$= \frac{1}{2}ut + \frac{1}{2}(u+at)t$

$= \frac{1}{2}ut + \frac{1}{2}ut + \frac{1}{2}at^2$

$A = ut + \frac{1}{2}at^2$



Area $= \frac{1}{2}$ (Sum of ||) $\times h$

$= \frac{1}{2}(u+v)\,t$

$= \frac{1}{2}ut + \frac{1}{2}vt$

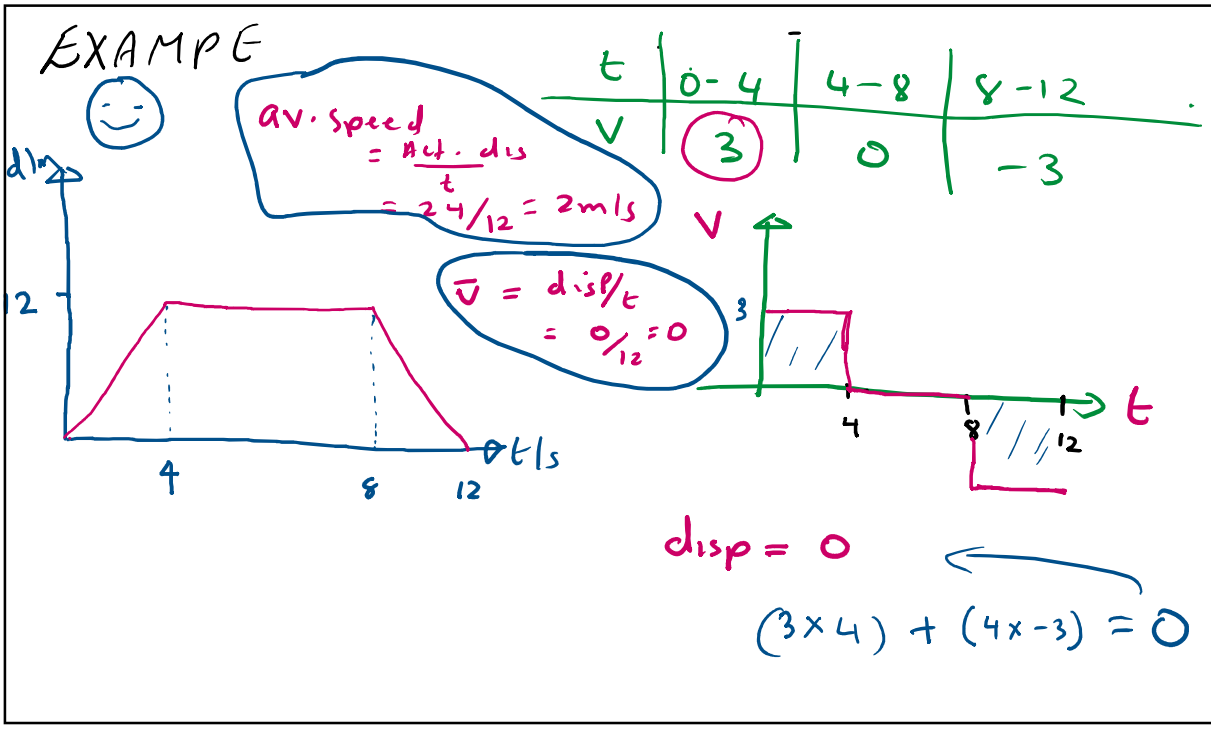
But $v = u + at$

$= \frac{1}{2}ut + \frac{1}{2}(u+at)t$

$= \frac{1}{2}ut + \frac{1}{2}ut + \frac{1}{2}at^2$

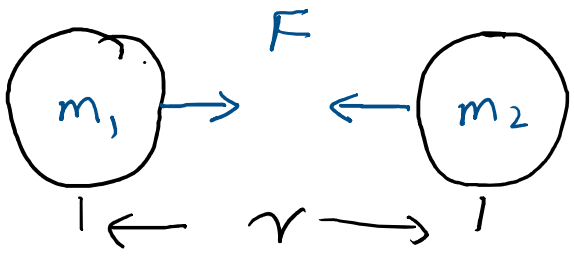
$A = ut + \frac{1}{2}at^2$

EXAMPLE



Free fall – falling under gravity.

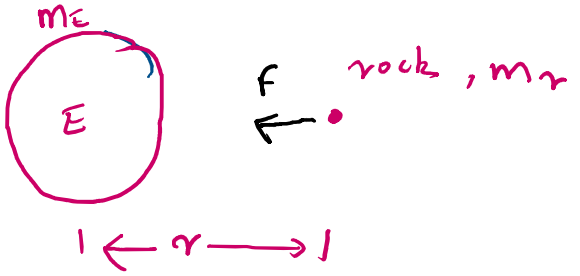
Universal Law of gravitation



$F = G\frac{m_1 m_2}{r^2}$

G = gravitational constant.

– This force is only appreciable when one of the masses or both is/are astronomical.



$$F = \frac{G M_E m_r}{r^2}$$
$$= \text{weight}$$
$$= m_r g$$

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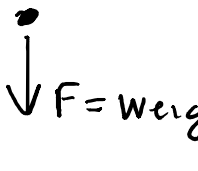
rock



Earth

$$F = ma$$
$$\therefore m_r a = m_r g$$
$$a = g.$$

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