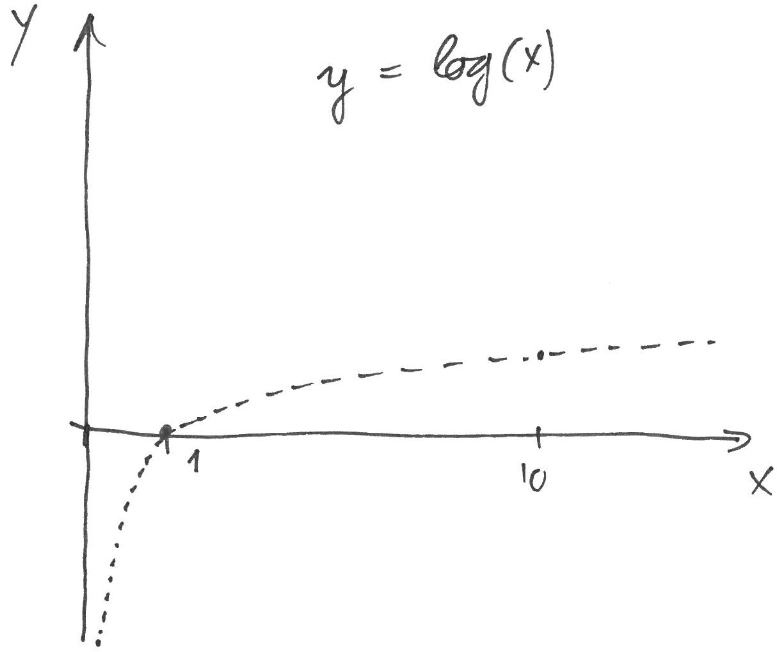
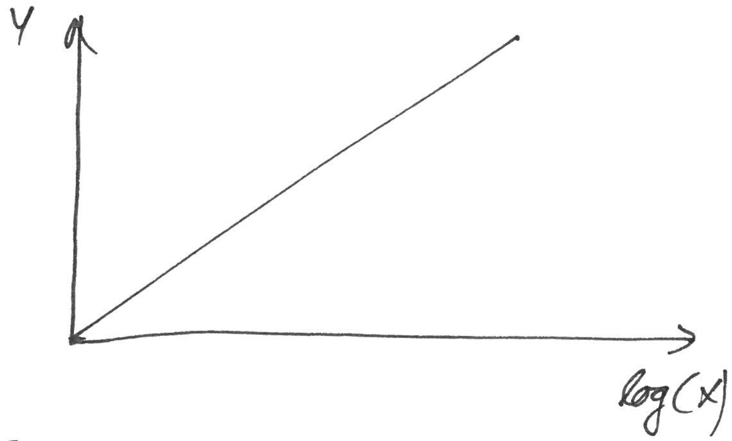
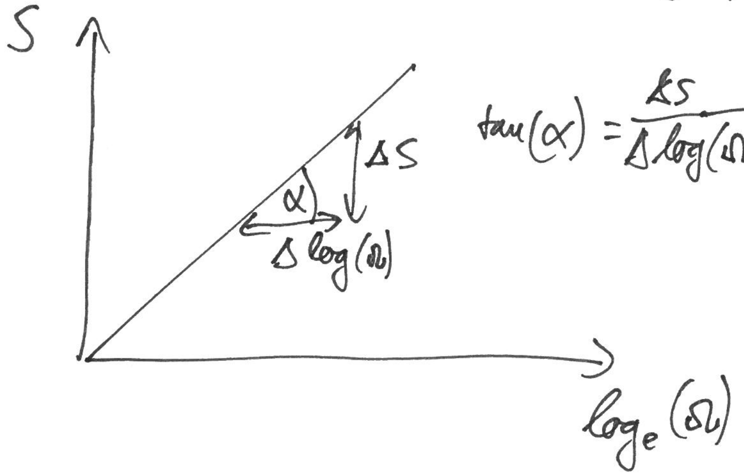
$y = b \cdot \log_a(x)$

$y = \log(x)$



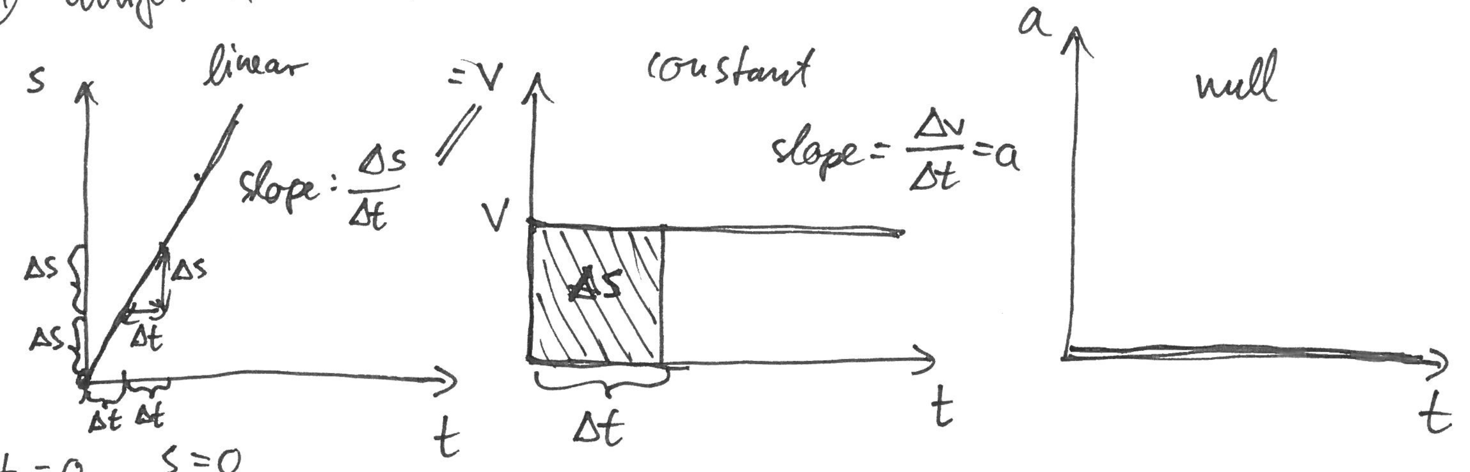




$\tan(\alpha) = \frac{\Delta S}{\Delta \log(\Omega)} = k_B$

rectilinear motions

① uniform rectilinear motion: direction, $|v|$ = constant

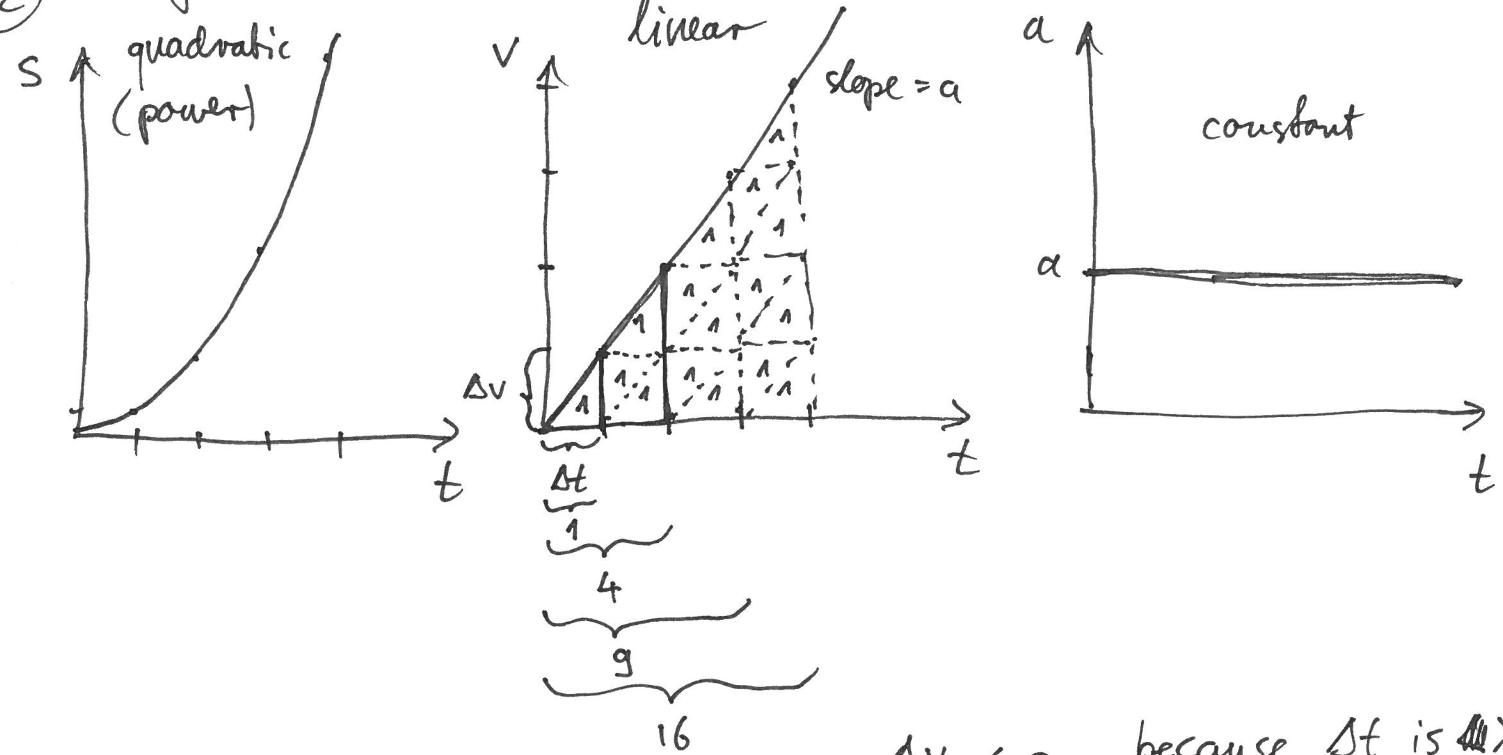


$t = 0 \quad s = 0$

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

$$\Delta s = v \cdot \Delta t$$

② uniform rectilinear acceleration: direction, $|a|$ = constant

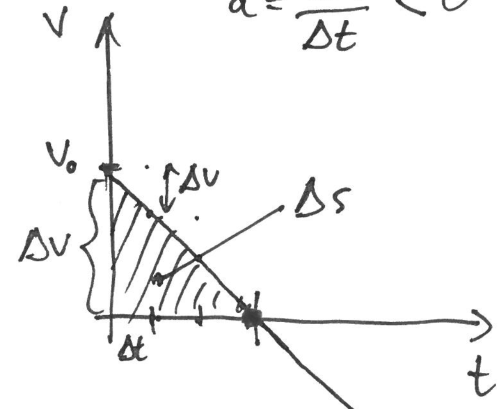


3/5

$a = g < 0$

$v_0 > 0$

$a = \frac{\Delta v}{\Delta t} < 0$ because Δt is > 0, $\Delta v < 0$



3/7 ~~$v_0 = 1361$~~

3/7 $v_0 = 36 \frac{km}{h} = 36 \cdot \frac{1000\ m}{3600\ s} = 10 \frac{m}{s}$

$a = g \cong 10 \frac{m}{s^2}$ $\qquad |\Delta v| = |v_0| = 10 \frac{m}{s}$

a) $a = \frac{\Delta v}{\Delta t} \longrightarrow \Delta t = \frac{\Delta v}{a} = \frac{10 \frac{m}{s}}{10 \frac{m}{s^2}} = \underline{\underline{1\ s}}$

$a \cdot \Delta t = \Delta v$

$\Delta t = \frac{\Delta v}{a}$ $\qquad \frac{\left(\frac{m}{s}\right)}{\left(\frac{m}{s^2}\right)} = \frac{\cancel{m}}{\cancel{s}} \cdot \frac{s^2}{\cancel{m}} = s$

b) $\Delta s = \frac{\Delta v \cdot \Delta t}{2} = \frac{10 \frac{m}{\cancel{s}} \cdot 1 \cancel{s}}{2} = \underline{\underline{5\ m}}$

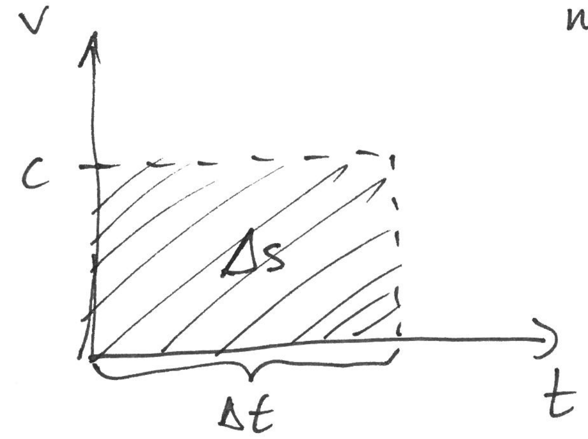
3/4

$\Delta t = 5 s$

$v = c = 330 \frac{m}{s}$

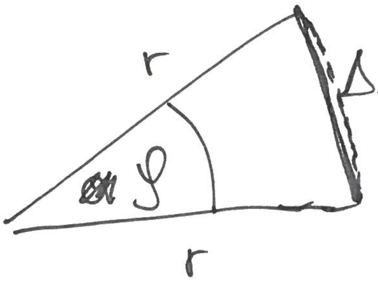
speed of sound or light

constant speed → rectilinear uniform motion

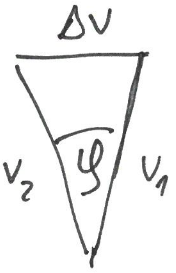


$\Delta s = c \cdot \Delta t = 330 \frac{m}{\cancel{s}} \cdot 5 \cancel{s} = \underline{\underline{1650\ m}}$

uniform circular motion



$\Delta s = v \cdot \Delta t$



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

$$\frac{\Delta s}{r} = \frac{\Delta v}{v}$$

$$\frac{v \cdot \Delta t}{r} = \frac{\Delta v}{v} \qquad // \cdot v$$

$$\frac{v^2 \cdot \Delta t}{r} = \Delta v \qquad // \div \Delta t$$

$$\frac{v^2}{r} = \frac{\Delta v}{\Delta t} = a$$

3/9 $\quad r = 8\,m$ $\qquad\qquad$ suppose uniform c. m.

$\Delta t = 3.5\,min = 210\,s$

$N = 20$

a) $T = \frac{210\,s}{20} = \underline{\underline{10.5\,s}}$

b) $f = \frac{1}{T} = \frac{20}{210\,s} = \frac{1}{10.5\,s} = 0.09524\,\frac{1}{s} = \underline{\underline{0.09524\,Hz}}$

c) $\omega = \frac{\Delta\varphi}{\Delta t} = \frac{\frac{\Delta s}{r}}{\Delta t} = \frac{\Delta s}{r \cdot \Delta t} = \frac{v}{r}$

$$\omega = \frac{\Delta\varphi}{\Delta t} = \frac{2\pi\,rad}{T} = 2\pi\,rad \cdot f$$

use a whole rev.

$$= \frac{2\pi\,rad}{10.5\,s} = 0.5984\,\frac{rad}{s} = 0.5984\,\frac{1}{s}$$

d) $v = \omega \cdot r = 0.5984 \frac{1}{s} \cdot 8\,m = 4.787 \frac{m}{s}$

$\boxed{\text{transposition}}$

1/c $\quad qU = h \cdot \frac{c}{\lambda_{min}} = \frac{h \cdot c}{\lambda_{min}} \quad // \cdot \lambda_{min}$

$$q \cdot U \cdot \lambda_{min} = h \cdot c \quad // \div (q \cdot U)$$

$$\lambda_{min} = \frac{h \cdot c}{q \cdot U} = h \cdot \frac{c}{q \cdot U} = h \cdot c \cdot \frac{1}{q \cdot U} = h \cdot c \cdot \frac{1}{q} \cdot \frac{1}{U}$$

1/g $\quad \frac{1}{2} m \cdot v^2 = \frac{3}{2} \cdot k T \quad // \cdot 2$

$$m \cdot v^2 = 3 \cdot k \cdot T \quad // \div (3 \cdot k)$$

$$\frac{m \cdot v^2}{3 \cdot k} = T = \frac{m \cdot v \cdot v}{3} \cdot \frac{1}{k} = m \cdot \frac{v^2}{k} \cdot \frac{1}{3}$$

$$\frac{\left(\frac{a}{b}\right)}{c} = \frac{a}{b \cdot c} \qquad \frac{a}{\left(\frac{b}{c}\right)} = a \cdot \frac{c}{b} = \frac{a \cdot c}{b}$$

2/e $\quad \frac{1}{2} m v^2 = \frac{3}{2} \cdot k T \quad // \cdot 2$

$$m v^2 = 3\, k\, T \quad // \div m$$

$$v^2 = \frac{3\, k\, T}{m} \quad // \sqrt{\ }$$

$$v = \sqrt{\frac{3\, k \cdot T}{m}}$$

2/i

$$f_0 = \frac{1}{2\pi} \cdot \sqrt{\frac{k}{m}} \qquad // \cdot (2\pi)$$

$$f_0 \cdot 2\pi = \sqrt{\frac{k}{m}} \qquad // (\;)^2$$

$$(f_0 \cdot 2\pi)^2 = \frac{k}{m} \qquad / \cdot m$$

$$(f_0 \cdot 2\pi)^2 \cdot m = k$$

2/i'

$$f_0 = \frac{1}{2\pi} \cdot \sqrt{\frac{k}{m}}$$

$$\vdots$$

$$(f_0 \cdot 2\pi)^2 = \frac{k}{m} \qquad // \cdot m$$

$$(f_0 \cdot 2\pi)^2 \cdot m = k \qquad // \div (f_0 \cdot 2\pi)^2$$

$$m = \frac{k}{(f_0 \cdot 2\pi)^2}$$

4/a

$$J = J_0 \cdot e^{-\mu x} \qquad // \div J_0$$

$$\frac{J}{J_0} = e^{-\mu x} \qquad // \ln(\;)$$

$$\ln\left(\frac{J}{J_0}\right) = \ln\left(e^{-\mu x}\right) = -\mu x \cdot \overbrace{\ln(e)}^{1} = -\mu x \cdot \qquad // \div (-\mu)$$

$$\frac{\ln\left(\frac{J}{J_0}\right)}{-\mu} = x$$