51.

1. $\dim(T) = T$

$\dim(g) = \dim(\text{acceleration}) = LT^{-2}$

$\dim(R) = L$

d) ger $\dim\left(2\pi\sqrt{\frac{R}{g}}\right) = \sqrt{\frac{L}{LT^{-2}}} = T$

d) Kan stämma.

6. Dimensionen för frekvens är $\frac{1}{T}$.

Ansätter $f = c \cdot l^x \cdot \rho^y \cdot S^z$

$\frac{1}{T} = c \cdot L^x \cdot \left(\frac{M}{L}\right)^y \cdot (MLT^{-2})^z$

$\Rightarrow z = 1/2$

$y = -1/2$

$x = -1$

$\Rightarrow f = \frac{c}{l} \cdot \sqrt{\frac{S}{\rho}}, \quad \dim(c) = 1$

8. $E = \frac{\text{energi}}{\text{massa}} = \frac{\cancel{M}L^2T^{-2}}{\cancel{M}} = L^2T^{-2}$

$u = \frac{\text{sträcka}}{\text{tid}} = LT^{-1}$

$q = \frac{\text{massa}}{\text{tid}} = MT^{-1}$

$g = \frac{\text{hastighet}}{\text{tid}} = LT^{-2}$

$\eta = 1$

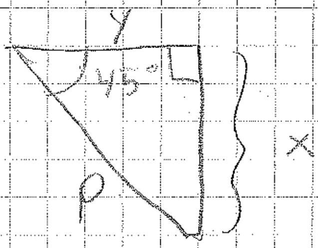
$\left(\frac{L^2}{T^2}\right)^x \cdot \left(\frac{L}{T}\right)^y \cdot \left(\frac{M}{T}\right)^z \cdot \left(\frac{L}{T^2}\right)^w = 1$

$z = 0$

S1.8 (Fortsättning)

$$\begin{cases} 2x + y + w = 0 \\ 2x + y + 2w = 0 \end{cases} \Rightarrow w = 0$$

$$\left(\begin{cases} 2x + y = 0 \\ x = 1 \\ y = -2 \end{cases} \right)$$



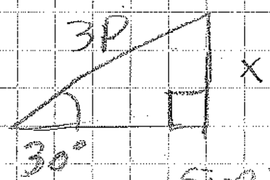
$\sin 45° = \frac{x}{\rho}$

$\rho \cdot \frac{1}{\sqrt{2}}$

Svaret blir att η beror som funktion av $\frac{E}{u^2}$

$\Rightarrow \eta = f\left(\frac{E}{u^2}\right)$, $\frac{E}{u^2}$ har dimension 1.

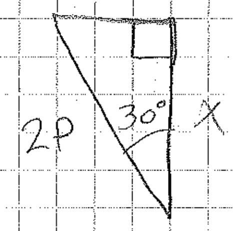
S.2

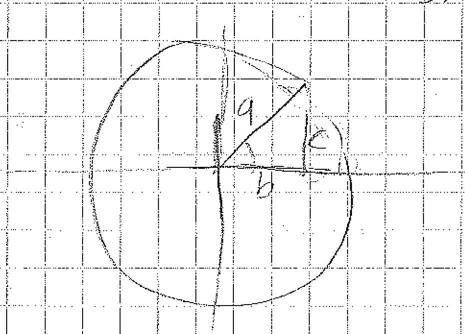


$\sin 30° = \frac{x}{3P}$

5. $\underline{2P:}$

e_y-komponent blir:





$\bar{e}_y: \ 2P \cdot \frac{\sqrt{3}}{2} = \sqrt{3}P$

$\bar{e}_x: \ -2P \cdot \frac{1}{2} = -P$

$\Rightarrow 2P: \ P(-\bar{e}_x, \sqrt{3}\,\bar{e}_y)$

$\cos x = \frac{b}{a}$

$\sin x = \frac{c}{a}$

$\underline{P:}$

$\frac{P}{\sqrt{2}}(\bar{e}_x, -\bar{e}_y)$

3P:

$3P \cdot \frac{\sqrt{3}}{2}\bar{e}_x + \frac{3P}{2}\bar{e}_y$

Summan blir: $\left(\left(\frac{P}{\sqrt{2}} + \frac{3P\sqrt{3}}{2} - P\right)\bar{e}_x, \left(\frac{3P}{2} + \sqrt{3}P - \frac{P}{\sqrt{2}}\right)\bar{e}_y\right)$

Kraftresultanten går genom origo med summans värde.