Bac 2019 Fysik

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June 4, 2020

Del A

a) $\frac{T^2}{r^3}$

Planet b: $m = 1.02 * jordmassan$
$r = 1.73 * 10^6 Km$
$T = 1.51d$

$\frac{1.51^2}{1.73^3} = 0.44$

Planet c: $m = 1.16 * jordmassan$
$r = 2.37 * 10^6 Km$
$T = 2.42d$

$\frac{2.42^2}{2.37^3} = 0.44$

b) Planet e: $m = 0.77$
$r = 4.38 * 10^9\ m$
$T = 6.10$
$T = 6.10\ d = (6.10 * 24 * 60 * 60)s = 527040s$
$O = 2\pi r$
$v_e = \frac{O}{T} = \frac{2\pi 4.58 * 10^9}{527040} = 52216,8\ m/s\ \approx\ 5.2 * 10^4\ m/s$

c) $\frac{T^2}{r^3} = 0.44$
$\frac{v_1}{v_2} = \frac{\frac{2\pi r_1}{T_1}}{\frac{2\pi r_2}{T_2}}\ \rightarrow\ \frac{r_1}{T_1} * \frac{T_2}{r_2}$
$\frac{v_1}{v_2} = \sqrt{\frac{r_2}{r_1}}$
$\frac{r_1}{T_1} * \frac{T_2}{r_2} = \sqrt{\frac{r_2}{r_1}}$

Kvadrering:
$\frac{r_1^2}{T_1^2} * \frac{T_2^2}{r_2^2} = \frac{r_2}{r_1} \qquad | * r_1\ \ |/r_2$
$\frac{r_1^3}{T_1^2} * \frac{T_2^2}{r_2^3} = 1\ \rightarrow\ \frac{r^3}{T^2} * \frac{T^2}{r^3}$