Külling & Noverraz, Gravitation
Corrigés

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GU01

a) $F = \frac{G \cdot m_1 \cdot m_2}{d^2} = \frac{6{,}67259 \cdot 10^{-11} \cdot 60 \cdot 80}{0.5^2} = \underline{\underline{1.281 \cdot 10^{-6}\ N}}$

b) $\frac{1 \cdot 10^{-3}}{1.281 \cdot 10^{-6}} = 781$ fois plus petite

GU04

$$F = \frac{6.67259 \cdot 10^{-11} \cdot 5 \cdot 5.97 \cdot 10^{24}}{\left(\frac{12'740 \cdot 10^3}{2}\right)^2} = \underline{\underline{49.1\ N}}$$

GU05

1) $$\frac{6.67259 \cdot 10^{-11} \cdot 65 \cdot 5.97 \cdot 10^{24}}{\left(\frac{12'800 \cdot 10^3}{2}\right)^2} = \underline{\underline{632.2\ N}}$$

2) $$\frac{6.67259 \cdot 10^{-11} \cdot 65 \cdot 0.073 \cdot 10^{24}}{\left(\frac{3500 \cdot 10^3}{2}\right)^2} = \underline{\underline{103.4\ N}}$$

3) $\dfrac{6.67259 \cdot 10^{-11} \cdot 65 \cdot 0.642 \cdot 10^{24}}{\left(\dfrac{6800 \cdot 10^3}{2}\right)^2} = \underline{\underline{240.9\ N}}$

4) $\dfrac{6.67259 \cdot 10^{-11} \cdot 65 \cdot 1900 \cdot 10^{24}}{\left(\dfrac{142\,600 \cdot 10^3}{2}\right)^2} = \underline{\underline{1621\ N}}$

GU09

$g = \dfrac{G \cdot m}{r^2}$

1) $g = \dfrac{6,67259 \cdot 10^{-11} \cdot 5.97 \cdot 10^{24}}{(6370 \cdot 10^3)^2} = 9.817\ N \cdot kg^{-1}$

2) $g = \dfrac{6.67259 \cdot 10^{-11} \cdot 5.97 \cdot 10^{24}}{((6370+2) \cdot 10^3)^2} = 9,811\ N \cdot kg^{-1}$

3) $g = \dfrac{6.67259 \cdot 10^{-11} \cdot 5.97 \cdot 10^{24}}{((6370+5) \cdot 10^3)^2} = 9.862\ N \cdot kg^{-1}$

4) $g = \dfrac{6.67259 \cdot 10^{-11} \cdot 5.97 \cdot 10^{24}}{((6370+9) \cdot 10^3)^2} = 9.790\ N \cdot kg^{-1}$

5) $g = \dfrac{6.67259 \cdot 10^{-11} \cdot 5.97 \cdot 10^{24}}{((6370+11)\cdot 10^3)^2} = 9.783\ N \cdot kg^{-1}$

6) $g = \dfrac{6.67259 \cdot 10^{-11} \cdot 5.97 \cdot 10^{24}}{((6370+30)\cdot 10^3)^2} = 9.725\ N \cdot kg^{-1}$

7) $g = \dfrac{6.67259 \cdot 10^{-11} \cdot 5.97 \cdot 10^{24}}{((6370+200)\cdot 10^3)^2} = 9,229\ N \cdot kg^{-1}$

8) $g = \dfrac{6.67259 \cdot 10^{-11} \cdot 5.97 \cdot 10^{24}}{((6370+36000)\cdot 10^3)^2} = 0,221\ N \cdot kg^{-1}$

GU10 50 kg, la masse ne varie pas

GU14

1) $g = \dfrac{G \cdot M_{mars}}{r_{mars}^2} = \dfrac{6.67259 \cdot 10^{-11} \cdot 0.642 \cdot 10^{24}}{\left(\frac{6800 \cdot 10^3}{2}\right)^2} =$

$= 3.706\ N \cdot kg^{-1}$

2. $P = m \cdot g = 80 \cdot 3.706 = 296.5\ N$

GU15

1) $P = 1 \cdot 9.81 = 9,81\ N$

$F = k \cdot \Delta l \Rightarrow k = \dfrac{F}{\Delta l} = \dfrac{9.81}{8 \cdot 10^{-2}} = 122.6\ N \cdot m^{-1}$

2) oui

GU16

$P_{Terre} = 0.2 \cdot 9.81 = 1.962\ N$

$F = k \cdot \Delta l \Rightarrow k = \frac{F}{\Delta l} = \frac{1.962}{90 \cdot 10^{-3}} = 21.8\ N \cdot m^{-1}$

$P_{Lune} = 0.2 \cdot 1.62 = 0.324\ N$

$\Delta l = \frac{F}{k} = \frac{0.324}{21.8} = 1.486 \cdot 10^{-2}\ m = \underline{1.486\ cm}$

GU17

$P = 5 \cdot 1.62 = 8.1\ N$

$\Delta l = \frac{F}{k} = \frac{8.1}{50} = 0.162\ m = \underline{16.2\ cm}$