Homework

① $F = 100 \cos 30 = 86.6\ N = \frac{100 \times \sqrt{3}}{2}$

$a = \frac{F}{m} = \frac{86.6}{40} = 2.17\ m/s^2 = \frac{\sqrt{100}}{20} = \frac{\sqrt{5}}{4}\ m/s^2$.

② (a) Yes.

(b) ~~Cont~~ Long-range force.

(c) $\vec{r} = x\vec{i} + y\vec{j} = a \sin \omega t\, \vec{i} + b \cos \omega t\, \vec{j}$

Differentiating twice w.r.t. time,

$\vec{\omega} = \frac{d^2\vec{r}}{dt^2} = -\omega^2 (a \sin \omega t\, \vec{i} + b \cos \omega t\, \vec{j})$

$= -\omega^2 \vec{r}$ (1)

Thus, $\vec{F} = m\vec{\omega} = -m\omega^2 r$.

③ 177.5 N.

① weight.

② 9.8 m/s.