1) Three equal 2 kg masses are located on three corners of a square of side lenght 4 m. In terms of G, find the magnitude of the force exerted on 1kg of mass located at the center of the square.

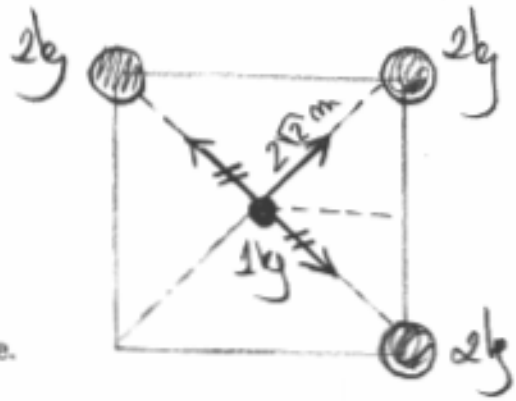
a) 1.2 G (N)

b) 0.44 G (N)

c) 0.84 G (N)

d) 0.25 G (N)

e) None of the above.



$$F = G\frac{(2kg)(1kg)}{(2\sqrt{2}m)^2} = G/4 = 0.25\,G$$

We throw a 1 kg object with upward speed of 12 km/s from Earth's surface. Neglecting air friction:

2) In terms of Earth's radius R_E, the maximum distance **from Earth's surface** reached by this object is:

a) R_E

b) $2.3R_E$

c) $5.6R_E$

d) $10R_E$

e) None of the above.

$12\,km/s > 11.2\,km/s = v_e$

$\rightarrow$ it reaches infinity!

3) The speed of this object far far away from the Earth's surface is:

a) 2.5 km/s

b) 6.3 km/s

c) 4.3 km/s

d) 7.4 km/s

e) None of the above.

Using ENERGY CONSERVATION:

$$\frac{1}{2}m v_0^2 - \frac{GM_E m}{R_E} = \frac{1}{2}m v_f^2$$

$$\rightarrow v_f^2 = v_0^2 - \frac{2GM_E}{R_E} = v_0^2 - v_e^2 = (12\,km/s)^2 - (11.2\,km/s)^2$$

$$\rightarrow v_f = 4.3\,km/s$$

4) The potential energy of this object on Earth's surface is:

a) -8.9×10^7 J

b) -6.3×10^7 J

c) -4.2×10^7 J

d) -1.3×10^7 J

e) None of the above.

$$U = -\frac{GM_E(1kg)}{R} = -6.3\times10^7\,J$$

5) The potential energy of this object far far from Earth's surface is about: