

6. An object is moving at constant speed in a circular path. Which of the following statements is true regarding the net force on the object?

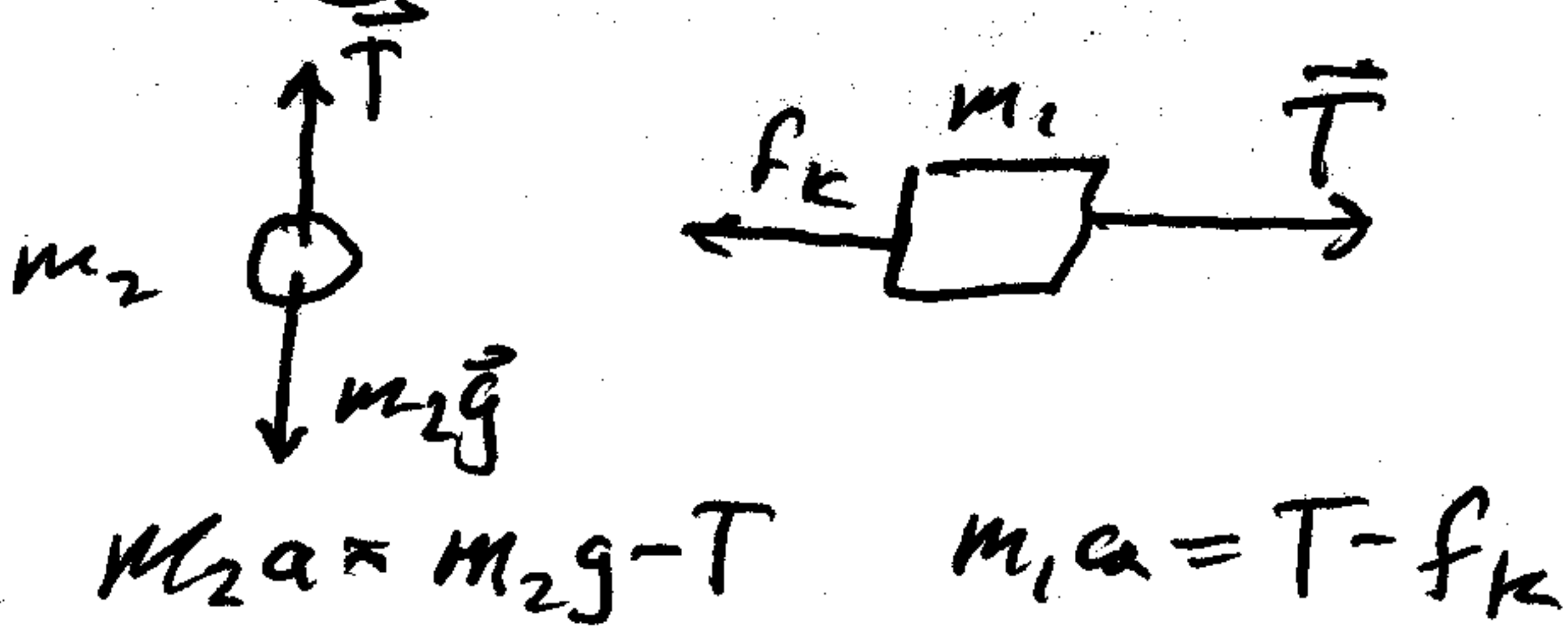
- a) it is in the direction the object is moving at all times
- b) it opposite to the direction the object is moving at all times
- c) a single force must be acting on it, pointing towards the center of the path
- d) The sum of all forces acting on it points towards the center of the path
- e) there are no forces acting on it, it is natural for it to move this way

77%

7. In the figure on the right, $M_1 = 5.0$ kg and $M_2 = 4.0$ kg. The coefficient of sliding friction between M_1 and the horizontal surface is 0.35. If M_2 is released from rest and the system of masses moves, what is the acceleration of the masses, in m/s^2 ?

- a) 1.9 b) 2.5 c) 4.4 d) 5.5 e) 9.8

49%

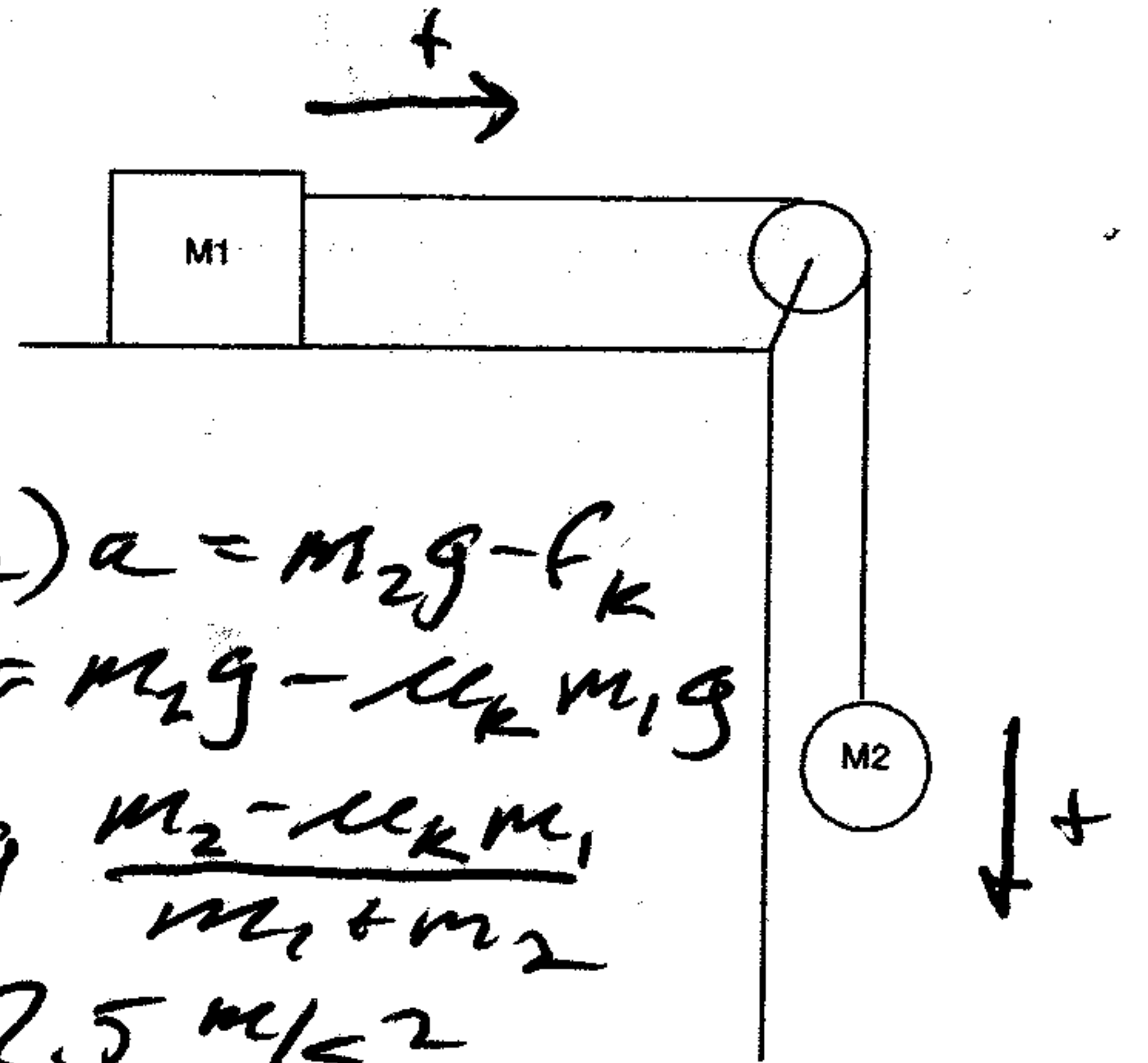


$$(m_1 + m_2) a = m_2 g - f_k$$

$$= m_2 g - \mu_k m_1 g$$

$$a = g \frac{m_2 - \mu_k m_1}{m_1 + m_2}$$

$$= 2.5 m/s^2$$



8. A car moving at high speed encounters a hill in the road and goes over it at a speed of 45 m/s. If the 80 kg driver's apparent weight becomes zero at the top of the hill, what is the radius of curvature of the hill at that point, in m?

- a) 35 b) 1700 c) 22000 d) 340 e) 210

79%

IF $N=0$ $m_2 g = \frac{m v^2}{r}$

$$\text{so } r = \frac{v^2}{g} = 210 m$$

9. A 5.0 kg block is held against a vertical wall with a horizontal applied force pushing on the block, directed perpendicular to the wall. What is the minimum applied force (in N) required to keep the block from sliding downwards if the coefficient of static friction is 0.65?

- a) 0 b) 14 c) 25 d) 32 e) 4.9

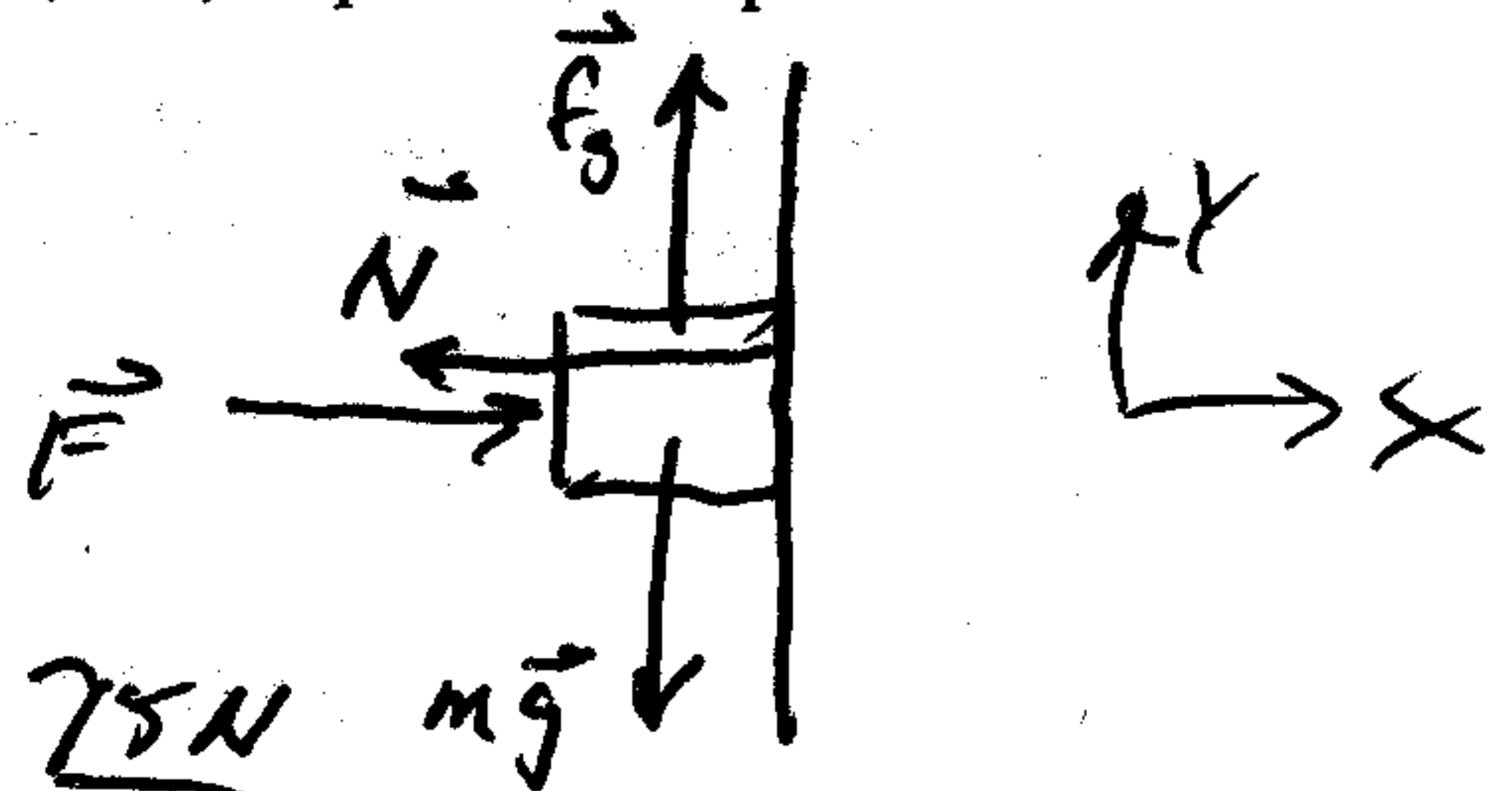
48%

$x: N = F$

minimum F when $f_s = f_{s, \max}$

$y: mg = f_{s, \max} = \mu_s N = \mu_s F$

$F = \frac{mg}{\mu_s} = 75 N$



10. A skydiver is falling at a terminal velocity that he/she/it finds to be too large and scary. If they want to reduce their terminal velocity as much as possible (without opening their parachute, which they tragically lost while jumping out of the plane), they should

- a) orient themselves vertically and flap their arms violently to gain downward thrust
- b) orient themselves vertically to decrease their effective area and hold still
- c) orient themselves horizontally, face down, and extend their arms and legs to increase their effective area
- d) orient themselves horizontally, but rotate about the long axis of their body, using their spin to slow them

96%

11. An object with a speed of 10 m/s has a kinetic energy of 10 J. If the same object has a speed of 20 m/s, its kinetic energy is, in J,

- a) 2.5 b) 5.0 c) 10.0 d) 20 e) 40

83%

$K = \frac{1}{2} m v^2$

$v' = 2v$

$K' = (2)^2 K = 4K$

12. A 5.0 kg object is pulled along a rough ramp (which is angled with respect to horizontal) by an external force. Out of the forces acting on the object, which does no work?

- a) gravity b) the normal force c) the external force d) kinetic friction

69%

$\vec{N} \perp \vec{d}$ (displacement)

so $\vec{N} \cdot \vec{d} = 0$