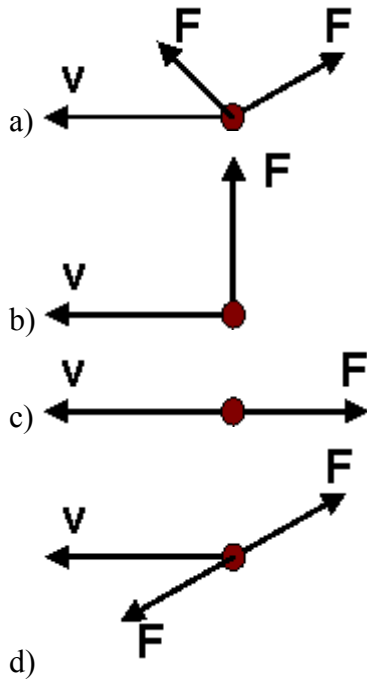


Dynamics

1. A particle is moving with a constant velocity, v . One or two forces are applied to the particle, as shown in the figures below. In which of the cases below, the forces applied do not change the speed of the particle?



2. An object of mass $m = 20\text{kg}$ is pushed by four forces: east by a 10N force, west by a 30N force, south by a 20N force and north by a 20N force, What is the magnitude of the acceleration of the object?
- a) $.5\text{m/s}^2$
 - b) 1m/s^2
 - c) 2m/s^2
 - d) 10m/s^2
 - e) 15m/s^2

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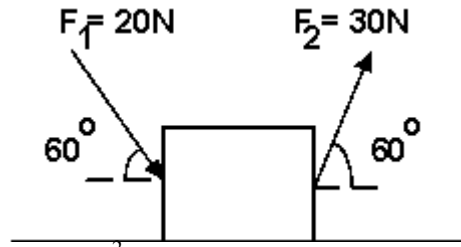
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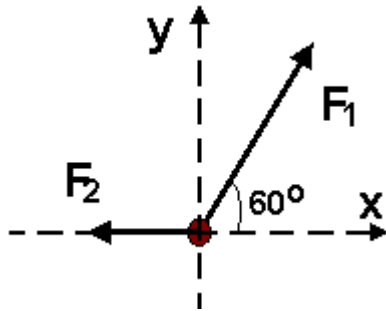
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3. Two forces F_1 and F_2 act on a block of mass $m = 5\text{kg}$, as shown in the figure below. What is the acceleration of the block if the friction between the surface and the block is negligible?

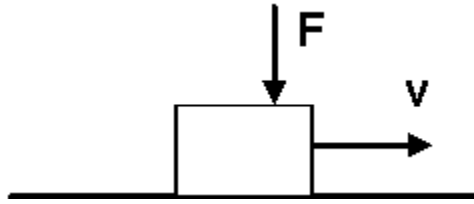


- a) $.5\text{m/s}^2$
b) 1m/s^2
c) 2m/s^2
d) 5m/s^2
e) 10m/s^2
4. Two forces F_1 and F_2 act on a particle as shown in the figure below. What is the orientation of the acceleration of the particle?

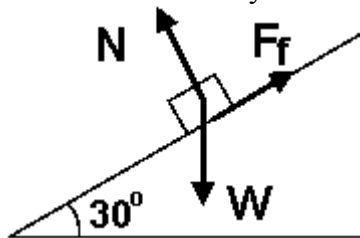


- a) same orientation as F_1
b) same orientation as F_2
c) same orientation as the x axis
d) same orientation as the y axis
e) same orientation as the negative -x axis

5. In the figure below, $F = 10\text{N}$, the mass of the block is $m = 2\text{kg}$ and the block decelerates with 5m/s^2 . What is the coefficient of kinetic friction between the block shown below and the surface of contact?

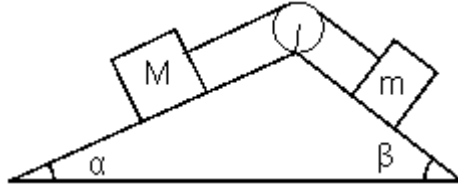


- a) .1
b) .22
c) .33
d) .45
e) .6
6. Two blocks of masses m_1 and m_2 sit on the same surface. Equal forces, $F_1 = F_2 = F$ are applied to the blocks, F_1 to the block of mass m_1 and F_2 to the block of mass m_2 . If block m_1 does not move and block m_2 is accelerating, and the coefficients of static friction are μ_{s1} and μ_{s2} , select the inequality that must be correct:
- a) $\mu_{s1}m_1g \leq F \leq \mu_{s2}m_2g$
b) $\mu_{s2}m_2g \leq F \leq \mu_{s1}m_1g$
c) $\mu_{s1}m_1g < F \leq \mu_{s2}m_2g$
d) $\mu_{s2}m_2g < F \leq \mu_{s1}m_1g$
e) $\mu_{s1}m_1 \leq F \leq \mu_{s2}m_2$
7. A block of mass $m = 5\text{kg}$ slides down the inclined plane from the figure below. If the coefficient of dynamic friction is .5, what is the acceleration of the block?

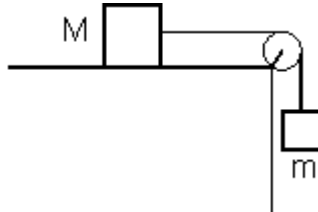


- a) $.375\text{m/s}^2$
b) $.5\text{m/s}^2$
c) $.525\text{m/s}^2$
d) $.675\text{m/s}^2$
e) $.75\text{m/s}^2$

8. Two blocks of masses m and M slide to the left with a constant speed v as shown in the figure below. Which of the following relations must be true? The pulley system is frictionless.

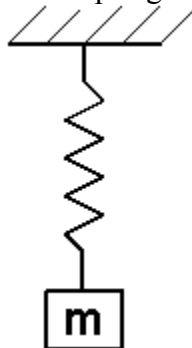


- a) $M \cdot \cos \alpha = m \cdot \cos \beta$
 - b) $M \cdot \sin \alpha = m \cdot \sin \beta$
 - c) $M \cdot \cos \beta = m \cdot \cos \alpha$
 - d) $M = m$
 - e) $M \cdot \sin \beta = m \cdot \sin \alpha$
9. The figure below represents a pulley system where masses $m = 5\text{kg}$ and $M = 10\text{kg}$ are connected by a rope over a massless and frictionless pulley. If the system moves with an acceleration of 1m/s^2 , what is the value of the coefficient of kinetic friction between the block of mass M and table?



- a) .2
- b) .35
- c) .45
- d) .5
- e) .75

10. An object of mass 4kg is attached to a spring. The equilibrium position of the object is $.4\text{m}$ from the point where the spring exerts no force on the object. What is the spring constant, k ?



- a) 20N/m
- b) 25N/m
- c) 45N/m
- d) 50N/m
- e) 100N/m

Solutions:

Question #1: d
Question #2: b
Question #3: d
Question #4: d
Question #5: c
Question #6: d
Question #7: d
Question #8: a
Question #9: b
Question #10: e