AP Physics 1 – Algebra-Based: Unit 2 Dynamics Practice Test

Question 1:

A student places a steak on one side of a double pan. She adds weights of known mass to the other side until both sides are balanced. Then, she eats three-fourths of the steak and places it back on the scale. How can she find gravitational mass of the steak? *(Assume all the weights of known mass are equal)*.

A. Quadruple the number of weights.
B. Keep the number of weights the same.
C. Remove about $\frac{3}{4}$ of the weights.

Question 2:

Planet Krypton has 4 times the radius and 2 times the mass of the Earth. What is the best estimate for the magnitude of the gravitational field at the surface of the planet Krypton?

A. $2.5\frac{m}{s^2}$
B. $5\frac{m}{s^2}$
C. $1.25\frac{m}{s^2}$
D. $20\frac{m}{s^2}$

Question 3:

The planet Skaro has 4 times the gravitational field strength and the same radius as the Earth. How does the mass of the planet Skaro compare with the mass of Earth?

A. $m_{Skaro} = 4\,m_{Skaro}$
B. $m_{Skaro} = 16\,m_{Earth}$
C. $m_{Skaro} = 2m_{Earth}$
D. $m_{Skaro} = m_{Earth}$

Question 4:

Is it possible for the normal force to be equal to the gravitational force?

A. Yes. If the surface is horizontal and F_g is perpendicular to the surface.
B. Yes. If the surface is vertical and F_g is parallel to the surface.
C. No. F_N will always be less than F_g .
D. No. F_g will be less than F_N .

Question 5:

The definition of gravitational field strength is:

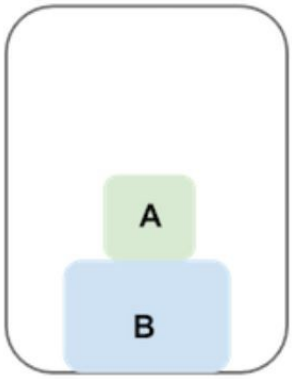
A. The region of space surrounding a body where other bodies will feel an attractive force due to it.
B. The region of space surrounding a body where other bodies will feel a repulsive force due to it.
C. The region of space surrounding a charge where other charges feel an attractive force due to it.
D. The region of space surrounding a charge where other charges will feel a repulsive force due to it.

Question 6:

The Earth pulls downward on a ping pong ball with a force of 1 N. If this is the "action" force, what is the "reaction" force?

A. The ground exerts a force of 1 N on the ping pong ball
B. The ping pong ball pushes down on the Earth with a force of 1 N.
C. There is no reaction force when a gravitational force is involved.
D. The ping pong ball exerts a force of 1 N to the Earth.

Question 7:



Block A with mass M sits on top of block B with mass 2M in an elevator. The elevator is moving upward and speeding up. The magnitude of the Earth's force of gravity on block A is F_{g_A} , the force magnitude exerted on block A by block B is F_A , and the force magnitude exerted on block B by block A is F_B . How do the force magnitude compare?

- **A.** $F_B > F_{g_A} > F_A$
- **B.** $F_B = F_{g_A} = F_A$
- **C.** $F_A = F_B > F_{g_A}$
- **D.** $F_A ¿ F_B > F_{g_A}$

Question 8:

What is the coefficient of static friction if it takes 44 N of force to move a box that weighs 86 N?

- **A.** 0.78
- **B.** 0.51
- **C.** 0.78 N
- **D.** 0.58 N

Question 9:

A magician pulls a tablecloth out from under dishes and glasses on a table without disturbing them. What principle in physics is shown?

- **A.** Newton's Second Law
- **B.** Newton's Third Law
- **C.** Newton's First Law

Question 10:

A bird glides with constant velocity. Which claim about the forces acting on the bird must be true?

- **A.** There is not enough information.
- **B.** There is no net force on the bird.
- **C.** There is a net force on the bird.
- **D.** There are no forces on the bird.

Question 11:

The van on Hans and Frans is stuck on slippery ice, so they must get out and move it by hand. Hans pushes rightwards with force magnitude F_H and Frans pulls rightward with force magnitude F_F. The van has a rightward acceleration magnitude a. What is the correct expression for the van's mass m? *(The van experiences no friction. Consider rightward as the positive direction)*

- **A.** $m\frac{F_F - F_H}{a}$
- **B.** $m = \frac{-F_F + F_H}{a}$
- **C.** $m = (F_F + F_H)a$
- **D.** $m = \frac{F_F - F_H}{a}$

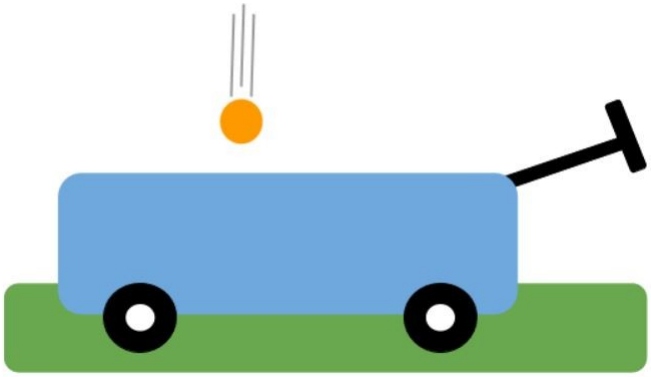
Question 12:

A student attaches black A to a force sensor and pulls it across a frictionless table. The force on block A is $2F_{pull}$ and the acceleration is a. Then, the student repeats the experiment with block B. The force on block B is F_{pull} and

the acceleration is a . How does the inertial mass m_A of block A, compare with the inertial mass m_B of block B?

- **A.** $m=2\,m_B$
- **B.** $m_A=m_B$
- **C.** $m_A=\frac{1}{2}m_B$

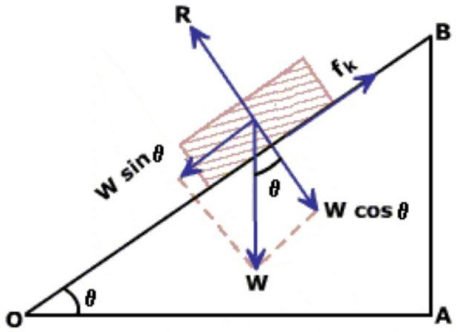
Question 13:



An orange of mass m falls into a wagon. Assume the orange experiences upward acceleration magnitude a when it comes in contact with the wagon. What is the correct expression for the normal force magnitude F_n exerted on the orange? *(Consider upward as the positive direction.)*

- **A.** $F_n=\frac{m}{a+g}$
- **B.** $F_n=\frac{a+g}{m}$
- **C.** $F_n=m(a-g)$
- **D.** $F_n=m(a+g)$

Question 14:

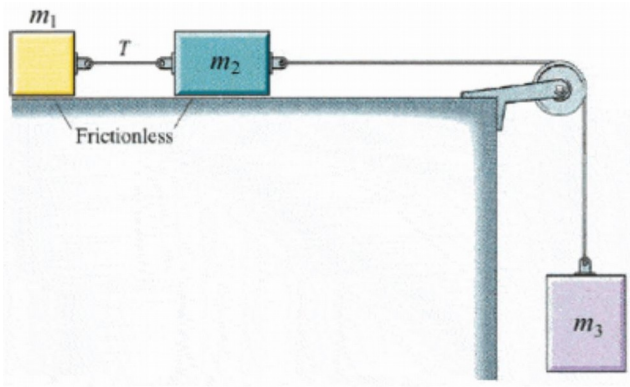


Body accelerating down an inclined plane

As the angle of the incline increases, what happens to the normal force?

A. The normal force increases.
B. The normal force decreases.
C. The normal force is not affected by the incline.
D. The normal force is only dependent on the force due to gravity.

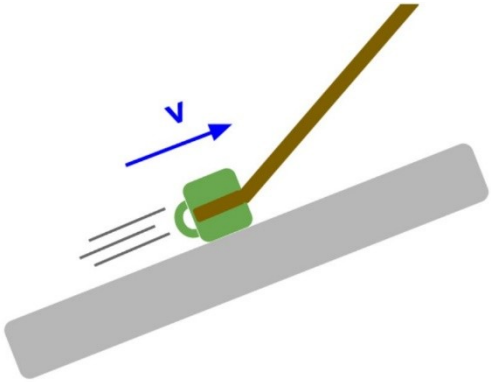
Question 15:



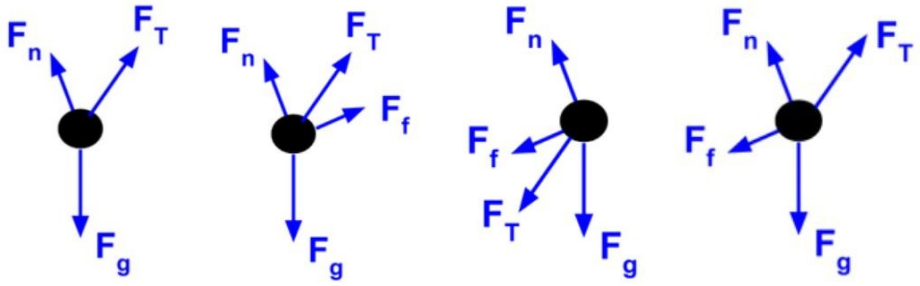
Which of the following is true about the system shown?

A. The system is not accelerating.
B. The acceleration of the system only depends on m_3.
C. None of the other answers are true.
D. The tension between m_2 and m_1 is less than the tension between m_2 and m_3.

Question 16:

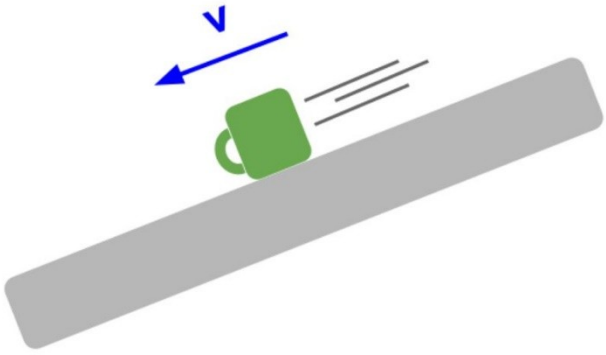


A cup is pulled on by a string and slides up a ramp to the right along a rough surface. What is the correct free body diagram for the cup?

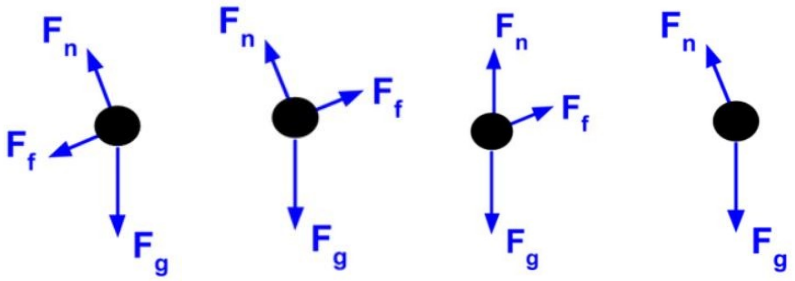


A **B** **C** **D**

Question 17:

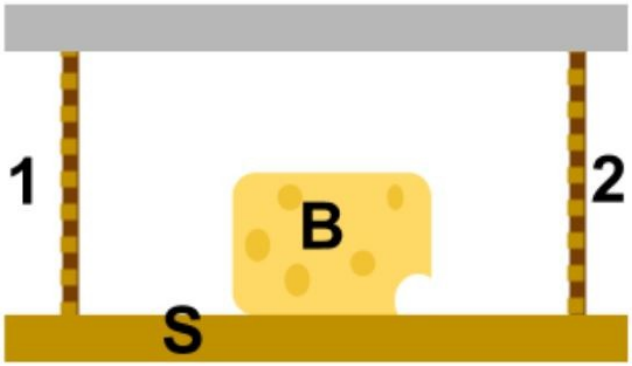


A cup is sliding down an inclined surface that is not smooth. What is the correct free body diagram for the cup?

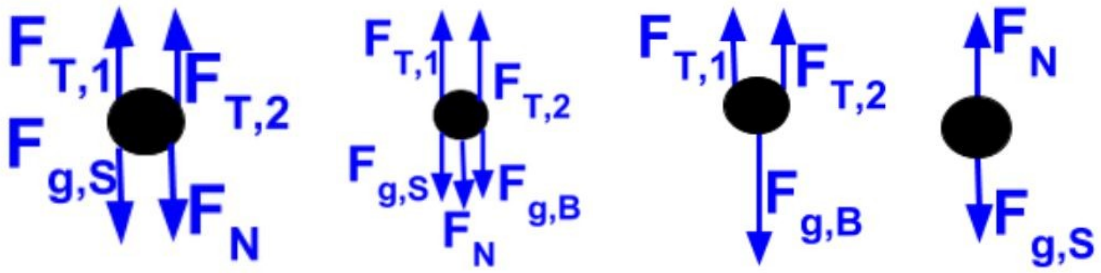


A **B** **C** **D**

Question 18:

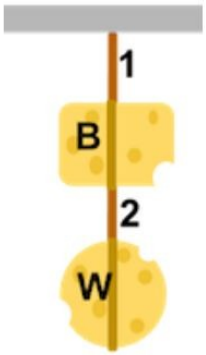


The shelf S hangs from the ceiling by two ropes (1 and 2). A block of cheese B rests on the shelf. What is the correct free body diagram for the shelf S?

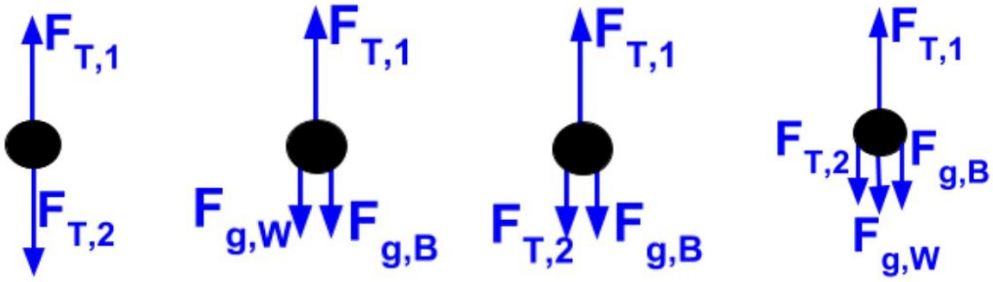


A **B** **C** **D**

Question 19:



A block of cheese B hangs from the ceiling by rope 1. A wheel of cheese W hangs from the block cheese by rope 2. What is the correct free body diagram for the block of cheese B?



A **B** **C** **D**

Answer Key:

1. C
2. C
3. A
4. A
5. A
6. D
7. C
8. B
9. C
10. B
11. D
12. A
13. D
14. B
15. D
16. D
17. B
18. A
19. C