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4. Quiz

Some questions might have more than one correct answer.

1. Which of the following statements are true?

(a) an inertial frame cannot be accelerating relative to us

(b) a reference frame that is rotating relative to any other frame cannot be an inertial frame

(c) if a particle is not accelerating relative to a noninertial frame then the net force on the particle is not zero

(d) two inertial frames might be accelerating relative to each other

(e) the acceleration of a particle is different for different inertial frames

2. Object A has twice the mass of object B. For A to have the same acceleration as B the net force on it must be

(a) more than twice as great as the net force on B

(b) twice as great as the net force on B

(c) the same as the net force on B

(d) half as great as the net force on B

(e) less than half as great as the net force on B

3. The masses of four particles and the magnitudes of the net forces on them are:

I. $m = 2\ kg,\ F^{\text{net}} = 6\ N$
II. $m = 3\ kg,\ F^{\text{net}} = 4\ N$
III. $m = 6\ kg,\ F^{\text{net}} = 3\ N$
IV. $m = 10\ kg,\ F^{\text{net}} = 2\ N$

Rank the magnitudes of their accelerations, least to greatest.

(a) I, III, IV, II

(b) I and II tied, III, IV

(c) IV, III, II, I

(d) III, II, IV, I

(e) I, II, III, IV

4. You are throwing a ball into the air and you want to calculate its acceleration while it is in your hand. Of the following forces, which should you include in the free-body diagram for the ball?

(a) the gravitational force of Earth on the ball

(b) the gravitational force of Earth on your hand

(c) the force of your hand on the ball

(d) the force of the ball on your hand

(e) the frictional force of the air on your hand

5. Particle A, with a small mass, caroms off particle B, with a larger mass. Only the forces of the particles on each other are significant. During the time the blocks are in contact

(a) the acceleration of A is greater than the acceleration of B

(b) the acceleration of A is less than the acceleration of

(c) the acceleration of A is the same as the acceleration of B

(d) the force of particle A on B is less than the force of B on particle A

(e) the force of particle A on B is greater than the force of B on particle A

6. You hold a book motionless in your hand. Pairs of forces that are equal in magnitude and opposite in direction by virtue of Newton's third law are

(a) the gravitational force of Earth on the book and the gravitational force of the book on Earth

(b) the gravitational force of Earth on the book and the force of your hand on the book

(c) the force of your hand on the book and the force of the book on your hand

(d) the gravitational force of your hand on Earth and the force of the book on your hand

(e) the gravitation force of Earth on your hand and the force of your hand on the book

7. If air resistance can be neglected the acceleration of a freely falling object

(a) is greater as the object is rising than when it is falling

(b) is greater as the object is falling than when it is rising

(c) is zero when the object is at its highest point

(d) is greatest when the object is at its highest point

(e) is none of the above

8. If air resistance can be neglected the acceleration of a freely falling object depends on

(a) the mass of the object

(b) the weight of the object

(c) the size of the object

(d) the initial speed of the object

(e) none of the above

9. If air resistance can be neglected the height reached by an object thrown straight upward depends on

(a) the mass of the object

(b) the size of the object

(c) the initial speed of the object

(d) the local value of the gravitational constant g

(e) none of the above

10. A boy stands at the edge of a cliff with three stones. He throws stone I upward with a speed v_0 and it falls past the edge to the canyon floor below. He throws stone II downward toward the canyon floor with the same speed. He drops stone III over the edge. Rank the stones according to their speeds just before they hit the canyon floor, least to greatest.

(a) II, III, I

(b) III, then I and II tied

(c) I, III, II

(d) III and II tied, then I

(e) I and II ties, then III If air resistance can be neglected the acceleration of a freely falling object

Answers: (1) B, C; (2) B; (3) B; (4) A, C; (5) A; (6) A, C; (7) E; (8) E; (9) C, D; (10) B