# Unit 3 Practice Test
## 2 pt Questions

196. Which of the following has the greatest inertia? → mass

A) A panda bear with a mass of $1.25 \times 10^2$ kg
B) A koala bear with a mass of 8 kg
C) A polar bear with a mass of $5 \times 10^2$ kg
D) A gummi bear with a mass of $2.5 \times 10^{-3}$ kg

197. The rate of change of momentum is known as

A) impulse B) net force C) inertia D) velocity

$F_{net} = \frac{\Delta p}{t}$

198. If a hover puck is accelerated down a hallway it must be experiencing a

A) balanced force
B) net force
C) constant velocity
D) zero force

199. If a 4.2 kg bowling ball hits a 1.4 kg bowling pin with a force of 10N. What is the force at which the bowling pin hits the bowling ball?

A) 30 N B) 3.3 N C) 4.2 N D) 10 N

200. Two dogs apply a force concurrently to a toy. Which angle between the two force vectors will create the greatest resultant?

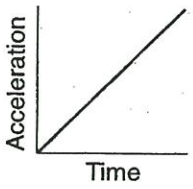
A) 30 degrees B) 180 degrees C) 90 degrees D) 45 degrees

smallest difference

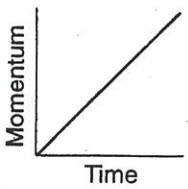
# Unit 3 Practice Test

201. Which graph best represents the motion of an object that has *no* unbalanced force acting on it?

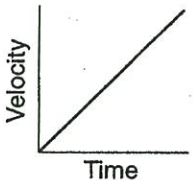
A)



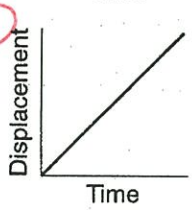

B)




C)




D)




202. Which statement explains why a book resting on a table is in equilibrium?

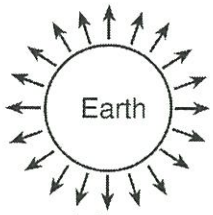
A) There is a net force acting downward on the book.
B) The weight of the book equals the weight of the table.
C) The acceleration due to gravity is 9.8 $m/s^2$ for both the book and the table.
D) The weight of the book and the table's upward force on the book are equal in magnitude, but opposite in direction.

203. The gravitational force of attraction between two objects would be increased by

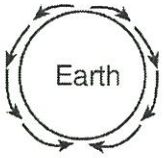
A) doubling the mass of both objects, only
B) doubling the distance between the objects, only
C) doubling the mass of both objects and doubling the distance between the objects
D) doubling the mass of one object and doubling the distance between the objects

204. Which diagram best represents the gravitational field lines surrounding Earth?

A)

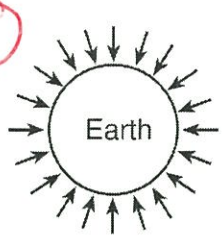



B)

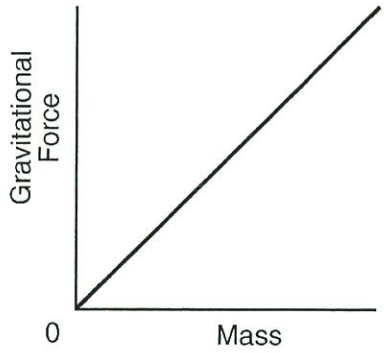



C)


D)




205. Base your answer to the following question on The graph below represents the relationship between gravitational force and mass for objects near the surface of Earth.

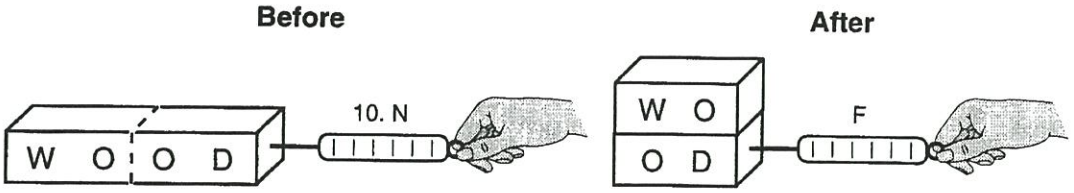



$\frac{F_g}{m} = g$

The slope of the graph represents the

A) gravitational field strength
B) universal gravitational constant
C) momentum of objects
D) weight of objects

206. The diagram below shows a student applying a 10.-newton force to slide a piece of wood at constant speed across a horizontal surface. After the wood is cut in half, one piece is placed on top of the other, as shown.




What is the magnitude of the force, *F*, required to slide the stacked wood at constant speed across the surface?

A) 40 N B) 20 N C) 10 N D) 5.0 N

207. Compared to the force needed to start sliding a crate across a rough level floor, the force needed to keep it sliding once it is moving is

A) less B) greater C) the same

$F_{fs} > F_{fk}$

208. Which of the following is a scalar quantity?

A) weight B) momentum C) force D) inertia

mass

209. What is the weight of a 2.00-kilogram object on the surface of Earth?

$F_g$

A) 4.91 N B) 2.00 N C) 9.81 N D) 19.6 N

$F_g = mg$

210. A 750-newton person stands in an elevator that is accelerating downward. The upward force of the elevator floor on the person must be

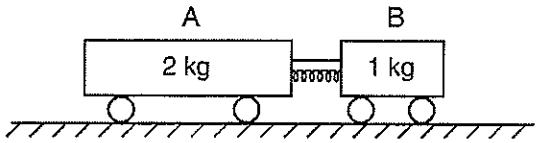
A) equal to 0 N
B) less than 750 N
C) equal to 750 N
D) greater than 750 N

211. An air bag is used to safely decrease the momentum of a driver in a car accident. The air bag reduces the magnitude of the force acting on the driver by

(A) increasing the length of time the force acts on the driver
B) decreasing the distance over which the force acts on the driver
C) increasing the rate of acceleration of the driver
D) decreasing the mass of the driver

212. Base your answer to the following question on the information and diagram below.

The diagram shows a compressed spring between two carts initially at rest on a horizontal frictionless surface. Cart *A* has a mass of 2 kilograms and cart *B* has a mass of 1 kilogram. A string holds the carts together.



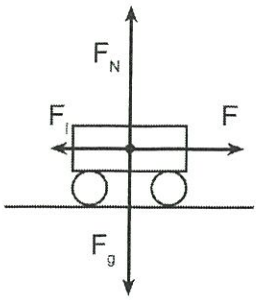

After the string is cut and the two carts move apart, the magnitude of which quantity is the same for both carts?

(A) momentum B) velocity C) inertia D) kinetic energy

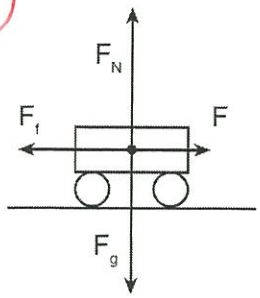
213. Which vector diagram best represents a cart slowing down as it travels to the right on a horizontal surface?

Fnet left

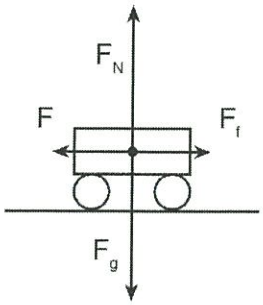
A)



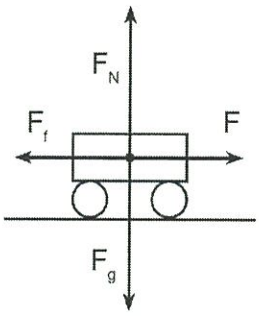

B)



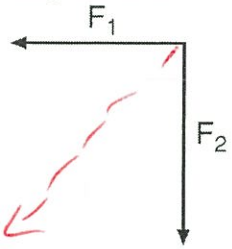

C)




D)

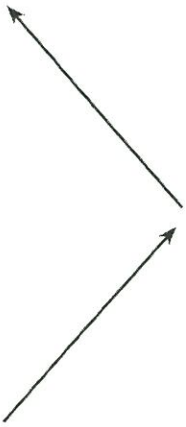



214. A force vector was resolved into two perpendicular components, $F_1$ and $F_2$, as shown in the diagram below.

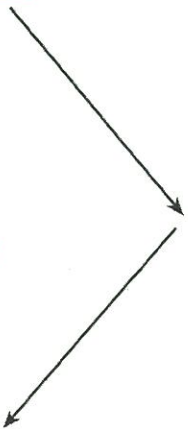



Which vector best represents the original force?

A)



B)

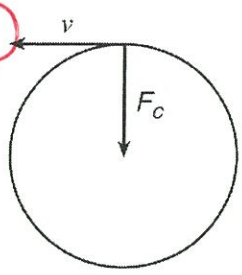


C)

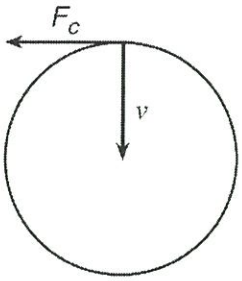
D)

215. A $1.0 \times 10^3$-kilogram car travels at a constant speed of 20. meters per second around a horizontal circular track. Which diagram correctly represents the direction of the car's velocity ($v$) and the direction of the centripetal force ($F_c$) acting on the car at one particular moment?

A)



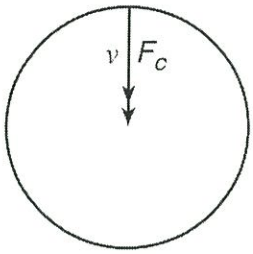

B)



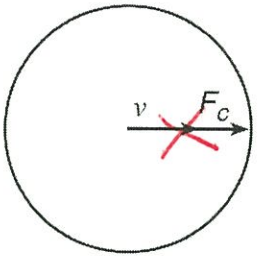

$F_c$ to center

V tangent

C)

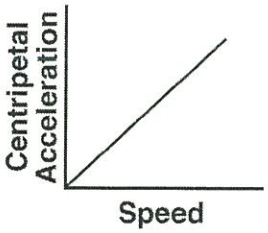



D)

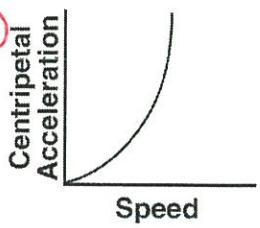



216. Which graph best represents the relationship between the magnitude of the centripetal acceleration and the speed of an object moving in a circle of constant radius?

A)

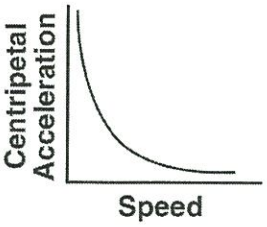



B)

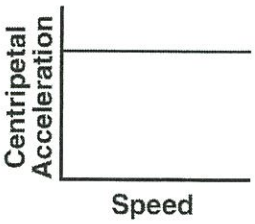



$a_c = \frac{v^2}{r}$

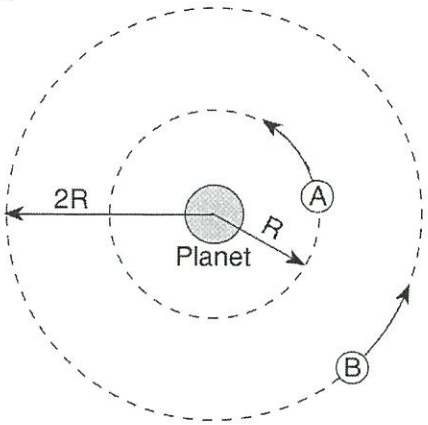
C)




D)



217. The diagram below represents two satellites of equal mass, $A$ and $B$, in circular orbits around a planet.



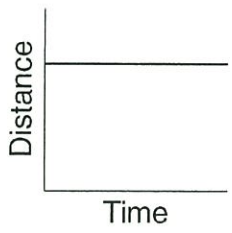

$F_g = \frac{Gm_1m_2}{r^2}$ r x 2 means $\frac{F_g}{4}$

Compared to the magnitude of the gravitational force of attraction between satellite $A$ and the planet, the magnitude of the gravitational force of attraction between satellite $B$ and the planet is

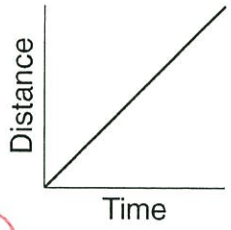
A) half as great
B) twice as great
C) one-fourth as great
D) four times as great

218. Which graph best represents the motion of an object moving down a frictionless inclined plane? $F_{Net} = F_{g\parallel}$ (acceleration)

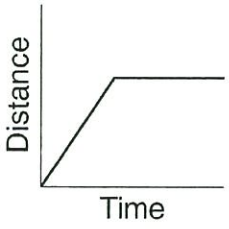
A)



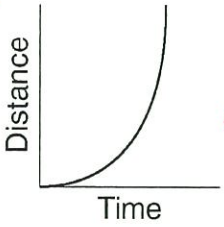

B)




C)




D)




acceleration

219. As the angle of incline of a ramp increases, the normal force acting on block resting on the ramp

A) increases
B) decreases
C) remains the same

$F_N = F_{g\perp} = F_g \cos\theta$

as $\theta$ increases
cos decreases

220. Which of the following is an acceptable unit for change in momentum?

A) Ns
B) kg m/s$^2$
C) Nm
D) N/m

$\Delta p = mv = J = Ft$

# Unit 3 Practice Test
## 3 pt Questions

221. A 200N crate rests on a ramp inclined at an angle of 30 degrees. What is the parallel component of the crate's weight?

A) 200N  B) 980N  C) 100N  D) 30N

$F_{g\parallel} = F_g \sin\theta$

$F_{g\parallel} = 200N \sin 30°$

222. A 300 kg crate is lifted by a crane. Determine the force of tension needed to accelerate the crate upward at 0.5m/s$^2$.

A) 2790N  B) 150N  C) 3090N  D) 2940N

$F_{Net}$ NOT $F_T$

$\Sigma F_y = F_g + F_T$

$ma = mg + F_T$

$(300kg)(.5m/s^2) = (300kg)(9.8m/s^2) + F_T$

$150N = -2940N + F_T$

223. At a certain location, a gravitational force with a magnitude of 350 newtons acts on a 70.-kilogram astronaut. What is the magnitude of the gravitational field strength at this location?

A) 0.20 kg/N  B) 5.0 N/kg  C) 9.8 m/s$^2$  D) 25 000 Nkg

$g = \frac{F_g}{m} = \frac{350N}{70kg}$

$= 5N/kg$

224. Marvin the Martian and his space craft experience a force of 2000N at a distance R from a planet. Marvin moves the ship to a new location and the gravitational force is now 500N. What distance is Marvin from the planet when he experiences this force?

A) 2R  B) 4R  C) R/2  D) R/4

| $F_g$ | $r$ | |
|---|---|---|
| 2000N | $r$ | |
| 500N | $2R$ | $\times 2$ |

$\div 4$

$F_g = G\frac{m_1 m_2}{r^2}$

$r = \sqrt{\frac{G m_1 m_2}{F_g}}$

225. Roller Rick stands on his Roller Blades on a smooth level surface. He has a mass of 55 kg. He throws an 8 kilogram rock horizontally away from his body at a speed of 5.5 m/s. What is Rick's recoil velocity? (neglect friction)

A) 44 m/s  B) 0.8 m/s  C) 5.5 m/s  D) 10 m/s

$P_{before} = P_{after}$

$0 = m_1 v_1 + m_2 v_2$

$0 = (55kg)(v_1) + (8kg)(5.5m/s)$

# Unit 3 Practice Test

226. A 5 kg mass attached vertically to a spring causes a spring to stretch 0.2 meter. What is the spring constant of the spring?

A) 25 N/m  B) 245 N/m  C) 9.8 N/m  D) 1 N/m

$m = 5kg$ $F_g = 49N$
$x = .2m$ $x = .2m$
$K = ?$

227. The force of attraction between a cow with mass $m_c$ and a "moon" with mass $m_m$ is 900N when separated by a distance of "r". If the distance were changed to 3r, what would be the new force between the cow and the moon?

A) 300N  B) 8100N  C) 100N  D) 2700N

$r \times 3$ means $\frac{F_g}{9}$

228. A 0.2 kg mouse named Jerry runs into a 4kg cat named Tom. In the collision Tom experiences a force of 10 N for a time of 0.1 seconds. What is the force experienced by Jerry during the collision?

A) 2N  B) 10N  C) 200N  D) 100N

229. A 4.0-kilogram object is accelerated at 3.0 meters per second$^2$ north by an unbalanced force. The same unbalanced force acting on a 2.0-kilogram object will accelerate this object toward the north at

A) 12 m/s$^2$  B) 6.0 m/s$^2$  C) 3.0 m/s$^2$  D) 1.5 m/s$^2$

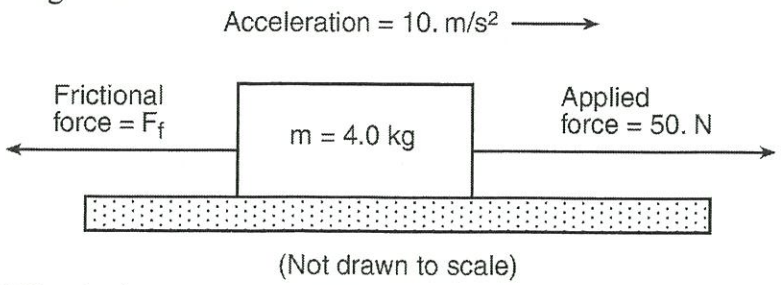
| $m = 4kg$ | $2kg$ |
|---|---|
| $a = 3 m/s^2$ | $6 m/s^2$ |
| $F_{net} = 12N$ | $F_{net} = 12N$ |

230. An 8.0-newton wooden block slides across a horizontal wooden floor at constant velocity. What is the magnitude of the force of kinetic friction between the block and the floor?

A) 2.4 N  B) 3.4 N  C) 8.0 N  D) 27 N

$F_N = 8N$ $F_f = \mu F_N$
$\mu = .3$ $F_f = (.3)(8N) = 2.4N$

231. The diagram below shows a 4.0-kilogram object accelerating at 10. meters per second$^2$ on a rough horizontal surface.



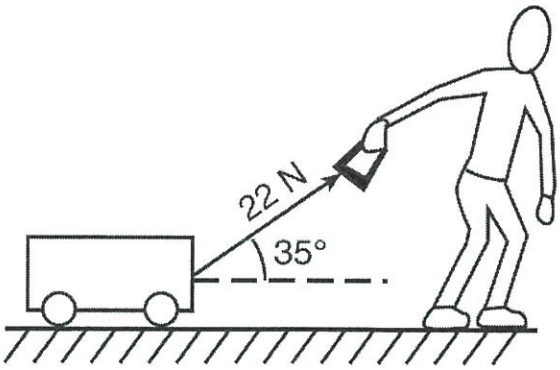

(Not drawn to scale)

$\Sigma F_x = F_A + F_f$
$ma = 50N + F_f$
$(4kg)(10\frac{m}{s^2}) = 50N + F_f$
$F_f = -10N$

What is the magnitude of the frictional force $F_f$ acting on the object?

A) 5.0 N B) 10. N C) 20. N D) 40. N

232. A child pulls a wagon at a constant velocity along a level sidewalk. The child does this by applying a 22-newton force to the wagon handle, which is inclined at 35° to the sidewalk as shown below.




Level sidewalk

$\Sigma F_x = F_{Ax} + F_f$
$0 = F_{Ax} + F_f$
$0 = 22N\cos 35^\circ + F_f$
$0 = 18N + F_f$
$F_f = 18N$

What is the magnitude of the force of friction on the wagon?

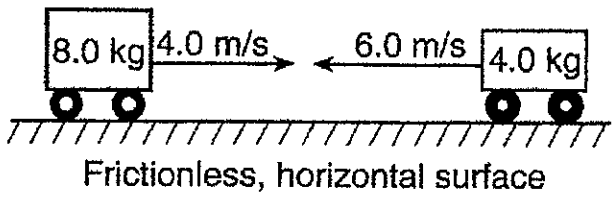
A) 11 N B) 13 N C) 18 N D) 22 N

233. An unbalanced force of 40. newtons keeps a 5.0-kilogram object traveling in a circle of radius 2.0 meters. What is the speed of the object?

A) 8.0 m/s B) 2.0 m/s C) 16 m/s D) 4.0 m/s

$F_c = \frac{mv^2}{r}$ $40N = \frac{(5kg)(v^2)}{2m}$ $\sqrt{v^2} = \sqrt{16\frac{m^2}{s^2}}$

234. The diagram below shows an 8.0-kilogram cart moving to the right at 4.0 meters per second about to make a head-on collision with a 4.0-kilogram cart moving to the left at 6.0 meters per second.




After the collision , the 4.0-kilogram cart moves to the right at 3.0 meters per second. What is the velocity of the 8.0-kilogram cart after the collision?

A) 0.50 m/s left B) 0.50 m/s right C) 5.5 m/s left D) 5.5 m/s right