

Practice questions for chapters 11-14

- 1) A person drops one rock from rest and it falls 100 meters down a cliff before hitting the ground. The person then throws an identical rock downward. The amount of kinetic energy gained by the rock dropped from rest is _____ that of the second rock, and the magnitude of the change in speed (between hitting the ground and its initial speed) of the rock dropped from rest is _____ that of the second rock.
 - A) equal to, greater than
 - B) equal to, less than
 - C) equal to, equal to
 - D) less than, less than
- 2) If you stood on a planet having a mass four times higher than Earth's mass, and a radius two times longer than Earth's radius, you would weigh
 - A) the same as you do on Earth.
 - B) four times more than you do on Earth.
 - C) two times less than you do on Earth.
 - D) two times more than you do on Earth.
- 3) A satellite is in an elliptical orbit about the Earth. At point X it is closest to Earth. At point Y it is furthest from Earth. Point Z is halfway between points X and Y, along the orbital path. Where is the angular momentum (relative to the Earth) of the satellite the highest?
 - A) It is the same at all locations
 - B) Point Y
 - C) Point X
 - D) Point Z
- 4) Two identical objects, each with a mass M , are attached to each other via a spring with a spring constant k . The two objects are oscillating such that one is always moving in the opposite direction and with the same speed as the other. If the spring were replaced with a stiffer spring having a spring constant equal to $2k$, and the objects were replaced with objects having a mass of $2M$, the period of oscillation would
 - A) decrease.
 - B) increase.
 - C) remain the same.
- 5) Two cyclists, who weigh the same and have identical bicycles, ride up the same mountain, both starting at the same time. Joe rides straight up the mountain, and Bob rides up the longer road that has a lower grade. Joe gets to the top before Bob. Which statement is true?
 - A) Ignoring friction and wind resistance, Bob and Joe exerted the same amount of work, and the average power of each cyclist was also the same.
 - B) Ignoring friction and wind resistance, the amount of work done by Joe is equal to the amount of work done by Bob, but the average power exerted by Joe is greater than that of Bob.
 - C) Ignoring friction and wind resistance, the average power exerted by Bob and Joe was the same, but Joe exerted more work in getting there.
 - D) Ignoring friction and wind resistance, the amount of work done by Joe is greater than the amount of work done by Bob, and the average power exerted by Joe is greater than that of Bob.
- 6) If an astronaut were exactly half way between the Earth and the Moon, the net gravitational force exerted on the astronaut by these two objects would be
 - A) directed towards Earth.
 - B) directed towards the Moon.
 - C) zero.

- 7) 77 J of work are needed to stretch a spring from 1.4 m to 2.9 m from equilibrium. What is the value of the spring constant?
- A) 24 N/m B) 34 N/m
C) 69 N/m D) 46 N/m
- 8) How long will it take a 9.80 hp motor to lift a 250 kg beam at constant velocity from the ground to a height of 45.0 m? Assume frictional forces are negligible.
- A) 28.7 s B) 15.1 s
C) 1.13×10^4 s D) 1.58×10^4 s
- 9) At what distance from the Earth should an astronaut be placed so that he will feel no net force when the Earth and the moon and he are aligned?
- A) 3.44×10^8 m B) 0.38×10^8 m
C) 0.47×10^8 m D) 4.29×10^8 m
- 10) The weight of spaceman Speff, solely due to the gravitational pull of planet X at its surface, is 231 N. If he moves to a distance of 2.41×10^4 km above the planet's surface, his weight changes to 14.44 N. What is the mass of planet X, if Speff's mass is 75 kg?
- A) 2.96×10^{17} kg
B) 2.96×10^{24} kg
C) 1.23×10^{18} kg
D) 2.96×10^{18} kg
- 11) A wheel accelerates from rest to 59 rad/s at a rate of 29 rad/s². Through what angle (in radians) did the wheel turn while accelerating?
- A) 49 rad B) 120 rad
C) 60 rad D) 76 rad
- 12) A simple harmonic oscillator begins at the equilibrium position. At a time where the amplitude is 1/4 its maximum value, through what phase angle has the oscillator moved?
- A) $(14.7 \times \pi/180)$ deg
B) $(2\pi + 1.32)$ rad
C) 75.5 deg
D) $(\pi \pm 0.254)$ rad
- 13) 4.00×10^5 J of work are done on a 1228 kg car while it accelerates from 10.0 m/s to some final velocity. Find this final velocity.
- A) 24.7 m/s B) 30.1 m/s
C) 27.4 m/s D) 21.9 m/s
- 14) An astronaut is in equilibrium when he is positioned 442 km from planet X and 569 km from planet Y, along the straight line joining the planets' centers. What is the ratio of the masses X/Y?
- A) 1.66 B) 0.777
C) 1.29 D) 0.603
- 15) An irregularly shaped object 10 m long is placed with each end on a scale. If the scale on the right reads 72 N and the scale on the left reads 58 N, how far from the left is the center of gravity.
- A) 5.5 m B) 12 m
C) 4.5 m D) 8.1 m
- 16) A 3.42 kg mass hanging vertically from a spring on the Earth (where $g = 9.8 \text{ m/s}^2$) undergoes simple oscillatory motion. If the spring constant is 12 N/m, find the period of oscillation of this setup on the moon, where $g = 1.6 \text{ m/s}^2$.
- A) 2.51 s B) 4.36 s
C) 3.35 s D) 5.70 s
- 17) If a force acts perpendicular to an object's direction of motion, that force cannot change the object's kinetic energy or momentum.
- 18) A satellite is orbiting the earth. If a payload of material is added until it doubles the satellite's mass, the earth's pull of gravity on this satellite will double but the satellite's orbit will not be affected.
- 19) Two unequal weights are connected by a massless string which passes over a frictionless pulley. If the pulley has no appreciable mass, the tension in the string is the same on both sides of the pulley; but if the pulley has mass, the tension will not be the same on both sides of the pulley.

- 20) A mass oscillates at the end of a spring. If you double both the mass and the spring constant, the period of oscillation is unchanged.

Answer Key

Testname: FINAL PRACTICE

- 1) A
- 2) A
- 3) A
- 4) C
- 5) B
- 6) A
- 7) A
- 8) B
- 9) A
- 10) B
- 11) C
- 12) D
- 13) C
- 14) D
- 15) A
- 16) C
- 17) FALSE
- 18) TRUE
- 19) TRUE
- 20) TRUE