Chapter 5: Forces in Two Dimensions

Forces in Two Dimensions			
$R = \sqrt{A^2 + B^2}$	$\theta = \tan^{-1}(\frac{Ry}{Rx})$	$R = \sqrt{A^2 + B^2 - 2AB(\cos\theta)}$	$Rx = R\cos\theta$ $Ry = R\sin\theta$
$\frac{R}{\sin\theta} = \frac{A}{\sin a} = \frac{B}{\sin b}$	$Ff, static = \mu_s F_N$	$Ff.kinetic = \mu_k F_N$	

1 - What are the components of a vector of magnitude 28.5 km at an angle of 42.0° from the positive x-axis?

A) 604 km, 544 km B) 21.2 km, -19.1 km C) 112 km, 91 km D) 21.2 km, 19.1 km

2 - Which of the following equations represents the Pythagorean theorem?

A) R2 = A2 - B2 B) R2 = A2 + B2 + 2AB cos Θ C) R2 = A2 + B2 - 2AB cos Θ D) R2 = A2 + B2

3 - Find the magnitude of the sum of a 10-m displacement and a 5-m displacement when the angle between them is 45°.

A) 11 m B) 9 m C) 7 m D) 14 m

4 - A car is driven 724.0 km due north, then 895.0 km due west. What is the magnitude of its displacement?

A) 171 km B) 1151 km C) 805 km D) 1619 km

5 - A(n) _____ is a vector that is equal to the sum of two or more vectors.

A) resultant B) graphical representation C) displacement D) addition vector

6 - To find the magnitude of the resultant vector for two vectors that are at some angle other than 90°, use _____.

A) the Pythagorean theorem B) R2 = A2 + B2 C) R2 = A2 - B2 D) the Law of Cosines

7 - The process of breaking a vector into its components is called _____.

A) trigonometry B) graphical representation C) vector resolution D) reduction

8 - Find the magnitude of the sum of a 27-m displacement and a 34-m displacement when the angle between them is 118°.

A) 52 m B) 43 m C) 32 m D) 16 m

9 - What is the magnitude of your displacement when you follow directions that tell you to walk 150.0 m north, then 25.0 m east?

A) 150 m B) 152 m
C) 175 m D) 127 m

10 - When there is no relative motion between two surfaces, the force exerted by one surface on the other is called _____.

A) resistance B) the kinetic force C) kinetic friction force D) the static friction force

11 - A sled of mass 40.0 kg is pulled along flat, snow-covered ground. The static friction coefficient is 0.28, and the kinetic friction coefficient is 0.080. What force is needed to keep the sled moving at a constant velocity?

A) 310 N B) 3.2 N C) 31 N D) 3900 N

12 - The _____ is the force exerted on one surface by another when the surfaces are in relative motion.

A) apparent weight B) kinetic friction force C) kinetic coefficient D) static friction force

13 - A sled of mass 40.0 kg is pulled along flat, snow-covered ground. The static friction coefficient is 0.28, and the kinetic friction coefficient is 0.08. What force will be needed to start the sled moving?

A) 110 N B) 31 N C) 147 N D) 392 N

14 - In the diagram below, if A's magnitude is 16 N and B's is 25 N, what is the magnitude of C?

A) 30 N B) 19 N C) 16 N D) 41 N

15 - A 75-kg person on skis is going down a hill sloped at 30.0°. The coefficient of kinetic friction between the skis and the snow is 0.15. How fast is the skier going 10.0 s after starting from rest?

A) 78 m/s B) 78 m/s2
C) 36 m/s2 D) 36 m/s

16 - A 475-N trunk is resting on a plane inclined 40.0° above the horizontal. Find the components of the weight force parallel and perpendicular to the plane.

A) Fgx = -364 N, Fgy = -305 N B) Fgx = 364 N, Fgy = 305 N

C) Fgx = 305 N, Fgy = 364 N D) Fgx = -305 N, Fgy = -364 N

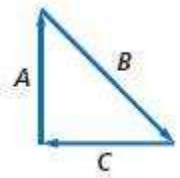
17 - A force that produces equilibrium is a(n) _____

A) net force

B) constant

C) equilibrant

D) resultant



18 - Two ropes pull on a ring. One exerts a 50.0-N force at 42.0°, the other an 87.0-N force at 70.0°. What is the net force on the ring?

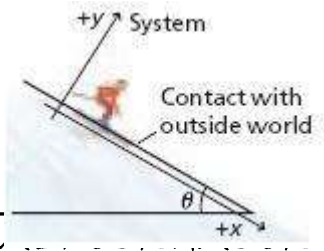
A) 133 N at 60.0° B) 100 N at 60.0° C) 133 N at 30.0° D) 100 N at 56.0°

19 - If in the diagram below, the skier has mass 45 kg and the slope is at 35°, what is the normal force of the hill on the skier?

A) cannot be determined with the given information

B) 440 N

C) 250 N

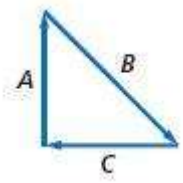


D) 360 N

20 - Two forces are exerted on an object. A 43-N force acts exactly at 240° and a 67-N force acts at 300°. What are the magnitude and direction of the equilibrant?

A) 98 N at 7° B) 98 N at 277° C) 84 N at 97° D) 98 N at 97°

21 - In the diagram below, if B's magnitude is 50 N and C's is 30 N, what is the magnitude of A?



A) 80 N B) 20 N

C) 40 N D) 58 N

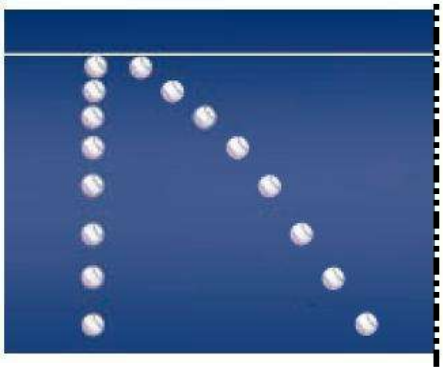
22 - A 175-N sign is supported in a motionless position by two ropes that each make 53.0° angles with the horizontal. What is the tension in the ropes?

A) 146 N B) 310 N C) 175 N D) 110 N

رقم السؤال	الإجابة		رقم السؤال	الإجابة		رقم السؤال	الإجابة
1	D		11	C		21	D
2	D		12	B		22	D
3	C		13	A			
4	B		14	B			
5	A		15	D			
6	D		16	D			
7	C		17	C			
8	A		18	A			
9	B		19	D			
10	D		20	D			

Chapter 6: Motion in Two Dimensions

MOTION IN TWO DIMENSION الحركة في بعدين			
$\Delta x = v_x t$	$v_{yf} = gt$	$\Delta y = \frac{1}{2} gt^2$	$v_y f^2 = 2g\Delta y$
$\Delta x = V_x t = Vi_x \cos\theta t$	$v_{yf} = vi\ (\sin\theta) + a_y\ t$	$V^2_{yf} = v_i^2\ (\sin\theta)^2 + 2\ a_y \Delta\ y$	$\Delta\ y = v_i\ (\sin\theta)\ t + \frac{1}{2} a_y t^2$
$a_c = \frac{v2}{r}$	$a_c = \frac{4\pi 2r}{T^2}$		$F_c = ma_c = \frac{mv^2}{r}$
$\nu_{a/c} = \nu_{a/b} + \nu_{b/c}$	$\nu_{a/c} = \nu_{a/b} - \nu_{b/c}$	$Vp/e = \sqrt{vi/e^2 + vp/i^2}$	$\theta = \tan^{-1} \frac{vp/i}{vi/e}$



1 - In the photograph below, if the baseballs fell a vertical distance of 1.6 m from the first to the last image, how long did it take them to fall?

A) 0.16 s B) 0.32 s

C) 0.40 s D) 0.57 s

2 - A stone is thrown horizontally at 20 m/s from the top of a cliff 63 m high. How fast is it moving the instant before it hits the ground?

A) 29 m/s B) 35 m/s C) 40 m/s D) 38 m/s

3 - You accidentally throw your car keys horizontally at 5.0 m/s from a cliff 45 m high. How far from the base of the cliff should you look for your keys?

A) 135 m B) 225 m C) 15 m D) 45 m

4 - The time a projectile is in the air is the _____.

A) trajectory B) range C) flight time D) centripetal acceleratio

5 - A stone is thrown horizontally at 20.0 m/s from the top of a cliff 63 m high. How far from the base of the cliff does the stone hit the ground?

A) 66 m B) 42 m C) 72 m D) 13 m

6 - Any moving object that moves only under the force of gravity (after initial thrust) is a(n) _____.

A) projectile B) satellite C) free floater D) vector

7 - A projectile's path through space is called its _____.

A) period B) flight plan C) trajectory D) range

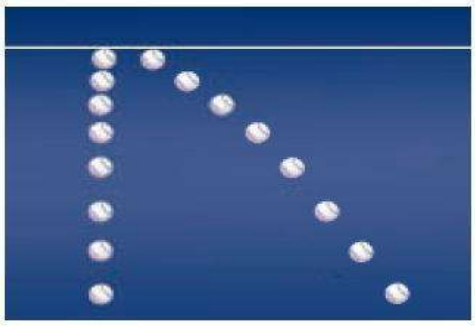
8 - The _____ is the height of the projectile when the vertical velocity is zero.

A) torque B) maximum height C) range D) trajectory

9 - The horizontal distance a projectile travels is the _____.

A) torque B) trajectory C) range D) maximum height

10 - In the picture below, if the baseballs fell a vertical distance of 1.6 m from the first to the last image, what is the time interval between frames?



A) 0.23 s B) 0.082 s

C) 0.095 s D) 0.071 s

11 - The acceleration of an object in uniform circular motion is called _____.

A) equilibrium B) torque C) range D) centripetal acceleration

12 - A carnival ride has a 3.0-m radius and rotates once every 1.7 s. What is the speed of the rider?

A) 9.4 m/s B) 3.4 m/s C) 5 m/s D) 11 m/s

13 - A carnival ride has a 3.0-m radius and rotates once every 1.7 s. Find the centripetal acceleration of a rider.

A) 41 m/s^2 outwards B) 41 m/s^2 inwards C) 11 m/s^2 inwards D) 11 m/s^2 outwards

14 - Picture an athlete preforming a hammer throw, if the mass of the hammer is 7.26 kg, its center is 0.50 m from the thrower, and it is moving at a speed of 1.5 m/s, what is its centripetal acceleration?

A) 33 m/s^2 B) 22 m/s^2 C) 4.5 m/s^2 D) 3.0 m/s^2

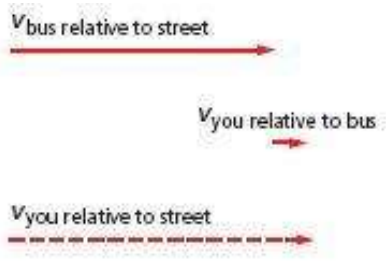
15 - Picture an athlete preforming a hammer throw, if the mass of the hammer is 7.26 kg, its center is 0.50 m from the thrower, and it is moving at a speed of 1.5 m/s, what is the tension in the chain?

A) 22 N B) 4.5 N C) 3.0 N D) 33 N

16 - If an object moves in a circle at steady speed it is in _____.

A) uniform circular motion B) projectile motion C) torque D) equilibrium

17 - Which of the following situations is physically the most like that depicted in the diagram below?



A) You slide to the right on the seat of a forward-moving bus.

B) You walk toward the rear of a forward-moving bus.

C) You walk forwards on a forward moving bus.

D) You step upwards onto a bus as you board it.

18 - You are riding in a boat that is traveling 15.0 m/s forward in still water. You move from the front to the back of the boat at 3.0 m/s. What is your speed relative to the water?

A) 18.0 m/s relative to the water B) 15.3 m/s relative to the water

C) 12.0 m/s relative to the water D) 9.0 m/s relative to the water

رقم السؤال	الإجابة		رقم السؤال	الإجابة		رقم السؤال	الإجابة
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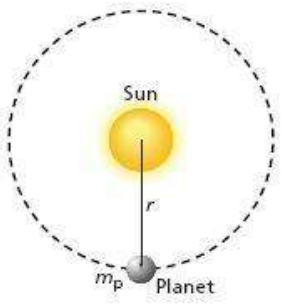
4	C		10	B		16	A
5	C		11	D		17	C
6	A		12	D		18	C

Chapter 7: Gravitation

Gravitation الجاذبية			
$\left(\frac{T_A}{T_B}\right)^2 = \left(\frac{r_A}{r_B}\right)^3$	$F = G\frac{m_1\ m_2}{r^2}$	$T = 2\pi\sqrt{\frac{r^3}{G\ m_s}}$	$v = \sqrt{\frac{Gm_E}{r}}$
$g = \frac{Gm}{r^2}$	$m_{Inertial} = \frac{F_{net}}{a}$	$m_{grav} = \frac{r^2 F_{grav}}{Gm}$	

1- If the mass of the Sun in the diagram below were doubled, what effect would it have on the planet's period of orbit?



A) The new period would be one divided by the square root of two times the original period.

B) The new period would be one-half of the original period.

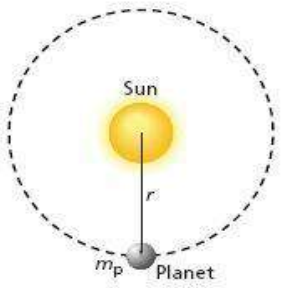
C) It would have no effect.

D) The new period would be twice the original period.

2 - If the radius of the planet's orbit were doubled in the diagram below, what effect would it have on its period of orbit?

A) More information is needed to determine the answer. B) It would decrease.

C) It would increase. D) It would have no effect.



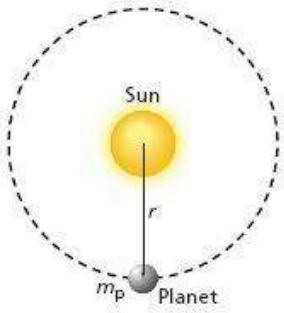
3 - According to Kepler's laws, the paths of the planets are _____.

A) parabolas B) ellipses C) Earth-centered D) circles

4 - The attractive force that exists between all masses is known as the _____.

A) gravitational force B) centripetal force C) torque D) normal force

5 - If the mass of the planet were doubled in the diagram below, what effect would it have on the period of its period of orbit?



A) The new period would be twice the original period.

B) There would be no significant change in the period of the orbit.

C) The new period would be one-half the original period.

D) The new period would be one-quarter the original perio

6 - If the mass of a planet near the Sun were doubled, the force of attraction would _____.

A) remain constant B) be squared C) be one half as strong D) be doubled

7 - Two balls have their centers 3.0 m apart. One ball has a mass of 2.7 kg. The other has a mass of 4.5 kg. What is the gravitational force between them? Assume G = 6.67×10^{-11} N·m2/kg2.

A) 1.3×10^{-11} N B) 9.0×10^{-10} N C) 2.7×10^{-10} N D) 9.0×10^{-11} N

8 - In Newton's equation for the law of universal gravitation, $F = Gm1m2/r^2$, r is _____.

A) the distance between the centers of the masses B) universal constant

C) the distance between a planet and the Sun D) the difference in the two masses

9 - In 1798, _____ devised an apparatus to measure the gravitational force.

A) Henry Cavendish B) Johannes Kepler C) Isaac Newton D) Tycho Brahe

10 - According to Kepler's laws, an imaginary line from the Sun to a planet _____.

A) sweeps out equal areas in equal time periods

B) remains a constant length through the entire orbit of that planet

C) sweeps out larger areas the greater the planet's distance from the Sun than it would in the same time interval when closest to the Sun

D) sweeps out larger areas when the planet is closest to the Sun than it would in the same time interval when farthest from the Sun

11 - According to Newton's law of universal gravitation in the case of a planet near the Sun, which of the following would necessarily cause the attractive force to be quadrupled?

A) square the mass of the planet B) quadruple the distance from the Sun

C) halve the distance from the Sun D) double the mass of the planet

12 - Assume that you have a mass of 45.0 kg and Earth has a mass of 5.97×10^{24} kg. The radius of Earth is 6.38×10^{6} m. What is the force of gravitational attraction between you and Earth? Use G = 6.67×10^{-11} N·m2/kg2.

A) 6.60×10^{2} N B) $2.80\times^{102}$ N C) 9.80 N D) 4.40×10^{2} N

13 - Which of the following equations describes one of Kepler's laws?

A) $(TA/rA)^2 = (TB/rB)^3$ B) $(TB/TA)^2 = (rA/rB)^3$ C) $(TA/TB)^2 = (rA/rB)^3$ D) $(TA/TB)^3 = (rA/rB)^2$

14 - Which of the following equations represents Newton's law of universal gravitation?

A) $F = Gm1m^2/r^2$ B) $G = Fm1m^2/r^2$ C) $T^3 = (4?2/Gms)r^2$ D) $T = (4?2/Gms)r^3$

15 - Two bowling balls each have a mass of 6.3 kg. They are located next to each other with their centers 16.5 cm apart. What gravitational force do they exert on each other? Assume G = 6.67×10^{-11} N·m2/kg2.

A) 9.7×10^{-7} N B) 1.6×10^{-8} N C) 9.7×10^{-8} N D) 3.1×10^{-7} N

16 - Two 1.00-kg masses have their centers 1.00 m apart. What is the force of attraction between them?

A) 6.67×10^{-11} N B) 1.33×10^{-10} N C) 9.7×10^{-8} N D) 6.67×10^{11} N

17 - According to Kepler's laws, which of the following statements is true?

A) All points on the path of the planet's orbit are equidistant from the Sun.

B) Planets move faster when they are closer to the Sun and slower when they are farther away.

C) Planets orbit at constant velocity.

D) Planets move slower when they are closer to the Sun and faster when they are farther away.

18 - The time it takes a comet to complete one revolution is called the _____.

A) focus B) orbit C) period D) ellipse

19 - If you weigh 440.0 N on Earth's surface, how much would you weigh on the planet Mars? Mars has a mass of 6.42×10^{23} kg and a radius of 3.40×10^{6} m.

A) 557 N B) 235 N C) 1.4×10^{3} N D) 166 N

20 - A satellite orbits Earth 5.00×102 km above its surface. What is its period?

A) 94.6 h B) 1.43 h C) 1.58 h D) 15.7 h

21 - What is the orbital period for Landsat 7, which orbits the Earth at an altitude of 705 km?

A) 1.65 h B) 3.14 h C) 0.0520 h D) 172 h

22 - The _____ of an object is measured by applying a force to the object and measuring its acceleration.

A) inertial mass B) weight C) gravitational mass D) resistance

23 - A satellite orbits Earth 5.00×102 km above its surface. What is its orbital speed?

A) 7.61×10^{3} m/s B) 7.90×10^{3} m/s C) 5.92×10^{3} m/s D) 7.76×10^{3} m/s

24 - When Uranus was discovered, why didn't Newton's law of gravitation correctly predict its orbit?

A) The period of Uranus was not known at the time. B) Newton's laws could not be applied over such great distances.

C)Newton's law of gravitation applies only to objects on Earth. D)Uranus was being attracted by the planet Neptune.

25 - If Earth began to shrink but its mass remained the same, what would happen to the value of g on Earth's surface?

A) It would remain constant. B) It would decrease. C) It would increase. D) It would be halved.

رقم السؤال	الإجابة		رقم السؤال	الإجابة		رقم السؤال	الإجابة
1	A		10	A		19	D
2	C		11	C		20	C
3	B		12	D		21	A

4	A		13	C		22	A
5	B		14	A		23	A
6	D		15	C		24	D
7	D		16	A		25	C
8	A		17	B			
9	A		18	C			

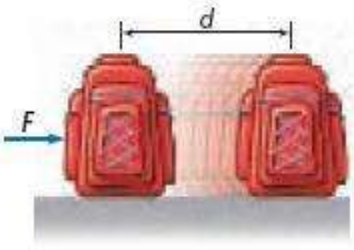
Chapter 9: Energy, Work, and Simple Machines

Work, Energy and Machines الشغل والطاقة والآلات			
W = F d cosθ	$w = kF_f - KE_i = \frac{1}{2}mv_f{}^2 - \frac{1}{2}mv_i{}^2$	$P = \frac{\Delta E}{t}$	$P = \frac{W}{t} = \frac{Fd}{t} = F\,v$

1 - An electric motor lifts an elevator 14.0 m in 22.5 s by exerting an upward force of 1.75×10^4 N. What power does the motor produce in kilowatts?

A) 10.9 kW B) 1.09×10^4 kW C) 2.45×10^4 kW D) 245 kW

2 - In the figure below, if the force exerted on the backpack is 20.0 N and the distance it acts over is 0.25 m, what is the change in kinetic energy of the backpack?



A) 2.5 J B) 5.0 J C) 4.0×10^1 J D) 8.0×10^1

3 - If you exert a force on an object in the direction opposite to its motion, the kinetic energy of the object _____.

A) is zero B) decreases C) increases D) remains constant

4 - How much work does the force of gravity do when a 50.0-N object falls a distance of 10.0 m?

A) 5.00×10^2 J B) 51.0 J C) 125 J D) 98.0 J

5 - One _____ is one joule of energy transferred in one second.

A) calorie B) newton C) volt D) watt

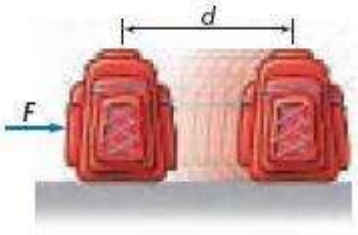
6 - An airplane passenger carries a 300.0-N suitcase up the stairs, a displacement of 5.50 m vertically and 3.75 m horizontally. How much work does the passenger do?

A)1.13×10^3 J B)1.65×10^2 J C)2.78×10^3 J D)1.65×10^3 J

7 - A 1200.0-kg car speeds up from 16.0 m/s to 20.0 m/s. How much work was done on the car to increase its speed?

A) 8.6×10^5 J B) 9.6×10^3 J C) 8.6×10^4 J D) 3.1×10^5 J

8 - In the figure below, if the force exerted on a 3.0-kg backpack that is initally at rest is 20.0 N and the distance it acts over is 0.25 m, what is the final speed of the backpack?



A) 1.8 m/s B) 2.8 m/s C) 5.0 m/s D) 3.3 m/s

9 - How much work does the force of gravity do on a 5.45-kg bowling ball that falls a distance of 0.755 m?

A) 40.3 J B) 71.2 J C) 4.11 J D) 262 J

10 - The equation for calculating work when there is an angle between force and displacement is _____.

A) $W = Fd\cos\Delta$ B) $W = F/m$ C) $W = Fd$ D) $W = F\Delta KE$

11 - The energy of an object resulting from motion is _____ energy.

A) potential B) kinetic C) mechanical D) thermal

12 - A 16.8-kg boy is riding in a 4.50-kg wagon. A 14.0-kg girl pushes the wagon and exerts a constant force of 2.60 N over a distance of 3.50 m. How much work does the girl do pushing the wagon?

A) 9.10 J B) 127 J C) 0.26 J D) 66.4 J

13 - A student lifts a box of books that weighs 215 N. The box is lifted 1.75 m. How much work does the student do on the box?

A) 38.4 J B) 217 J C) 123 J D) 376 J

14 - Energy is defined as _____.

A) power B) the ability of an object to produce change in the environment or itself

C) motion D) the effort required to perform work

15 - A student lifts a box of books that weighs 215 N. The box is lifted 1.75 m. What is the change in energy of the box?

A) 38.4 J B) 376 J C) 225 J D) 123 J

16 - The work-energy theorem states that _____.

A) when a machine works at 100 percent efficiency, the energy of the system remains constant

B) when work is done at a rate of one joule per second, the power produced is one watt

C) when work is done on an object, a change in kinetic energy results.

D) effort is required to resist a change in the energy of a system

17 - A joule is _____.

A)1 N·s B) 1 N·m/s C) 1 N·m D) 1 Fr/Fe

18 - The unit for kinetic energy is the _____.

A) ampere B) volt C) joule D) watt

19 - A steel ball with mass 5.0 kg is at rest on a smooth, level surface. A constant force acts on it through a distance of 10.0 m causing it to roll at 25 m/s. What is the magnitude of the force?

A) 1.6×10^2 N B) 1.6×10^3 N C) 4.9 N D) 6.3 N

20 - A rope is used to pull a metal box 12.0 m across the floor with a force of 456 N. The rope is held at an angle of 52.0° with the floor. How much work does the puller do?

A) 5.47×10^3 J B) 4.31×10^3 J C) 3.37×10^3 J D) 3.37×10^2 J

21 - A sailor pulls a boat 15.0 m along a dock using a rope that makes a 45.0° angle with the horizontal. How much work does the sailor do on the boat if he exerts a force of 185 N on the rope?

A) 1.96×10^3 J B) 1.59×10^3 J C) 1.96×10^2 J D) 2.78×10^3 J

22 - A 1200.0-kg car speeds up from 16.0 m/s to 20.0 m/s. What were its initial and final energies?

A) initial 4.80×10^5 J, final 3.07×10^5 J B) initial 2.40×10^5 J, final 1.54×10^5 J

C) initial 1.54×10^5 J, final 2.40×10^5 J D) initial 3.07×10^5 J, final 4.80×10^5 J

23 - A forklift raises a box 2.5 m doing 8.7 kJ of work on it. What is the mass of the box?

A) 3.6×10^3 kg B) 3.5×10^3 kg C) 7.2×10^2 kg D) 3.6×10^2 kg

24 - The equation for work is _____.

A) W = Fd B) W = FΔKE C) W = ma D) W = F/m

25 - A rifle can shoot a 4.20-g bullet at a speed of 965 m/s. What is the kinetic energy of the bullet as it leaves the rifle?

A) 1.96×10^6 J B) 2.03 J C) 1.96×10^3 J D) 2.03×10^3 J

26 - Which of the following has the greatest kinetic energy, a 35.0-g bullet traveling at 1.20×10^3 m/s, a 35.0-kg cheetah running at 30 m/s, an 875-kg car traveling at 5 m/s, or a 148-g pitched baseball moving at 45 m/s?

A) bullet B) cheetah C) car D) baseball

27 - A 16.8-kg boy is riding in a 4.50-kg wagon. A 14.0-kg girl pushes the wagon and exerts a constant force of 2.60 N over a distance of 3.50 m. What is the change in energy of the boy and the wagon?

A) 9.10 J B) 12.8 J C) 25.5 J D) 47.6 J

28 - A hydrolic lift raises a 1.14×10^3-kg car a distance of 2.4 m. If the car is lifted in 47 s, how much power does the lift produce?

A) 570 kW B) 290 W C) 570 W D) 58.2 W

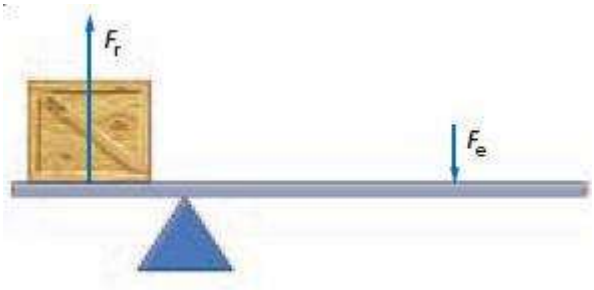
29 - _____ is the rate of doing work.

A) Energy B) Force C) Power D) Effort

30 - The ratio of resistance force to effort force is called the _____.

A) torque B) mechanical advantage C) power D) efficiency

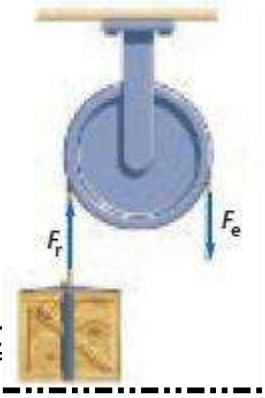
31 - If the machine below is ideal and an effort force of 7.0 N just lifts a 14.0 N box situated 0.75 m from the pivot, what is the distance from the pivot point to where the effort force is exerted?



A) 2.0 m B) 0.38 m

C) 1.5 m D) 65 m

32 - If the efficiency of the pulley system bellow is 95 percent, what effort force must be exerted to lift a 20.0 N box at constant velocity?



A) 20 N

B) 19 N

C) 22 N

D) 21 N

33 - The _____ of a machine is defined as the ratio of output work to input work.

A) IMA B) mechanical advantage C) efficiency D) reliability

34 - The rear wheel of a bicycle has a radius of 38.5 cm and has a gear with a radius of 4.75 cm. When the chain is pulled with a force of 175 N, the wheel rim moves 18.0 cm. The efficiency of this part of the bike is 95.0 percent. How far was the chain pulled to move the rim that amount?

A) 1.45×10^2 cm B) 1.45 cm C) 2.12 cm D) 2.21 cm

35 - The force exerted by a machine is called the _____.

A) mechanical advantage B) effort force C) mechanical force D) resistance force

رقم السؤال	الإجابة		رقم السؤال	الإجابة		رقم السؤال	الإجابة		رقم السؤال	الإجابة
1	A		11	B		21	A		31	C
2	B		12	A		22	C		32	D
3	B		13	D		23	D		33	C
4	A		14	B		24	A		34	D
5	D		15	B		25	C		35	D
6	D		16	C		26	A			
7	C		17	C		27	A			
8	A		18	C		28	C			
9	A		19	A		29	C			
10	A		20	C		30	B			

Chapter 12: Thermal Energy

Thermal Energy الطاقة الحرارية			
$T_K = T_C + 273$ $Q = m\,C\,\Delta T$	$T_f = \frac{m_A C_A T_A + m_B C_B T_B}{m_A C_A + m_B C_B}$		$Q = mH_f$ $Q = mH_v$
$\Delta U = Q - W$	$e = \frac{W}{Q_H}$	$\Delta S = \frac{Q}{T}$	

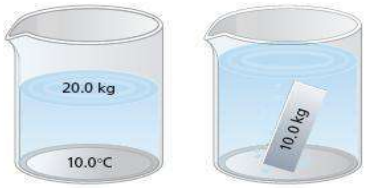
1-If the final temperature of a system is greater than the initial temperature, Δt is _____.

A) positive B) eliminated C) negative D) reduced

2- _____ is the amount of energy that must be added to a material to raise one unit of mass by one temperature unit.

A) Temperature B) Specific Heat C) Radiation D) Hotness

3- In the figure below, if you doubled the amount of zinc put into the beaker, which of the following effects would it have on the final equilibrium temperature?



A) This question can not be answered without knowing the size of the container.

B) The final equilibrium temperature of the water and zinc would be greater.

C) It would have no effect; the final equilibrium temperature would be the same as before.

D) The final equilibrium temperature of the water and zinc would be lower.

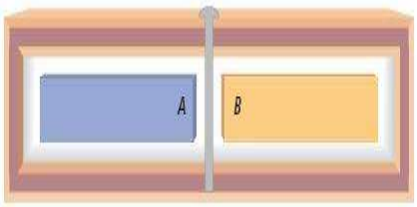
4 - Thermodynamics is the study of _____.

A) heat B) light C) stars D) sound

5 - What does a calorimeter measure?

A) change in radiation B) change in thermal energy C) change in kinetic energy D) change in temperature

6 - Looking at the situation in the figure below, and using the same color scheme as in the figure, how would the block in part b be shaded after a really long time? Assume the two blocks have the same mass.



A) The left half would be yellow and the right half would be blue.

B) The whole block would be red.

C) The left half would be blue and the right half would be yellow.

D) The whole block would be green.

7 - In which direction does heat flow?

A) from hot to cold B) from left to right C) from light to dark D) from cold to hot

8 - Absolute zero is _____.

A) 273 K B) -273°F C) -273 K D) -273°C

9 - You have equal masses of four of the substances listed in Table 12-1. All are at the same initial temperature, and then you place them in a hotter room. Which of the objects' temperatures will increase the most rapidly?

A) Iron B) Aluminum C) Lead D) Zinc

10 - The Sun warms us by _____.

A) conduction B) convection C) induction D) radiation

11 - You have equal masses of four of the substances listed in Table 12-1. All are at the same initial temperature, and then you place them in a hotter room. Which of the objects' temperatures will increase the most slowly?

Heats of Fusion and Vaporization of Common Substances

Material	Heat of Fusion H_f (J/kg)	Heat of Vaporization H_v (J/kg)
Copper	2.05×10^5	5.07×10^6
Mercury	1.15×10^4	2.72×10^5
Gold	6.30×10^4	1.64×10^6
Methanol	1.09×10^5	8.78×10^5
Iron	2.66×10^5	6.29×10^6
Silver	1.04×10^5	2.36×10^6
Lead	2.04×10^4	8.64×10^5
Water (ice)	3.34×10^5	2.26×10^6

A) Brass B) Glass

C) Zinc D) Aluminum

12 - Heat is transferred by _____ when objects touch.

A) convection B) radiation C) thermoduction D) conduction

13 - Water boils at 100° on the _____ temperature scale.

A) Celsius B) Molecular C) Kelvin D) Fahrenheit

14 - Which of the following is ordered from the least thermal energy to the most?

A) ice to steam to water B) water to ice to steam C) ice to water to steam D) steam to water to ice

15 - The thermal energy needed to boil a liquid is the heat of _____.

A) condensation B) specific C) fusion D) vaporization

16 - When disorder increases, entropy _____.

A) decreases B) fluctuates C) reaches zero D) increases

17 - The average kinetic energy of ice particles_____ as ice melts.

A) decreases B) increases C) reduces to zero D) remains constant

18 - An increase in heat in a system _____.

A) less kinetic energy B) decreases entropy C) increases entropy D) reduces temperatur

19 - Which of the following processes is NOT like the dye spreading through the beaker in the figure below?

A) Shortly after your mother puts cookies in the oven to bake you can smell them in your bedroom.

B) Dandilion seeds spread from one yard into several others.

C) At a restaurant, you notice smoke in the air from the cigarette of a person several tables away.

D) You use the vacuum cleaner to suck the dirt out of the carpet.

20 - Which has the highest entropy?

A) a diamond B) a fire C) an ice cube D) a stack of books

21 - Using information from the table below, determine which of the following processes will require the most energy be added.

A)1 kg of iron is changed from liquid to gas.

B)2 kg of water is evaporated.

C)1 kg of liquid mercury is frozen.

D)1 kg of copper is converted from solid to liquid.

Heats of Fusion and Vaporization of Common Substances

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Silver	1.04×10^5	2.36×10^6
Lead	2.04×10^4	8.64×10^5
Water (ice)	3.34×10^5	2.26×10^6

22 - Heat spontaneously flowing from a cold body to a hot body violates the _____.

A) law of conservation of energy B) kinetic-molecular law

C) first law of thermodynamics D) second law of thermodynamics

23 - The first law of thermodynamics is a restatement of which law?

A) gravity B) second law of thermodynamics C) conservation of energy D) kinetic-molecular law

24 - Friction that you feel when you rub your hands together was changed from _____ to heat.

A) sound energy B) thermal energy C) nuclear energy D) kinetic energy

25 - A perpetual motion machine violates which law?

A) third law of conservation B)first law of thermodynamics

C) third law of thermodynamics D) first law of gravity

26 - Which is an example of a heat engine?

A) windmill B) automobile engine C) solar panels D) volcano

رقم السؤال	الإجابة		رقم السؤال	الإجابة		رقم السؤال	الإجابة
1	D		10	D		19	D
2	D		11	D		20	B
3	B		12	D		21	A
4	A		13	A		22	D
5	B		14	C		23	C
6	D		15	D		24	D
7	A		16	D		25	B
8	D		17	D		26	B
9	C		18	C			

Chapter 13: States of Matter

States Of Matter حالات المادة			
$P = \frac{F}{A}$	$P_1V_1 = P_2V_2$	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
$PV = nRT$	$\frac{F_1}{A_1} = \frac{F_2}{A_2}$	$P = \rho gh$	$F_{Buoyant} = \rho_{flouid}\, V\, g$
$F_{net} = F_g - F_{buoyant}$	$F_g = mg = \rho_{solid} V\, g$	$\alpha = \frac{\Delta L}{L_1\, \Delta T}$ $= \frac{L_2 - L_1}{L_1(T_2 - T_1)}$	$\beta = \frac{\Delta V}{V_1\, \Delta T} = \frac{V_2 - V_1}{V_1(T_2 - T_1)}$

1 - Which state of matter is the most common in the universe?

A) solid B) gas C) liquid D) plasma

2 - As water cools below 4°C, what happens?

A) it changes to an amorphous solid B) it contracts C) it melts D) it expands

3 - What causes air pressure?

A) air particles vaporize B) air particles flow through an object

C) air particles hit an object D) air particles suck away from an object

4 - What are the four stages of matter in order from least kinetic energy to most kinetic energy?

A) plasma, gas, liquid, solid B) plasma, solid, gas, liquid C) solid, liquid, gas, plasma D) solid, liquid, plasma, gas

5 - What are the particles in plasma?

A) free nuclear particles of protons, neutrons, and electrons B) positively charged ions and negatively charged electrons

C) negatively charged ions and positively charged protons D) free neutrons

6 - _____ have no definite shape and flow.

A) Crystals B) Solids C) Metals D) Fluids

7 - Pressure is measured as _____.

A) FA B) F/A C) A/F D) F + A

8 - A particle is moving so fast in a liquid that it escapes the liquid's cohesive force. This is an example of _____.

A) condensation B) sublimation C) evaporation D) melting

9 - Surface tension is a result of _____ in a fluid.

A) nuclear forces B) adhesive forces C) cohesive forces D) kinetic force

10 - _____ is the force that acts between particles of different substances.

A) Rehesion B) Cohesion C) Elasticity D) Adhesion

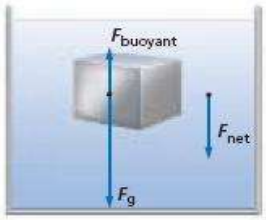
11 - Which of the following does pressure in water not depend on?

A) depth B) density C) shape D) gravity

12 - The buoyant force is in which direction?

A) toward higher pressures B) upward C) circular D) downward

13 - In the figure below, if the chunk of steel were cut in half and one of the pieces were placed in the same liquid, how would it behave?



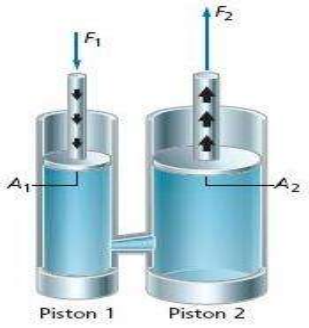
A) It would float mostly submerged. B) It would sink to the bottom of the container

C) There is insufficient information to answer the question. D) It would float almost entirely above the surfac

14 - If you wanted to use a setup like the one in the figure below to create an upward force triple that of the downward force you exert, which of the following combination of piston radii could accomplish this?

A) r_1, 3 m; r_2, 1 m B) r_1, 0.577 m; r_2, 1 m

C) r_1, 0.333 m; r_2, 1 m D) r_1, 1.73 m; r_2, 1 m



15 - To rise in water, a fish uses its air bladder to _____.

A) displace more water B) increase water pressure

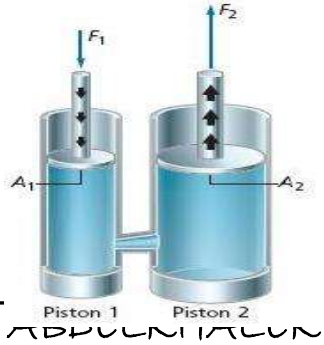
C) increase air pressure D) displace less water

16 - _____ states that any change in pressure applied to any point on a confined fluid is transmitted undiminished throughout the fluid.

A) Boyle's law B) Pascal's principle

C) Galileo's law D) Dalton's law

17 - If you wanted to use a setup like the one in the figure bellow to create an upward force triple that of the downward force you exert, which of the following combination of piston areas could accomplish this?



A) A_1, 6 m^2; A_2,10 m^2 B) A_1, 6 m^2; A_2, 18 m^2

C) A_1, 6 m^2; A_2, 2 m^2 D) A_1, 6 m^2; A_2, 8 m^2

18 - What type of buoyancy results in a feeling of weightlessness?

A) positive B) neutral C) changing D) negative

19 - Why does ice float?

A) It is an amorphous solid. B) It has strong cohesive properties.

C) It has a lower density than water. D) It has a higher density than water.

20 - Which is an example of Pascal's principle?

A) a straw B) hydroplaning wheels C) hydraulic brakes D) a sipho

21 - According to Archimedes' principle, an object immersed in fluid has an upward force on it equal to _____.

A) the weight of the fluid displaced B) the weight of all the fluid in the container

C) the weight of the fluid displaced minus the weight of the object D) the weight of the object

22 - What happens to a bimetallic strip when it is heated?

A) it becomes elastic B) its cohesive properties decrease

C) it bends D) it contracts

23 - Why is it important to take thermal expansion into account when building bridges?

A) so the bridge will not move at all

B) so the bridge materials expand and contract with the changes in weather

C) so the bridge materials can change state as the weather changes

D) so the bridge materials don't deteriorate

24 - Amorphous solids have no _____.

A) volume B) liquid phase C) crystalline pattern D) shape

25 - In terms of the kinetic-molecular theory, why do substances expand when heated?

A) The particles vibrate less and push other particles away.

B) The particles on the surface vibrate faster.

C) The particles vibrate more, causing air pressure to compress the substance.

D) The particles vibrate more and push other particles away.

26 - Which example demonstrates elasticity?

A) a snapping rubber band B) a bent iron bar C) a broken stick D) a melted stick of butter

27 - If an iron bar expands 0.1 cm when heated 20°C, how much would it expand if it were heated 40°C?

A) 1 cm B) 0.1 cm C) 0.05 cm D) 0.2 cm

رقم السؤال	الإجابة		رقم السؤال	الإجابة		رقم السؤال	الإجابة
1	D		10	D		19	C

2	D		11	C		20	C
3	C		12	B		21	A
4	C		13	B		22	C
5	B		14	B		23	B
6	D		15	A		24	C
7	B		16	B		25	D
8	C		17	B		26	A
9	C		18	B		27	D