Exam 1

Use Pencil. NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely. e.g. (●) DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is, if one of the multiple choices listed is greater than A/1.1 and less than 1.1 × A, then that choice is correct; otherwise mark "(●) Not Given".

Note: \( f = 10^{15} \); \( p = 10^{-12} \); \( n = 10^{-9} \); \( u = 10^{-6} \); \( m = 10^{3} \); \( k = 10^{5} \); \( M = 10^{6} \); \( G = 10^{9} \); \( T = 10^{12} \)

1. I throw a ball directly upward with a velocity of +5 m/s. Find its position (in m) 1.3 s later.
   [Assume the zero of position is at Dr. I's hand.]
   \( \bullet \) -8.3; \( \bullet \) +16; \( \bullet \) +6.5; \( \bullet \) -1.8; \( \bullet \) not given

2. \( v = 5 \text{ m/s} \); \( t = 1.3 \text{ s} \); \( d = vt \rightarrow d = (5 \cdot 1.3) \rightarrow d = 6.5 \text{ m} \)
   Find the gravitational force (in kN) on a 6 × 10^{14} kg comet that is 5 × 10^{15} m from the 2 × 10^{30} kg sun.
   \( \bullet \) 3.2; \( \bullet \) 2.4; \( \bullet \) 2.0; \( \bullet \) 5.8; \( \bullet \) not given
   \( F = \frac{(6 \times 10^{14})(5 \times 10^{15})}{(2 \times 10^{30})} \rightarrow F = 200.0 \text{ kN} \)

3. The combination of units \([\text{N} \cdot \text{s} / (\text{m} \cdot \text{kg})]\) is equivalent to (i.e. the same as) the unit(s):
   ( ) \( \text{s} \); \( \text{s} / \text{m} \); \( \text{J} / \text{m} \); \( \text{N}^2 \); \( \text{s} \cdot \text{kg}^2 \)

   \( N = \text{kg} \text{m/s}^2 \)
   \( N \text{sec} / \text{kg} \cdot \text{m/s} = \frac{1}{s} \)

   Find "g" (in m/s^2) on Planet Hollywood where an astronaut weighs 460 N if she weighs 750 N on earth.
   \( \bullet \) 6.0; \( \bullet \) 47; \( \bullet \) 77; \( \bullet \) not given

   \( F = \frac{N \text{m} / \text{kg}}{1 \text{ kg}} \rightarrow F = 50.0 \text{ N} \)\( g = 10 \text{ m/s}^2 \)

   Tired 820-N Dr R is sleeping in a 210-kg bed. Find the (normal) force (in kN) the floor exerts on the bed.
   \( \bullet \) 0.82; \( \bullet \) 1.2; \( \bullet \) 2.1; \( \bullet \) 9.2; \( \bullet \) not given

   \( F = \frac{1000 \text{ N} \cdot 9.8 \text{ m/s}^2}{210 \text{ kg}} = 43.9 \text{ kN} \)

4. Pres. Born ties a rope around 950-N Dr. I's neck and pulls the good doctor with an 1100-N force up to the top of the Clock Tower. Find Dr. I's acceleration (in m/s^3).
   \( \bullet \) 15; \( \bullet \) 11; \( \bullet \) 21; \( \bullet \) 97; \( \bullet \) not given

   \( F = 1100 \text{ N} \); \( m \); \( a \); \( 1 \text{ kg} \)\( a = \frac{1100}{9.8} \text{ m/s}^2 \)\( a = 113 \text{ m/s}^2 \)

5. Find the force (in mN) due to air resistance on a 2-gram leaf falling with a TERMINAL velocity of 1.3 m/s.
   \( \bullet \) 0.0; \( \bullet \) 20; \( \bullet \) 3.9; \( \bullet \) not given

   \( F = \frac{2 \times 2 \times 9.8 \times 10^{-3}}{2 \times 6.7 \times 10^{-3}} \rightarrow F = 32.0 \text{ N} \)

6. If you drive the first 120 miles of a 470-mile trip in 3 h, how fast (in m/s) must you drive the remainder of the trip if the total trip takes 8 h?
   \( \bullet \) 57; \( \bullet \) 70; \( \bullet \) 31; \( \bullet \) not given

   \( v = \frac{470 \text{ miles} - 120 \text{ miles}}{8 \text{ hours} - 3 \text{ hours}} \rightarrow v = 57 \text{ m/s} \)

7. Find the NET force (in kN) on a 76,000-kg plane flying 180 m/s directly east at an altitude of 9500 m.
   \( \bullet \) 14,000; \( \bullet \) 740; \( \bullet \) 350; \( \bullet \) 420; \( \bullet \) not given

   \( (76,000 \text{ kg})(180 \text{ m/s}) = 13,800 \text{ kN} \)

   \( \frac{13,800}{9500} \rightarrow 14 \text{ kN} \)
A rocket goes from 75 miles per hour to 350 miles per hour in 9 s. Find its acceleration (in m/s^2).

\( \frac{\Delta v}{\Delta t} = \frac{350 - 75}{9} = 28.3 \text{ m/s}^2 \)

A skydiver drops out of a hovering helicopter and falls freely. Find his velocity (in m/s) 3.4 s later.

\( v_f = v_i + gt = 0 + 9.8 \times 3.4 = 33.3 \text{ m/s} \)

Find the centripetal acceleration (in m/s^2) of a 0.5-kg ball traveling 12 m/s in a 1.5-m-radius circle.

\( a_c = \frac{v^2}{r} = \frac{12^2}{1.5} = 96 \text{ m/s}^2 \)

Select the number below that most accurately represents the distance traveled (in m) between the times t = 5 s and t = 9 s by the object whose velocity vs. time graph is given in Fig. B.

- 70
- 40
- 30

Select the number below that most accurately represents the instantaneous velocity (in m/s) at the time t = 9 s of the object whose position vs. time graph is given in Fig. A.

- 20
- 5.0
- 4.0

Find the acceleration (in km/s^2) of a 1.7 \times 10^{-27} kg proton that experiences a net force of 3.9 \times 10^{-24} N.

\( a = \frac{F}{m} = \frac{3.9 \times 10^{-24}}{1.7 \times 10^{-27}} = 220 \text{ m/s}^2 \)

Select the number below that most accurately represents the average acceleration (in m/s^2) between the times t = 7 s and t = 12 s of the object whose velocity vs. time graph is given in Fig. B.

- 3.0
- 2.0
- 1.0

How far (in m) does a glacier travel in one year if its average velocity is 1/8 of an inch per hour?

\( v = \frac{1}{8} \text{ inch/h} = \frac{1}{8} \times \frac{1}{12} \text{ m/s} = 0.0032 \text{ m/s} \)

If 64 mite = 1 carat, 1 carat = 0.29 obol, and 5.8 obol = 1 dinar, how many dinar is 3700 mite?

\( \frac{3700 \text{ mite}}{64 \text{ carats}} \times \frac{1 \text{ carat}}{0.29 \text{ obol}} \times \frac{5.8 \text{ obol}}{1 \text{ dinar}} = 2.89 \text{ dinar} \)
Exam 2  Physics 1114 Fall 2009

Use Pencil, NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely. e.g. (e)

DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is: If one of the multiple choices listed is "greater than A/1.1 and less than 1.1*A", then that choice is correct; otherwise mark "(e) Not Given".

Note: $f = 10^{-15}$, $p = 10^{-12}$; $n = 10^3$; $\mu = 10^{-6}$; $m = 10^3$; $k = 10^3$; $M = 10^6$; $G = 10^2$; $T = 10^{12}$.

1. At Six Flags over Norman, Dr. I starts from rest at the top of a frictionless slide. How high (in m) is the slide if he is traveling 10 m/s at the bottom of the slide?
   - 5.1; ( ) 0.54; ( ) 4.0; ( ) 10; ( ) need his mass

2. Find the NET force (in kN) on a 1.2-m by 0.5-m window on the space shuttle when it is in orbit, if the pressure inside the shuttle is 0.6 atm.
   - 3.6; ( ) 61; ( ) 47; (e) 36; ( ) not given

3. Which of the following has the smallest volume:
   - 11 kg of iron; ( ) 14 kg of brass; (e) 8 kg of water; ( ) 7 kg of ice; ( ) 20 kg of lead

4. Find the force (in N) required to load a 75-kg box on a 1.5-m-high truck using a 6-m-long frictionless ramp.
   - 11; ( ) 240; (e) 180; ( ) 19; ( ) not given

5. Find the pressure (in kN/m^2) needed to lift a 48-kN truck using hydraulic lift with a 0.25-m-radius piston.
   - 61; (e) 240; ( ) 770; ( ) 2400; ( ) not given

6. How deep (in m) below the surface of Lake Dirtybird is Dr. I, if the total pressure on him is 180 kN/m^2 and the pressure at the surface of the lake is 1 atm?
   - 29; ( ) 6.2; ( ) 11; (e) 18; ( ) not given

7. Traveling 17 m/s, Dr. I's 1300-kg car collides with Prez Boren's stalled 3700-kg truck locking bumpers. Find the final speed (in m/s) of the Dynamic Duo assuming no brakes were set.
   - 6.0; (e) 4.4; ( ) 13; ( ) 17; ( ) not given

8. How much does electricity cost (in $/kWh) if you spend $1.25 to operate a 1.4 kW heater for 12 h?
   - 2.5; ( ) 9.5; ( ) 34; (e) 7.4; ( ) not given

9. What pressure (in kN/m^2) does a 65-kg ballerina exert on the floor standing on the 7 x 10^{-4} m^2 tip of her shoe.
   - 910; ( ) 34; ( ) 640; ( ) 93; ( ) not given

10. A 2.5-kg ball travelling 5.5 m/s hits a wall and bounces away from the wall with a speed of 3.5 m/s. Find the impulse (in N·s) that the wall exerts on the ball if it is in contact with the ball for 0.25 s.
    - 14; ( ) 90; ( ) 5.0; (e) 23; ( ) not given
11 Which of the following set of characteristics describes a liquid: (0-compressible; @ not easily compressed; • rigid; $ flows readily; $-strong forces between atoms; $$-very weak forces between atoms; $ atoms close together; $-atoms far apart; $-atoms only vibrate; $-atoms readily move about)
( ) 0, 4, 9; ( ) 2, 0, 9; ( ) 1, 7, 4, 9; ( ) 3, 3, 5, 8; ( ) 2, 4, 8, 9

12 Initially at rest on a frictionless frozen pond with a 5-kg bowling ball, 85-kg Dr. I throws the ball toward the far shore with a speed of 2.3 m/s. What is Dr. I's final speed (in m/s)?
( ) 0.14; ( ) 0.18; ( ) 2.3; ( ) 12; ( ) not given

13 Find the NET work (in MJ) required to accelerate a 2400-kg rocket from rest to 130 m/s.
( ) 15; ( ) 41; ( ) 0.31; ( ) 20; ( ) not given

14 How much work (in MJ) can a 1.5-hp (horsepower) motor do in 3 hours?
( ) 21; ( ) 3.6; ( ) 1100; ( ) 16; ( ) not given

15 Find the kinetic energy (in MJ) of a 1300-metric-ton ocean liner traveling 6 m/s. [1 metric ton = 1000 kg]
( ) 47; ( ) 18; ( ) 23; ( ) 7.8; ( ) not given

16 Using Fig. A, the graph of gauge pressure (in atm) vs. depth (in m), select the answer below that most accurately represents the increase in pressure (in kN/m²) as you go from a depth of 1.8 m to 7.3 m.
( ) 65; ( ) 120; ( ) 160; ( ) 90; ( ) 40

17 Find the mass density (in kg/m³) of Ryanite if a 33-kg cube of it has an edge of length 0.15 m.
( ) 220; ( ) 7500; ( ) 1500; ( ) 9800; ( ) not given

18 Find momentum (in kg · m/s) of a 2.5-gram leaf falling with a velocity of 1.7 ft/s.
( ) 0.0013; ( ) 4.3; ( ) 0.52; ( ) 0.0043; ( ) not given

19 A 7.2-kg bowling ball falls off a 0.85-m-high table hitting the floor. How much work (in J) could be done by the bowling ball as it hits the floor.
( ) 4.1; ( ) 6.1; ( ) 60; ( ) 2.6; ( ) not given

20 Starting from rest with 42 kJ of potential energy atop the Clock Tower, Dr. I slides down the side of the tower. Find the work (in kJ) done by Dr. I if he hits the ground (where PE = 0) with 17 kJ of kinetic energy.
( ) 32; ( ) 52; ( ) 42; ( ) 17; ( ) not given

Fig. A Gauge Pressure vs. Depth
Physics 1114 Fall 2009

Exam 3

Use Pencil, NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely. e.g. (●) DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is: if one of the multiple choices listed is "greater than A/1.1 and less than 1.1•A", then that choice is correct; otherwise mark "(●) Not Given".

Note: f = 10^{-15}, p = 10^{-12}, n = 10^5, µ = 10^{-6}, m = 10^{-3}, k = 10^3, M = 10^5, G = 10^9, T = 10^{12}

1

Changing a light bulb while standing on a damp floor, Dr. I experiences a 440-V potential difference between his hand and feet. If his total resistance is 3.5 kΩ, will he experience (●) discomfort; ( ) muscular contraction; ( ) difficulty breathing; ( ) ventricular fibrillation; or ( ) irreversible heart damage?

2

Find L, the latent heat of fusion, (in kJ/kg) of Indestructum if 1.3 MJ of energy is needed to melt 4.5 kg of Indestructum at its melting point of 7 °C.

( ) 380; ( ) 660; ( ) 42; ( ) 290; ( ) not given

3

Find ΔU, the change in the internal energy, (in kJ) of an ideal gas if the work done by the gas is 4.5 kJ while 2.5 kJ of heat is removed from the gas.

( ) +4.5; ( ) -7.0; ( ) -2.5; ( ) +2.0; ( ) not given

4

Find the repulsive force (in mN) between +6 nC charge and a +4 nC charge that are 5.4 mm apart.

( ) 5.4; ( ) 40; ( ) 11; ( ) 7.4; ( ) not given

5

How much liquid water (in kg) at 100 °C can be produced by removing 5.6 MJ from steam at 100 °C?

( ) 2.5; ( ) 17; ( ) 9.7; ( ) 1.3; ( ) not given

6

Which of the following is the smallest fuse (rated in A) that will operate a 1200 W heater on 67 V?

( ) 7.0 A; ( ) 9.0 A; ( ) 67 A; ( ) 14 A; ( ) 20 A

7

Find the Fahrenheit temperature that corresponds to -8 °C.

( ) -72; ( ) -22; ( ) +18; ( ) +13; ( ) not given

8

If the force between two equal charges Q a distance d = 2 m apart is 18 nN, what is the force (in nN) when the charges are a distance D = 6 m apart?

( ) 2.0; ( ) 160; ( ) 6.0; ( ) 54; ( ) 18

9

How much heat (in kJ) is required to raise the temperature of 7-kg of concrete from 20 °C to 70 °C?

( ) 350; ( ) 1500; ( ) 240; ( ) 670; ( ) not given

10

Find the resistance (in Ω) of a potato if 1.3 A of current flows through it when it is connected across a 45-V battery.

( ) 26; ( ) 0.029; ( ) 59; ( ) 35; ( ) not given
11 How much heat (in kJ) is required to produce 2 kg of water at 65 °C from 2 kg of ice initially at 0 °C?
( ) 1600; ( ) 1200; ( ) 670; ( ) 530; ( ) not given

12 How much charge (in C) flows through a 27-Ω resistor in 15 minutes if the current in it is 0.73 A?
( ) 20; ( ) 900; ( ) 410; ( ) 11; ( ) not given

13 An iron pipe is 530 m long at -5 °C. How much longer (in m) is it at 25 °C?
( ) 0.19; ( ) 12·10^{-6}; ( ) 0.30; ( ) 0.13; ( ) not given

14 How much energy (in GJ) is dissipated when 13 C of charge flows in a lightning bolt that flashes across a cloud-to-ground potential difference of 270 MV?
( ) 4.8; ( ) 3.5; ( ) 21; ( ) 1.4; ( ) not given

15 Find the net charge (in μC) in Dr. J’s pocket if it contains 4·10^{12} electrons, 950 protons, and 760 neutrons.
( ) -640; ( ) -2100; ( ) +880; ( ) +96; ( ) not given

16 Find the peak AC voltage, V_{peak} (in V) if the effective alternating voltage, V_{RMS} is 67 V.
( ) 130; ( ) 36; ( ) 95; ( ) 47; ( ) not given

17 Find the resistance (in Ω) of a 75-W light bulb that operates on 67 V.
( ) 0.89; ( ) 75; ( ) 1.1; ( ) 5,000; ( ) not given

18 Using the graph of voltage vs. current (in mA) in the resistor R given in Fig. A, select the answer that most accurately represents the power (in mW) dissipated in R when the current through R is 7 mA.
( ) 53; ( ) 4.3; ( ) 30; ( ) 210; ( ) 150

19 Find the current (in mA) through R_1 = 360 Ω in Fig. B if V_0 is 18 V.
( ) 530; ( ) 6.5; ( ) 50; ( ) 900; ( ) not given

20 Which of the following takes the largest amount of heat to raise 2.5 kg of it from -25 °C to +15 °C?
( ) lead; ( ) iron; ( ) copper; ( ) silver; ( ) concrete
Make-Up Exam  
Physics 1114  Fall 2009  

Make-Up Exam
Use Pencil, NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely. e.g. ( )
DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is: if one of the multiple choices listed is
'greater than A/1.1 and less than 1.1*A", then that choice is correct; otherwise mark "( ) Not Given".

Note: \( f = 10^{-15}; \ p = 10^{12}; \ n = 10^9; \ \mu = 10^6; \ m = 10^{-3}; \ k = 10^3; \ M = 10^6; \ G = 10^9; \ T = 10^{12} \)

1. On frictionless ice, 80-kg Dr. I. kicks a 3-kg box accelerating it at 3.4 m/s². Find Dr. I.'s acceleration (in m/s²).
   \( \dot{v} = 3.4; \) \( ( ) = 10; \) \( \boxed{0.13}; \) \( ( ) = 270; \) \( ( ) = \text{not given} \)

2. Find \( \Delta U \), the change in the internal energy, (in kJ) of an ideal gas if the work done by the gas is 7.2 kJ
   while 5.3 kJ of heat is added to the gas.
   \( ( ) = +13; \) \( ( ) = -9.1; \) \( ( ) = +5.3; \) \( ( ) = -7.2; \) \( \boxed{\text{not given}} \)

3. Which of the following is the largest 110-V heater (rated in W) that will operate on a 9-A fuse?
   \( ( ) = 110; \) \( ( ) = 1500; \) \( \boxed{800}; \) \( ( ) = 650; \) \( ( ) = 1200 \)

4. How deep (in m) below the surface of Lake Dirtybird is Dr. I, if the total pressure on him is 180 kN/m²
   and the pressure at the surface of the lake is 1 atm?
   \( ( ) = 18; \) \( ( ) = 4.0; \) \( \boxed{8.1}; \) \( ( ) = \text{not given} \)

5. Dr. I throws a ball directly upward with a velocity of +9 m/s. Find its velocity (in m/s) 1.2 s later.
   \( \boxed{2.8}; \) \( ( ) = -8.4; \) \( ( ) = +3.7; \) \( ( ) = -12; \) \( \boxed{\text{not given}} \)

6. Find the gravitational force (in µN) between a 8-10^5 kg rock and a 35-kg boy, which are 25 m apart.
   \( ( ) = 340; \) \( ( ) = 30; \) \( \boxed{43}; \) \( ( ) = 750; \) \( ( ) = \text{not given} \)

7. Find the resistance (in Ω) of a potato if 3.2 A of current flows through it when it is connected across
   a 90-V battery.
   \( ( ) = 21; \) \( ( ) = 290; \) \( ( ) = 0.036; \) \( \boxed{28}; \) \( ( ) = \text{not given} \)

8. How much does electricity cost (in ¢/kWh) if you spend $2.75 to operate a 1.8 kW heater for 20 h?
   \( \boxed{7.6}; \) \( ( ) = 36; \) \( ( ) = 9.5; \) \( ( ) = 6.1; \) \( ( ) = \text{not given} \)

9. How many electrons must Dr. I. remove from a piece of paper to leave it with a net charge of 445 µC.
   \( ( ) = 7.2 \cdot 10^{-24}; \) \( ( ) = 1.6 \cdot 10^{-19}; \) \( ( ) = 8.2 \cdot 10^{14}; \) \( \boxed{4.5 \cdot 10^{19}}; \) \( ( ) = \text{not given} \)

10. A 0.8-kg ball traveling 4 m/s hits a wall and bounces away from the wall with a speed of 3 m/s.
    Find the impulse (in N·s) that the wall exerts on the ball if it is in contact with the ball for 0.25 s.
    \( ( ) = 3.2; \) \( \boxed{5.6}; \) \( ( ) = 0.80; \) \( ( ) = 22; \) \( ( ) = \text{not given} \)


Find the acceleration (in \text{km/s}^2) of a 1.7 \cdot 10^{-27} \text{ kg} neutron that experiences a net force of 2.3 \cdot 10^{-23} \text{ N}.

\begin{align*}
\text{Options:} & \quad 740; & \quad 32; & \quad 470; & \quad 14; & \quad \text{not given} \\
\end{align*}

12. How much heat (in kJ) is required to produce 1.8 kg of water at 55°C from 1.8 kg of ice initially at 0°C?

\begin{align*}
\text{Options:} & \quad 1000; & \quad 780; & \quad 600; & \quad 410; & \quad \text{not given} \\
\end{align*}

13. Pres. Born ties a rope around 890-N Dr. I's neck and pulls the good doctor with a 970-N force up to the top of the Clock Tower. Find Dr. I's acceleration (in m/s^2).

\begin{align*}
\text{Options:} & \quad 11; & \quad 1.1; & \quad 0.88; & \quad 0.66; & \quad \text{not given} \\
\end{align*}

14. What pressure (in kN/m^2) does a 45-kg ballerina exert on the floor standing on the 9 \cdot 10^{-5} \text{ m}^2 tip of her shoe.

\begin{align*}
\text{Options:} & \quad 440; & \quad 3600; & \quad 580; & \quad 4900; & \quad \text{not given} \\
\end{align*}

15. Find the kinetic energy (in MJ) of a 900-metric-ton ocean liner traveling 6 m/s. [1 metric ton = 1000 kg]

\begin{align*}
\text{Options:} & \quad 23; & \quad 16; & \quad 5.4; & \quad 32; & \quad \text{not given} \\
\end{align*}

16. A rocket goes from 35 \text{ miles per hour} to 170 \text{ miles per hour} in 5 s. Find its acceleration (in m/s^2)

\begin{align*}
\text{Options:} & \quad 27; & \quad 60; & \quad 16; & \quad 21; & \quad \text{not given} \\
\end{align*}

17. Find the force (in N) required to load a 250-kg box on a 1.5-m-high truck using a 7-m-long frictionless ramp.

\begin{align*}
\text{Options:} & \quad 530; & \quad 400; & \quad 3700; & \quad 54; & \quad \text{not given} \\
\end{align*}

18. A skydiver drops out of a hovering helicopter and falls freely. How far (in m) does he fall in the first 1.5 s?

\begin{align*}
\text{Options:} & \quad 22; & \quad 29; & \quad 15; & \quad 11; & \quad \text{not given} \\
\end{align*}

19. Find the NET work (in MJ) required to accelerate an 1800-kg rocket from rest to 95 m/s.

\begin{align*}
\text{Options:} & \quad 16; & \quad 170; & \quad 8.1; & \quad 11; & \quad \text{not given} \\
\end{align*}

20. How much heat (in kJ) is required to raise the temperature of 4-kg of concrete from 20°C to 130°C?

\begin{align*}
\text{Options:} & \quad 300; & \quad 450; & \quad 1800; & \quad 670; & \quad \text{not given} \\
\end{align*}
Physics 1114
Physics 1114 Fall 2010

Exam 1

Use Pencil; NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely, e.g., ( ). DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is: if one of the multiple choices listed is "greater than A/1.1 and less than 1.1 times", then that choice is correct; otherwise mark "( ) Not Given".

Note: f = 10^{-15}; p = 10^{-12}; n = 10^{-9}; u = 10^{-6}; m = 10^{-3}; k = 10^3; M = 10^6; G = 10^9; T = 10^{12}

1. Dr I stands on a scale holding a box. Find the weight (in N) of the box if the scale reads 250 lb.
   ( ) 680; ( ) 41; ( ) 180; ( ) 370; ( ) not given

2. Find the net force (in kN) on an 1300-kg car traveling north on I-40 at the 65 mile/hour speed limit.
   ( ) 15; ( ) 20; ( ) 38; ( ) 40; ( ) not given

3. Acceleration

   Dr. I throws a ball directly upward with a velocity of +8 m/s. Find the ball's velocity (in m/s) 1.1 s later.
   ( ) +8.0; ( ) -2.8; ( ) -8.7; ( ) +17; ( ) not given

4. Find the gravitational force (in MN) on a 3 \times 10^{12} kg comet 8 Gm from the 6 \times 10^{24} kg earth.
   ( ) 19; ( ) 28; ( ) 56; ( ) 100; ( ) not given

5. The combination of units \([\text{N} \cdot \text{m}/\text{kg}]\) is equivalent to (i.e. the same as) the unit(s):
   ( ) \text{m/s}; ( ) \text{kg/s}; ( ) \text{kg} \cdot \text{m}^2/\text{s}; ( ) \text{N}; ( ) \text{kg} \cdot \text{s}

6. Find the centripetal force (in kN) needed to keep a 1500-kg car on the road as it travels 18 m/s around an 65 m radius curve.
   ( ) 0.42; ( ) 5.6; ( ) 7.5; ( ) 9.7; ( ) not given

7. Prez Loren ties a rope around 750-N Dr. I's neck and pulls the good doctor up to the top of the Clock Tower. Find the force (in N) that the Prez applies to the rope if Dr. I accelerates at 1.8 m/s^2.
   ( ) 890; ( ) 610; ( ) 77; ( ) 140; ( ) not given

8. A flea crawls 24 inches from a dog's nose to its tail in 2 days. Find the flea's average velocity (in \mu m/s).
   ( ) 140; ( ) 2.7; ( ) 11; ( ) 3.5; ( ) not given

9. Number Change

   On frictionless ice, a 120-kg student punches 70-kg Dr. I accelerating him at 0.32 m/s^2. Find the acceleration (in m/s^2) of the student.
   ( ) 98; ( ) 0.19; ( ) 22; ( ) 0.32; ( ) not given

10. Skydiving Dr. I starts his timer when he is freely falling 11 m/s. How far (in m) does he fall in the next 3 s?
    ( ) 44; ( ) 33; ( ) 59; ( ) 77; ( ) not given
11. Select the number below that most accurately represents the distance (in m) between the times $t = 8\ s$ and $t = 12\ s$ of the object whose velocity vs. time is given in Fig. B.

- 38;
- 7.5;
- 48;
- 5.0;
- 75

12. How long (in h) is a 400-mile trip if you drive 150 miles at 12 m/s and the rest of the trip at 28 m/s.

- 5.6;
- 4.0;
- 9.6;
- 25;
- not given

13. \[ \sqrt{13} \sqrt{ } \]

Find the net force (in nN) on a 3-gram leaf falling with a terminal velocity of 0.34 m/s.

- 0.32;
- 1.0;
- 20;
- 29;
- not given

14. If 1 liter = 0.21 hekat, 8.4 hekat = 1 ephah, and 24 ephah = 1 tun, how many tun is 1350 liters?

- 0.78;
- 1.4;
- 960;
- 32;
- not given

15. How fast (in km/s) is a 250-kg rocket travelling after 55 s if it accelerates from rest at 45 m/s²?

- 2.5;
- 1.5;
- 68;
- 1.2;
- not given

16. Select the number below that most accurately represents the average velocity (in m/s) between the times $t = 6\ s$ and $t = 9\ s$ of the object whose position vs. time is given in Fig. A.

- +1.7;
- +5.0;
- +1.0;
- +0.27;
- +7.5

17. If the force between two 1-kg potatoes a distance D apart is 20 nN, what is the force (in nN) between a $\frac{1}{2}$-kg apple and a 5-kg pumpkin the same distance D apart?

- 100;
- 8.0;
- 2.5;
- 50;
- 10

18. Find the acceleration (in m/s²) of a 650-metric-ton train if the net force is $2.5 \cdot 10^6$ N. [1 metric ton = 1000 kg]

- 3.8;
- $6.4 \cdot 10^6$;
- 9.8;
- 0.26;
- not given

19. \[ F_{\text{net}} = ma \rightarrow a = \frac{F_{\text{net}}}{m} = \frac{2.5 \cdot 10^6}{650000} = 5.8 \]

Find an astronaut's weight (in N) on Planet X where $g = 5.4\ m/s^2$, if she weighs 760 N on Earth.

- 76;
- 1400;
- 240;
- 880;
- not given

20. Select the number below that most accurately gives the instantaneous acceleration (in m/s²) at the time $t = 7.5\ s$ of the object whose velocity vs. time is given in Fig. B.

- +10;
- +1.3;
- -10;
- -1.3;
- -5.0
Exam 2  

Use Pencil, NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely, e.g. ( ) DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is: if one of the multiple choices listed is "greater than A/1.1 and less than 1.1A", then that choice is correct; otherwise mark "( ) Not Given".

Note: $f = 10^{-15}$; $p = 10^{-12}$; $n = 10^{-9}$; $p = 10^{-6}$; $m = 10^{-3}$; $k = 10^{3}$; $M = 10^{6}$; $G = 10^{9}$; $T = 10^{12}$

1. SCUBA diving in a lake, how deep (in ft) are you below the surface if the pressure gauge reads 19 lb/in$^2$?
   
   ( ) 9.9; ( ) 44; ( ) 0.30; ( ) 34; ( ) not given

2. Find the work (in kJ) done by a crane that slowly lifts a 650-kg steel beam 2 m up to the roof.
   
   ( ) 18; ( ) 260; ( ) 6.4; ( ) 170; ( ) not given

3. Find the net force (in kN) exerted on a 15-cm-by-15-cm window in the space shuttle if the pressure inside the shuttle is 0.75 atm when it is in orbit.
   
   ( ) 1.7; ( ) 0.11; ( ) 0.26; ( ) 11; ( ) not given

4. Which of the following has the largest mass?
   
   ( ) 0.2 m$^3$ of lead; ( ) 4 m$^3$ of ice; ( ) 1 m$^3$ of concrete; ( ) 0.5 m$^3$ of iron

5. Find the force (in N) required to change the momentum of a 0.45-kg ball by 67 kg·m/s in a time of 0.28 s.
   
   ( ) 67; ( ) 240; ( ) 150; ( ) 18; ( ) not given

6. Find the work (in kJ) done ON 680-N Dr. I (initially at rest on the ground) by two students who pull him 40 m up the Clock Tower increasing his kinetic energy by 21 kJ in the process. [No work is done BY Dr. I.]
   
   ( ) 27; ( ) 6.2; ( ) 67; ( ) 84; ( ) not given

7. Find the mass (in kg) of 0.26 m$^3$ Borenite, if its specific gravity is 1.7
   
   ( ) 440; ( ) 6500; ( ) 0.45; ( ) 1700; ( ) not given

8. How many dollars must you pay to operate a 1.8-kW heater for 48 hours if electricity costs 9 ¢/kWh?
   
   ( ) 3.3; ( ) 86; ( ) 7.8; ( ) 5.3; ( ) not given

9. The parking brakes fail (completely) on Dr. I's truck initially parked at the top a hill. How high (in m) is the hill if the truck is traveling 19 m/s at the bottom of the hill.
   
   ( ) 10; ( ) 26; ( ) 14; ( ) 81; ( ) not given

10. Dr. I's 1300-kg truck is traveling 35 m/s when it collides with Prez Boren's 2800-kg stalled car locking bumpers. What is the Dynamic Duo's final speed (in m/s) assuming that no brakes are applied?
   
   ( ) 16; ( ) 11; ( ) 46; ( ) 25; ( ) not given
11. Find the mass (in gram) of a flying saucer traveling 180 m/s with a momentum of 13 kg·m/s.
   ( ) 2.7; ( ) 140; ( ) 240; ( ) 4.2; ( ) not given

12. Find the NET work (in MJ) required to accelerate a 5400-kg truck from rest to a speed of 34 m/s.
    ( ) 3.1; ( ) 2.3; ( ) 6.2; ( ) 180; ( ) not given

13. Find the work (in kJ) required to load a 1500-N box on a 1.4-m-high truck using a 6-m-long frictionless ramp?
    ( ) 1.6; ( ) 20; ( ) 350; ( ) 2.1; ( ) not given

14. Which of the following set of characteristics describes a gas: (1) compressible; (2) not easily compressed; (3) rigid; (4) flows readily; (5) very strong forces between atoms; (6) very weak forces between atoms; (7) atoms close together; (8) atoms far apart; (9) atoms only vibrate; (10) atoms move about relative to each other?
    ( ) 2, 3, 4, 9, 10; ( ) 4, 1, 2, 8; ( ) 4, 6, 5, 8; ( ) 6, 1, 2, 9; ( ) 2, 4, 5, 8

15. How much work (in MJ) can a 750-W motor do in 2 hours?
    ( ) 7.2; ( ) 1500; ( ) 380; ( ) 4.4; ( ) not given

16. Failing to tie his 45-kg canoe to the dock, 85-kg Dr. R jumps from the canoe with a speed of 1.3 m/s. Find the speed (in m/s) with which the canoe recoils from the dock.
    ( ) 2.5; ( ) 0.91; ( ) 110; ( ) 4.0; ( ) not given

17. 75-kg Dr. I sleeps in his 170-kg bed, the legs of which exert a pressure of 650 kN/m² on the floor. Find the total area (in m²) of the legs (at the point where they touch the floor).
    ( ) 2.6·10⁻³; ( ) 6.2·10⁻³; ( ) 3.7·10⁻³; ( ) 0.27; ( ) not given

18. Find the pressure (in kN/m²) in the 0.19-m-radius cylinder of a hydraulic lift required to lift a 28-kN car.
    ( ) 47; ( ) 250; ( ) 780; ( ) 130; ( ) not given

19. Find the kinetic energy of a 240-gram ball with a velocity of 35 m/s.
    ( ) 290; ( ) 8.4; ( ) 150; ( ) 8400; ( ) not given

20. Using the graph of gauge pressure (in atm) vs. depth (Fig. A), select the answer below that most accurately represents the total pressure (in lb/in²) at a depth of 8.9 m if the pressure at the surface is 1 atm.
    ( ) 33; ( ) 230; ( ) 170; ( ) 18; ( ) 43
Exam 3  
Physics 1114 Fall 2010

Use Pencil, NOT PEN. Erase Incorrect answer completely. Mark an answer by filling in the cross in the space between the brackets completely. e.g. ()

DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A, that is: if one of the multiple choices listed is greater than A/1.1 and less than 1.1A, then that choice is correct. Otherwise mark "( ) Not Given".

Note: \( f = 10^{-15}; \ p = 10^{-12}; \ m = 10^{-9}; \ p = 10^{-6}; \ m = 10^{-3}; \ m = 10^{-2}; \ M = 10^{-4} \)

1. A lead pipe is 550-ft long at \(-10^\circ\text{C}\). How much has its length increased (in inches) at \(30^\circ\text{C}\)?
   \(1\) 7.7; \(2\) 2.9 \(\times\) 10\(^{-5}\); \(3\) 0.60; \(4\) 7.1

2. Find \(\Delta U\), the change in internal energy, \((\text{in kJ})\) of an ideal gas when 500 kJ of work is done on the gas and 250 kJ of heat is removed from the gas.
   \(1\) +790; \(2\) -250; \(3\) +440; \(4\) +290; \(5\) not given

3. Which of the following is the largest 66-V heater (rated in Watts) that can operate on a 15-A fuse?
   \(1\) 61; \(2\) 850; \(3\) 600; \(4\) 410; \(5\) 1500

4. Find the voltage (in V) across a 6.7-k\(\Omega\) resistor if the current through is 34 mA.
   \(1\) 180; \(2\) 51; \(3\) 51; \(4\) 7.8; \(5\) 320

5. The starting motor on Dr. R's crack used 430 A on a cold day. How much charge \((\text{in kC})\) flows through the starting motor in 3 minutes?
   \(1\) 43; \(2\) 56; \(3\) 110; \(4\) 226; \(5\) not given

6. If the force between two charges, Q and q, that are a distance d apart is 9 nN, what is the force \((\text{in nN})\) between the same two charges when they are a distance D = d/3 apart?
   \(1\) 27; \(2\) 1.0; \(3\) 81; \(4\) 30; \(5\) 9.0

7. Find the Fahrenheit temperature that corresponds to \(-18^\circ\text{C}\).
   \(1\) -64; \(2\) +31; \(3\) +7.2; \(4\) -64; \(5\) not given

8. Find the latent heat of fusion (in J/kg) of Soomez if 790 kJ of heat is required to melt 1.6 kg of it when it is at its melting point of 27°C.
   \(1\) 18; \(2\) 490; \(3\) 330; \(4\) 110; \(5\) not given

9. How much energy \((\text{in GJ})\) is dissipated when 8 C of charge flows in a lightning bolt that flashes across a cloud-to-ground potential difference of 320 MV?
   \(1\) 48; \(2\) 34; \(3\) 26; \(4\) 16; \(5\) not given

10. Find the heat \((\text{in MJ})\) required to produce 2.6 kg of steam at 100°C from 2.6 kg of water initially at 5°C.
    \(1\) 6.9; \(2\) 5.8; \(3\) 1.9; \(4\) 1.9; \(5\) not given
11. Find the repulsive force (in MN) between two -55 mC charges 1.7 m apart.
   ( ) 18; ( ) 8.5; ( ) 11; ( ) 310; ( ) not given

12. Find the total charge (in C) in Dr. I's pocket if it contains 650 protons, 300 electrons, and 950 neutrons.
   ( ) +5.6 \times 10^{-17}; ( ) 0.0; ( ) +1.5 \times 10^{-16}; ( ) -4.8 \times 10^{-17}; ( ) not given

13. How much heat (in kJ) must be added to 3.2 kg of copper to raise its temperature from 20 °C to 150 °C?
   ( ) 1.7; ( ) 300; ( ) 210; ( ) 160; ( ) not given

14. Which of the following takes the smallest amount of heat to raise its temperature from -15 °C to -5 °C?
   ( ) 2 kg of iron; ( ) 2 kg of copper; ( ) 0.6 kg of ice; ( ) 1 kg of aluminum

15. Find the current (in mA) through \( R = 650 \Omega \) in Fig. B if \( V = 36 \) V.
   ( ) 42; ( ) 230; ( ) 18; ( ) 2.0; ( ) not given

16. Select the answer that best represents the power (in mW) dissipated in the resistor \( R \) (whose \( V \) vs. \( I \) graph is shown in Fig. A) when the current through \( R \) is 20 mA.
   ( ) 780; ( ) 1.6; ( ) 310; ( ) 240; ( ) 400

17. Repairing his truck, Dr. I puts his hands on the terminals of its 12-V battery. If his total resistance is 2400 Ω, will he experience: ( ) discomfort; ( ) muscular contraction; ( ) difficulty breathing; ( ) ventricular fibrillation; or ( ) irreversible heart damage?

18. Find the effective alternating voltage \( V_{\text{rms}} \) (in V) that corresponds to a peak alternating voltage \( V_{\text{peak}} = 28 \) V.
   ( ) 40; ( ) 56; ( ) 28; ( ) 14; ( ) not given

19. How much heat (in kJ) is required to raise the temperature of 1.7 kg of water from 15 °C to 70 °C?
   ( ) 760; ( ) 390; ( ) 300; ( ) 600; ( ) not given

20. Find the resistance (in Ω) of a 90-W light bulb that operates on 48 V.
   ( ) 0.53; ( ) 2.4; ( ) 1.9; ( ) 26; ( ) not given

---

Fig. A Voltage (in V) vs Current (in mA)

Fig. B

\[ V = V_{\text{rms}} \]

\[ R \]
1. How much energy (in J) is dissipated when 13 C of charge flows in a lightning bolt that flashes across a cloud-to-ground potential difference of 240 MV?
   ( ) 0.054; ( ) 18; ( ) 3.1; ( ) 240; ( ) not given

2. Find the total pressure (in lb/in²) when you dive 65 ft below the surface of a lake if the pressure at the surface is 1 atm.
   ( ) 43; ( ) 15; ( ) 4100; ( ) 26; ( ) not given

3. How long (in h) does it take to do 23 MJ of work using a 900-W motor?
   ( ) 5.8; ( ) 26; ( ) 39; ( ) 7.2; ( ) not given

Find $\Delta U$, the change in internal energy, (in kJ) of an ideal gas when 540 kJ of work is done by the gas and 250 kJ of heat is removed from the gas.
   ( ) -790; ( ) +290; ( ) -540; ( ) +290; ( ) not given

6. Find the volume (in m³) of 750 kg of Ryanite, which has a specific gravity of 2.8
   ( ) 0.35; ( ) 260; ( ) 0.72; ( ) 3.7; ( ) not given

7. Find the final temperature (in °C) when 850 kJ of heat is added to 1.7 kg of ice initially at 0 °C.
   ( ) 91; ( ) 40; ( ) 73; ( ) 129; ( ) not given

8. Find the power (in W) dissipated by a 73-Ω resistor if the current through it is 1.7 A.
   ( ) 43; ( ) 120; ( ) 25; ( ) 210; ( ) not given

Skydiving Dr. I starts his timer when he is freely falling 8 m/s. How far does he fall in the next 2.2 s?
   ( ) 18; ( ) 30; ( ) 44; ( ) 24; ( ) not given

A 4.3 kg bat hits a 0.35 kg ball accelerating it at 65 m/s². Find the force (in N) that the ball exerts on the bat.
   ( ) 13; ( ) 32; ( ) 18; ( ) 85; ( ) not given

Find the maximum height (in m) reached by an arrow shot directly upward with an initial speed of 36 m/s.
   ( ) 66; ( ) 7.4; ( ) 130; ( ) 51; ( ) needs mass
11. Dr. I throws a ball directly upward with a velocity of +5 m/s. Find the ball's velocity (in m/s) 1.7 s after it leaves his hand.

\[
\begin{array}{ccc}
Y & +5.0; & -5.7; \\
X & -12; & \text{not given}
\end{array}
\]

12. Prez Boren drags 70-kg Dr. I across campus at the end of a long rope using a 190-N force. Find the frictional force (in N) exerted on Dr. I by the sidewalk if he accelerates at 0.85 m/s².

\[
\begin{array}{ccc}
250; & \text{not given} & 190; \\
\text{not given} & 60; & \text{not given}
\end{array}
\]

13. Find the atmospheric pressure (in atm) on Planet X if its atmosphere exerts a 1600-lb force on a 8-inch by 9-inch window in a spacecraft.

\[
\begin{array}{ccc}
72; & 22; & 110; \\
\text{not given} & 5.1; & \text{not given}
\end{array}
\]

14. Find the centripetal force (in kN) needed to keep a 2400-kg car on the road as it travels 16 m/s around an 65-m-radius curve.

\[
\begin{array}{ccc}
720; & 3.9; & 5.5; \\
\text{not given} & \text{not given} & 350; \\
\text{not given}
\end{array}
\]

15. Find the gravitational force (in MN) between a $3 \times 10^{12}$ kg comet and the $6 \times 10^{24}$ kg earth that are $4 \times 10^{11}$ apart.

\[
\begin{array}{ccc}
75; & 98; & 300; \\
\text{not given} & 1.0 \times 10^{22}; & \text{not given}
\end{array}
\]

16. Find the force (in N) required to change the momentum of a 0.55-kg ball by 35 kg·m/s in a time of 0.14 s.

\[
\begin{array}{ccc}
4.9; & 64; & 450; \\
\text{not given} & \text{not given} & 250; \\
\text{not given}
\end{array}
\]

17. Find the force (in lb) needed to load a 450-lb box on a 2.3-ft-high truck using a 12-ft-long frictionless ramp.

\[
\begin{array}{ccc}
840; & 86; & 1000; \\
\text{not given} & \text{not given} & 120; \\
\text{not given}
\end{array}
\]

18. Find the $L_f$, the latent heat of fusion, (in kJ/kg) of Soonerite if 680 kJ of heat is required to melt 2.6 kg of it when it's at its melting point of 17 °C.

\[
\begin{array}{ccc}
330; & 15; & 260; \\
\text{not given} & \text{not given} & 40; \\
\text{not given}
\end{array}
\]

19. Find the (normal) force (in N) that the floor exerts on a 35-kg wagon when a 52-lb box is loaded on it.

\[
\begin{array}{ccc}
570; & 340; & 230; \\
\text{not given} & \text{not given} & 400; \\
\text{not given}
\end{array}
\]

20. If the force between two charges, $Q$ and $q$, that are a distance $d$ apart is 20 nN, what is the force (in nN) between the same two charges when they are a distance $D = d/2$ apart.

\[
\begin{array}{ccc}
10; & 80; & 5.0; \\
\text{not given} & \text{not given} & 20; \\
\text{not given}
\end{array}
\]

\[
\text{not given}
\]
Name: **Phys 1114**
Exam 1
Physics 1114 Spring 2004

Use PENCIL. NOT PEN. Erase incorrect answers completely. Mark all answers by filling in the spaces between the brackets completely, e.g. (8). DO NOT CIRCLE ANSWERS. If all your answers are correct, then mark the number within 1/10 of A. That is, if one of the multiple choice blanks is greater than A/1.1 and less than 1.1A, then that choice is correct; otherwise mark (8) Not Given.

Note: $f_0 = 10^{-12}$; $p_0 = 10^{-15}$; $\rho = 10^{-6}$; $\mu_0 = 10^{-1}$; $k = 10^2$; $M = 10^6$; $G = 10^9$; $T = 10^{12}$

1. The combination of units [kg s/m] is equivalent to (i.e., the same as) the units:

   \[
   \begin{align*}
   & (A) \text{ s/m}^2; \\
   & (B) \text{ m/s}^2; \\
   & (C) \text{ s}^2; \\
   & (D) \text{ s}^2/m; \\
   & (E) \text{ 1/m}
   \end{align*}
   \]

2. If 1.4 bol = 1 won, 21 won = 1 rupee, 1 rupee = 0.68 baht, and 1 euro = 49 baht, how many euro is 1800 bol?

   \[
   \begin{align*}
   & (A) 58; \\
   & (B) 38; \\
   & (C) 210; \\
   & (D) 1.8; \\
   & (E) \text{ not given}
   \end{align*}
   \]

3. Find $g_x$ (in m/s$^2$) on Planet X where an astronaut weighs 1250 N if the weights 540 N on earth.

   \[
   \begin{align*}
   & (A) 55; \\
   & (B) 9.8; \\
   & (C) 1.8; \\
   & (D) \text{ not given}
   \end{align*}
   \]

4. Dr. I throws a ball directly upward with a velocity of +4 m/s. Find its velocity (in m/s) 0.8 s later.

   \[
   \begin{align*}
   & (A) -3.8; \\
   & (B) +0.064; \\
   & (C) +12; \\
   & (D) +4.0; \\
   & (E) \text{ not given}
   \end{align*}
   \]

5. Find the centripetal force (in kgN) needed to keep a 3500-kg truck on the road as it travels 13 m/s around a 75-m radius curve.

   \[
   \begin{align*}
   & (A) 7.8; \\
   & (B) 34; \\
   & (C) 0.061; \\
   & (D) 2.3; \\
   & (E) \text{ not given}
   \end{align*}
   \]

6. Find the net force (in MN) on a 35,000-kg airplane cruising 280 m/s at an altitude of 5,300 m on a straight path between NYC and OKC.

   \[
   \begin{align*}
   & (A) 9.8; \\
   & (B) 1.9; \\
   & (C) 0.34; \\
   & (D) 35; \\
   & (E) \text{ not given}
   \end{align*}
   \]

7. Find the force (in N) due to air resistance on a 0.35-gram snowflake falling with a terminal velocity of 2 m/s.

   \[
   \begin{align*}
   & (A) 0.69; \\
   & (B) 6.9; \\
   & (C) 0.0; \\
   & (D) 2.9; \\
   & (E) \text{ not given}
   \end{align*}
   \]

8. A 54-kg student stands on a bathroom scale in an elevator accelerating downwards at 2.4 m/s$^2$. Find the force (in N) exerted on the student by the scale (that is, the reading on the bathroom scale).

   \[
   \begin{align*}
   & (A) 530; \\
   & (B) 600; \\
   & (C) 130; \\
   & (D) 660; \\
   & (E) \text{ not given}
   \end{align*}
   \]

9. Find the gravitational force (in MN) on a 3.5 - $10^3$ kg asteroid, which is 2.5 Gm from the 2 - $10^6$ kg sun.

   \[
   \begin{align*}
   & (A) 11; \\
   & (B) 5.7; \\
   & (C) 7.5; \\
   & (D) 1.8; \\
   & (E) \text{ not given}
   \end{align*}
   \]

10. Initially traveling 25 miles/h, Dr. K accelerates at 1.2 m/s$^2$ for 14 s. Find his final speed (in miles/h).

    \[
    \begin{align*}
    & (A) 42; \\
    & (B) 720; \\
    & (C) 63; \\
    & (D) 25; \\
    & (E) \text{ not given}
    \end{align*}
    \]
Exam 1
Physics 1114 Fall 2006

Use Pencil, NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely. E.g. (4.6)

1. The combination of units [N/m/kg-m] is equivalent to (i.e. the same as) the units:
   (1) 1 N/(s/m); (2) s/m; (3) kg/m/s²; (4) kg/m

2. 850-N Dr. I sits in his stationary little red wagon waiting for a ride. Find the mass (in kg) of the wagon if the sidewalk exerts a 12 N (normal) force on the wagon.
   (1) 520; (2) 350; (3) 76; (4) not given

3. Find “a” (in m/s²) on Planet X where a Klingon weighs 1570 N if he weighs 1100 N on earth.
   (1) 6.5; (2) 13; (3) 110; (4) 9.8; (5) not given

4. If 1 kite = 1 dekimon, 1 sep = 0.5 mina, 1 tan = 94 mina, how many kites is 0.4 tan?
   (1) 24,000; (2) 19,000; (3) 1900; (4) not given

5. Find the gravitational force (in N) on a 7.10³ kg comet that is 1.5 Gm from the 5.10²⁴ kg earth.
   (1) 4.8; (2) 1.2; (3) 8.3; (4) 1900; (5) not given

6. A crane lifts a box weighing 1250 N using a 1400-N force. Find the acceleration (in m/s²) of the box.
   (1) 1.3; (2) 1.2; (3) 1.1; (4) not given

7. After Exam 1, two students tie a rope to 85-kg Dr. I and spin him around in a circle at a speed of 5 m/s. Find the radius of the circle (in m) if the centripetal force on Dr. I is 670 N.
   (1) 3.2; (2) 0.63; (3) 2.6; (4) 7.9; (5) not given

8. If the force between two bowling balls a distance D apart is 6 N, find the force (in N) when they are a distance (0.25D) apart.
   (1) 0.67; (2) 2.0; (3) 18; (4) 6.0; (5) 54

9. Dr. I throws a ball directly upward with a velocity of 4 m/s. Find its position (in m) 2.5 s later.
   (1) +4.8; (2) -2.9; (3) +22; (4) -9.7; (5) not given

10. Find the acceleration (in km/h²) of a 9.1.10⁻³¹ kg electron that experiences a force of 1.8.10⁻⁷⁹ N.
    (1) 0.51; (2) 7.6; (3) 15; (4) 20; (5) not given
Exam I
Physics 1114 Spring 2007

[Signature]

[Name]

[Score]
Exam 1
Physics 1114 Spring 2005

Use Pencil NOT PEN (write incorrect answer completely. Mark an answer by filling in the space between the brackets completely, e.g. (4). Do NOT CIRCLE ANSWER. If A is your answer, then mark the number within 1000- A. That is if one of the multiple choices listed is greater than A/1 and less than 1/A+1, then that choice is correct; otherwise mark "X." Not Given.

Note: i = 10^-1; p = 10^1; m = 10^3; p = 10^4; m = 10^5; k = 10^6; M = 10^7; G = 10^8; T = 10^12

1. The combination of units [m/(N-s)] is equivalent to (i.e., the same as) the units:
   (i) s^2
   (ii) s/m
   (iii) s/kg
   (iv) kg/s
   (v) kg/s^2

2. If 1 cubit = 3 span, 1 chain = 44 cubit, and 0.55 bolt = 1 chain, how many bolt is 180 span?
   (i) 0.75
   (ii) 2.5
   (iii) 240
   (iv) 3.4
   (v) not given

3. Charmy Dr. R drops (from rest) a quarter of his salary. How fast (in m/s) is it traveling 0.6 s later?
   (i) 4.4
   (ii) 1.8
   (iii) 9.8
   (iv) 5.8
   (v) not given

4. 90-kg Dr. R sits on top of 350-N ladder to change a light bulb. Find the (normal) force (in N) that the floor exerts on the ladder.
   (i) 530
   (ii) 1200
   (iii) 350
   (iv) 880
   (v) not given

5. A rocket goes from 90 miles per hour to 250 miles per hour in 4.5 s. Find its acceleration (in m/s^2)
   (i) 20
   (ii) 28
   (iii) 44
   (iv) 89
   (v) not given

6. Find the force (in N) due to air resistance on a 0.002-kg leaf falling with a terminal velocity of 1.8 m/s.
   (i) 3.6
   (ii) 0.0
   (iii) 39
   (iv) 20
   (v) not given

7. What is the acceleration (in km/s^2) of a 1.7-10^-7 kg proton that experiences a net force of 7.6-10^-14 N.
   (i) 7.6
   (ii) 55
   (iii) 13
   (iv) 0.022
   (v) not given

8. Find the weight (in kg) of the NASA Rover on Mars, where "g" is 3.8 m/s^2, if it weighs 6.5 kg on earth.
   (i) 660
   (ii) 17.7
   (iii) 2.5
   (iv) 17
   (v) not given

9. Late one night, Dr. I drives his 1800-kg truck at 17 m/s around the Lloyd Noble parking lot in a 75-m-radius circle. Find the centripetal acceleration (in m/s^2) of Dr. I's truck.
   (i) 3.9
   (ii) 5.7
   (iii) 0.900
   (iv) 0.23
   (v) not given

10. If the force between two 1-kg potatoes that are a distance D apart is 16 N, find the force (in N) when the potatoes are a distance 2D apart.
    (i) 32
    (ii) 4.0
    (iii) 64
    (iv) 16
    (v) 8.0

11. Find the NET force (in N) on a 300-meter-ton ship traveling 17 m/s directly east. [1 metric ton = 1000 kg]
    (i) 5.3
    (ii) 2.1
    (iii) 0.30
    (iv) 2.9
    (v) not given

12. Dr. I throws a ball directly upward with a velocity of +5.5 m/s. Find its position (in m) 1.3 s later. [Assume the zero of position is at Dr. I's hand.]
    (i) +7.2
    (ii) -8.3
    (iii) -1.1
    (iv) +5.5
    (v) not given

13. Select the number below that most accurately represents the distance traveled (in m) between the times t = 3 s and t = 7 s by the object whose velocity vs. time graph is given in Fig. A.
    (i) 10
    (ii) 5.0
    (iii) 40
    (iv) 30
    (v) 20

14. A 27-kg bat hits a 0.32-kg ball accelerating it at 65 m/s^2. Find the force (in N) that the bat exerts on the bat.
    (i) 26
    (ii) 21
    (iii) 9.0
    (iv) 180
    (v) not given

15. President Boren ties a rope around 88-kg Dr. I and pulls the good doctor using a 270-N force along a sidewalk accelerating him at 1.2 m/s^2. Find the frictional force (in N) that the sidewalk exerts on Dr. I.
    (i) 85
    (ii) 110
    (iii) 380
    (iv) 160
    (v) not given

16. Find the total time (in h) that it takes to drive 550 miles to Houston, if you drive the first 210 miles in 4 hours and the remainder of the drive at 50 m/h? [Assume no pit stops.]
    (i) 4.0
    (ii) 2.5
    (iii) 1.2
    (iv) 5.2
    (v) not given

17. Find the gravitational force (in GN) between 2.7-10^15 kg comet and the 2.10^-16 kg sun that are 2.7 Gm apart.
    (i) 100
    (ii) 20
    (iii) 2.4
    (iv) 1200
    (v) not given

18. Select the number below that most accurately represents the average acceleration (in m/s^2) between the times t = 4 s and t = 11 s of the object whose velocity vs. time graph is given in Fig. B.
    (i) +15
    (ii) +2.1
    (iii) +1.0
    (iv) 0.0
    (v) +5.0

19. Initially at rest, Dr. I accelerates at 0.43 m/s^2. How far (in m) does he travel in 30 s?
    (i) 190
    (ii) 590
    (iii) 13
    (iv) 390
    (v) not given

20. Select the number below that most accurately represents the instantaneous velocity (in m/s) at the time t = 4.5 s of the object whose position vs. time graph is given in Fig. A.
    (i) +18
    (ii) -7.8
    (iii) -35
    (iv) +10
    (v) +3.9
Exam 114 Spring 2006

Use Pencils. NOT PEN. Make correct answer completely. Mark an answer by filling in the space between the brackets completely. e.g., (A)

DO NOT CIRCLE ANSWER: If A is your answer, then mark the number within A of A, so that if one of the multiple choices listed is "greater than A/41 and less than 1/41", then that choice is correct; otherwise mark "(A) Not Given".

Note: \( f = 10^{-13}; \rho = 10^{12}; N = 10^{16}; m = 10^{10}; k = 10^3; M = 10^9; G = 10^{10}; T = 10^{12} \)

1. The combination of units [N⋅m/s²] is equivalent to (i.e., the same as) the unit(s):
   ( ) kg·s; ( ) N·s; ( ) N²/kg; ( ) kg/s²; ( ) kg

2. If 94 rad = 1 won, 4.6 won = 1 colom, 1 colom = 0.40 tolar, and 1.6 tolar = 1 nail, how many rad is 3.5 nail?
   ( ) 610; ( ) 400; ( ) 170; ( ) 920; ( ) not given

3. A freight train accelerates from 15 mi/h to 50 mi/h in 250 s. Find its acceleration (in m/s²).
   ( ) 0.085; ( ) 0.14; ( ) 0.036; ( ) 0.16; ( ) not given

4. Find an astronaut's weight (in N) on a planet where \( g \) is 6.4 m/s² if he weighs 630 N on earth.
   ( ) 84; ( ) 410; ( ) 940; ( ) 630; ( ) not given

5. 820 N Dr. R stands on top of the 130 kg lecture bench in 170 Nielsen. Find the normal force (in kN) that the floor exerts on the lecture bench.
   ( ) 0.95; ( ) 1.6; ( ) 2.1; ( ) 2.3; ( ) not given

6. Initially traveling 10 m/s, Dr. T travels 750 m while accelerating for 15 s. Find his acceleration (in m/s²).
   ( ) 2.7; ( ) 6.7; ( ) 4.4; ( ) not given

7. A 9-km trip takes 50 min. If the first 6 km takes ½ hour, find the speed (in m/s) for the rest of the trip.
   ( ) 1.7; ( ) 3.0; ( ) 1.3; ( ) 2.5; ( ) not given

8. If the force between two 1 kg rocks a distance D apart is 18 nN, find the force (in nN) between the rocks when they are a distance d = 10/3 apart.
   ( ) 18; ( ) 9.0; ( ) 36; ( ) 45; ( ) 72

9. Find the acceleration (in km/s²) of a 0.1-10³ kg electron that experiences a net force of 2.5-10⁻²² N.
   ( ) 0.27; ( ) 2.7; ( ) 0.2; ( ) 3.6; ( ) not given

10. Prez Rosen ties a rope around 830 N Dr. I and pulls him up the Clock tower. Find the force (in N) applied by the Prez if Dr. I accelerates at 1.2 m/s².
    ( ) 100; ( ) 83; ( ) 930; ( ) 1200; ( ) not given

11. Find the gravitational force (in N) between a 4-10² kg comet and the 6-10²⁴ kg earth that are 4.3 Gm apart.
    ( ) 140; ( ) 87; ( ) 19; ( ) 370; ( ) not given

12. A batter hits a 0.34-kg baseball accelerating it at 45 m/s². Find the force (in N) that the bat exerts on the bat.
    ( ) 15; ( ) 110; ( ) 8.8; ( ) 3.3; ( ) not given

13. Find the net force (in N) on a 4.3 gram snowflake falling with a terminal velocity of 0.85 m/s.
    ( ) 0.47; ( ) 0.15; ( ) 0.39; ( ) 0.24; ( ) not given

14. Dr. I falls from a hovering helicopter. How high (in m) is the helicopter if he hits the ground 7 s later?
    ( ) 140; ( ) 69; ( ) 410; ( ) 240; ( ) not given

15. Find the centripetal force (in N) needed to keep the 1800 kg truck traveling 22 m/s on the road as it travels around a 75-m-radius curve.
    ( ) 12; ( ) 660; ( ) 8.6; ( ) 6.5; ( ) not given

16. Find the net force (in N) on a 28-meter-ton truck traveling 55 m/s directly east. [1 metric ton = 1000 kg]
    ( ) 260; ( ) 270; ( ) 15; ( ) 350; ( ) not given

17. Dr. I throws a ball directly upwards with a velocity of 9.5 m/s. Find the ball’s velocity (in m/s) 1.5 s later.
    ( ) 24; ( ) 36; ( ) 15; ( ) 14; ( ) 52; ( ) not given

18. Select the number below that most accurately represents the instantaneous velocity (in m/s) at the time \( t = 10 \) s of the object whose position versus time graph is given in Fig. B.
    ( ) 15; ( ) 50; ( ) 50; ( ) 50; ( ) 10

19. Select the number below that most accurately represents the average acceleration (in m/s²) between the times \( t = 3 \) s and \( t = 8 \) s of the object whose velocity versus time graph is given in Fig. A.
    ( ) 7.8; ( ) 3.6; ( ) 2.6; ( ) 1 + 14; ( ) 0

20. Select the number below that most accurately represents the distance traveled (in m) between the times \( t = 5 \) s and \( t = 6 \) s by the object whose position vs. time graph is given in Fig. A.
    ( ) 90; ( ) 50; ( ) 70; ( ) 110; ( ) 150

![Fig. A Velocity vs. Time](image)

![Fig. B Position vs. Time](image)
9:30 Final Exam  Physics 1114  Spring 2007  Exam Score: 20

Use Pencil, NOT PEN. Erase Incorrect answer completely. Mark an answer by filling in the space between the brackets completely. E.g. (●)  Do NOT circle answer! If A is your answer, then mark the number within 10% of A; that is, if one of the multiple choices listed is "greater than A/1.1 and less than 1.1*A", then that choice is correct; otherwise mark (●) Not Given.

Note: f = 10^{-15}; p = 10^{-12}; n = 10^{3}; \mu = 10^{6}; m = 10^{-3}; k = 10^{3}; M = 10^{6}; G = 10^{9}; T = 10^{12}

Water Data: D = 1000 \text{ kg/m}^3; \text{D}_{\text{mg}} = 62.4 \text{ lb/ft}^3; C = 4.184 \text{ kJ/(kg \cdot ^\circ C)}; L_f = 334 \text{ kJ/kg}; L_v = 2260 \text{ kJ/kg}

1. Freely fall 9 m/s, skydiving Dr. I starts his stopwatch. How far (in m) does he fall in the next second?
   ( ) 19;  ( ) 14;  ( ) 4.9;  ( ) 9.0;  ( ) not given

2. What is the power rating (in kW) of a crane that can lift a 30-kN box a height of 5 m in 20 s?
   ( ) 150;  ( ) 74;  ( ) 5.8;  ( ) 7.5;  ( ) not given

3. Find the cost of electricity (in €/kWh) if you pay $2.40 to operate a 3-kW oven for 9 h.
   ( ) 8.9;  ( ) 6.5;  ( ) 12;  ( ) 27;  ( ) not given

4. How deep (in m) are you below the surface of Lake Superior if the gauge pressure is 1.5 MN/m^2?
   ( ) 100;  ( ) 250;  ( ) 150;  ( ) 200;  ( ) not given

5. Initially traveling 17 miles/h, Dr. I accelerates to 75 miles/h in 7.4 s. Find his acceleration (in m/s^2).
   ( ) 7.8;  ( ) 26;  ( ) 4.5;  ( ) 3.5;  ( ) not given

6. Find the voltage (in V) across a 750 \Omega resistor if the current through it is 18 mA.
   ( ) 18;  ( ) 0.24;  ( ) 42;  ( ) 24;  ( ) not given

7. Find the volume (in m^3) of a 4100-kg rock that has a density of 2300 kg/m^3.
   ( ) 0.56;  ( ) 940;  ( ) 1.8;  ( ) 2.3;  ( ) not given

8. Find the voltage (in V) required to operate a 3.6-kW oven that has a resistance of 13 \Omega.
   ( ) 220;  ( ) 170;  ( ) 47;  ( ) 3.6;  ( ) not given

9. Find the attractive force (in pN) between an electron and a proton separated by a distance of 13 nm.
   ( ) 0.22;  ( ) 1.4;  ( ) 1.8;  ( ) 18;  ( ) not given

10. Find the peak AC voltage \( V_{\text{peak}} \) (in V) if the effective voltage \( V_{\text{RMS}} \) is 47 V.
    ( ) 24;  ( ) 94;  ( ) 33;  ( ) 47;  ( ) not given
11. How much heat (in kJ) is required to raise the temperature of 3.5 kg of water from 25 °C to 70 °C? 
   ( ) 4.2; ( ) 660; ( ) 1000; ( ) 190; ( ) not given

12. Dr. I walks 1400 m at 1.5 m/s while his dog "Fluffy" trots at 3.7 m/s for 10 minutes. ( ) Both travel the same distance; ( ) Dr. I goes farther than Fluffy; ( ) Fluffy goes farther than Dr. I; ( ) need their starting times.

13. Late at night in the Lloyd Noble parking lot, Dr. R drives his 1500-kg truck at 6.5 m/s in a 15-m-radius circle. Find the truck's centripetal acceleration (in m/s²).
   ( ) 4.2; ( ) 2.1; ( ) 8.2; ( ) 0.43; ( ) not given

14. What force (in N) is required to change the momentum of a golf ball by 15 kg·m/s in a time of 0.03 s? 
   ( ) 500; ( ) 15; ( ) 350; ( ) 0.45; ( ) need its mass

15. 370 A of current flows in the starting motor of Prez Boren's truck on a cold day. How much charge (in kC) passes through the starting motor in 10 minutes?
   ( ) 37; ( ) 0.62; ( ) 3.7; ( ) 220; ( ) not given

16. Find the mass (in kg) of an asteroid that accelerates at 0.0068 m/s² around the sun, which exerts a gravitational force of 2.6·10¹² N on it.
   ( ) 1.8·10⁻¹⁴; ( ) 6.8·10⁻¹⁴; ( ) 3.8·10⁻¹⁴; ( ) 1.8·10⁻¹⁰; ( ) not given

17. If 3.6 kg of gaseous Ryanite, at its boiling point of 78 °C, liquefies when 3200 kJ of heat is removed from it, find Lᵥ, the latent heat of vaporization (in kJ/kg).
   ( ) 890; ( ) 680; ( ) 330; ( ) 11; ( ) not given

18. After the Final, two students drop Dr. I off the top of the 50-m tall Clock Tower. How fast (in m/s) is he falling just before he hits the ground?
   ( ) 40; ( ) 31; ( ) 3.2; ( ) 22; ( ) need his mass

19. An upward force of 1040 N is applied to a rope tied around 930-N Dr. I's neck lifting him off the ground. Find is his upward acceleration (in m/s²).
   ( ) 11; ( ) 1.6; ( ) 95; ( ) 1.2; ( ) not given

20. Find the heaviest (in kN) truck that can be raised by a hydraulic lift with a 0.19-m-radius piston if the maximum pressure in the hydraulic cylinder is 380 kN/m².
   ( ) 230; ( ) 3400; ( ) 43; ( ) 56; ( ) not given
Exam 2

Physics 1114 Fall 2007

Use Pencil, NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely. e.g. (5)

DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is: if one of the multiple choices listed is "greater than A/1.1 and less than 1.1*A", then that choice is correct; otherwise mark "(O) Not Given".

Note: \( f = 10^{-15}, \ p = 10^{-12}, \ n = 10^3, \ \mu = 10^{-6}, \ \ m = 10^3; \ k = 10^2; \ M = 10^6; \ G = 10^9; \ T = 10^{12} \)

1. A skier (on frictionless skies) starts from rest atop a 48-m-high ski jump. How fast (in m/s) is she traveling at the bottom of the jump?
   \( 31; \quad 48; \quad 62; \quad 22; \quad \) need her mass

2. Find the NET work (in kJ) required to stop a 2700-kg raging bull initially traveling 13 m/s.
   \( 460; \quad 35; \quad 230; \quad 0.0; \quad \) not given

3. How much does electricity cost (in c/kWh) if you spend $3.50 to operate a 2.7 kW oven for 18 h?
   \( 19; \quad 7.2; \quad 9.4; \quad 4.9; \quad \) not given

4. Find the force (in lb) exerted by the earth's atmosphere on the 12 inch by 18 inch top of a sealed box.
   \( 450; \quad 220; \quad 15; \quad 2300; \quad \) not given

5. Which of the following is an appropriate unit for power?
   \( \) (ton \cdot mile)/h; \( \) (N \cdot s)/m; \( \) (lb \cdot s)/ft; \( \) (kg \cdot m)/s; \( \) J/s

6. Find the work (in kJ) required to load a 1500-N box on a 1.6-m-high truck using a 6-m-long ramp.
   \( 1.9; \quad 400; \quad 24; \quad 2.4; \quad \) not given

7. SCUBA diving in a lake, how deep (in m) are you below the surface if your pressure gauge reads 65 kN/m²?
   \( 6.6; \quad 5.0; \quad 65; \quad 9.5; \quad \) not given

8. How much work (in MJ) can a 2.7 horsepower (hp) motor do in 23 minutes?
   \( 46; \quad 2.0; \quad 2.8; \quad 1.5; \quad \) not given

9. Which of the following set of characteristics describes a liquid: (1) compressible; (2) not easily compressed; (3) rigid; (4) flows readily; (5) strong forces between atoms; (6) very weak forces between atoms; (7) atoms close together; (8) atoms far apart; (9) atoms only vibrate; (10) atoms readily move about.
   \( 1, 2, 3, 4, 5; \quad 1, 4, 5, 6; \quad 1, 2, 4, 5, 6, 7; \quad 1, 2, 4, 6, 8; \quad 1, 2, 4, 6, 8, 9; \quad 1, 2, 4, 6, 8, 9, 10\

10. Initially at rest atop the Clock Tower with 42 kJ of potential energy, Dr. I slides down its brick side. If 18 kJ of work is done BY Dr. I, find the kinetic energy (in kJ) with which he hits the ground (where PE = 0).
    \( 18; \quad 24; \quad 60; \quad 42; \quad \) not given
Find the mass (in kg) of a flying saucer traveling 44 m/s with a momentum of 1400 kg m/s.
( ) 7.5;    ( ) 3.2;    ( ) 0.31;    ( ) 2.4;    ( ) not given

Find the pressure (in kN/m²) required to lift a 1700-kg car using a hydraulic lift with a 0.2-m-radius piston.
( ) 14;  ( ) 270;  ( ) 18; ( ) 0.130; ( ) not given

Find the kinetic energy (in J) of a 2.3 ·10⁻⁴ kg snowflake falling with a velocity of 0.45 m/s.
( ) 47; ( ) 0.0; ( ) 23; ( ) 100; ( ) not given

Find the pressure (in kN/m²) a 65-kg ballerina exerts on the floor when she stands on the 7·10⁻⁴ m² tip of one toe-shoe.
( ) 190; ( ) 34; ( ) 640; ( ) 93; ( ) not given

Which of the following has the largest mass?
• 0.3 m³ of copper;  ( ) 0.1 m³ of gold;  ( ) 1 m³ of concrete; ( ) 2 m³ of ice

Using the graph of gauge pressure vs. depth in Fig. A, select the answer that most accurately represents the increase in pressure (in kN/m²) as you go from a depth of 3.5 m to a depth of 9.0 below the surface.
( ) 0.75; ( ) 130; ( ) 11; ( ) 76; ( ) 51

Find the change in the momentum (in kg·m/s) of a 0.17-kg ball when it is hit by a bat that applies an impulse of 6.5 N·s to the ball in a time of 0.3 s.
( ) 2.0; ( ) 17; ( ) 38; ( ) 22; ( ) not given

A 1.7-kg gun shoots a 6.5-gram bullet at 340 m/s. Find the final momentum (in kg·m/s) of the gun.
( ) 1.3; ( ) 580; ( ) 2.2; ( ) 2.9; ( ) not given

Find the volume (in m³) of the Great Pyramid if its mass is 7·10⁸ kg and density is 2700 kg/m³.
( ) 1.9·10¹²; ( ) 2.6·10⁵; ( ) 3.9·10⁶; ( ) 1.9·10⁵; ( ) not given

Find the work (in kJ) done by a student who drags 85-kg Dr. R 1.6-km along a sidewalk using a 320-N force.
( ) 830; ( ) 200; ( ) 1300; ( ) 510; ( ) not given

---

**Fig. A Gauge Pressure vs. Depth**

![Graph of Gauge Pressure vs. Depth](image-url)
Exam 2
Physics 1114 Fall 2004

1. Find the mass of a bullet traveling 150 m/s if its kinetic energy is 280 J.
   \[ \text{mass} = \frac{2 \times \text{KE}}{v^2} \]
   \[ = \frac{2 \times 280}{150^2} \]
   \[ = \frac{560}{22500} \]
   \[ = 0.025 \text{ kg} \]

2. Find the work required to load a 180-kg box on a 1.5-m-high truck using a 6-m-long frictionless ramp.
   \[ \text{Work} = \text{mg}h \]
   \[ = (180 \times 9.8 \times 1.5) \]
   \[ = 2676 \text{ J} \]

3. A student does 3.7 kJ of work on Dr. 1 dragging him along a level sidewalk. If 2.6 kJ of work is done by Dr. 1 on the sidewalk, find the increase in the kinetic energy (in kJ) of the good doctor.
   \[ \Delta KE = W_1 - W_2 \]
   \[ = 3.7 - 2.6 \]
   \[ = 1.1 \text{ kJ} \]

4. Which of the following set of characteristics describes a gas: 0-D compressible, 0-not easily compressed, 0-rigid, 0-flows readily, 0-strong forces between atoms, 0-very weak forces between atoms, 0-atoms close together, 0-atoms far apart, 0-atoms only vibrate, 0-atoms readily move about?
   \[ \text{Choose: } 0, 0, 0, 0, 0, 0, 0, 0, 0, 0 \]

5. How long (in h) does it take to do 35 MJ of work using a 1200-W motor?
   \[ \text{Time} = \frac{\text{Work}}{\text{Power}} \]
   \[ = \frac{35 \times 10^6}{1200} \]
   \[ = 29,000 \text{ s} \]
   \[ = 8.1 \text{ h} \]

6. Find the increase in pressure (in lb/in^2) as you dive 65 ft below the surface of Lake Tempe.
   \[ \text{Pressure} = \rho g h \]
   \[ = (62.4 \times 32.2 \times 65) \]
   \[ = 11,760 \text{ lb/in}^2 \]

7. Find the heaviest (in kN) truck that can be raised by a hydraulic lift with a 0.20-m-radius piston if the maximum hydraulic pressure in the lift is 380 kN/m^2.
   \[ \text{Force} = \text{Pressure} \times \text{Area} \]
   \[ = (380 \times \pi \times 0.20^2) \]
   \[ = 48 \text{ kN} \]

8. Dr. R does 70 kJ of work pushing his 1500-kg truck 540 m to the gas station. Find the force (in N) he uses.
   \[ \text{Force} = \frac{\text{Work}}{\text{Distance}} \]
   \[ = \frac{70 \times 10^3}{540} \]
   \[ = 130 \text{ N} \]

9. Using the graph of gauge pressure vs. depth in Fig. A, select the answer that most accurately represents the total pressure (in lb/in^2) at a depth of 9.5 m if the pressure at the surface of the fluid is 1 atm.
   \[ \text{Pressure} = \text{Atmospheric Pressure} + \text{Gauge Pressure} \]
   \[ = 14.7 + 40 \]
   \[ = 54.7 \text{ lb/in}^2 \]
   \[ = 37 \text{ atm} \]

10. Prez Boren's 3700-kg SUV is traveling 18 m/s when it collides with Dr. I's 1300-kg stalled truck locking bumpers. What is the Dynamic Duo's final speed (in m/s) assuming that no brakes are applied?
    \[ \text{Final Speed} = \sqrt{\frac{2 \times \text{Initial Speed} \times \text{Mass of SUV} + \text{Initial Speed} \times \text{Mass of Truck}}{\text{Mass of SUV + Mass of Truck}}} \]
    \[ = \sqrt{\frac{2 \times 18 \times 3700 + 18 \times 1300}{3700 + 1300}} \]
    \[ = 18 \text{ m/s} \]
1. Which of the following has the smallest mass?
   - 0.8 m² of iron
   - 2 m³ of water
   - 2 m³ of gasoline
   - 0.5 m³ of silver
   - 10 m³ of concrete

2. Find the net work (in MJ) required to stop a 2900-kg truck traveling 36 m/s.
   - 26
   - 1.9
   - 4.8
   - 0.99
   - not given

3. Find the increase in pressure (in lb/in²) as you dive 46 ft below the surface of Lake Eufala.
   - 20
   - 2900
   - 48
   - 4.8
   - not given

4. Find the momentum (in kg·m/s) of a 580-metric-ton ship traveling 32 ft/s. (1 metric ton = 1000 kg)
   - 3.0·10¹⁰
   - 2.7·10¹⁰
   - 1.9·10¹⁰
   - 5.2·10¹⁰
   - not given

5. Find the mass (in grams) of a bullet traveling 230 m/s if its kinetic energy is 0.3 J.
   - 4.6
   - 0.40
   - 3.5
   - 1.8
   - not given

6. Find the force (in N) required to load a 230-kg box on a 1.5-m-high ramp using a 5-m-long frictionless ramp.
   - 250
   - 69
   - 3400
   - 860
   - not given

7. Human cannonball, 85-kg Dr. L. is fired at 13 m/s from a 340-kg cannon. What is the recoil speed (in m/s) of the cannon? (Assume the cannon has frictionless wheels)
   - 22
   - 3.3
   - 13
   - 5.1
   - not given

8. A skier (on frictionless skies) starts from rest atop a 37-m-high ski jump. How fast (in m/s) is she traveling at the bottom of the jump?
   - 27
   - 19
   - 80
   - 37
   - need her mass

9. Find the force (in lb) on a 9-in by 12-in window in the space shuttle when it is in orbit if the pressure inside the shuttle is 0.55 atm.
   - 110
   - 50
   - 600
   - 870
   - not given

10. How many pounds of sulfuric acid can you put in a 3.7-ft³ steel can?
    - 6702
    - 420
    - 340
    - 110
    - not given
Which of the following has the largest mass:

(1) 2 m³ of iron; (2) 20 m³ of water; (3) 1 m³ of lead; (4) 3 m³ of copper; (5) 15 m³ of ice.

Find the momentum (in kg·m/s) of a 750-metric-ton ship traveling 40 ft/s. (1 metric ton = 1000 kg)

(1) 7.0·10⁶; (2) 9.1·10⁶; (3) 3.0·10⁶; (4) 1.9·10⁶; (5) not given.

Find the work (in J) done by a crane that slowly lifts a 540-kg concrete beam 27 m to the top of the stadium.

(1) 5.3; (2) 15; (3) 140; (4) 45; (5) not given.

A 4-gm bullet fired from a rifle hits and stops inside a 3-kg block of wood initially at rest on frictionless ice. Find the initial speed (in m/s) of the bullet if the final speed of block and bullet is 0.05 m/s.

(1) 450; (2) 0.16; (3) 2.0; (4) 380; (5) not given.

Find the velocity (in m/s) of a 58,000-kg asteroid with 3.9 GJ of kinetic energy.

(1) 24; (2) 370; (3) 67; (4) 260; (5) not given.

Find the work (in J) required to load a 350-kg box on a 1.6-m-high truck using a 7-m-long frictionless ramp.

(1) 550; (2) 780; (3) 1.2; (4) 7.0; (5) not given.

A skier (on frictionless skis) starts from rest atop a 43-m-high ski jump. How fast (in m/s) is she traveling at the bottom of the jump?

(1) 29; (2) 38; (3) 20; (4) 9.8; (5) need her mass.

If the air pressure inside the space shuttle is 0.55 atm when it is orbiting the earth, find the force (in lb) exerted by the air in the shuttle on a 8.5 inch by 14 inch window in the shuttle.

(1) 66; (2) 960; (3) 960; (4) 8.1; (5) not given.

Find the NET work (in J) required to accelerate a 1700-kg truck from rest to 32 m/s.

(1) 54; (2) 27; (3) 1700; (4) 870; (5) not given.

45-kg Mrs. Destructo walks all over her husband in her high-heeled shoes, which have a total area of 0.013 m². What pressure (in kN/m²) does Mrs. D exert on the good doctor?

(1) 43; (2) 26; (3) 5.7; (4) 440; (5) not given.

Find the work (in J) done on 850-N Dr. I by two students who pull him 42 m up the E. T. Dunlop Clock Tower increasing his kinetic energy by 24 kJ in the process. [Assume no work is done by Dr. D.]

(1) 36; (2) 12; (3) 60; (4) 24; (5) not given.

A 2.4-kg gun shoots a 7-gram bullet at 270 m/s. Find the final momentum (in kg·m/s) of the gun.

(1) 1.9; (2) 0.79; (3) 650; (4) 2.4; (5) not given.

What is the horsepower (hp) of an electric motor that can do 35 kJ of work in 17 s?

(1) 750; (2) 21; (3) 0.80; (4) 2.8; (5) not given.

Find the heaviest load (in kN) that can be raised by the 0.22-m-radius cylinder in a hydraulic lift if the hydraulic pressure in the cylinder is 350 kN/m².

(1) 35; (2) 25; (3) 240; (4) 2300; (5) not given.

How long (in h) can you operate a 1700-W heater on $5.50 if electricity costs $0.10/kWh?

(1) 7; (2) 21; (3) 12; (4) 36; (5) not given.

Which of the following set of characteristics describes a liquid: (1) compressible; (2) not easily compressed; (3) rigid; (4) flows readily; (5) strong forces between atoms; (6) very weak forces between atoms; (7) atoms close together; (8) atoms far apart; (9) atoms only vibrate; (10) atoms readily move about.

(1) (1, 3, 4, 7, 8); (2) (2, 4, 5, 6, 9); (3) (2, 3, 4, 5, 6); (4) (1, 3, 4, 7, 8); (5) (2, 3, 4, 5, 6).

SCUBA diving in lake, how deep (in m) are you below the surface if your pressure gauge reads 37 kN/m²?

(1) 2.9; (2) 360; (3) 3.8; (4) 7.6; (5) not given.

Find the change in the momentum (in kg·m/s) of a 0.4-kg ball when it is hit by a bat that applies an impulse of 6.5 N·s to the ball in a time of 0.3 s.

(1) 22; (2) 6.5; (3) 20; (4) 16; (5) not given.

Find the volume (in m³) of 650 kg of Boreinite, which has a specific gravity of 1.4

(1) 0.46; (2) 47; (3) 800; (4) 2.2; (5) not given.

Using the graph of gauge pressure (in atm) vs. depth in a fluid in Fig. A, select the answer below that most accurately represents the total pressure (in kN/m²) at a depth of 6 m if the pressure at the surface is 1 atm.

(1) 38; (2) 160; (3) 100; (4) 250; (5) 340.
Exam 2
Physics 1114 Fall 2006

Use Pencil, NOT PEN! Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely, e.g. (w)
DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is, if one of the multiple choices listed is
greater than A/1.1 and less than A/1.4, then that choice is correct; otherwise mark "(W) Not Given".

Note: \( f = 10^{-15} \), \( p = 10^{12} \), \( n = 10^5 \), \( b = 10^6 \), \( m = 10^4 \), \( k = 10^5 \), \( M = 10^6 \), \( G = 10^5 \), \( T = 10^{12} \)

1. Find the heaviest (in kN) truck that can be lifted by an automobile lift with a 0.25-m-radius piston if the hydraulic pressure is 160 kN/m².
   \( (130); \) \( (23); \) \( (31); \) \( (80); \) \( (90); \) \( (150); \) \( (10); \) \( (20); \) \( (40); \) \( (60); \) Not given

2. Find the force (in lb) needed to load a 270-lb box on a 2.3-ft-high truck using a 7-ft-long frictionless ramp.
   \( (620); \) \( (9); \) \( (870); \) \( (150); \) \( (10); \) \( (30); \) \( (20); \) \( (23); \) \( (260); \) \( (16); \) Not given

3. Which of the following has the largest volume?
   \( (3~	ext{kg of copper});\) \( (1~	ext{kg of gold});\) \( (6~	ext{kg of iron});\) \( (1~	ext{kg of ice});\) \( (2~	ext{kg of concrete});\) Not given

4. Starting from rest with 35 kJ of potential energy atop the Clock Tower, Dr. I slides down the tower's brick side. Find the work (in J) done by Dr. I if he hits the ground where PE = 0 with 14 kJ of kinetic energy.
   \( (21); \) \( (14); \) \( (35); \) \( (49); \) Not given

5. A skier (on frictionless skis) starts from rest atop a 27-m-high ski jump. How fast (in m/s) is she traveling at the bottom of the jump?
   \( (30); \) \( (18); \) \( (23); \) \( (260); \) \( (10); \) \( (20); \) \( (30); \) \( (40); \) \( (50); \) Not given

6. Find the increase in pressure (in lb/in²) as you dive to a depth of 25 ft below the surface of a pond.
   \( (62); \) \( (11); \) \( (1000); \) \( (20); \) Not given

7. Find the net work (in lb) required to stop a 1500-lb car traveling 27 m/s.
   \( (1100); \) \( (79); \) \( (41); \) \( (1500); \) Not given

8. Find the momentum (in kg m/s) of a 3-gram leaf falling with a velocity of 1.7 ft/s.
   \( (1.6 \times 10^{-6}); \) \( (4.3 \times 10^{-5}); \) \( (2.0 \times 10^{-5}); \) \( (5.1 \times 10^{-5}); \) Not given

9. Find the velocity (in km/s) of an 8500-kg asteroid with 26 GJ of kinetic energy.
   \( (6.2); \) \( (3300); \) \( (1.8); \) \( (3.8); \) Not given

10. A 170-lb man puts all of his weight on the heel of one shoe, which has an area of 9.3 in². What pressure (in lb/in²) does his heel exert on the ground?
    \( (12); \) \( (20); \) \( (179); \) \( (18); \) \( (1600); \) Not given

11. How much work (in MJ) can a 3.5 horse power (hp) motor do in 7.5 minutes?
    \( (20); \) \( (2.6); \) \( (12); \) \( (1.8); \) Not given

12. Find the volume (in m³) of the Great Pyramid if its mass is \( 6 \times 10^8 \) kg and density is 3700 kg/m³.
    \( (2.2 \times 10^{-2}); \) \( (1.6 \times 10^{-5}); \) \( (1.5 \times 10^{-6}); \) \( (1.2 \times 10^{-7}); \) Not given

13. Find the force (in kN) due to the earth's atmosphere on the top face of a cube with a side of length 0.27 m.
    \( (1.1); \) \( (2500); \) \( (27); \) \( (7.4); \) Not given

14. Running 3.4 m/s, 85 kg Dr. J jumps on his stationary 28-kg wagon. Find the final speed (in m/s) of Dr. J and his wagon.
    \( (10); \) \( (26); \) \( (1.9); \) \( (290); \) Not given

15. Find the impulse (in N·s) required to accelerate a 0.65-kg ball from rest to a speed of 23 m/s in a time of 0.3 s.
    \( (8.1); \) \( (50); \) \( (170); \) \( (15); \) Not given

16. Prez. Boren does 460 kJ of work in dragging Dr. J a distance of 1.4 km across campus at the end of a long rope. Find the force (in N) that Prez. Boren applies to Dr. J.
    \( (330); \) \( (440); \) \( (450); \) \( (250); \) Not given

17. How much does it cost (in $) to operate a 2700-W oven for 8 h if electricity costs 74/kWh?
    \( (56); \) \( (2.4); \) \( (5.1); \) \( (22); \) Not given

18. A 4-kg gun shoots a 12-gm bullet with a speed of 320 m/s. Find the residual velocity (in m/s) of the gun.
    \( (3.8); \) \( (0.65); \) \( (0.96); \) \( (320); \) Not given

19. Which of the following set of characteristics describes a liquid? (D) compressible; (E) not easily compressed; (F) flows readily; (G) strong forces between atoms; (H) weak forces between atoms; (I) atoms close together; (J) atoms far apart; (K) atoms only vibrate; (L) atoms move about relative to each other.

20. Using the graph of gauge pressure (in atm) vs. depth given in Fig. A, select the answer below that most accurately represents the total pressure (in kN/m²) at a depth of 8.2 m if the pressure at the surface is 1 atm.
    \( (2.8); \) \( (100); \) \( (41); \) \( (180); \) \( (280); \) Not given
Exam 3
Physics 114 Fall 2006

Use Pencil, NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely. e.g. ( )
DO NOT CIRCLE ANSWERS. If A is your answer, then mark the number within 10% of A. (L) that is if one of the multiple choices listed is greater than 3/1.1 and less than 1.1/3, then that choice is correct; otherwise mark "L" not given.

Find the repulsive force (in N) between two identical -5.6 μC charges which are 4.3 mm apart.

( ) 55; ( ) 20; ( ) 15; ( ) 11; ( ) not given

1. Find -6.5 °C on the Fahrenheit scale.

( ) +28; ( ) +20; ( ) -21; ( ) +46; ( ) not given

2. Find ΔU, the change in the internal energy (in kJ) of an ideal gas if the work done BY the gas is 2.7 kJ while 3.8 kJ of heat is REMOVED from the gas.

( ) +1.1; ( ) +2.7; ( ) -3.8; ( ) +5.6; ( ) not given

4. Find the heat (in kJ) required to produce water at 60 °C from 2.9 kg of ice initially at 0 °C.

( ) 840; ( ) 330; ( ) 1500; ( ) 630; ( ) not given

5. Which of the following is the largest 110-V heater (rated in Watts) that will operate on a 7-A fuse?

( ) 950 W; ( ) 840 W; ( ) 110 W; ( ) 400 W; ( ) 1200 W

6. A charge of -5.6 × 10^-17 C can be made up of: ( ) 350 protons; ( ) 250 protons and 600 electrons; ( ) 175 protons and 175 electrons; ( ) 1.6 × 10^17 electrons; ( ) none of these

7. If the force between two -1 μC charges a distance D apart is 12 N, what is the force (in μN) between a +2 μC charge and a -3 μC charge the same distance D apart?

( ) 72; ( ) 36; ( ) 24; ( ) 2.0; ( ) 6.0

8. The nucleus contains more than 95% of an atom's: ( ) number of particles; ( ) volume; ( ) mass; ( ) negative charge; ( ) none of those is more than 95%

9. Find the latent heat of vaporization, in kJ/kg, of Phystium if 770 kJ of heat must be removed from 2.4 kg of gaseous Phystium at its boiling point of 130 °C to produce liquid Phystium at 130 °C.

( ) 320; ( ) 1800; ( ) 2.25; ( ) 240; ( ) not given

10. How much charge (in C) is stored in a 12-V battery that can supply 56 kJ of (potential) energy?

( ) 670; ( ) 56; ( ) 95; ( ) 9.4; ( ) not given

11. How much heat (in kJ) is required to raise the temperature of 3.5 kg of iron from 30 °C to 150 °C?

( ) 190; ( ) 130; ( ) 460; ( ) 1800; ( ) not given

12. A copper pipe is 18 m long at -10 °C. How much longer (in cm) is it at 60 °C?

( ) 1.6; ( ) 2.2; ( ) 17; ( ) 2.7; ( ) not given

13. Find the resistance (in Ω) of a hot dog that dissipates 500 W when the voltage across it is 120 V.

( ) 4.2; ( ) 0.24; ( ) 2.2; ( ) 92; ( ) not given

14. Find the charge (in C) that flows in a 6.7-kA lightning bolt that lasts 3.5 ms.

( ) 1.9; ( ) 2.4; ( ) 24; ( ) 19; ( ) not given

15. Find the final temperature (in °C) of 2.7 kg of water initially at 20 °C after 4.50 kJ of heat is added to it.

( ) 30; ( ) 60; ( ) 70; ( ) 80; ( ) not given

16. Find the effective voltage Vpeak (in V) if the peak AC voltage Vpeak is 67 V.

( ) 96; ( ) 136; ( ) 55; ( ) 47; ( ) not given

17. Which of the following takes the most heat to raise the temperature of 3 kg of it from 15 °C to 80 °C:

( ) aluminum; ( ) lead; ( ) gasoline; ( ) concrete; ( ) iron

18. Using the graph of voltage (in V) vs. current (in mA) in a resistor given in Fig. A, select the answer that most accurately represents the power (in W) dissipated in the resistor when the voltage across it is 25 V.

( ) 520; ( ) 48; ( ) 1.8; ( ) 0.92; ( ) 1.2

19. In Fig. B, find the current (in mA) supplied by V = 18 V if R = 5.6 kΩ.

( ) 3.2; ( ) 5.8; ( ) 7100; ( ) 4.2; ( ) not given

20. Changing a light bulb while standing on a damp floor, Dr. I experiences a 240-V potential difference between his hand and feet. If his total resistance is 750 Ω, will he experience: ( ) discomfort; ( ) muscular contraction; ( ) difficulty breathing; ( ) ventricular fibrillation; or ( ) irreversible heart damage?
Exam 3  
Physics 1114  Fall 2004

Use PENCIL NOT MARKER for your answers. Mark an answer by filling in the cross between the letters, e.g. (a). DO NOT CIRCLE OR BOX ANSWERS. If in doubt, then mark the number within 10% of A. If in doubt, then mark all of the multiple choices listed. Then, circle or box the correct answer. Mark (X) if none of the choices listed is correct; otherwise mark (X) Not Given.

Note: f = 10⁻¹⁵; p = 10⁻¹²; m = 10⁻¹²; M = 10⁻¹²; k = 10⁻⁶; N = 10⁻⁶; T = 10⁻¹²

1. How much heat (in J) must be added to 3 kg of ice at 0°C to produce 3 kg of water at 50°C?  
(a) 590;  
(b) 1000;  
(c) 750;  
(d) 1000;  
(e) not given

2. How much energy (in MJ) does a 220-V heater use in 30 minutes if the current in it is 15 A?  
(a) 5.9;  
(b) 3.3;  
(c) 1700;  
(d) 150;  
(e) not given

3. Find L, the latent heat of vaporization, in kJ/kg, of Soonerite if 370 kg of heat vaporizes 2.3 kg of it at its boiling point of 49°C.  
(a) 850;  
(b) 160;  
(c) 23;  
(d) not given

4. How much energy (in GJ) is dissipated when 13°C of charge flows in a lightning bolt that flashes across a cloud-to-ground potential difference of 270 MV?  
(a) 3.5;  
(b) 13;  
(c) 21;  
(d) 6.3;  
(e) not given

5. Which of the following requires the least amount of heat to raise its temperature from 20°C to 80°C?  
(a) 4 kg of copper;  
(b) 1 kg of iron;  
(c) 2 kg of concrete;  
(d) 1 kg of gasoline;  
(e) 6 kg of lead

6. Find the effective resistance (V) if the peak AC voltage (Vac) is 75 V.  
(a) 53;  
(b) 38;  
(c) 140;  
(d) not given

7. Find the resistance (in Ω) of a hot dog that dissipates 50 W of power when 120 V is connected across it.  
(a) 5;  
(b) 120;  
(c) 410;  
(d) 24;  
(e) not given

8. If 2 kg of copper at 2°C is dropped into 1 kg of water at 4°C, heat will flow:  
(a) from water to copper;  
(b) until the temperature is 3°C;  
(c) from copper to water;  
(d) until their internal energies are equal;  
(e) no heat will flow

9. If the force between two +1 mC charges a distance D apart is 5 N, what is the force (in N) between a +3 mC charge and a +2 mC charge the same distance D apart?  
(a) 2.5;  
(b) 0.83;  
(c) 10;  
(d) 15

10. Find the final temperature (in °C) of 6 kg of silver initially at 30°C after 140 kcal of heat is added to it.  
(a) 36;  
(b) 140;  
(c) 60;  
(d) 230;  
(e) not given

11. To curl his hair, Dr. I connects an 85-V battery between his nose and toes. If his total resistance is 600 Ω, will he experience: (a) discomfort; (b) muscular contraction; (c) difficulty breathing; (d) ventricular fibrillation; (e) irreversible heart damage?

12. Find the attractive force (in nN) between an electron and an α particle when they are 1.5 mm apart.  
(a) 7.7;  
(b) 1.4;  
(c) 2.8;  
(d) 5.6;  
(e) not given

13. Dr. I has 430 electrons, 580 protons, and 1010 neutrons in his pocket. Find the net charge (in C) in his pocket.  
(a) 4.8 × 10⁻¹⁴;  
(b) 0;  
(c) 2.4 × 10⁻¹⁴;  
(d) 1.6 × 10⁻¹⁴;  
(e) not given

14. Find the change in the internal energy (in J) of an ideal gas when 700 J of heat is added to the gas and 500 J of work is done by the gas.  
(a) +700;  
(b) +200;  
(c) +1200;  
(d) -500;  
(e) not given

15. How long (in h) can a 12-V battery that stores 55 C of charge supply a 180 mA current?  
(a) 660;  
(b) 33;  
(c) 0.22;  
(d) 85;  
(e) not given

16. Find the resistance (in Ω) of a 55-V light bulb if the current through it is 23 mA.  
(a) 2.4;  
(b) 0.42;  
(c) 1.3;  
(d) 1.6;  
(e) not given

17. Find the temperature of the water that corresponds to 12°F.  
(a) -25;  
(b) -31;  
(c) +53;  
(d) -36;  
(e) not given

18. How much current (in A) is supplied by the battery in Fig. B if Vₒ = 12 V and Rₒ = 37 Ω?  
(a) 3.1;  
(b) 0.42;  
(c) 3.9;  
(d) 0.32;  
(e) not given

19. A brick wall is 150 ft long at 5°C. How much longer (in inches) is it at 30°C?  
(a) 90;  
(b) 0.81;  
(c) 0.41;  
(d) 0.034;  
(e) not given

20. Select the answer that best represents the power (in W) dissipated in the resistor R₁, whose V vs. I graph is shown in Fig. A, when the current through Rₐ is 6.3 mA.  
(a) 20;  
(b) 0.13;  
(c) 0.17;  
(d) 3200;  
(e) 0.10

---

**Fig. A**

**Voltage (in V) vs Current (in mA)**

---

**Fig. B**

Voltage source connected to resistor R₁.
Physics 114 Spring 2007

Exam 3

11. Find the current (in mA) in a 9Ω resistor if 35 C of charge flows through it in 2 h. ( ) 7.2; ( ) 44; ( ) 4.9; ( ) 18; ( ) not given

12. Find the current (in mA) through a 35-kΩ resistor connected across an 18-V battery. ( ) 0.51; ( ) 0.0003; ( ) 1.4; ( ) 0.96; ( ) not given

13. When 4 kg of lead at 2°C is dropped into 3 kg of water at 4°C, heat will flow ( ) from water to lead; ( ) until the temperature is 3°C; ( ) from lead to water.

14. Find the charge (in KΩ) stored in a 45-volt battery that can supply 35 Ω of energy. ( ) 600; ( ) 790; ( ) 1.8; ( ) 1.3; ( ) not given

15. Find the final temperature (in °C) when 325 J of heat is added to 2.5 kg of water initially at 15°C. ( ) 15; ( ) 8.7; ( ) 84; ( ) 46; ( ) not given

16. Which of the following is the largest 90-V heater (rated in Watts) that will operate on an 8-A fuse? ( ) 600 W; ( ) 850 W; ( ) 10 W; ( ) 90 W; ( ) 8.0 W

17. How much heat (in Btus) is required to produce 4.5 kg of water at 80°C from 4.5 kg of ice initially at 0°C? ( ) 5.9; ( ) 1.5; ( ) 2.6; ( ) 1.1; ( ) not given

18. In Fig. B, find the resistance of R₁ (in kΩ) if 6.5 mA of current flow through R₂ and V₀ = 36 V. ( ) 36; ( ) 230; ( ) 0.18; ( ) 5.5; ( ) not given

19. Using the graph of voltage (in V) vs. current (in mA) in a resistor R given in Fig. A, select the answer that most accurately represents the power (in mW) dissipated in R when the current through it is 23 mA. ( ) 790; ( ) 1800; ( ) 35; ( ) 610; ( ) 1500

20. Find the current (in kA) that flows in a lightning bolt which dissipates 2.3 TW in flashing across a cloud-to-ground potential difference of 150 MV. ( ) 1.7; ( ) 410; ( ) 78; ( ) 0.18; ( ) not given

---

**Fig. A Voltage (in V) vs Current (in mA)**

---

1. Which of the following takes the smallest amount of heat to raise 2 kg of it from 20°C to 90°C? ( ) aluminum; ( ) gasoline; ( ) lead; ( ) copper; ( ) concrete

2. The force between two charges, Q and q, that are a distance d apart is 12 N. What is the force (in N) between the same two charges when they are a distance D = d/2 apart? ( ) 48; ( ) 3.0; ( ) 6.0; ( ) 12; ( ) not given

3. Ind the Celsius temperature that corresponds to 13°F. ( ) 55; ( ) -11; ( ) -25; ( ) 39; ( ) not given

4. Ind the retentive force (in nN) between a proton and a +4-mC charge when they are 15 nm apart. ( ) 64; ( ) 380; ( ) 55; ( ) 29; ( ) not given

5. Ind the retentive force (in nN) between a proton and a +4-mC charge when they are 15 nm apart. ( ) 64; ( ) 380; ( ) 55; ( ) 29; ( ) not given

6. A change in the internal energy, in J, of an ideal gas if the work done on the gas is 2.3 J and 3.6 J of heat is removed from the gas. ( ) 0.9; ( ) -3.6; ( ) -2.3; ( ) not given

7. How much heat (in J) must be removed from 3 kg of aluminum to cool it from 250°C to 60°C? ( ) 890; ( ) 510; ( ) 670; ( ) 240; ( ) not given

8. Charge of -6.4 x 10⁻¹⁷ C can be made up of: ( ) 400 protons; ( ) 850 electrons and 450 protons; ( ) 1.6 x 10⁻¹⁹ electrons; ( ) 200 electrons and 200 protons; ( ) none of these

9. Ind the latent heat of vaporization, Lᵥ, (in kJ/kg) of water in 2.4 kg of it vaporizes when 610 kJ of heat is added to it at its boiling point of 74°C. ( ) 18; ( ) 190; ( ) 520; ( ) 330; ( ) not given

10. A light bulb while standing on a wet floor. Dr. I experiences a 240-V potential difference between the hand and feet. If his total resistance is 35 kΩ, he will experience: ( ) discomfort; ( ) muscular attraction; ( ) difficulty breathing; ( ) ventricular fibrillation; or ( ) irreversible heart damage. ( )
Exam 3

Physics 1114 Spring 2004

Use Pencil. NOT PEN. Erase incorrect answer completely. Mark an answer by filling in the space between the brackets completely, e.g. (0). DO NOT CIRCLE ANSWER. If a is your answer, then mark the number within 1½ of a . That is, if one of the multiple choices listed is greater than A/1.5 and less than 1.5 A, then that choice is correct. Otherwise mark "(E) Not Given".

1. Repairing his truck, Dr. J. puts his hands on the terminals of its 12-V battery. If his total resistance is 2.4 kΩ, will he experience: ( ) discomfort; ( ) muscular contraction; ( ) difficulty breathing; ( ) ventricular fibrillation; or ( ) irreversible heart damage?

2. Find the repulsive force (in N) between a proton and a +0.75 C charge that are 8 mm apart.
   ( ) 0.14;
   ( ) 2.1;
   ( ) 53;
   ( ) 17;
   ( ) not given

3. A brick tower is 50 m tall at -20 °C. How much heat is transferred (in J) at a temperature of 40 °C?
   ( ) 72;
   ( ) 36;
   ( ) 90;
   ( ) 9.10^5;
   ( ) not given

4. Which of the following takes the smallest amount of heat to raise 4.5 kg of ice from -15 °C to 5 °C?
   ( ) concrete;
   ( ) iron;
   ( ) copper;
   ( ) ice;
   ( ) water

5. How much heat (in J) is required to produce 1.7 kg of steam at 100 °C from 1.7 kg of water initially at 5 °C?
   ( ) 4.5;
   ( ) 2.7;
   ( ) 8.5;
   ( ) 0.68;
   ( ) not given

6. Find the effective alternating voltage V peaks (in V) that corresponds to a peak alternating voltage V p = 36 V.
   ( ) 460;
   ( ) 230;
   ( ) 540;
   ( ) 320;
   ( ) not given

7. Find the resistance (in Ω) of a 40-W light bulb that operates on 24 V.
   ( ) 0.60;
   ( ) 14;
   ( ) 1.7;
   ( ) 38;
   ( ) not given

8. Find the total charge (in C) in Dr. J's pocket if it contains 250 protons, 550 electrons, and 800 neutrons.
   ( ) 3.2 X 10^-17;
   ( ) 0.0;
   ( ) 1.2 X 10^16;
   ( ) 4.8 X 10^17;
   ( ) not given

9. Find the change in internal energy, (in kJ) of an ideal gas when 450 kJ of work is done by the gas and 300 kJ of heat is added to the gas.
   ( ) -150;
   ( ) 450;
   ( ) +450;
   ( ) +450;
   ( ) not given

10. Find T, the latent heat of fusion, (in kJ/kg) of Indestructible if 1.3 MJ of energy is needed to melt 4.5 kg of Indestructible at its melting point of 7 °C.
    ( ) 380;
    ( ) 660;
    ( ) 42;
    ( ) 920;
    ( ) not given
Exam 3

Physics 1114 Fall 2007

Use Pencil, NOT PEN. Erase Incorrect answer completely. Mark an answer by filling in the space between the brackets completely, e.g. (9)

DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is, if one of the multiple choices listed is "greater than A/1.1 and less than 1.1*A", then that choice is correct; otherwise mark "(9) Not Given".

Note: f = 10^{-15}; p = 10^{-12}; n = 10^9; m = 10^6; m = 10^3; k = 10^3; M = 10^6; G = 10^9; T = 10^{12} 

1. If the repulsive force between two +1 mC charges a distance D apart is 16 mN, what is the force (in mN) between the same two charges when they are a distance d = D/2 apart?
   ( ) 8.0; ( ) 18; ( ) 64; ( ) 4.0; (9) 32

2. Find the final temperature (in °C) after 35 kJ of heat is added to 6.5 kg of lead initially at 15 °C.
   ( ) 130; (9) 56; ( ) 16; ( ) 82; ( ) not given

3. Find L_v, the latent heat of vaporization, (in kJ/kg) of Normanite if takes 850 kJ of heat to vaporize 1.8 kg of it at its boiling point of 120 °C.
   ( ) 4.0; ( ) 850; ( ) 630; ( ) 360; (9) not given

4. Changing a light bulb while standing on a damp floor, Dr. I experiences a 120-V potential difference between his hands and feet. If his total resistance is 800 Ω, will he experience: ( ) discomfort; ( ) muscular contraction; ( ) difficulty breathing; (9) ventricular fibrillation; or ( ) irreversible heart damage?

5. A charge of +5.6 \cdot 10^{-17} C can be made up of: ( ) 250 electrons; ( ) 225 protons and 225 electrons; (9) 570 protons and 220 electrons; ( ) 1.6 \cdot 10^{-19} protons; ( ) none of these

6. Find the attractive force (in pN) between an electron and a +5 μC charge that are 6.5 mm apart.
   ( ) 130; ( ) 370; (9) 170; ( ) 1.1; ( ) not given

7. Which of the following is the largest 220-V heater (rated in Watts) that will operate on a 15-A fuse?
   (9) 2500 W; ( ) 220 W; ( ) 1500 W; ( ) 4000 W; ( ) 15,000 W

8. Find Δu, the change in the internal energy, (in kJ) of an ideal gas if the work done by the gas is 3.5 kJ while 2.6 kJ of heat is added to the gas.
   ( ) -3.5; ( ) +7.1; ( ) +2.6; (9) -0.90; ( ) not given

9. An iron bridge is 750 m long at -10 °C. How much longer (in m) is it at 30 °C?
   ( ) 12; ( ) 0.26; ( ) 0.53; ( ) 0.18; (9) not given

10. Find the power (in W) dissipated by a 160-Ω resistor when the voltage across it is 120 V.
    ( ) 210; (9) 90; ( ) 0.75; ( ) 19,000; ( ) not given

   ♦
11 How long (in h) can you run a 350-W stereo on $2.50/h electricity if electric rates are:
( ) 29; ( ) 22; ( ) 2.8; ( ) 82; ( ) not given

12 Find the Fahrenheit temperature that corresponds to -26 °C.
( ) -15; ( ) -47; ( ) +11; ( ) -32; ( ) not given

13 A battery stores 650 kJ of (potential) energy and can supply 145 kC. What is the battery's voltage (in V)?
( ) 0.22; ( ) 32; ( ) 4.5; ( ) 6.0; ( ) not given

14 Find the heat (in kJ) required to raise 5.6 kg of water from 10 °C to 70 °C.
( ) 670; ( ) 1900; ( ) 390; ( ) 1400; ( ) not given

15 Which of the following takes the smallest amount of heat to raise 3.2 kg of it from 25 °C to 55 °C?
( ) lead; ( ) iron; ( ) copper; ( ) mercury; ( ) water

16 How much charge (in kC) is stored in a 6-V battery that can supply a 0.750 A current for 9 h?
( ) 4.5; ( ) 72; ( ) 24; ( ) 41; ( ) not given

17 How much heat (in kJ) must be added to 1.8 kg of ice at 0 °C to produce 1.8 kg of water at 95 °C?
( ) 1600; ( ) 730; ( ) 600; ( ) 1300; ( ) not given

18 Find the current (in mA) through $R_1 = 2.9 \, k\Omega$ in Fig. B if $V_0$ is 24 V.
( ) 120; ( ) 8.3; ( ) 200; ( ) 6.3; ( ) not given

19 Using the graph of voltage (in V) vs. current (in mA) in a resistor $R$ given in Fig. A, select the answer that most accurately represents the power (in $\text{mW}$) dissipated in $R$ when the voltage across it is 15 V.
( ) 100; ( ) 75; ( ) 170; ( ) 130; ( ) 0.83

20 When two electrons come near each other they always: ( ) attract each other; ( ) form an ion;
( ) repel each other; ( ) form a molecule; ( ) become a nucleus; ( ) none of these is always true
Make-Up Exam  Physics 1114  Fall 2007

Use Pencil, NOT PEN. Erase Incorrect answer completely. Mark an answer by filling in the space between the brackets completely. e.g. (●)

DO NOT CIRCLE ANSWER! If A is your answer, then mark the number within 10% of A; that is: if one of the multiple choices listed is "greater than A/1.1 and less than 1.1*A", then that choice is correct; otherwise mark *(●)* Not Given.

Note: f = 10^{-15}; p = 10^{12}; n = 10^{-9}; m = 10^{-6}; k = 10^{3}; M = 10^{6}; G = 10^{9}; T = 10^{12}

Water Data: D = 1000 kg/m^{3}; D_{mg} = 62.4 lb/ft^{3}; C = 4.184 kJ/(kg \cdot ^oC); L_f = 334 kJ/kg; L_v = 2260 kJ/kg

1
Initially at rest atop the Clock Tower with 35 kJ of potential energy, Dr. I slides down its brick side. If 26 kJ of work is done BY Dr. I, find the kinetic energy (in kJ) with which he hits the ground (where PE = 0).

(●) 9.0; ( ) 35; ( ) 61; ( ) 26; ( ) not given

2
Find the increase in pressure (in kN/m^{2}) as you dive 24 in below the surface of Lake Dirtybird.

( ) 70; ( ) 340; (●) 240; ( ) 35; ( ) not given

3
Find the volume (in m^{3}) of a pyramid if its mass is 3 \times 10^8 kg and density is 2500 kg/m^{3}.

( ) 7.5 \times 10^{11}; (●) 1.2 \times 10^5; ( ) 9.2 \times 10^4; ( ) 1.6 \times 10^5; ( ) not given

4
Find the final temperature (in oC) after 300 kJ of heat is added to 2.4 kg of water initially at 15 oC.

( ) 55; ( ) 70; ( ) 30; (●) 45; ( ) not given

5
Find the acceleration (in km/s^{2}) of a 560-kg rocket if the net force on it is 2.1 MN.

(●) 3.8; ( ) 1.2; ( ) 270; ( ) 5.6; ( ) not given

6
How much charge (in kC) is stored in a 6-V battery that can supply 750 kJ of (potential) energy?

( ) 23; ( ) 4.5; ( ) 310; ( ) 95; (●) not given

7
Find the NET work (in kJ) required to stop a 750-kg running deer initially traveling 34 m/s.

( ) 860; (●) 430; ( ) 26; ( ) 320; ( ) not given

8
Find the gravitational force (in N) on a 5 \times 10^7 kg asteroid, which is 32 Gm from the 2 \times 10^{30} kg sun.

( ) 1.9 \times 10^7; (●) 7.1 \times 10^5; ( ) 6.5 \times 10^6; ( ) 2.1 \times 10^8; ( ) not given

9
Find the resistance (in \Omega ) of a hot dog that dissipates 75 watts when the voltage across it is 48 V.

(●) 31; ( ) 24; ( ) 56; ( ) 1.6; ( ) not given

10
Find the velocity (in mm/s) of a snail that travels 23 cm in 2 minutes.

( ) 0.77; ( ) 9.1; ( ) 1.3; ( ) 12; (●) not given

◆

◆
11. How much heat (in kJ) must be added to 0.75 kg of ice at 0 °C to produce 0.75 kg of water at 45 °C?
   ( ) 140; ( ) 960; ( ) 390; ( ) 250; ( ) not given

12. Find the force (in kN) on a 0.15-m by 0.2-m window in the space shuttle when it is in orbit if the pressure inside the shuttle is 0.8 atm.
   ( ) 4.6; ( ) 3.0; ( ) 35; ( ) 2.4; ( ) not given

13. Find the heaviest truck (in kN) that can be raised by a hydraulic lift with a 0.35-m-radius piston if the hydraulic pressure is 87 kN/m².
   ( ) 33; ( ) 24; ( ) 11; ( ) 68; ( ) not given

14. After Exam I, two students tie a rope to 75-kg Dr. I and spin him around in a circle at a speed of 7 m/s. Find the radius of the circle (in m) if the centripetal force on Dr. I is 1400 N.
   ( ) 15; ( ) 2.3; ( ) 11; ( ) 3.3; ( ) not given

15. Using an 1040-N force, Prez Boren pulls Dr. I, who weighs 960-N, up to the top of the Clock Tower. Find Dr. I's acceleration (in m/s²).
   ( ) 0.63; ( ) 0.82; ( ) 1.2; ( ) 11; ( ) not given

16. How much charge (in C) is stored in a 12-V battery that can supply a 150 mA current for 3 h?
   ( ) 1600; ( ) 1.8; ( ) 450; ( ) 2100; ( ) not given

17. 96-kg Dr. I sits on a ladder to change a light bulb. Find the weight (in N) of the ladder if the floor exerts a 1.7-kN (normal) force on the ladder.
   ( ) 620; ( ) 940; ( ) 2600; ( ) 460; ( ) not given

18. Find L_f, the latent heat of fusion, (in kJ/kg) of Rynite if takes 3800 kJ of heat to melt 2.7 kg of it at its melting point of 45 °C.
   ( ) 31; ( ) 1400; ( ) 560; ( ) 330; ( ) not given

19. Find the work (in kJ) required to load a 1900-N box on 1.7-m-high truck using an 8-m-long ramp.
   ( ) 400; ( ) 31; ( ) 1.1; ( ) 3.2; ( ) not given

20. Dr. R throws a ball directly upward with a velocity of +3 m/s. Find its position (in m) 0.9 s after it leaves his hand. [His hand is the zero of position.]
   ( ) -4.0; ( ) +2.7; ( ) -1.3; ( ) -5.8; ( ) not given