Vocabulary will be **Multiple Guess**:

500 J	A box weighing 25 Newtons is lifted 20 meters. How much work is done?
9W	45 J of work are done in 5 seconds. What is your power?
Watt	The unit of power is the:
Potential	Which type of energy does a stretched rubber band have?
Potential	Which type of energy does a ball thrown in the air have at its highest point?
Kinetic	Which type of energy does a ball thrown in the air have right before it hits the ground?
Joule	The unit of work is the:
30 N	A certain lever has a Mechanical Advantage of 3. If you push down on it with a force of 10 Newtons, how much weight can you lift?
7 N	A pulley system has five supporting ropes. How much force will it take to lift 35 Newtons?
Joule	The unit of energy is:
Bowling	Which has more energy, a bowling ball or a tennis ball if they both are ten feet off the ground?
Specific Heat	The amount of energy needed to raise the temperature of one kilogram of a substance one degree Celsius
Thermal Energy	The total amount of molecular kinetic energy in a substance:
Temperature	The average amount of molecular kinetic energy in a substance:
º Centigrade	The standard unit of temperature in the metric system
º Kelvin	The unit of absolute temperature:
Absolute Zero	The point at which there is no more molecular kinetic energy:
Heat	The energy that MOVES from one substance to another substance:
Heat of Fusion	The heat necessary to change one kilogram of a substance from a solid to a liquid
Heat of Vaporization	The amount of heat given off when a substance changes from a gas to a liquid
Luminous	Lit by giving off light of your own:
Translucent	A material that transmits light, but distorts it:
Opaque	A material that does not allow light to pass through:
Index of Refraction	A measure of how much a material will refract light:
Transparent	A material that transmits light without any distortion:
Plane	Flat mirror, can only produce a virtual image:
Focal Length	Distance from the focal point to the lens or mirror:
Lens	A piece of glass or plastic designed to refract light in a particular way:
Concave	Curved inward at the center (mirror or lens):
Illuminated	Lit by reflecting the light of another:
Convex	Curved out at the center (mirror or lens):
Real	An inverted image that can be projected:
Virtual	A correctly positioned image that cannot be projected:
Focal Point	Point near a lens or mirror that all light rays are deflected towards:
Medium	The substance through which a wave travels is called a:
Crest	The highest point of a transverse wave is called the:
Energy	The thing that is transferred in a wave is:
Acoustics	The science of sound is called:
Rarefaction	The stretched out portion of a longitudinal wave is called a:
Compression	The scrunched up portion of a longitudinal wave is called a:
Trough	The low point of a transverse wave is called a:
Amplitude	The height of a wave is the:
Wavelength	One crest plus one trough equals one:
Diffracted	Waves that curve around corners are:
Solid	Which of the following is the fastest transmitter of sound?
Reflection	Produces echos in large buildings:
Consonances	Frequencies that produce a pleasing sound are called:
Dissonances	Frequencies that produce an unpleasant sound are called:
343 m/s	The speed of sound in air is approximately:
Amplitude	Intensity of sound depends on:
Overtones	Quality of sound depends on:
Frequency	Pitch of sound depends on:
Refracted	Waves that bend when changing mediums are called:
Reflected	Waves that bounce back are called:
Volt	The unit of potential difference:
Capacitor	A device used to hold a charge:
Voltage	Electrons move from areas of high __ to areas of low __:
Ohm	The unit of resistance:
Circuit Breaker	A modern electromagnetic safety switch used to protect circuits from overloads of current:

Parallel	A circuit containing resistors on separate branches to the power supply:
Circuit	A complete loop from a power supply, through a resistor and back to the power supply:
Resistance	Opposition to the flow of electricity:
Ampere	The unit of current:
Watt	The unit of power:
Fuse	A safety switch in a circuit designed to melt at a certain current level to kill the circuit:
Series	A circuit in which all parts are in one continuous loop:
Voltage	How hard the electricity is being pushed along the circuit - also called potential difference:
Schematic	A symbolic line drawing of an electric circuit:
Current	The amount of electricity flowing through a circuit:

Problems: Using the following, and the formulas on the formula sheet, solve for the unknown. ANSWERS are in parentheses at the end of each problem.

Specific heat of water = 4180 (J/kg C)
heat of fusion of water = 334 000 J/kg
heat of vaporization of water = 2 260 000 J/kg

1. A 50.0 g piece of metal is **boiled in water**, and then placed in 350.0 g of water at 19.5 C. After a minute, the temperature of the water is 25.0 C. Assuming no heat loss or gain to the surroundings, what is the specific heat of the metal? (2150 J/kg C)

$$mc\Delta T_{lost} = mc\Delta T_{gained}$$

$$(50)(c)(100-25) = (350)(4180)(25-19.5)$$

2. A) If a pipe has a closed end and is 62.3 cm long, what will the fundamental frequency be? Assume sound speed of 343 m/s. (138 Hz)
If there is a closed end, the fundamental wavelength is 1/4 λ, so 1/4 λ = .623 m, which means 1 λ = 2.492 m
v = f λ 343 = f 2.492 Solve for f

B) What will the first overtone's frequency be? (413 Hz)
Same as above, but the first overtone is 3/4 λ

3. Waves of frequency of 2.0 Hz are generated on a spring. The waves have a wavelength of .95 m.
A. What is the waves speed? (1.9 m/s) v = f λ
v = (2.0)(.95)
B. If the frequency is increased to 6.0 Hz, what is the new wavelength? (.32 m) v = f λ
(1.9) = (6.0) λ solve for λ

4. Cecy, macho hunter, is out hunting javalina with a spear. A 20.9 kg boar charges at her at 18.68 m/s, and she calmly throws her 8.82 kg spear into the beast at a rate of 19.5 m/s. What is the new velocity of the Javelina? (7.35 m/s toward Cecy) $m_1v_1 + m_2v_2 = (m_1 + m_2)\, v'$
(20.9)(18.68) + (8.82)(-19.5) = (20.9+8.82) v'

5. Light falls on a clear pool of water at an angle of 69.4 degrees, measured from the normal (of course!). Some of the light is reflected, most is refracted into the water.
A. At what angle is the light reflected? (69.4°)
$\emptyset_{in} = \emptyset_{out}$
B. At what angle is the light refracted? n of water = 1.33
(44.7°) $n_1 \sin\emptyset_1 = n_2 \sin\emptyset_2$ 1.00 sin (69.4) = 1.33 sin(x)

6. Miguel is trapped in space. He was working on the engine of his spacemobile when a meteor sideswiped him. His jetpack stopped him, but he is now 180.0 m away from his ship, and his jetpack is out of fuel. He has a mass of 85.3 kg and the pack's mass is 25.8 kg. If he throws the pack away from his ship at 12.4 m/s, how long will it take him to reach his spacemobile? (48.0 sec)
$m_1v_1 = -m_2v_2$ $85.3v_1 = 25.8(12.4)$ then put that v into v = d/t

7. A 4.21 kg steel ball rolls across a smooth table and attains a speed of 8.18 m/s. It started at rest and was accelerated by a force over a distance of 1.26 meters.
A. How much kinetic energy does it have? (141 J)
$KE = mv^2/2 = 4.21(8.18^2)/2$
B. What was the magnitude of the force that accelerated the ball? (112 N)
ΔKE = ΔPE = ΔW, so W = 141 J W = Fd 141 = F 1.26
C. What is the power exerted if the above work is done in 5.82 seconds? (24.2 W) P = W/t P = 141/5.82
D. If the ball rolls up a frictionless ramp, to what height could it roll? (3.41 m) ΔKE = ΔPE = ΔW, so PE = 141 J
PE = mgh 141 = 4.21 (9.81) h

8. A convex lens with a 8.8 cm focal length is placed 9.0 cm away from a candle flame that is 3.2 cm tall. It projects a perfectly focused image on a wall nearby.
A. How far away is the wall? (396 cm = 4.0 m)
$1/f - 1/d_o = 1/d_i$ $8.8^{-1} - 9.0^{-1} = ans^{-1} =$
B. How big does the candle flame look on the wall? (140 cm) $h_i / h_o = d_i / d_o$
$h_i = (3.2)\ (396) / (9.0)$

9. A 16.0 ohm, a 54 ohm, and a 32 ohm resistor are connected in series.
A) What is their total resistance? (102 ohms)
$R_e = R_1 + R_2 + R_3 = 16 + 54 + 32$
B) If they are placed in parallel, what is their resistance? (8.91 ohms)
$1/R_e = 1/R_1 + 1/R_2 + 1/R_3 = 16^{-1} + 54^{-1} + 32^{-1} = ans^{-1} =$

10. A 150.0W light bulb is placed in a 120V outlet.
A) How much current flows through the bulb? (1.25 A)
P = IV 150 = I (120) solve for I
B) What is the resistance of the bulb? (96 ohms)
V = IR 120 = (1.25) R solve for R

12. A microwave oven draws 8.5 A when operated on 120 V.
A) How much power does it use? (1020 W)
P = IV P = (8.5)(120)
B) If it takes 15 minutes to cook the meal, how much energy does it use? (918 000 J) 15 min = 900 sec
P = W/t 1020 = W/ 900 solve for W