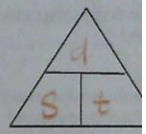
ysics Review Packet Selected answers **Name:** KEY

1. Speed: the distance an object travels over the amount of time it takes to travel
2. Velocity not only accounts for speed but also direction.

- Speed (m/s) = distance (m) ÷ time (s)
- Speed = $\Delta d/\Delta t$



alculating Speed/ Velocity

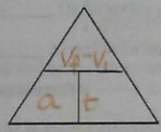
3. After driving for exactly 60 seconds, you have driven 600 meters. What speed were you driving? $\frac{600\text{ m}}{60\text{ s}} = 10\text{ m/s}$

4. After driving for 3.5 hours at a rate of 85 km/hr, how far did you go?

5. Acceleration: occurs when an object:

- **Speeds** up,
- Slows down,
- **Changes direction.**

Acceleration is found by: $a = (v_f - v_i)/t$



Practice Acceleration

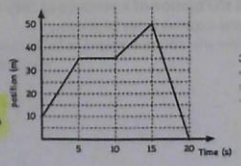
6. A car goes from 0 m/s to 20 m/s in 6 s. What is the car's acceleration?

7. A man was running at 3 m/s. In 4 seconds, he slowed down so his velocity is now 1 m/s. W his acceleration? $\frac{1\text{ m/s} - 3\text{ m/s}}{4} = \frac{-2}{4} = -.5\text{ m/s}$

Graphing Motion:

8. Slope is equal to rise divided by run.
9. Slope on a distance-time graph represents an object's speed.
10. Slope on a speed-time graph represents an object's acceleration.

For each graph- answer the following:



Time	Describe
0-5 s	Constan
5-10 s	not m
10-15 s	Constan
15-20 s	movin

11. Describe the motion using the chart.
12. How fast is the object moving at 5 seconds? $\frac{\text{rise}}{\text{run}} = \frac{35\text{ m}}{5\text{ sec}} = 7\text{ m/s}$
13. What is the average speed of the object from 0-15 seconds?

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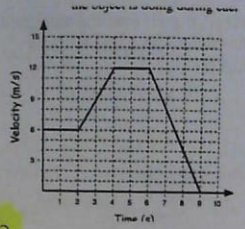
Describe the motion of the ond graph using the chart.



Time	Describe motio
0-2 s	moving @ c
2-4 s	accelerati
4-6 s	moving @
6-9 s	slowing do

How fast is the object moving 9 seconds?

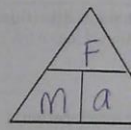
. What is the acceleration of e object from 2-4 seconds? $\frac{\text{rise}}{\text{run}} = \frac{6}{2} = 3\text{ m/s}^2$

. Force: Any push or pull on an object

3. Newton's 1st Law – An object in motion will stay in _____ and an object at rest will sta _____, unless what? _____

9. Newton's 2nd Law: A _____ applied to an object will cause celeration.

0. F = m x a ------→Force is measured in _____.



L. An object with a mass of 10 kg accelerates at a rate of 9.8 m/s². hat force is exerted on the object?

2. What is the weight (force) of a person on the moon if they have a mass of 45 kg and the gravity e moon is 1.6 m/s²? $F = ma \quad F = 45\text{ kg} \times 1.6\text{ m/s}^2$ Weight = 72 N

3. Newton's 3rd Law: For every _____ force, there is an equal and opposite _____ force.

4. Friction: is the force that opposite motion.

- Sliding friction – opposes the motion of 2 surfaces as they slide against each other
- Static friction – opposes the motion from beginning

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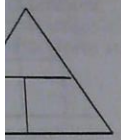
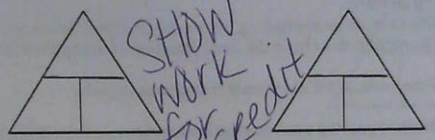
w of Motion and Force Problems





SHOW work for credit

traveling at 45 m/s travels at the same speed for 120 seconds. How far does the car travel?

5400 m

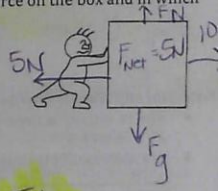
're driving to Wilmington for the weekend. You know it usually takes 2 hours to get to mington from Raleigh, and you have to drive 130 miles. In mi/hr, what is your average speed?

65 mi/hr

all is initially still in a baseball player's hand. He throws the ball, and by the time it leaves his nd 0.5 seconds later, it is traveling at 50 m/s. What is the ball's acceleration?

100 m/s²

box is being pushed to the right across the floor by a force of 10 N. A frictional force of 5 N poses the motion. The box has a weight of 20 N. What is the net force on the box and in which rection is the net force? Hint: draw a force diagram! Some forces ay not be listed in the problem!



ball falls through the air with an acceleration of 9.8 m/s². The ravitational force on the ball is 4.9 N. What is the mass of the ball?

.5 kg

A car traveling north with a velocity of 30 m/s slows down to a velocity of 10 m/s within 10 seconds. What is the car's acceleration?

-2 m/s²

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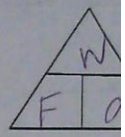
rk: To do work:
1. A force must be applied
2. The motion must be in the same direction as the applied force



calculate work: $W = F \times d \rightarrow$ *work is measured in Joules*

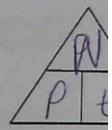
. A person is pushing a car that has broken down. They exert a force of 0N but the car does not move. How much work is done?

2. A student exerts a force of 500N pushing a box 10m across the floor in 4 seconds. How much es the student perform?

W = 500N x 10m = 5000 J

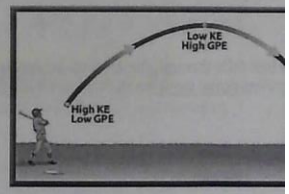
ower
Power is the rate of Work done
Power is the rate of Joules used per second or Watts

$P = W / t = (F \cdot d) / t$



3. How much power is used to lift a box that weighs 50 Newtons 10 meters in 0 seconds?

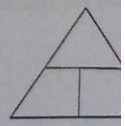
otential and Kinetic Energy
- Kinetic energy is the energy of _____
  $KE = ½ mv^2$
- Gravitational Potential Energy (GPE) is energy _____ in objects that can fall
  $GPE = mgh$
  Energy is measured in Joules



34. Describe the energy conversions that take place in the following:
A. Rollercoaster:

B. Listening to the radio
radio
electromagnetic → sound

C. Driving a car



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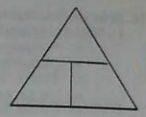
Energy practice problems:

35. A ball that weighs 35 kg is at rest on a table that is 1m above the ground. What is its kinetic energy?



36. A 35 g pencil is 1.6 m off the ground. What is its potential energy?

37. A 2 kg mass flies off a lab ramp and is traveling 5 m/s, 3 m above the ground. What is its kinetic and potential energies? What is the total energy?

38. A car of mass 1500 kg is traveling at 30.0 m/s. What is its kinetic energy?

$KE = \frac{1}{2}mv^2$ $KE = 675000\ J$

a. If it slows down to 10.0 m/s, what is its KE now?

$KE = \frac{1}{2}mv^2$ $KE = 75000\ J$

39. A diver of weight of 50.0 N climbs up to a diving platform 1.25 m high. What is her potential energy at the top of the platform?

62.5 J $PE = mgh = Wh = 50N \cdot 1.25m$

$PE = 62.5J$

a. As she dives, what is her KE as she hits the water?

Energy is conserved $KE = 62.5\ J$

b. What is her speed as she hits the water?

62.5 J $KE = 62.5\ J$ $m = 50N/9.8 = 5.1\ kg$ $KE = \frac{1}{2}(5.1)v^2$ $v = 4.9$

Temperature – the average kinetic energy of the particles in a substance.

- The faster the particles that make up an object are moving, the higher the object's temperature.

Heat – the transfer of thermal energy from an object at a high temperature to an object at low temperature.

3 Types of Heat Transfer

1) Conduction – heat transfer between objects that are touching
2) Convection – heat transfer by the rising of low density (hot) liquid/gas and the sinking of high density (cold) liquid/gas.
3) Radiation – heat transfer by electromagnetic radiation (ex. ultraviolet radiation)

Specific Heat – the amount of heat needed to increase the temperature of a substance

- The larger the specific heat, the longer it takes to heat up and cool down.

No machine is 100% efficient – some usable energy is always lost because friction changes it into heat

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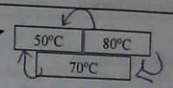
40. Draw 3 arrows to show the direction of heat transfer.



41. What type of heat transfer (conduction, convection, or radiation?)
    a. Your microwave heats your food. R
    b. A fireplace heats the entire house. CV
    c. Water boiling. CV
    d. You put a pan on the stove to cook food. CD
    e. The sun heats the Earth. R
42. Which will heat up faster, **iron** (specific heat = 0.449 J/g*°C) or **copper** (specific heat = 0.385 J/g*°C)?
    Copper

43. Mechanical Waves – waves that require medium to travel through, ex. sound, water, earthquakes

44. Transverse waves- label the wave below

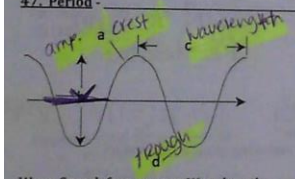
- crest (_____), trough (bottom)
- amplitude (mid - top)
- wavelength (_____)

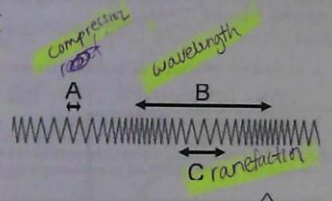
45. Longitudinal (compressional) waves- label the wave below

- compression (areas close together)
- rarefaction (_____)
- ex. sound wave, slinky

46. Frequency - _____

47. Period - _____





Wave Speed: frequency x Wavelength

48. Electromagnetic waves (radiation)

- Higher _____ → shorter wavelength → higher energy
- Lower frequency → longer _____ → lower energy
- Speed is fastest in a vacuum= $3x10^8$ m/s

49) A sound that is very loud (has a lot of energy) will have a very high [frequency, amplitude, or wavelength?].

50) Which type of wave requires a medium? [Transverse/Electromagnetic]

51) For electromagnetic waves, a high energy wave has a high [frequency or wavelength?] and a short [frequency or wavelength]

52) Which type of electromagnetic wave has the higher energy: radio wave or gamma ray?

53) Which type of electromagnetic wave has the higher energy: red light or violet light?

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54) Which type of electromagnetic wave has a shorter wavelength: microwave or infrared?
55) Which type of electromagnetic wave has a higher frequency: ultraviolet or violet light?
56) Which type of electromagnetic wave has the smaller frequency: x-rays or gamma rays?
57) The color of visible light is determined by the [wavelength, amplitude, or speed] of the wave.

58. Calculate the speed of an ocean wave that has a wavelength of 4.5 meters and a frequency of 6 hertz.

$S = \lambda f = 4.5m \times 6hz = 27 m/s$

59. What type of electromagnetic wave has a frequency of 2.1×10^{-7}? C= 3×10^{8} m/s

60. Static electricity – the build-up of excess (stationary) charges
- Like charges _____ and opposite charges _____

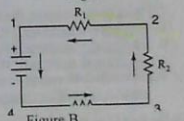
61. Types of charging:
1) Friction – charging by _____
2) _____ – charging by touching
3) Induction – charging by holding a charged object _____

62. Current Electricity – _____ charges (open circuit – OFF)
63. Series Circuit – only _____ path for current to flow; if one goes out, they _____ go out.
64. Parallel Circuit – _____ paths, current splits to go through separate paths & recombines when returns to battery (current is different in different places); draws more current out of the battery than series circuits; each lightbulb gets entire voltage of battery; brighter than series; if one goes out, the rest _____.

65) These pith balls have the [same or opposite?] charge.

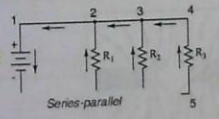
66) Figure A is a [series or parallel?] circuit.
a. If R3 went out, which bulbs would light? NOT
b. Would the current be the same at point 3? YES

Figure A



67) Figure B is a [series or parallel?] circuit.
a. If R1 went out, which bulbs would light? R2 & R3
b. Would the current be the same at point 1 and point 4? NO

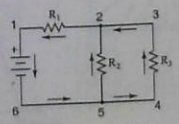
Figure B



Series-parallel

68) Lightbulbs in [series or parallel?] are brighter than those in [series or parallel?].
69) The higher the voltage in a circuit, the [higher or lower?] the current.
70) The higher the resistance in a circuit, the [higher or lower?] the current.

71) In this complex circuit:
a. If R1 went out, which bulbs would light? ____
b. If R2 went out, which bulbs would light? ____
c. If R3 went out, which bulbs would light? ____



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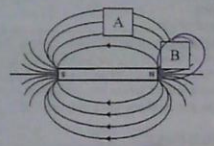
5-Minute Lesson – Objective 4.03 (CONCEPT review)

Magnets (have a N and S pole)
- Magnetic domains – if the domains (mini-magnets) inside a material are aligned, the material is magnetized.
  - To demagnetize: drop it, hammer it, heat it (so the domains are not aligned)
- Opposite poles attract, like poles repel
- Magnetic field is strongest near the poles.

Electromagnets – a wire that a current is traveling through will have a magnetic field around it.
- If you coil a wire into a solenoid & put a piece of iron inside, the iron will become magnetized.
- Generators – changes mechanical energy into electrical energy
  - When you rotate a coil of wire in a magnetic field, electrical current will start the flow through the wire.
- Electric Motors – changes electrical energy into mechanical energy
  - A coil of wire with current moving through it will rotate when placed in a magnetic field.

72) Which location would have the strongest magnetic field: A or B?



73) In an electromagnet, the strength of the magnet will increase if you:
a. [increase or decrease?] the number of coils.
b. [increase or decrease?] the voltage of the battery.
c. [increase or decrease?] the current going through the wire.
74) The poles will switch on an electromagnet if you [change the voltage of the battery, decrease the number of coils, or change the direction of the current?]

75) Do the field lines show that these poles are attracting or repelling each other: