

Name: KEY

Period: _____

Active Physical Science

SEMESTER 2 EXAM
STUDY GUIDE


Motion

1. The formula to calculate velocity:

$$v = \frac{d}{t}$$
2. The formula to calculate acceleration:

$$a = \frac{\Delta v}{t} = \frac{v_f - v_i}{t}$$

3. Negative acceleration means that the change in velocity has decreased.
4. Label these as acceleration or velocity?
 A. A car traveling east 70 mi/hr. V
 B. A car speeding up from 33 km/hr to 42 km/hr. A
 C. A train decreasing speed 50 m/s/s. A
 D. A bus driving north at 30 m/s. V

Use the table to answer questions #5-6. 

Distance	5m	10m	15m	20m
Runner #1 Time	1.7 s	2.5 s	3.1 s	3.9 s
Runner #2 Time	1.1 s	2.2 s	3.3 s	4.5 s

5. Using the data table above, which runner had the fastest time in the first 5m? #2
 Which runner had the fastest time in the last 5m? #1
6. Which runner won the race? #1

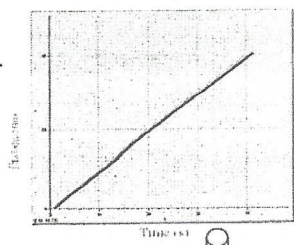
7. A sprinter accelerates from 0 m/s to 4 m/s in 8 seconds. Calculate her acceleration? $a = \frac{v_f - v_i}{t}$

$v_f = 4 \text{ m/s}$
 $v_i = 0 \text{ m/s}$
 $t = 8 \text{ s}$

$$a = \frac{4 \text{ m/s} - 0 \text{ m/s}}{8 \text{ s}} = 0.5 \text{ m/s/s}$$

8. Circle which words are true about this graph of velocity.

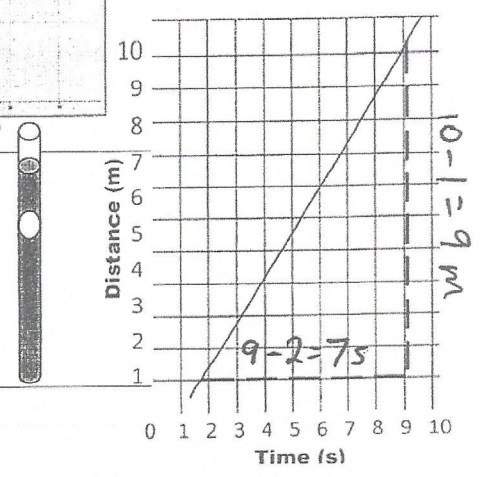
- zero
 constant
 changing
 increasing
 decreasing



9. Calculate the slope of the bubble in this velocity tube on the right.

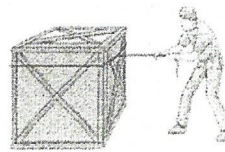
$$\bar{v} = \frac{\text{rise}}{\text{run}} = \frac{9 \text{ m}}{7 \text{ s}} = 1.3 \text{ m/s}$$

The slope of the line tells the average velocity.



Forces

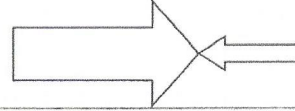
10. A push or a pull is called a Force.



11. Which of Newton's laws of motion says "For every action there is an equal and opposite reaction."

Newton's 3rd Law of Motion

12. Unbalanced forces result in motion.



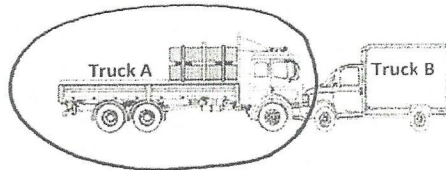
13. According to Newton's 2nd Law of Motion ($F = m \times a$) how much force is exerted by a 2000kg mass at an acceleration of 45 m/s².

$m = 2000 \text{ kg}$
 $a = 45 \text{ m/s}^2$

$F = ma$
 $F = (2000 \text{ kg})(45 \text{ m/s}^2)$
 $F = 90000 \text{ N}$

14. Complete the rule: "The more mass, the more momentum."

15. Two trucks have a collision. Truck A has a mass of 2000 kg and was going 40 mph. Truck B has a mass of 1500 kg and was going 25 mph. Circle the truck that had more momentum?



16. The tool that measures the force of gravity on an object is called a Force meter.



17. If you are riding on a school bus, your frame of reference is the bus.

18. Sliding friction is in the opposite direction as the motion of a moving object.

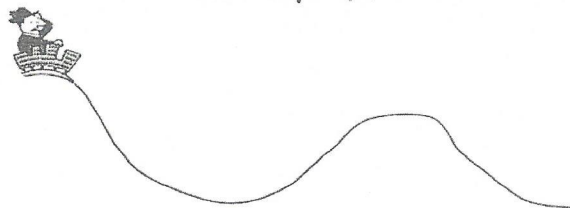
Energy

19. Kinetic energy is the Energy of motion.

20. Potential energy is stored energy.

21. At the top of a hill the roller coaster car will have the most potential energy.

At the bottom of a hill the roller coaster car will have the most kinetic energy.



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Heat

22. Temperature is the measure of the average kinetic energy of the particles in a substance.

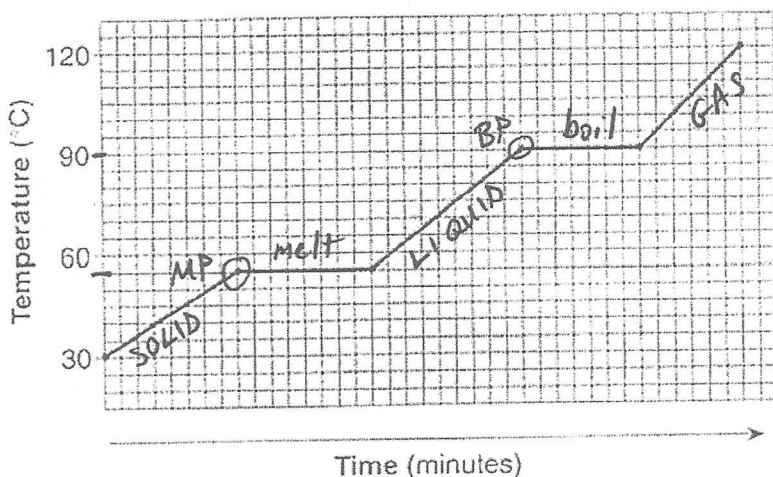
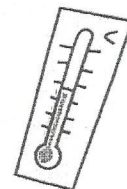
23. Higher temperatures indicate more motion of molecules.

24. Heat transfer by conduction requires direct contact.

25. The boiling point of water is 100 °C. melting point 0 °C

26. A substance that easily lets heat transfer is a conductor.

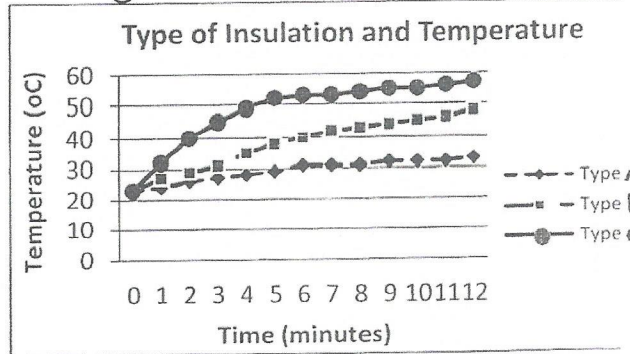
A substance that does not let heat transfer is a insulator.



27. According to the heating curve above, what is the melting point of this substance? 55 °C

28. Heat transfer, like everything in science, moves from high to low.

29. 3 materials (Type A, B, & C) were filled with cold water. According to the graph, which material is the best insulator? A



30. How much heat in joules is required to increase the temperature of 100 g of water by 15 °C?

(specific heat of water (c) = 4.18 J/g°C) $Q = mc\Delta T$

$$m = 100g$$

$$\Delta T = 15^\circ C$$

$$Q = mc\Delta T$$

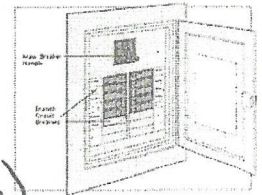
$$Q = (100g)(4.18 J/g^\circ C)(15^\circ C)$$

$$Q = 6270 J$$

Electricity

31. Current is the measure of the flow of electrons.
32. Negatively charged subatomic particles are called electrons.
33. A device that you can reset that protects a circuit from becoming overloaded is a

circuit breaker.



34. Electricity can flow in a closed circuit.
35. The unit of measurement for current is ampere (amp)

36. A battery with a voltage (E) of 9volts is hooked up to a light bulb with a resistance (R) of 3 ohms. How much current (I) in amps passes through the light? $I = E/R$

$$E = 9V$$
$$R = 3\Omega$$

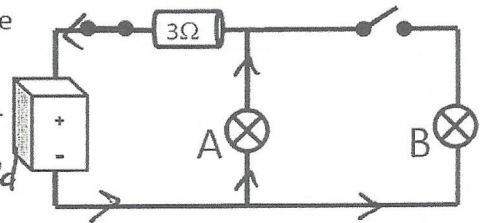
$$I = \frac{E}{R}$$

$$I = \frac{9V}{3\Omega} = \boxed{3\text{amps}}$$

37. If resistance increases, then current decreases.

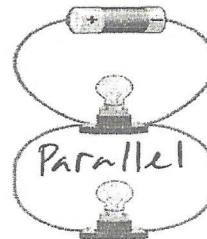
38. According this diagram, light B cannot be on because

it is on an open circuit,
the path for e^- is interrupted

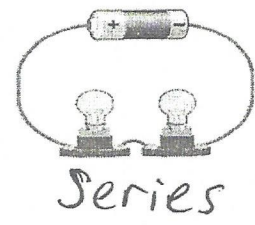


39. An electric current flowing around an iron rod that acts like a magnet is called a(n)

electromagnet.



Parallel



Series

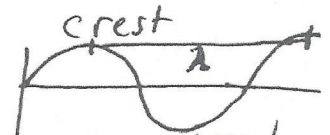
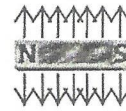
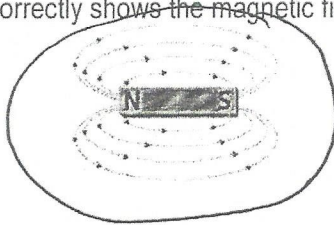
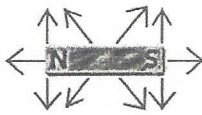
40. In a series circuit, if one bulb stops working then all of the other bulbs will not work.
41. In a parallel circuit, one bulb can go out and the other bulbs will still be able to work.
42. Batteries are an example of electrons moving in only one direction. This is referred to as direct current. (DC)

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43. Which of the following correctly shows the magnetic field produced by a bar magnet?



Waves

44. The crest of a wave diagram corresponds to the highest point of the wave. trough

45. The distance between the crest of one wave and the crest of the next wave is called its wavelength.

46. A wave where the motion of the wave is perpendicular to the direction the wave's energy is moving is a transverse wave.

47. Write the formula for calculating the speed of a sound wave:

$$v = \lambda f$$

48. What is the speed of a wave with a wavelength of 1.8 m and a frequency of 278 hertz?

$$\lambda = 1.8 \text{ m}$$

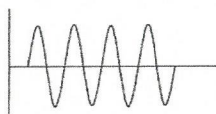
$$f = 278 \text{ Hz}$$

$$v = \lambda f$$

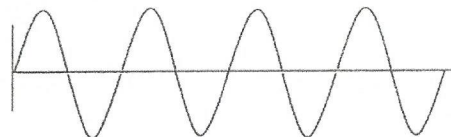
$$v = (1.8 \text{ m})(278 \text{ Hz})$$

$$v = 500.4 \text{ m/s}$$

Use the 3 graphs below to answer questions 49-51.



A



B



C

49. Wavelength: shortest wavelength? A

longest wavelength? C

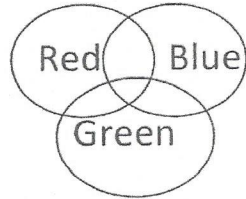
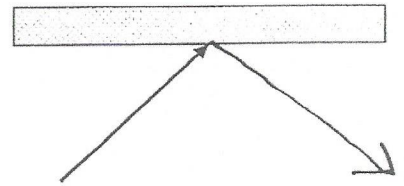
50. Amplitude: least amplitude? C

greatest amplitude? B

51. Frequency: lowest frequency? C

highest frequency? A

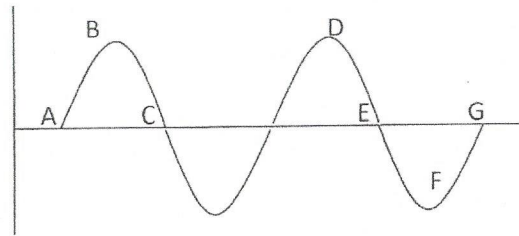
52. The diagram ^{right} below shows an incident ray on a plane mirror. Draw a line at the correct angle for the reflected ray?



53. Mixing the primary colors of light, red, blue, and green light, will produce white light.

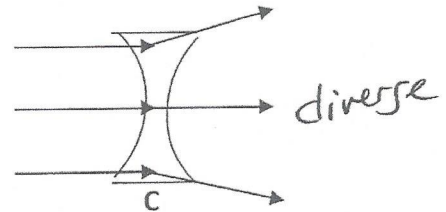
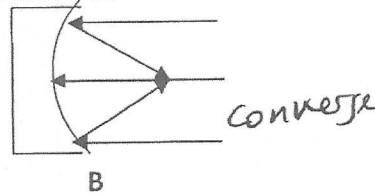
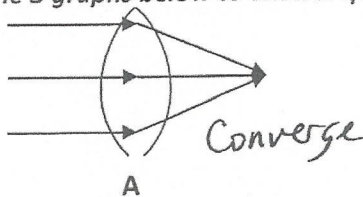
54. The colors we see are due to the light waves that are reflected.

55. Between which two points below is wavelength properly calculated? B-D or C-E



56. Lenses refract light, while mirrors reflect light.

Use the 3 graphs below to answer questions 57-58.



57. Which of the diagrams above illustrates the reflection of a concave mirror? B

58. Which of the diagrams above illustrates the refraction of a convex lens? A
 concave lens? C

59. In 1 second four crests of a wave pass a certain point. What is the wave's frequency?

$$4 \text{ waves} / 1 \text{ sec} = 4 \text{ Hz}$$

60. All electromagnetic radiation travels at 3.0×10^8 m/s.