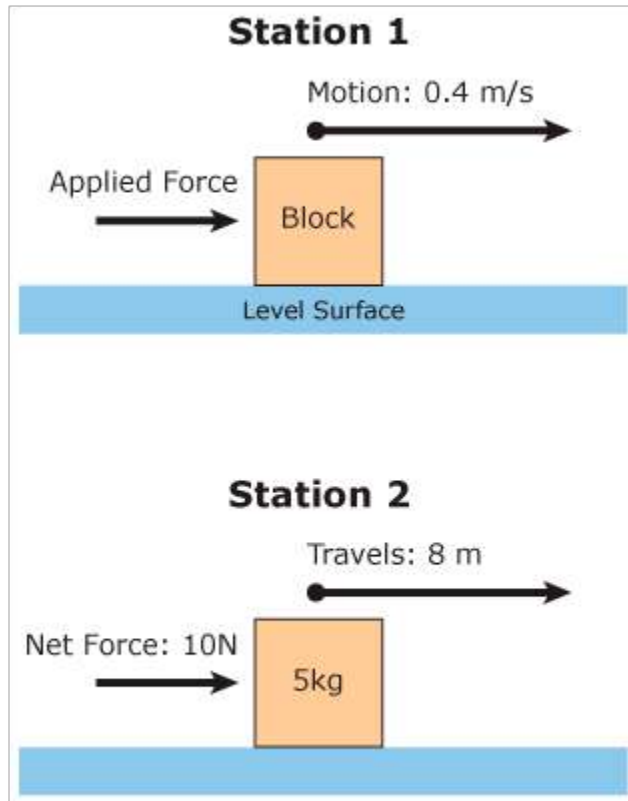


Final Exam Study Guide:

In a physics lab, two stations are set up for student investigations of force and motion. At each station, stone blocks are acted on by an applied force. Various properties of each system are recorded. The students use the recorded data to produce diagrams of each station:



1. What is the acceleration of the block at station 2?
2. Based on the diagram for Station 2, what is the total work performed on the block?
3. The table shows the speed of sound in three different mediums.
Air at 0 C-----331m/s
Air at 20 C----343 m/s
Hydrogen at 20 C----1286 m/s

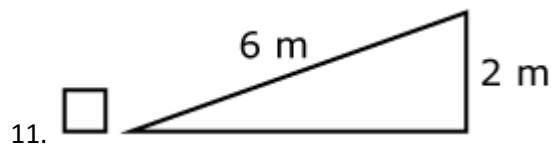
Based on this information, a reasonable hypothesis is that the speed of sound in hydrogen at 20 °C is _____?

4. Scientists measured the patterns of spectral lines given off by distant galaxies and concluded that almost all of these galaxies are moving away from Earth. What did the scientists observe directly? (Hint: Something to do with the wavelength of light)
5. A student produced an echo by clapping her hands in front of a large building. The echo is an example of sound waves being?
6. Electromagnetic waves are sometimes demonstrated by rippling waves in water. However, electromagnetic waves are different from water waves. Which is a characteristic that makes electromagnetic waves and water waves different?
7. Under which condition will a student most likely experience the Doppler effect?
8. Sound waves and ocean waves are similar in that both _____energy?
9. Using 3.00×10^8 m/s as the speed of light, what is the wavelength, in meters, of a photon with a frequency of 1.50×10^7 Hz?

Machine Forces

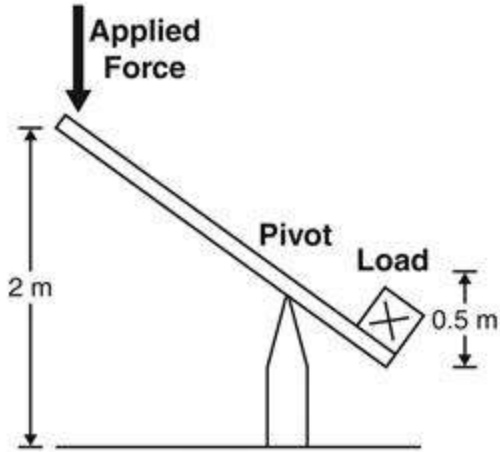
Machine	Input Force (N)	Output Force (N)
1	5	50
2	10	50
3	25	50
4	50	50

10. Which machine would have the greatest mechanical advantage?



What is the mechanical advantage of this ramp?

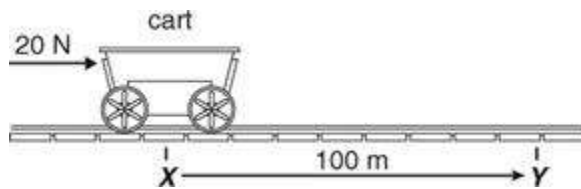
12. **This first-class lever is a machine that changes the direction and size of an applied force in order to lift a load. The applied force moves one end of the lever down 2 meters while raising the load 0.5 meter.**



$$\text{Mechanical Advantage} = \frac{\text{input distance}}{\text{output distance}}$$

What is the actual mechanical advantage for the lever?

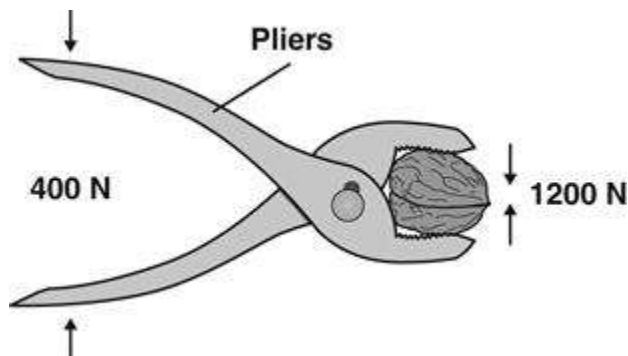
13. Look at the picture below.



The cart is moved from Point X to Point Y. Based on the information in the picture, the only quantity that can be calculated is

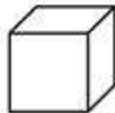

14. A 600-newton person runs up a set of stairs that is 2.5 meters high in 2 seconds. How much power has the person generated?

15. Jeremy exerted a force of 400 newtons on a pair of pliers that held a walnut. The pliers generated a force of 1200 newtons onto the walnut and cracked it open.



What was the mechanical advantage of the pliers?

16. The drawing shows a cube and a pyramid.

		
Volume	27 cm ³	8 cm ³
Mass	10 g	28 g

Why would the objects most likely have different weights?

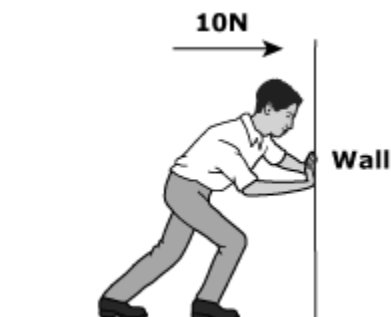
17. A heavy round rock and a light marble are simultaneously dropped from the same height. Why would they most likely land at the same time?

18. What is the amount of force required to accelerate a 20 kg object to 5 m/s²?

19. What should be used to compare the forces produced by two motors?

20. A 10 N force is applied to a 2 kg block for 3 seconds. During the 2nd second, which property increases in the block?

21. A student pushes against a wall as shown in the drawing below.



What result does Newton's Third Law predict in this situation?

22. The property of matter that resists changes in motion is called?

23. A student pushed a toy truck on a flat surface that was 10 meters long. At the end of the surface was a wall. The first time he pushed the toy truck, it traveled 4 meters. How far would the toy truck travel if friction was eliminated?

24. Speed = Distance/Time. A mouse traveled 1 meter in 5 seconds. According to the above formula, what was the speed of the mouse?

25. How far would a mouse travel in 5 seconds at a speed of 20 cm/s?

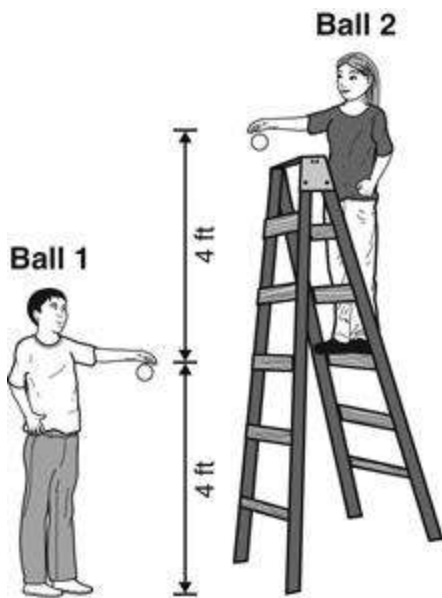
26. A train travels at a rate of 13 meters per second (m/s). Over the next 60 seconds, the speed of the train increases to speed to 22 m/s. What is the average rate of acceleration of the train?

27. A student pushes a shopping cart filled with groceries. The cart has a mass of 12 kilograms (kg). The student pushes the cart with a force of 15 newtons (N). Assuming the ground is frictionless, how fast will the cart accelerate until the student stops applying the force?

28. An exploratory robot was sent to the planet Mars. The gravity on Mars is weaker than the gravity on Earth. Compared to the mass and weight of the robot on Earth, the robot on Mars has.....

29. A student pushes a 9 kg box across a floor, causing the box to accelerate at a rate of 1.5 m/s². What is the net force acting on the box?

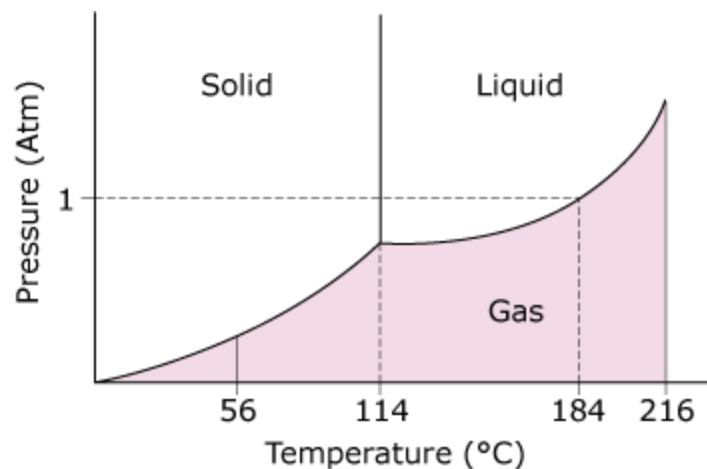
30. Ball 1 and ball 2 are identical. Ball 1 is dropped from a height of 4 feet. At the same time, ball 2 is dropped from a height of 8 feet.



Students hypothesize that ball 2 will hit the ground with a greater speed than ball 1. Explain Why?

31.) During a classroom discussion on motion, the teacher instructs the class to write down something that specifically addresses Isaac Newton's second law of motion. Which of these responses would best represent the second law?

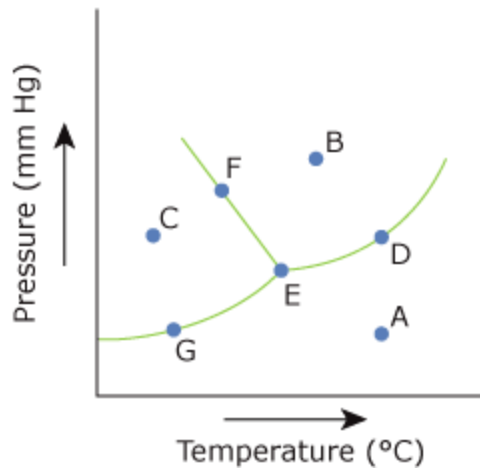
32.)



Based on the phase diagram shown above, at what temperature does the substance exist as a vapor, solid, and liquid at equilibrium?

33.

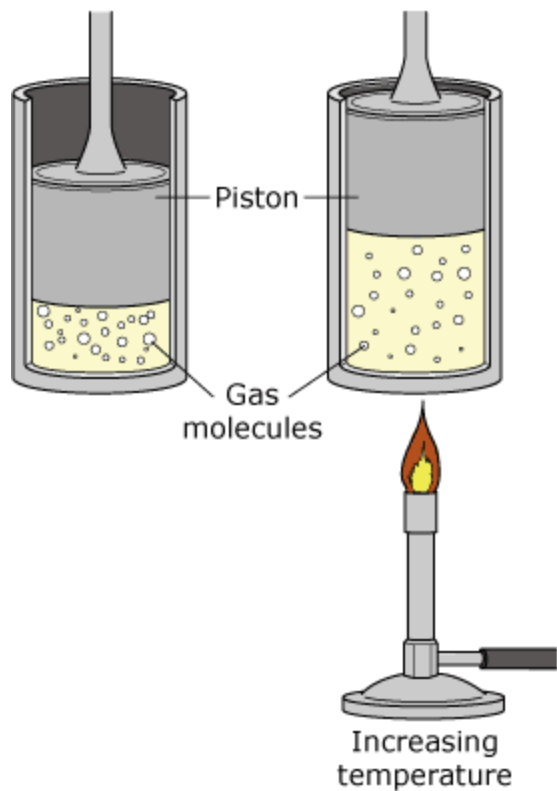
Phase Diagram for Water



Several points are labeled on the diagram. At which point on the diagram can only the liquid and solid phases of water coexist?

34.

The diagram below shows a burner heating a piston cylinder which contains a gas.



Why does the volume under the piston increase with heating?

35.

An electric motor is used to turn the blades of a fan. The energy input and output in the system are shown in the diagram.

Electrical Energy > Mechanical Energy

Which best explains what happened to the rest of the energy?

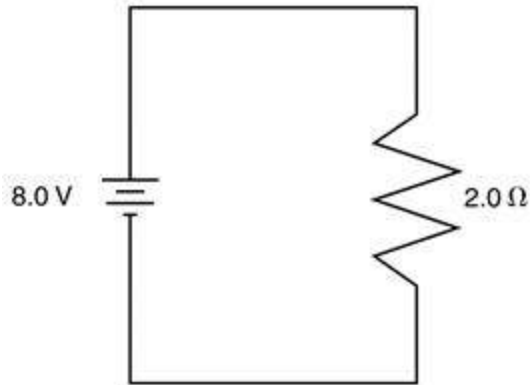
36.

During exertion, the human body breaks down molecules of ATP. This reaction provides the energy needed for muscle contraction. This process is an example of the transformation of?

37.

Which term can be described as the measure of the average kinetic energy of a substance?

38.



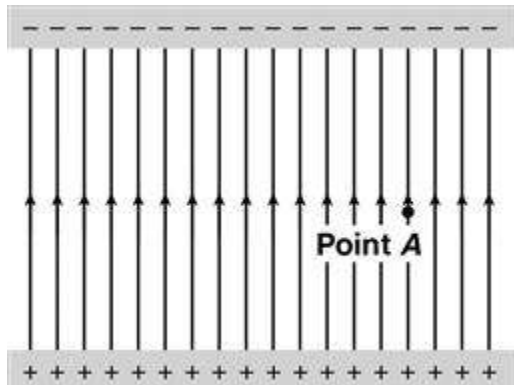
What is the current in this circuit?

39.

One device used for electrical safety involves a metal strip that bends when it gets hot. This bending flips a switch which interrupts the current. What is this device called?

40. A hardware designer finds that the wiring in a circuit is releasing enough heat to make the circuit dangerously hot. Which change would best solve this problem?

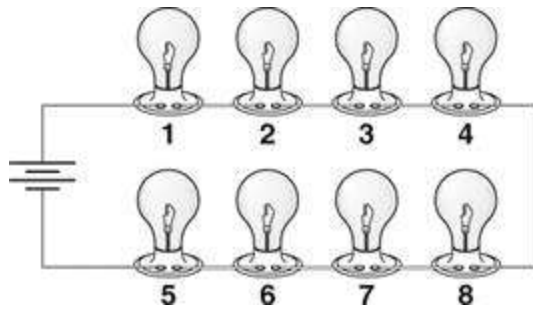
41



Which direction will an electron move if placed at Point A?

42.

If bulb 8 burns out, how will the remaining bulbs be affected?



43. If a wool sock is dragged across a rug, there is a buildup of static electricity on the wool sock. Which type of particle is transferred between the rug and the sock to cause this static?

44. An element has 8 protons and 6 neutrons. What is the total number of electrons in a neutral atom of this element?

45.

Activity	Percent of Students
Football	53
Basketball	22
Snowboarding	13
Rollerblading	12

The table above shows the percent of students at a school that report football, basketball, snowboarding, or rollerblading as their favorite physical activities. In which of the following ways would this data be best represented ?