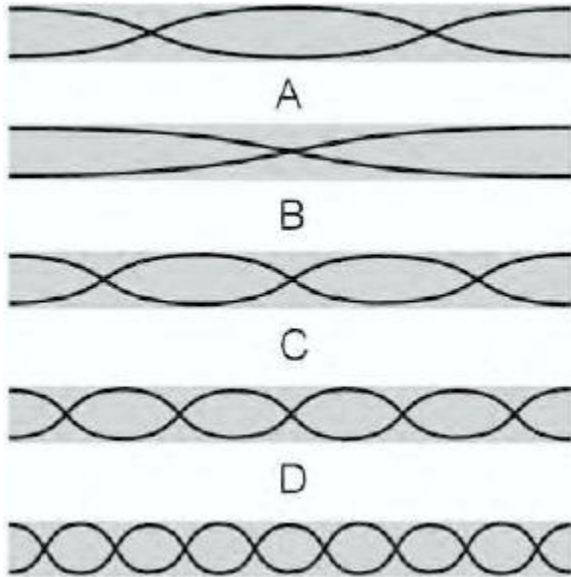


SAT Physics Practice Paper 17

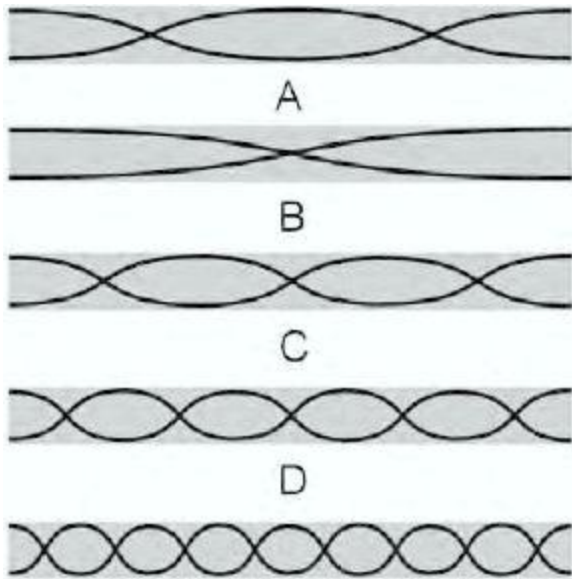
1. The diagram below shows a set of open-ended pipes with waves vibrating inside them.



Which of the diagrams shows the pipe containing waves with the longest wavelength?

- A.
- B.
- C.
- D.
- E.

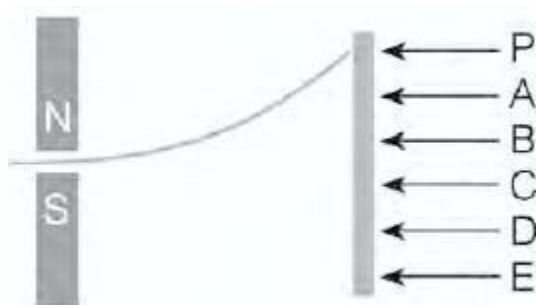
2. The diagram below shows a set of open-ended pipes with waves vibrating inside them.



Which of the diagrams shows the pipe containing the waves with the highest frequency?

- A.
- B.
- C.
- D.
- E.

3. The diagram below shows atomic particles moving through a magnetic field.



A beam of electrons is deflected in the magnetic field shown. The electrons that have passed through the field strike the screen at point P.

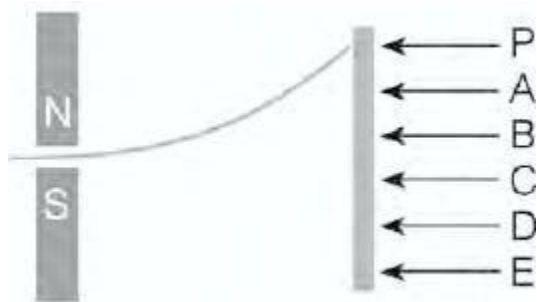
At which letter would a stream of neutrons strike the screen?

- A.
- B.
- C.

D.

E.

4. The diagram below shows atomic particles moving through a magnetic field.



A beam of electrons is deflected in the magnetic field shown. The electrons that have passed through the field strike the screen at point P.

At which letter would a stream of protons strike the screen?

A.

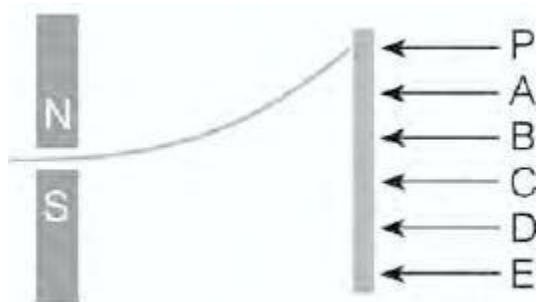
B.

C.

D.

E.

5. The diagram below shows atomic particles moving through a magnetic field.



A beam of electrons is deflected in the magnetic field shown. The electrons that have passed through the field strike the screen at point P.

At which letter would a stream of electrons strike the screen if the poles of the magnet were reversed?

A.

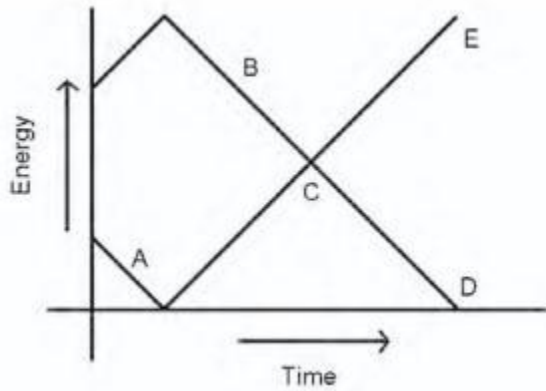
B.

C.

D.

E.

6. The graph below shows an object that is thrown almost straight up from the top of a ten-story building.



At what point on the graph does the potential energy of the object equal the kinetic energy of the object?

A.

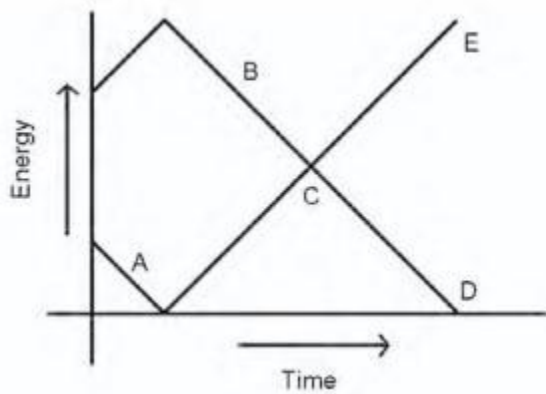
B.

C.

D.

E.

7. The graph below shows an object that is thrown almost straight up from the top of a ten-story building.



At what point on the graph does the kinetic energy of the object decrease while the potential energy increases?

A.

B.

- C.
- D.
- E.

8. The symbols used in writing nuclear equations. Atomic nuclei are typically written in the form  ${}^A_Z X$ . Which letter represents the atomic number?

- A. The number of protons is Z.
- B. The number of neutrons is X.
- C. The symbol of the element is X.
- D. The number of electrons is A.
- E. The mass number is A.

9. The symbols used in writing nuclear equations. Atomic nuclei are typically written in the form  ${}^A_Z X$ . Which letter represents the protons plus neutrons in the nucleus?

- A. The number of protons is Z.
- B. The number of neutrons is X.
- C. The symbol of the element is X.
- D. The number of electrons is A.
- E. The mass number is A.

10. The symbols used in writing nuclear equations. Atomic nuclei are typically written in the form  ${}^A_Z X$ . Which letter represents the name of the nuclide?

- A. The number of protons is Z.
- B. The number of neutrons is X.
- C. The symbol of the element is X.
- D. The number of electrons is A.
- E. The mass number is A.

11. A train engine that weighs 5000N stops at the exact center of a bridge. The bridge weighs 75,000N and has two equally spaced pillars that completely support the bridge. The sum of the torques

- A. 75,000N

- B. 40,000N
- C. 37,500N
- D. 2500N
- E. 0N

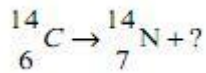
**12.** A train engine that weighs 5000N stops at the exact center of a bridge. The bridge weighs 75,000N and has two equally spaced pillars that completely support the bridge. The force exerted on the ground by a single pillar

- A. 75,000N
- B. 40,000N
- C. 37,500N
- D. 2500N
- E. 0N

**13.** A train engine that weighs 5000N stops at the exact center of a bridge. The bridge weighs 75,000N and has two equally spaced pillars that completely support the bridge. The upward force exerted by each pillar

- A. 75,000N
- B. 40,000N
- C. 37,500N
- D. 2500N
- E. 0N

**14.** A carbon atom decays into a nitrogen atom in the equation below. Which of the quantities correctly



finishes the equation?

- A. Alpha
- B. Beta
- C. Gamma
- D. Neutron
- E. Neutrino

**15.** A rocket is launched into the air during a fireworks show. Which of the following statements about the parts of the rocket is appropriate immediately after the explosion?

- A. They have less mass than they had before the explosion.

- B. They have more momentum than they had before the explosion.
- C. They have less momentum than they had before the explosion.
- D. They have the same momentum as they had before the explosion.
- E. They have less kinetic energy than they had before the explosion.

**16.** Two 1 liter containers contain 1 mole each of the same gas at the same temperature. Container A is allowed to expand until the temperature of gas A is reduced by half. Container B is compressed until the temperature of gas B doubles. Both gases are then mixed together in a 2 liter container. Which of the following statements about the gases is correct?

- A. Both gases gain heat.
- B. Both gases lose heat.
- C. Gas A loses heat to gas B.
- D. Gas B loses heat to gas A.
- E. The equilibrium temperature of the gases is exactly one half the original starting temperature of the gases.

**17.** The energy obtained in a nuclear reaction is derived from

- A. mass defect.
- B. binding energy.
- C. fission.
- D. fusion.
- E. all of these.

**18.** Constructive interference between two light beams results in

- A. a loss of kinetic energy.
- B. the destruction of the waves.
- C. the reversal of the direction of the waves.
- D. a larger wave.
- E. the refraction of the waves.

**19.** Two batteries are hooked together in an electric circuit. Which of the following statements is/are true?

- I. Maximum voltage is obtained when the batteries are wired in parallel.
- II. Maximum voltage is obtained when the batteries are wired in series.
- III. Maximum current capacity is obtained when the batteries are wired in parallel.

- A. I only
- B. II only
- C. I and III only
- D. II and III only
- E. I, II, and III

**20.** A goldfish swims through an aquarium by moving its fins and tail. What causes the fish to move forward?

- I. The force the water exerts on the goldfish
- II. The force the tail of the goldfish exerts on the water
- III. The force the fins of the goldfish exert on the water.

- A. I only
- B. II only
- C. I and III only
- D. II and III only
- E. I, II, and III

**21.** A hydrogen electron gains enough energy to rise from the  $n=1$  to the  $n=5$  energy level. How much energy does it gain?



- A. +.88 eV
- B. +2.54 eV
- C. +10.21 eV
- D. +12.09 eV
- E. +12.75 eV

**22.** A 50 g cube of ice is added to 500 g of boiling water. Which of the following is most likely to occur?

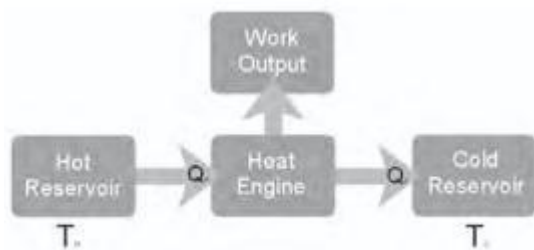
- A. The ice cube vaporizes before it strikes the bottom of the container.
- B. The water boils more vigorously because the hot water draws cold from the ice cube.
- C. The water in the container stops boiling during the phase change of the ice to water.
- D. The more dense ice cube sinks in the less dense hot water.



E. Steam bubbles form on the ice cube.

**23.** An unmanned exploratory space vehicle is accelerated to  $.85c$  as it leaves the solar system. Years later a stationary extraterrestrial watches the vehicle pass and measures the length of the vehicle to be 12.64 m. What was the length of the vehicle on earth before it began its trip?

- A. 8.44 m
- B. 12.64 m
- C. 18.23 m
- D. 24.0 m
- E. 29.77 m



**24.**

The diagrammatic representation of a heat engine above shows which of the following?

- A. Positive work
- B. An adiabatic process
- C. An isobaric process
- D. An isochoric process
- E. An isothermal process

**25.** A force is applied to an object that is free to move. Which of the following statements is correct?

- A. The frictional force is larger than the applied force.
- B. The frictional force is smaller than the applied force.
- C. The weight of the object is larger than the applied force
- D. The weight of the object is smaller than the applied force
- E. All of these statements could be correct.

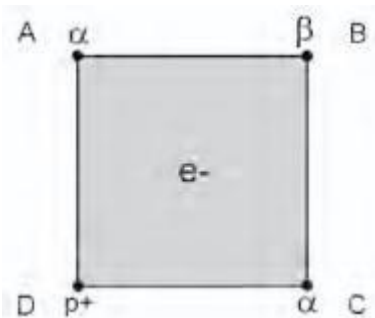
**26.** Two charged spheres are separated by 2 mm. Which of the following would yield the greatest attractive force?

- A.  $+1q$  and  $+4q$

- B.  $-1q$  and  $-4q$
- C.  $+2q$  and  $+2q$
- D.  $-2q$  and  $-2q$
- E.  $+2q$  and  $-2q$

27. An astronaut is standing on an asteroid when he accidentally drops a wrench. He observes that the gravitational acceleration on the asteroid is  $2.4 \text{ m/s}^2$ . If he had thrown the wrench at an upward angle instead, he would have found the gravitational acceleration on the asteroid to be

- A. less than  $2.4 \text{ m/s}^2$ .
- B. toward him at  $2.4 \text{ m/s}^2$ .
- C. downward at  $2.4 \text{ m/s}^2$ .
- D. greater than  $2.4 \text{ m/s}^2$ .
- E. none of these.



28.

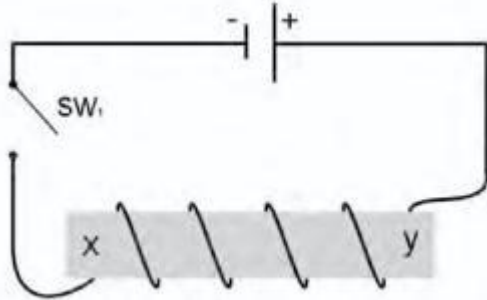
The two-dimensional cube in the diagram above has charged objects placed at the corners as shown. An electron that is free to move is placed at the exact center of the cube. In which direction will the electron move?

- A. It will move toward A.
- B. It will move toward B.
- C. It will move toward C.
- D. It will move toward D.
- E. It will remain stationary.

29. A white disk and a black disk are placed on top of a snow bank on a sunny day. The black disk sinks deeper into the snow because

- A. the black disk reflects light better.
- B. the white disk reflects light better.

- C. the black disk radiates heat better.
- D. the white disk radiates heat better.
- E. both of the disks reflect light and radiate heat at the same rate.



**30.**

Based on the diagram above, which of the following statements describes the quantities induced into the iron core when  $SW_1$  is closed?

- A. Lines of force emanate from side y.
- B. Lines of force emanate from side x.
- C. Side y becomes a south magnetic pole.
- D. Side x becomes a north magnetic pole.
- E. The electric field cancels the magnetic field.