NMAT Physics Practice Questions

Set 3

Directions: Choose the letter that corresponds to the correct answer.

1. The resultant of a 3-newton and a 4-newton force that act on an object in opposite directions to each other is, in newtons,

A. 0

B. 1

C. 5

D. 7

2. A converging lens produces a real image at a distance of 20 cm for an object located 40 cm in front of the lens. What is the focal length of the lens?

A. 0.50 cm

B. 2.5 cm

C. 13 cm

D. 20 cm

3. It is certain that a rod is electrically charged if it

A. repels a pith ball

B. attracts a pith ball

C. attracts the N-pole of a compass needle

D. repels the N-pole of a compass needle

4. If the velocity of light in a medium depends on its frequency, the medium is said to be

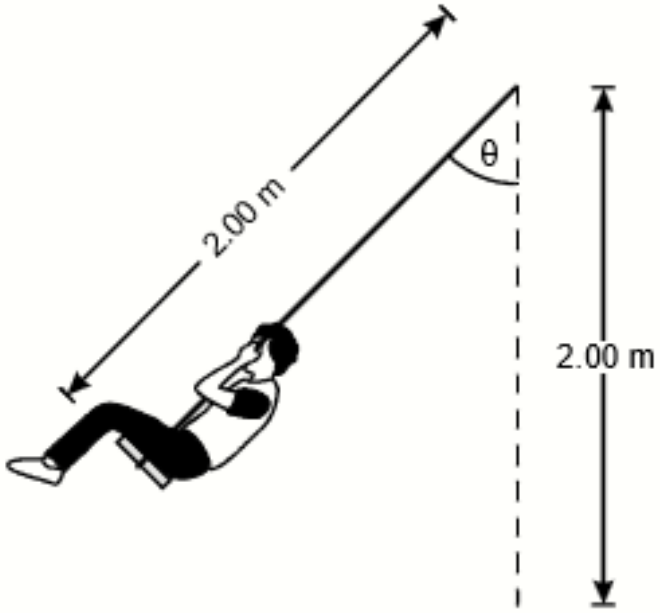
A. coherent

B. refractive

C. dispersive

D. diffractive

5. Use the diagram below to answer the question that follows.



The length of each of the ropes on a playground swing is 2.00 m. What is the maximum speed attainable on the swing if the maximum value of θ is 45.0°?

A. 1.41 m/s

B. 2.00 m/s

C. 3.39 m/s

D. 8.85 m/s

6. Students in a physics class are learning how to solder electronic components onto a printed circuit board. In addition to working in a well-ventilated area, the students should also wear:

A. leather gloves

B. safety glasses

C. rubber shoes

D. an antistatic wrist strap

7. The time of one vibration of a simple pendulum may be decreased by:

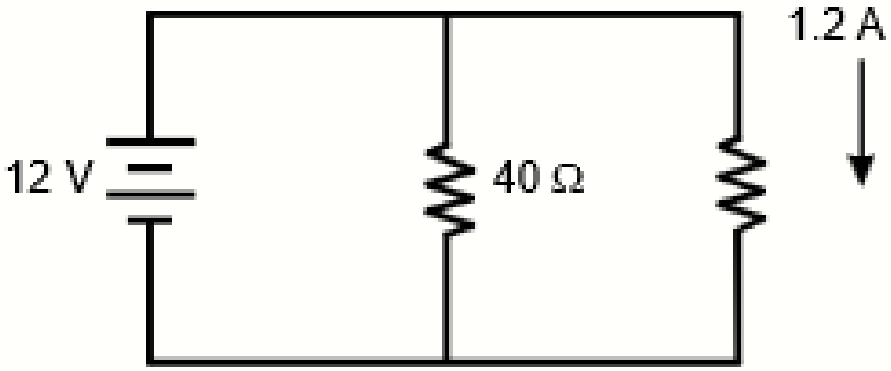
A. increasing the length of the pendulum

B. decreasing the length of the pendulum

C. using a heavier bob

D. using a lighter bob

8. Use the diagram below to answer the question that follows.



What is the current through the battery?

A. 0.3 A

B. 1.2 A

C. 1.5 A

D. 2.4 A

9. A horizontal pipe has a diameter of 10.0 cm. Fluid flows in the pipe at 0.500 m/s. The pipe is attached to a smaller pipe that has a diameter of 4.00 cm. What is the speed of the fluid in the smaller pipe?

A. 0.200 m/s

B. 1.25 m/s

C. 3.13 m/s

D. 12.5 m/s

10. On a dry winter day, a person walks across a carpet, reaches to touch a doorknob, and observes a spark about 3 mm long. Given that the dielectric breakdown of air is approximately 3 MV/m, which of the following is best estimate for the potential difference between the person's hand and the doorknob?

A. 90 V

B. 900 V

C. 9,000 V

D. 9,000,000 V

11. The following five lengths of thin wire, all of which have the same diameter and length, are connected in a circuit to a battery. Which length of wire generates the greatest power?

A. 3 m of nichrome wire

B. 3 m of copper wire

C. 3 m of lead wire

D. 3 m of steel wire

12. If the intensity of monochromatic light is increased while incident on a pair of narrow slits in a diffraction experiment, the spacing between maxima in the pattern will

A. increase

B. decrease

C. remain the same

D. increase or decrease depending on frequency

13. A point source of light is placed at the principal focus of a convex lens. Which of the following will be true of the refracted light?

I. It will diverge.

II. It will be parallel to the principal axis.

III. It will seem to come from a point 1.2 of the radius of curvature from the lens.

IV. It will converge.

A. I, II, and III only

B. I and III only

C. II only

D. IV only

14. Electrical appliances are usually grounded in order to

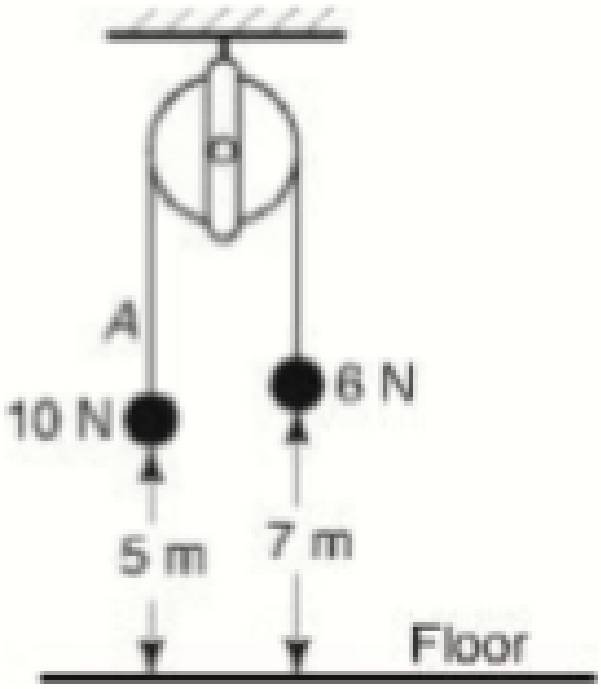
A. maintain a balanced charge distribution

B. prevent a buildup of heat

C. run properly using household electricity

D. prevent a buildup of static charges

15. As shown in the diagram below, two weights, one of 10 newtons and the other of 6 newtons, are tied to the ends of a flexible string. The string is placed over a pulley that is attached to the ceiling. Frictional losses and the weight of the pulley may be neglected as the weights and the string are allowed to move.



At the instant shown in the diagram, the potential energy of the 10-newton object with respect to the floor is, in joules,

A. 0

B. 2

C. 20

D. 50

16. Which of the following is an action-reaction pair for a space station containing astronauts in orbit about the earth?

A. the weight of the space station and the centripetal force on the space station

B. the weight of the astronauts and the centripetal force on the space station

C. the weight of the space station and the gravitational force of the space station on the earth

D. the weight of the astronauts and the gravitational force of the space station on the astronauts

17. How many meters will a 2.00-kilogram ball starting from rest fall freely in 1.00 second?

A. 4.90

B. 2.00

C. 9.81

D. 19.6

18. An object that is black

A. absorbs black light

B. reflects black light

C. absorbs all light

D. reflects all light

19. Of the following, the particle whose mass is closest to that of the neutron is the

A. meson

B. deuteron

C. neutrino

D. proton

20. Several students in a physics class are planning to design a wind power system that can generate enough electricity to perform hydrolysis of water in a 500 mL beaker. According to the engineering design process, which of the following should the students do first?

A. make an expanded sketch of the major parts of the system

B. build a small, working prototype of the system

C. define the problem that needs to be solved

D. brainstorm several alternative designs for the system

21. An object with a constant mass rests on a smooth and perfectly horizontal table. If a horizontal force F is applied, acceleration results. If F is doubled without changing the direction, what will be the effect(s) on the acceleration?

I. The acceleration will remain the same.

II. The acceleration will be doubled

III. The acceleration will decrease.

IV. The acceleration will increase but not double.

A. I, II, and III only

B. II only

C. II and IV only

D. IV only

22. Use the diagram below to answer the question that follows.

The diagram above shows a string of length 0.30 m oscillating in its first harmonic. What is the wavelength when the string is oscillating in its third harmonic?

A. 0.10 m

B. 0.20 m

C. 0.45 m

D. 0.90 m

23. A wire coil of radius 2.0 cm with 10 turns is in a magnetic field of 2.0 T. The field is perpendicular to the plane of each turn of the coil. The coil is wired in series with a resistor of 5.0 Ω. The field drops at a constant rate to 0.0 T in 10 ms. What is the current through the resistor?

A. 0.50 A

B. 2.5 A

C. 8.0 A

D. 13 A

24. The rate of heat production of a wire immersed in ice water and carrying an electric current is proportional to

A. the current

B. the reciprocal of the current

C. the reciprocal of the square of the current

D. the square of the current

25. A lens is used to produce a sharp image on a screen. When the right half of the lens is covered with an opaque material, how will the image be affected?

I. The right half of the image will disappear.

II. The left half of the image will disappear.

III. The image size will become approximately half of the original size.

IV . The image brightness will become approximately half of the original brightness.

A. I, II, and III only

B. I and III only

C. II and IV only

D. IV only