

STAR Test Sample Questions

Physics (End-of-course)

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More Questions



STAR Test Sample Questions

Physics (End-of-course)

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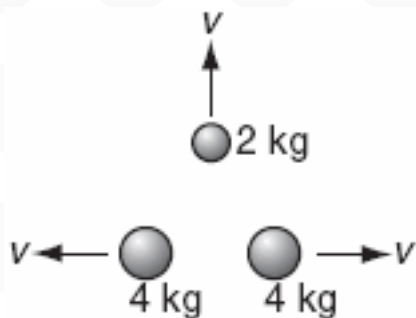
Standardized Testing and Reporting - STAR

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Advanced)

– Question 01

Three objects move with a velocity of $1 \frac{\text{m}}{\text{s}}$.



What is the total kinetic energy of the system?

- ☐ A 1 J
- ☐ B 2 J
- ☐ C 5 J
- ☐ D 10 J

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Advanced) – Question 02

A hydraulic lift used at an automotive repair shop raises a 1000-kilogram car two meters off of the ground. What is the potential energy given to the car?

- ☐ A 1000 J
- ☐ B 2000 J
- ☐ C 9800 J
- ☐ D 19,600 J

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Advanced) – Question 03

A 50-kilogram firefighter is on a ladder 10 meters above the ground. When the firefighter descends to 5 meters above the ground, the firefighter's gravitational potential energy will decrease by

- ☐ A 0.194 joules.
- ☐ B 5.10 joules.
- ☐ C 490 joules.
- ☐ D 2450 joules.

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Advanced) – Question 04

A 5-kilogram mass is lifted from the ground to a height of 10 meters. The gravitational potential energy of the mass is increased by approximately

- A 0.5 J.
- B 50 J.
- C 250 J.
- D 500 J.

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Advanced) – Question 05

A high diver steps off a diving platform that is 10 meters above the water. If no air resistance is present, during the fall there will be a decrease in the diver's

- A gravitational potential energy.
- B total mechanical energy.
- C kinetic energy.
- D momentum.

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Advanced) – Question 06

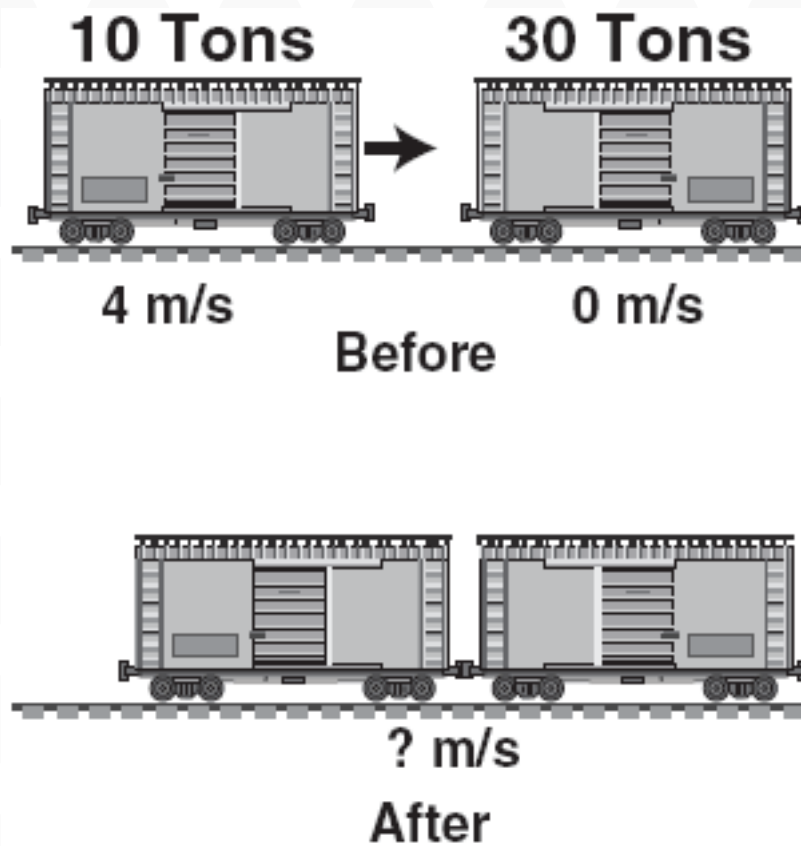
A 2.5-kg brick falls to the ground from a 3-m-high roof. What is the approximate kinetic energy of the brick just before it touches the ground?

- A 75 J
- B 38 J
- C 12 J
- D 11 J

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Advanced) –

Question 07



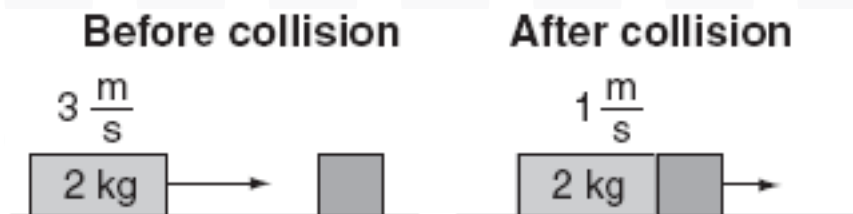
When these two freight cars of different mass collide and couple, what will be their resultant velocity?

- A $1 \frac{\text{m}}{\text{s}}$
- B $2 \frac{\text{m}}{\text{s}}$
- C $4 \frac{\text{m}}{\text{s}}$
- D $8 \frac{\text{m}}{\text{s}}$

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Advanced) – Question 08

The diagram depicts a 2-kg mass colliding with and sticking to a second box.



What is the mass of the second box?

- A 4 kg
- B 6 kg
- C 8 kg
- D 9 kg

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Proficient)

– Question 01

A 2.0-kilogram mass is moving with a speed of $3.0 \frac{\text{m}}{\text{s}}$.
What is the kinetic energy of the mass?

- A 1.5 J
- B 6.0 J
- C 9.0 J
- D 12.0 J

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Proficient)

– Question 02

A 70-kg skier leaves a ski jump at a velocity of $14 \frac{\text{m}}{\text{s}}$. What is the skier's momentum at that instant?

- ☐ A 5 N•s
- ☐ B 50 N•s
- ☐ C 980 N•s
- ☐ D 9800 N•s

Physics (End-of-course)

Conservation of Energy and Momentum (Performance Level: Proficient)

– Question 03

A child is on a sled moving down a hill at $20 \frac{\text{meters}}{\text{second}}$.

The combined mass of the sled and child is 100 kilograms.

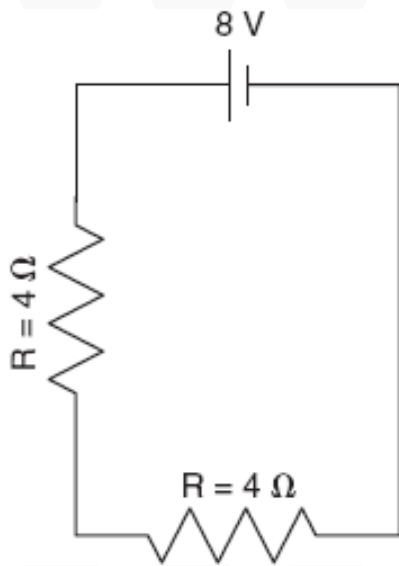
The momentum of the child and sled is

- ☐ A 5 kilogram $\frac{\text{m}}{\text{s}}$.
- ☐ B 20 kilogram $\frac{\text{m}}{\text{s}}$.
- ☐ C 1000 kilogram $\frac{\text{m}}{\text{s}}$.
- ☐ D 2000 kilogram $\frac{\text{m}}{\text{s}}$.

Physics (End-of-course)

Electric and Magnetic Phenomena (Performance Level: Advanced)

– Question 01



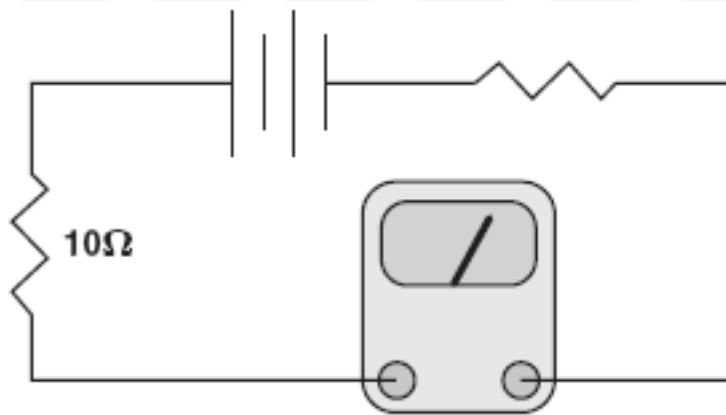
What is the current through the battery?

- A 1 A
- B 2 A
- C 4 A
- D 8 A

Physics (End-of-course)

Electric and Magnetic Phenomena (Performance Level: Advanced)

– Question 02



In the circuit shown above, the meter registers 1.5 amperes. The voltage across the 10.0-ohm resistor is about

- A 1.5 V.
- B 6.7 V.
- C 8.5 V.
- D 15.0 V.

Physics (End-of-course)

Electric and Magnetic Phenomena (Performance Level: Advanced)

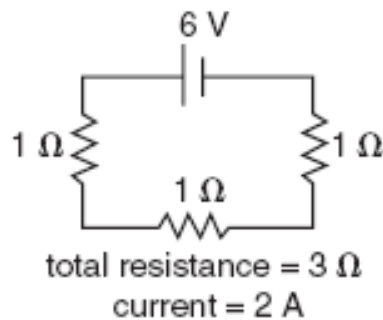
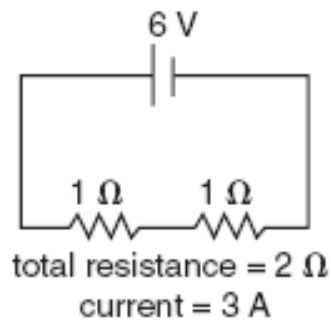
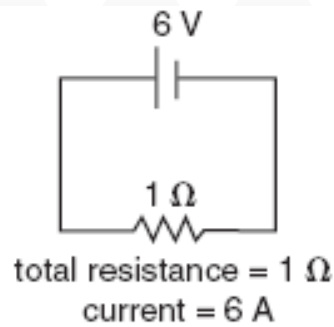
– Question 03

In order to turn neon gas into neon plasma,

- A energy must be removed from the neon gas.
- B energy must be supplied to the neon gas.
- C the neon gas must be ignited with a flame.
- D the neon gas must become a superconductor.

Physics (End-of-course)

Electric and Magnetic Phenomena (Performance Level: Proficient) – Question 01



How many amperes of current will flow when four 1-ohm resistors are in this series circuit?

- A 0.5 ampere
- B 1.0 ampere
- C 1.5 amperes
- D 2.0 amperes

Physics (End-of-course)

Electric and Magnetic Phenomena (Performance Level: Proficient) – Question 02

A 9-V battery is connected to a light bulb with a resistance of $3\ \Omega$. What is the current in the circuit?

- ☐ A 27 A
- ☐ B 3.0 A
- ☐ C 1.0 A
- ☐ D 0.3 A

Physics (End-of-course)

Electric and Magnetic Phenomena (Performance Level: Proficient) – Question 03

A transistor circuit is used as an amplifier.
When a signal is applied to the input of the transistor, the output signal is

- A a smaller amplitude.
- B an equal amplitude.
- C a larger amplitude.
- D zero amplitude.

Physics (End-of-course)

Heat and Thermodynamics (Performance Level: Advanced) – Question 01

In which of the following processes is the order of the system increasing?

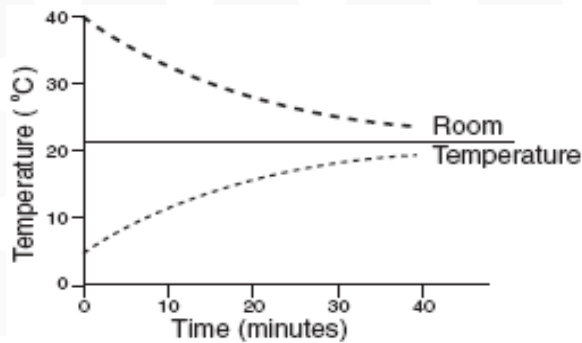
- A shaking a jar containing separate layers of salt and pepper
- B smashing a coffee cup with a hammer
- C adding cold milk to a cup of hot coffee
- D forming crystals in a solution

Physics (End-of-course)

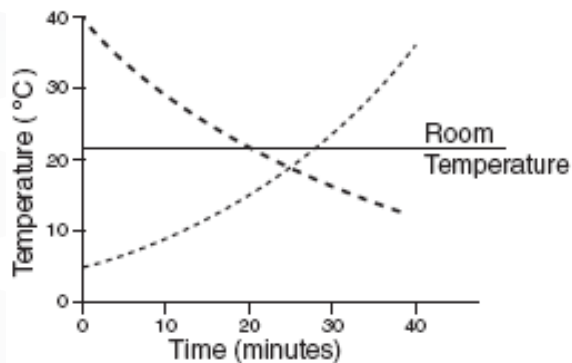
Heat and Thermodynamics (Performance Level: Proficient) – Question 01

A cup of water at 40°C and a cup of water at 5°C are left on a table. Which graph correctly shows the temperature of the two cups of water as time passes?

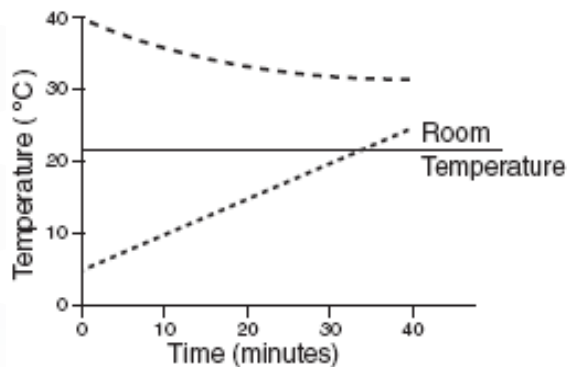
A



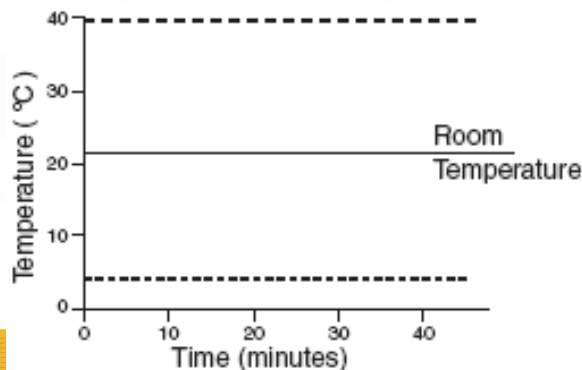
B



C



D



Physics (End-of-course)

Heat and Thermodynamics (Performance Level: Proficient) – Question 02

A heated gas expands, raising a piston. Which of the following describes the energy exchanges of this process?

- A Energy is transferred to the gas by the piston, and to the piston from the heat source.
- B Energy is transferred to the gas from the heat source, and to the raised piston from the gas.
- C Energy is transferred to the gas in the form of heat and work done by the piston.
- D Energy is transferred directly to the piston from the heat source.

Physics (End-of-course)

Heat and Thermodynamics (Performance Level: Proficient) – Question 03

A proposed ideal heat engine would run with a high temperature reservoir at 800 kelvin and a low temperature reservoir at 300 kelvin. When the engine is running, it extracts 400 joules of energy from the hot reservoir and does 250 joules of work each minute. How much energy is expelled to the low temperature reservoir each minute?

- A 150 J
- B 250 J
- C 300 J
- D 400 J

Physics (End-of-course)

Heat and Thermodynamics (Performance Level: Proficient) – Question 04

The pressure of a gas inside a closed, rigid container will increase when the gas temperature increases. The pressure of the gas increases because the

- A density of the gas decreases.
- B rate of collisions of gas molecules with the surface increases.
- C container expands in size when heated.
- D gas molecules bond together to form more massive molecules.

Physics (End-of-course)

Heat and Thermodynamics (Performance Level: Proficient) – Question 05

A container of cold water is dumped into a larger container of hot water. It is mixed and then left alone for a long time interval. The water temperature is found to

- A randomly vary from region to region in the container.
- B be uniform throughout the container.
- C fluctuate at all positions in the container.
- D be greater at the bottom of the container.

Physics (End-of-course)

Heat and Thermodynamics (Performance Level: Basic) – Question 01

An engine has an input of heat energy of 10,750 J and does 2420 J of work. Which of the following is the heat loss?

- A 0.225 J
- B 4.44 J
- C 8330 J
- D 13,170 J

Physics (End-of-course)

Investigation and Experimentation (Performance Level: Advanced)

– Question 01

A student does an experiment to measure

the acceleration of a falling object, which is $9.8 \frac{\text{m}}{\text{s}^2}$.

The student obtains an experimental

value of $14.6 \frac{\text{m}}{\text{s}^2}$. The reason for this variation

is most likely due to

- A human error.
- B air resistance.
- C local fluctuations in gravity.
- D the mass of the object.

Physics (End-of-course)

Investigation and Experimentation (Performance Level: Advanced)

– Question 02

A student attempts to measure the mass of a brick by measuring the force required to accelerate it at $1 \frac{\text{m}}{\text{s}^2}$ on a level surface. The force required is 2 N, and the student concludes that the brick has a mass of 2 kg. A balance shows that the mass of the brick is really 1.5 kg. The experimental error is *most* likely due to

- A gravity.
- B work.
- C friction.
- D inertia.

Physics (End-of-course)

Investigation and Experimentation (Performance Level: Proficient) – Question 01

To create real-time graphs of an object's displacement versus time and velocity versus time, a student would need to use a

- ☐ A motion sensor.
- ☐ B low-g accelerometer.
- ☐ C potential difference probe.
- ☐ D force probe.

Physics (End-of-course)

Investigation and Experimentation (Performance Level: Proficient) – Question 02

A student wires a series circuit that includes a block of rubber and a light bulb. She states that she does not expect the light bulb to light up when current is applied to the circuit. Which of the following *best* describes her statement?

- ☐ A It is a conclusion based on observed data about electrical phenomena.
- ☐ B It is a hypothesis based on knowledge of the theory of electrical phenomena.
- ☐ C It is a procedure based on her hypothesis about electrical phenomena.
- ☐ D It is a theory based on her observations of electrical phenomena.

Physics (End-of-course)

Motion and Forces (Performance Level: Advanced) – Question 01

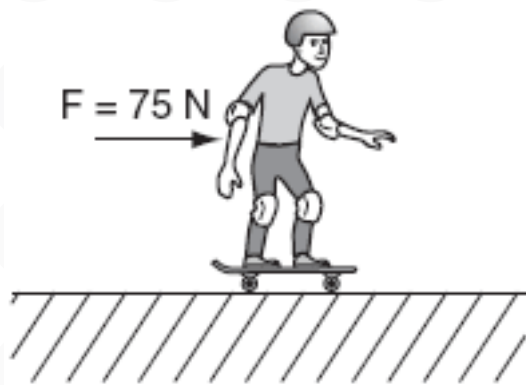
A student holds a book at rest in an outstretched hand. The force exerted on the book by the student is equal to the book's

- A mass.
- B weight.
- C volume.
- D density.

Physics (End-of-course)

Motion and Forces (Performance Level: Advanced) – Question 02

A 50-kg child on a skateboard experiences a 75-N force as shown.



What is the expected acceleration of the child?

- A $0.67 \frac{\text{m}}{\text{s}^2}$
- B $1.50 \frac{\text{m}}{\text{s}^2}$
- C $6.70 \frac{\text{m}}{\text{s}^2}$
- D $25.00 \frac{\text{m}}{\text{s}^2}$

Physics (End-of-course)

Motion and Forces (Performance Level: Advanced) – Question 03



The figure shows a block that is being pulled along the floor. According to the figure, what is the acceleration of the block?

- ☐ A $2 \frac{\text{m}}{\text{s}^2}$
- ☐ B $3 \frac{\text{m}}{\text{s}^2}$
- ☐ C $4 \frac{\text{m}}{\text{s}^2}$
- ☐ D $6 \frac{\text{m}}{\text{s}^2}$

Physics (End-of-course)

Motion and Forces (Performance Level: Advanced) – Question 04

A soccer player kicks a 0.5-kilogram stationary ball with a force of 50 newtons. What is the force on the player's foot?

- ☐ A 0 N
- ☐ B 25 N
- ☐ C 50 N
- ☐ D 100 N

Physics (End-of-course)

Motion and Forces (Performance Level: Advanced) – Question 05

A communication satellite is in a circular orbit around Earth. If the speed of the satellite is constant, the force acting on the satellite

- ☐ A is zero.
- ☐ B is decreasing.
- ☐ C points toward the center of Earth at all times.
- ☐ D points in the direction that the satellite is moving.

Physics (End-of-course)

Motion and Forces (Performance Level: Proficient) – Question 01

A ball is dropped from rest from a height 6.0 meters above the ground. The ball falls freely and reaches the ground 1.1 seconds later. What is the average speed of the ball?

- A 5.5 $\frac{\text{m}}{\text{s}}$
- B 6.1 $\frac{\text{m}}{\text{s}}$
- C 6.6 $\frac{\text{m}}{\text{s}}$
- D 11 $\frac{\text{m}}{\text{s}}$

Physics (End-of-course)

Motion and Forces (Performance Level: Proficient) – Question 02

A 10-newton force and a 15-newton force are acting from a single point in opposite directions. What additional force must be added to produce equilibrium?

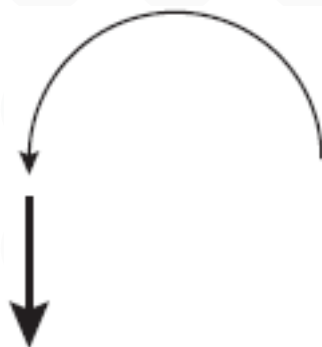
- ☐ A 5 N acting in the same direction as the 10-N force
- ☐ B 5 N acting in the same direction as the 15-N force
- ☐ C 10 N acting in the same direction as the 10-N force
- ☐ D 25 N acting in the same direction as the 15-N force

Physics (End-of-course)

Motion and Forces (Performance Level: Proficient) – Question 03



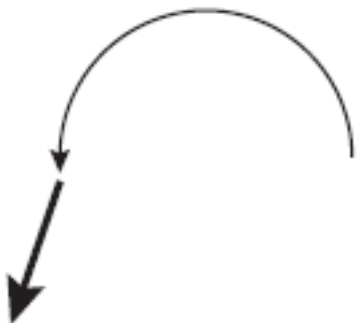
The picture shows the circular path of a toy plane being swung around on a string. What path would the toy take if the string broke?



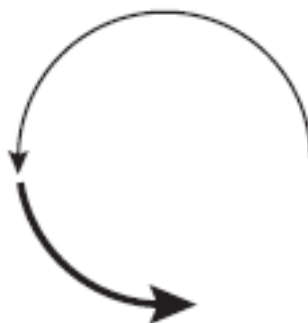
A



C



B



D

Physics (End-of-course)

Waves (Performance Level: Advanced) – Question 01

A sound wave traveling through a solid material has a frequency of 500 hertz. The wavelength of the sound wave is 2 meters. What is the speed of sound in the material?

A 250 $\frac{\text{m}}{\text{s}}$

B 500 $\frac{\text{m}}{\text{s}}$

C 1000 $\frac{\text{m}}{\text{s}}$

D 250,000 $\frac{\text{m}}{\text{s}}$

Physics (End-of-course)

Waves (Performance Level: Advanced) – Question 02

A student shakes the end of a rope with a frequency of 1.5 Hz, causing waves with a wavelength of 0.8 m to travel along the rope.

What is the velocity of the waves?

- A $1.9 \frac{\text{m}}{\text{s}}$
- B $1.6 \frac{\text{m}}{\text{s}}$
- C $1.2 \frac{\text{m}}{\text{s}}$
- D $0.53 \frac{\text{m}}{\text{s}}$

Physics (End-of-course)

Waves (Performance Level: Advanced) – Question 03

Objects appear different in size and shape in a container of water due to

- A refraction of the light waves.
- B interference of the water and light waves.
- C polarization of the light waves.
- D diffraction of the light waves.

Physics (End-of-course)

Waves (Performance Level: Proficient) – Question 01

A tuning fork is used to produce sound waves with a frequency of 440 hertz. The waves travel through the air at $344 \frac{\text{m}}{\text{s}}$. What is the wavelength of the sound waves?

- A 0.15 m
- B 0.39 m
- C 0.78 m
- D 1.28 m