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PHYSICS

PAPER 1 3117/1

Tuesday **30 MAY 2023** 12:00 NOON–1:15 P.M.

Additional materials:
None

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS AND INFORMATION TO CANDIDATES

Do not open this booklet until you are told to do so.

All answers are to be recorded in this booklet.

Write your school number, candidate number, surname and initials in the spaces provided above.

Answer as many questions as you can. For each question, four possible answers, **A**, **B**, **C** and **D** are given.

Circle the letter by the response which you consider to be correct.

Rough work paper should not be handed in.

FOR EXAMINER'S USE ONLY

Total marks



This question paper consists of 19 printed pages and 1 blank page.

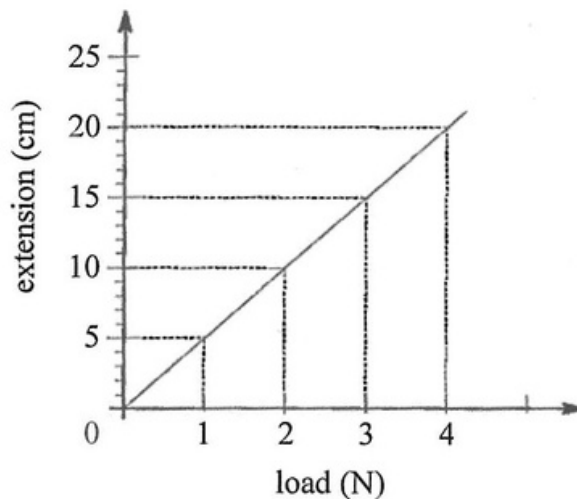
1. A book at rest on a table is given a horizontal push, as shown in the diagram.

Which force will cause the book to slow down to a stop?



- A. friction
B. normal reaction force
C. tension
D. weight
2. Weight is an example of which quantity?
- A. acceleration
B. force
C. mass
D. pressure
3. A spring has an original length of 2 cm. The graph shows the extension of the spring when various weights are attached.

On the graph, what is the length of the spring, when a 4 N weight is attached?

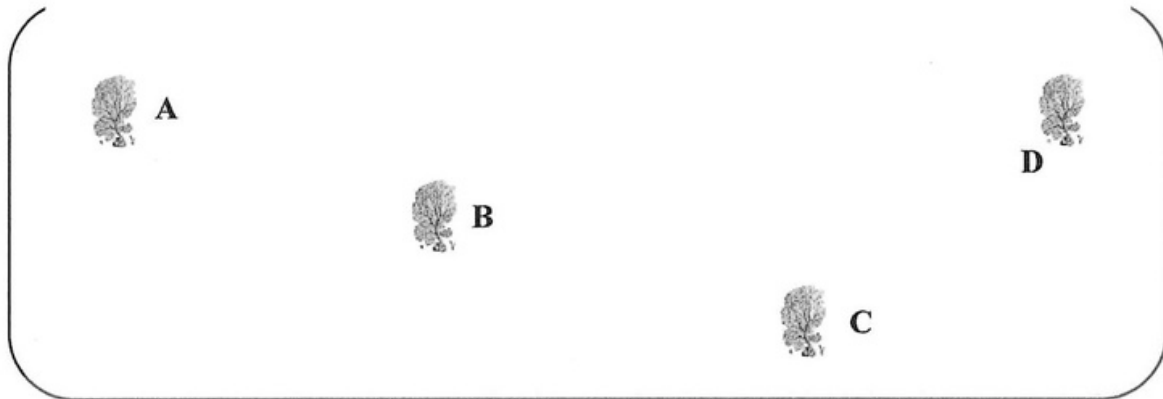


- A. 2 cm
B. 4 cm
C. 20 cm
D. 22 cm

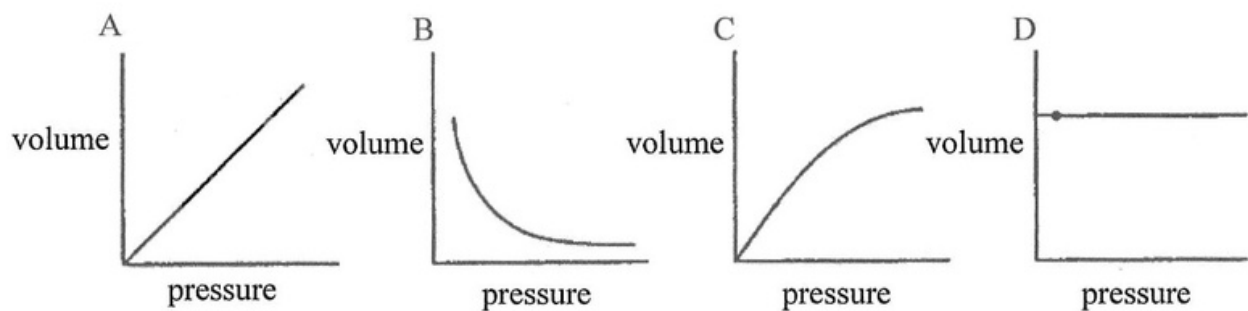


4. Four divers **A**, **B**, **C** and **D** explore the coral reefs in the ocean.

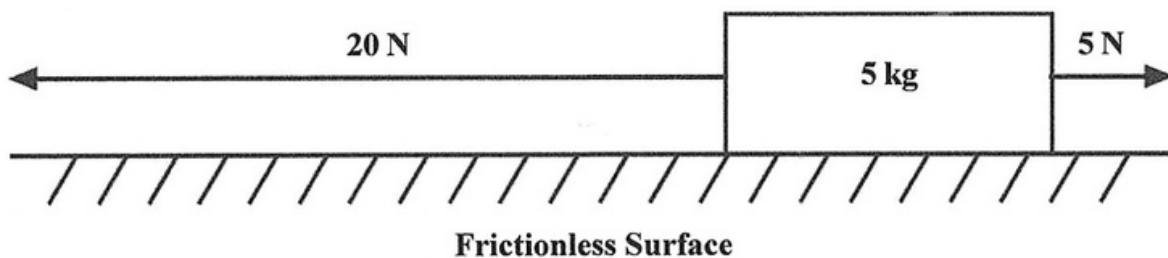
Which diver will experience the greatest pressure?



5. Which graph shows the relationship between volume and pressure of a gas, while temperature is constant?



6. Two forces 20 N and 5 N act on a 5 kg box, which is on a frictionless surface. The directions of the forces are shown in the diagram.



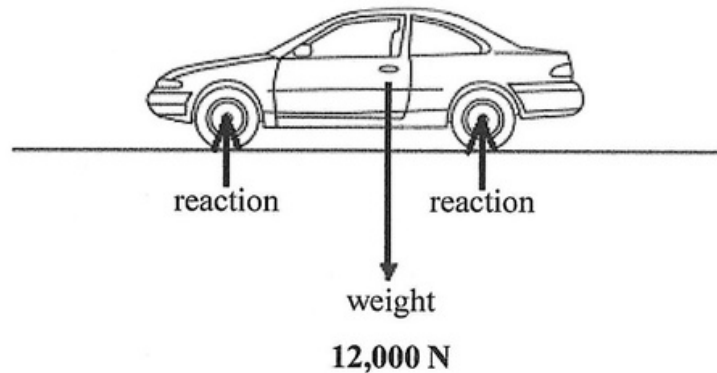
What is the acceleration of the 5 kg box?

- A. 1 m/s^2
- B. 3 m/s^2
- C. 25 m/s^2
- D. 100 m/s^2

7. What type of energy does a stretched elastic band contain?

- A. potential
- B. kinetic
- C. chemical
- D. light

8. The diagram shows a stationary car in a parking lot.



The car has a weight of 12,000 N. Equal and opposite reaction forces from the road, push upwards on each of the four wheels of the car.

Which is the correct reaction force on each wheel and the Law of Motion being demonstrated?

	Reaction Force on Each Wheel (N)	Law of Motion
A.	3,000 N	Newton's First Law
B.	3,000 N	Newton's Third Law
C.	6,000 N	Newton's First Law
D.	6,000 N	Newton's Third Law

9. A steel ball is dropped from a height of 4 m and it falls under the influence of gravity. Air resistance is negligible.

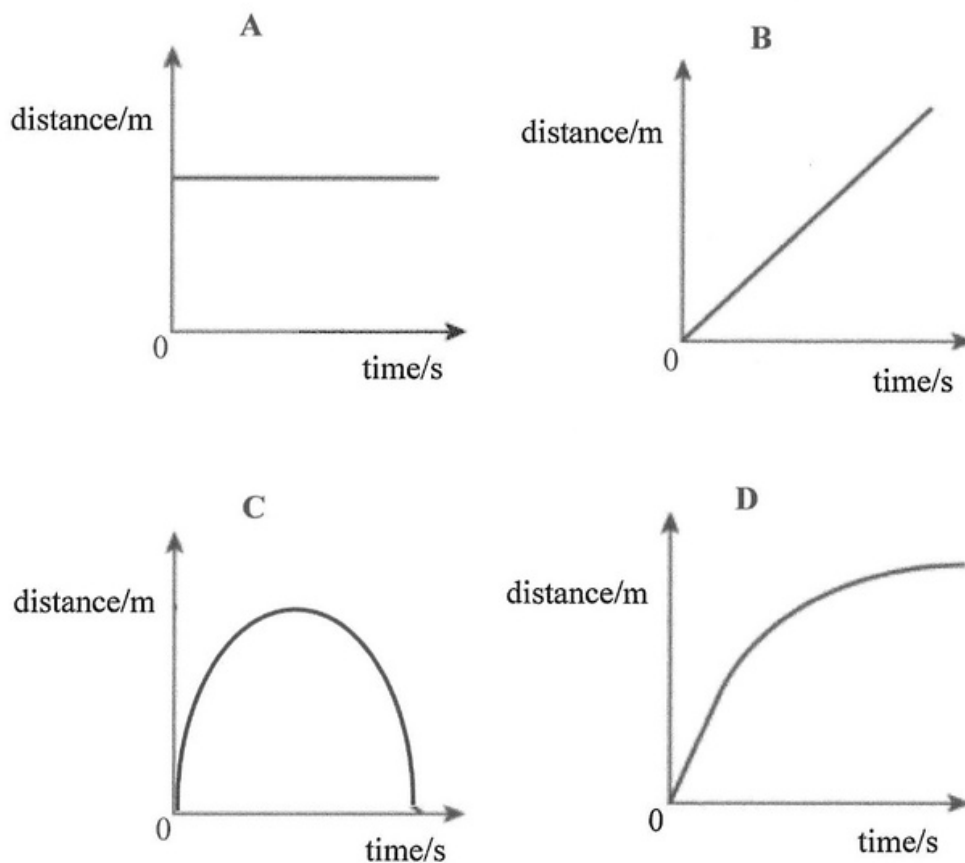
What is the ball's acceleration and velocity as it falls?

	Acceleration	Velocity
A.	constant	constant
B.	constant	increases
C.	increases	constant
D.	increases	increases

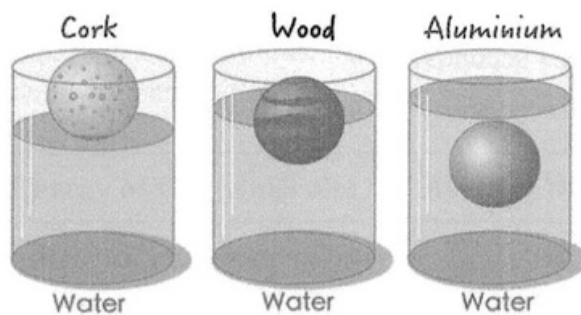


10. Four distance-time graphs for four cars **A**, **B**, **C** and **D** are shown below.

Which distance-time graph shows the motion of a car moving at constant velocity away from its starting point?



11. The diagram shows three spheres made of cork, wood and aluminium and placed in a container of water.



Which substance is the most dense?

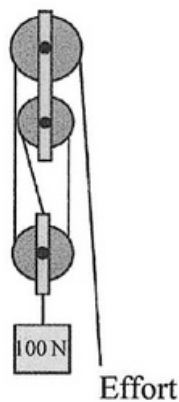
- A. aluminium
- B. cork
- C. water
- D. wood

12. Which is a third-class lever?

- A. ice tongs
- B. see-saw
- C. scissors
- D. wheelbarrow

13. The pulley system shown is used to lift a 100 N weight.

If the weight of the lower pulley and friction are ignored, what is the mechanical advantage of the system?



- A. 2
- B. 3
- C. 4
- D. 5

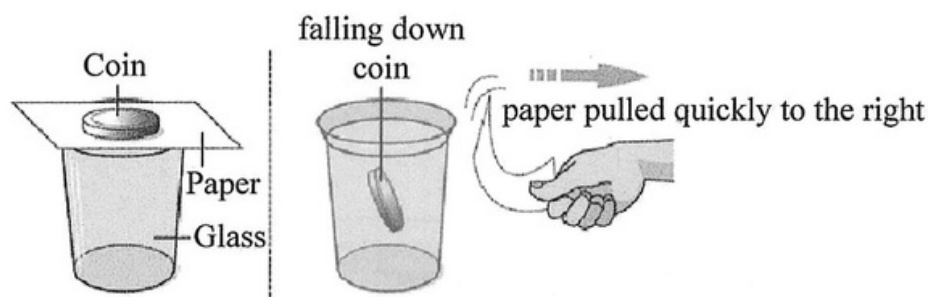
14. An object travelling with an initial velocity of 5 m/s, undergoes an acceleration of 2 m/s^2 .

What is its velocity after 3 seconds?

- A. 7 m/s
- B. 10 m/s
- C. 11 m/s
- D. 13 m/s

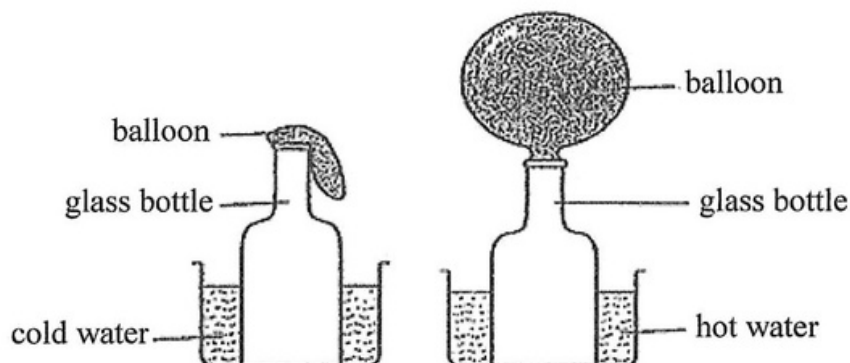


15. The diagram shows a demonstration of a law in Physics.



Which law is demonstrated in the diagram?

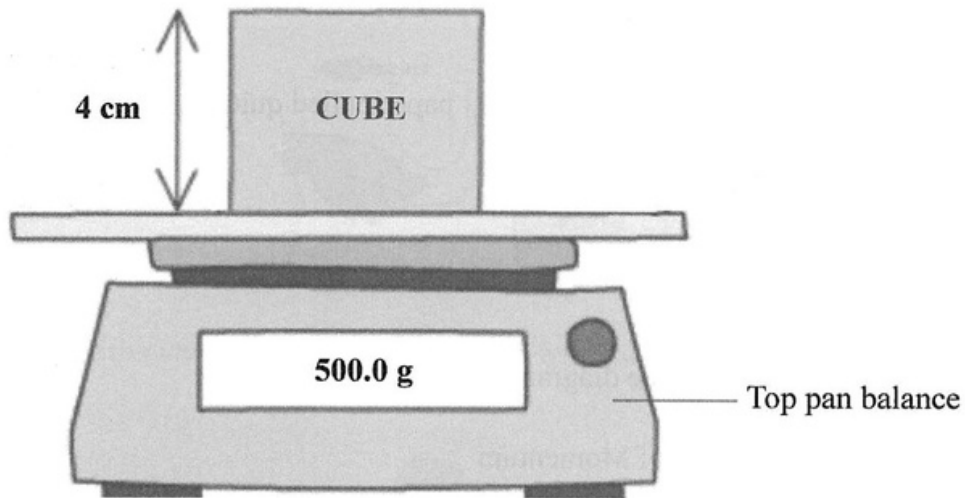
- A. Law of Conservation of Momentum
 - B. Newton's First Law of Motion
 - C. Newton's Second Law of Motion
 - D. Newton's Third Law of Motion
16. A student attached a deflated balloon to the mouth of a glass bottle and alternatively placed it in cold and hot water baths. The diagram shows the results in cold and hot water.



How does the kinetic energy of the gas molecules compare with the average distance between gas molecules in the balloon in cold and hot water?

	Kinetic Energy of Gas Molecules	Average Distance between Gas Molecules
A.	less in cold water bath	less in hot water bath
B.	more in cold water bath	less in hot water bath
C.	more in hot water bath	more in hot water bath
D.	the same in cold and hot water bath	the same in cold and hot water bath

17. A cube of length 4 cm is placed on a top pan balance to measure its mass, as shown in the diagram.



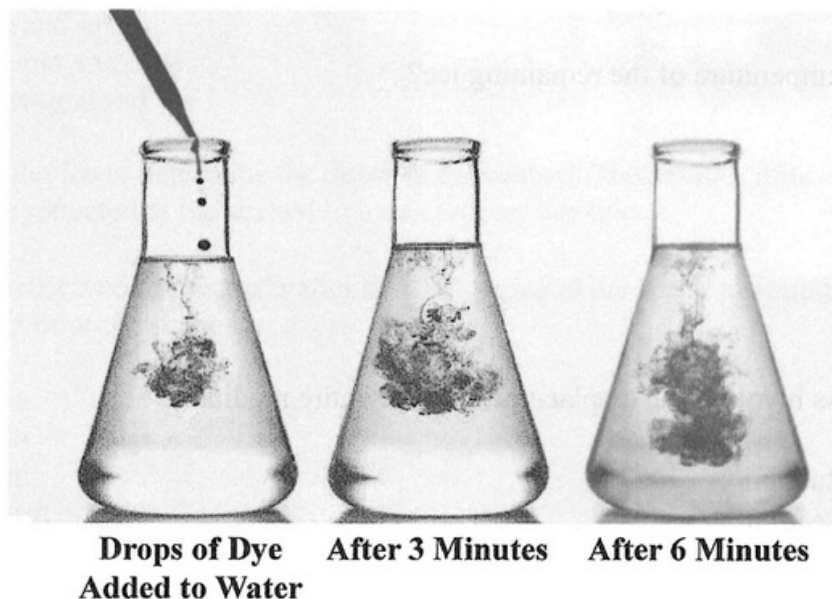
What is the density of the cube?

- A. 7.8 g/cm^3
 - B. 31.3 g/cm^3
 - C. 41.7 g/cm^3
 - D. 125.0 g/cm^3
18. An alcohol-based hand sanitiser rubbed on the hands feels cool.
- Which process explains this cooling effect?

- A. condensation
- B. convection
- C. evaporation
- D. fusion



19. A few drops of a coloured liquid dye are added to water in a conical flask. The results after 3 and 6 minutes are shown.



Which process is occurring in the conical flask?

- A. Brownian motion
 - B. condensation
 - C. diffusion
 - D. freezing
20. Which is the main energy transformation taking place in a microphone?
- A. electrical $\rightarrow$ sound
 - B. heat $\rightarrow$ sound
 - C. kinetic $\rightarrow$ sound
 - D. kinetic $\rightarrow$ electrical
21. What is the kinetic energy of a 25 kg cart that is travelling with a velocity of 16 m/s?
- A. 200 J
 - B. 400 J
 - C. 3200 J
 - D. 6400 J
22. Which quantities are measured in the same unit?
- A. energy, power and work
 - B. energy and power, but not work
 - C. energy and work, but not power
 - D. power and work, but not energy

[Turn over

23. An ice cube at a temperature of 0°C is put into a drink at a temperature of 10°C .
After a short time some of the ice has melted and the drink has cooled to a temperature of 8°C .
What is the temperature of the remaining ice?

A. 0°C
B. 2°C
C. 4°C
D. 8°C

24. Which process involves the displacement of the entire medium?

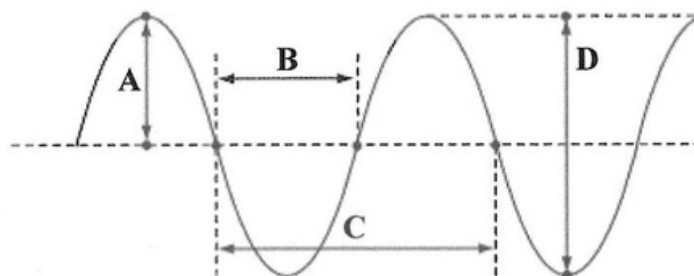
A. conduction
B. convection
C. evaporation
D. radiation

25. Which phenomenon occurs as light passes through a lens?

A. diffraction
B. rarefaction
C. reflection
D. refraction

26. The diagram shows a wave.

Which labelled distance is the amplitude?



27. Which property is unique to electromagnetic waves?

A. moves parallel to the direction of the wave
B. requires a medium to propagate
C. travels at the speed of light
D. travels at the speed of sound



28. Which combination of coloured light can produce white light?

- A. blue and yellow
- B. cyan and green
- C. magenta and blue
- D. yellow and red

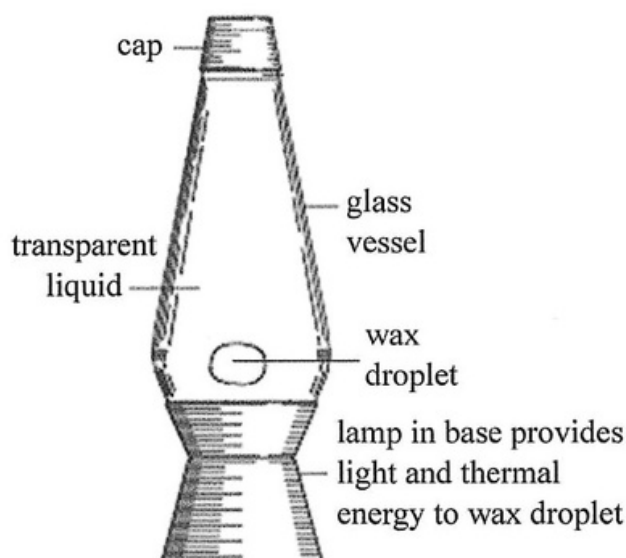
29. A ship uses a device to determine the depth of the seabed. The device emits a sound pulse from the ship, which is reflected at the seabed to a receiver on the ship.

If the pulse is received 0.4 seconds after transmission and the speed of sound in water is 1,500 m/s, what is the depth of the seabed?

- A. 150 m
- B. 300 m
- C. 600 m
- D. 1 200 m

30. The diagram shows a lava lamp.

When the lamp at the base is switched on, wax droplets commonly referred to as lava, rise in the lamp.



What is the correct change of volume and density of the wax droplets?

	Volume of wax droplet	Density of wax droplet
A.	decreases	decreases
B.	decreases	increases
C.	increases	decreases
D.	increases	increases

[Turn over

31. Which quantity will increase, as the amplitude of a sound wave is increased?

- A. energy
- B. frequency
- C. wavelength
- D. speed

32. Which row describes two characteristics of a light wave?

	Types of Waves	Method of Propagation
A.	electromagnetic	longitudinal
B.	electromagnetic	transverse
C.	mechanical	longitudinal
D.	mechanical	transverse

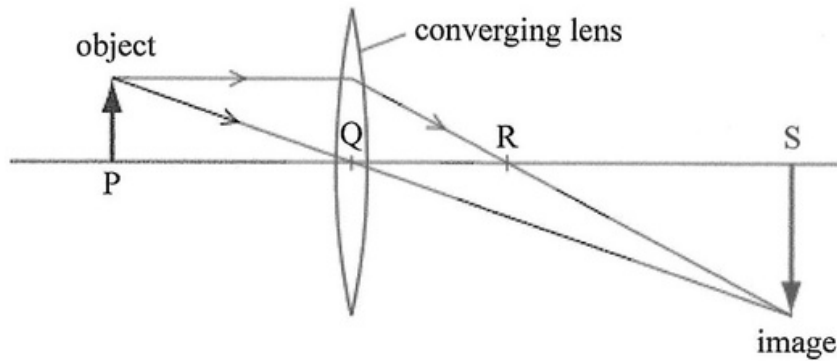
33. Light waves pass from air into glass and are refracted.

What always remains constant when this happens?

- A. direction
- B. frequency
- C. speed
- D. wavelength

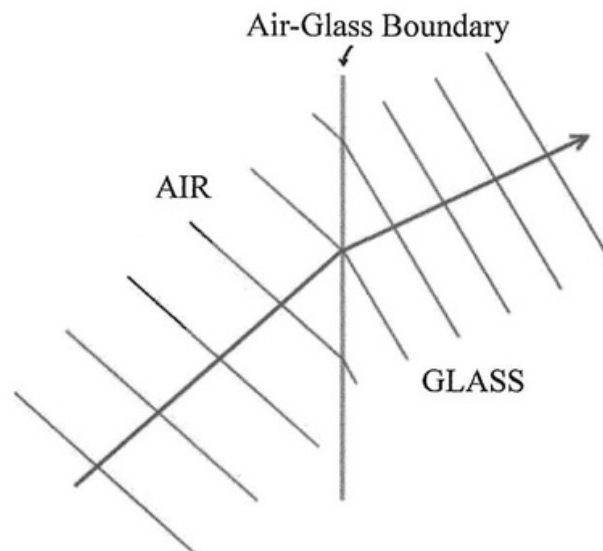


34. The diagram represents a converging lens forming an image of an object.



Which distance is the focal length of the lens?

- A. PQ
 - B. PR
 - C. QR
 - D. QS
35. The diagram shows wavefronts of light waves leaving air and entering a glass block.



Which describes the process occurring and shows the effect on the speed and frequency of the light wave?

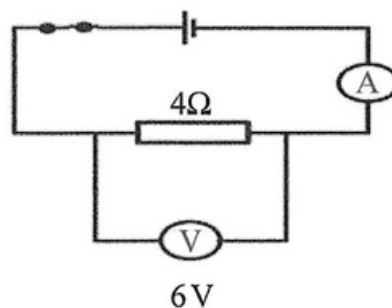
	Process	Speed	Frequency
A.	reflection	decreases	decreases
B.	reflection	remains the same	remains the same
C.	refraction	decreases	remains the same
D.	refraction	increases	remains the same

36. Four wires are made from the same material.

Which wire has the least resistance?

	Diameter of wire / mm	Length of wire / cm
A.	0.2	100
B.	0.2	200
C.	0.4	100
D.	0.4	200

37. The diagram shows a circuit with a 4Ω resistor.



If the voltage across the resistor is 6 V what is the current flowing in the circuit?

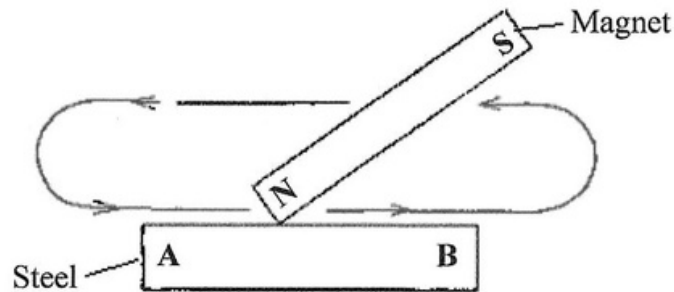
- A. 0.67 A
 B. 1.5 A
 C. 2.0 A
 D. 10 A
38. A water heater has a power consumption of 3.0 kW.

If it uses this power on an average of 3 hours per day, what is its average daily energy consumption, in joules?

- A. 9.0 J
 B. 540 J
 C. 32 400 J
 D. 32 400 000 J



39. What is the electrical safety device in the household that uses an electromagnet?
- A. circuit breaker
 - B. fuse
 - C. smoke detector
 - D. thermostat
40. A steel bar can be magnetised by stroking it with a bar magnet, as shown in the diagram.
- The steel bar is being stroked in an anticlockwise direction.

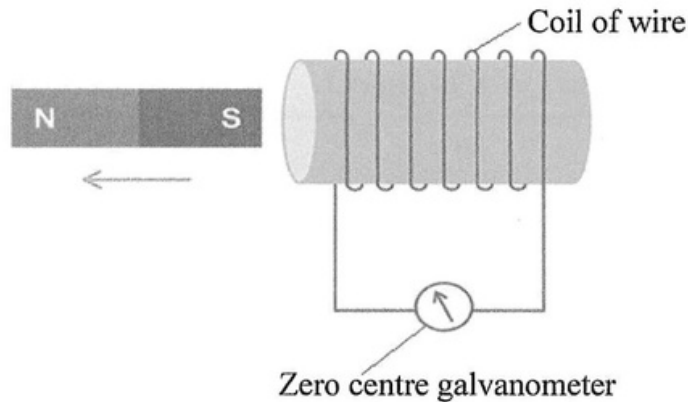


Which row indicates the magnetic pole induced at ends **A** and **B** of the steel bar?

	Pole induced at A	Pole induced at B
A.	North	North
B.	North	South
C.	South	North
D.	South	South



41. A magnet can be used to induce a voltage into a coil of wire. The needle of the galvanometer moves to the left when the south pole of the magnet is withdrawn from the coil.



Which row best explains what will be seen in the galvanometer if the pole of the magnet is reversed and moved towards the coil at a faster rate?

	Direction of needle	Amount of deflection
A.	left	decrease
B.	left	increase
C.	right	decrease
D.	right	increase

42. A stable atom of carbon has 6 protons and 6 neutrons.

What is the number of neutrons in an atom of carbon, which has a mass number of 14?

- A. 6
- B. 8
- C. 12
- D. 14

43. What is the process occurring in the core of the sun, which produces heat and light?

- A. alpha decay
- B. beta decay
- C. nuclear fission
- D. nuclear fusion



44. 100 grams of a radioactive sample is present when a stopwatch is started. After 30 minutes, 25 grams of the sample remains.

What is the half-life of the substance?

- A. 10 minutes
- B. 15 minutes
- C. 30 minutes
- D. 60 minutes

45. A food processing company uses radioisotopes, which can emit particles or rays, to improve the shelf life of foods.

What is the particle or ray most suitable for this process?

- A. alpha particles
- B. beta particles
- C. gamma rays
- D. neutrons

46. Which is the unit used to measure electromotive force (e.m.f.)?

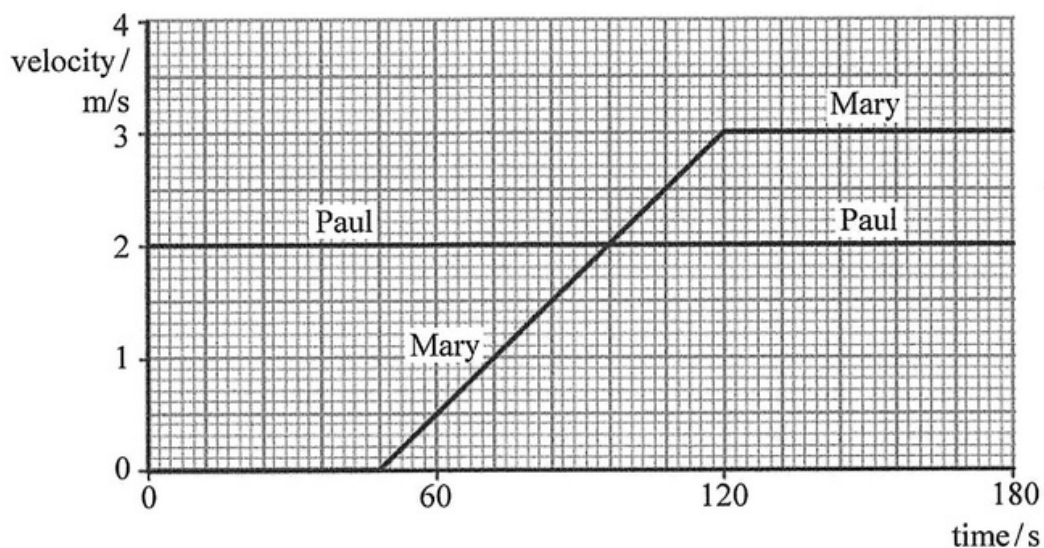
- A. ampere
- B. newton
- C. ohm
- D. volt

47. Which test could be used to find out which end of the magnet is the north pole?

- A. putting it near a compass needle
- B. putting it near a ferrous metal
- C. putting it near a non-ferrous metal
- D. putting it near a steel spoon



48. The velocity time graph below shows the motion of two friends, Paul and Mary while jogging.



Which row best describes the motion of Paul and Mary between 60 s and 120 s?

	Paul's Motion	Mary's Motion
A.	At rest	Constant acceleration
B.	At rest	Constant velocity
C.	Constant acceleration	Constant velocity
D.	Constant velocity	Constant acceleration

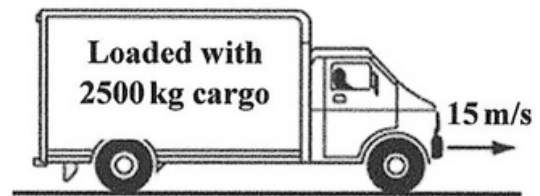
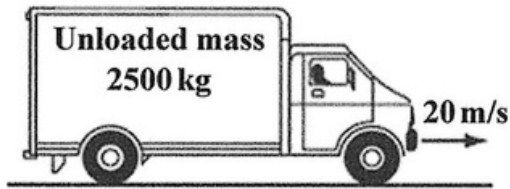
49. Which of the following would have the shortest wavelength?

- A. infra-red rays
- B. light rays
- C. sound waves
- D. water waves



50. An unloaded truck of mass 2500 kg travels at a steady speed of 20 m/s.

The truck then picks up 2500 kg of cargo and travels with a steady speed of 15 m/s.



What is the momentum of the unloaded and loaded truck?

	Momentum of Loaded Truck (kgm/s)	Momentum of Unloaded Truck (kgm/s)
A.	750	333.33
B.	750	1333.33
C.	75,000	50,000
D.	50,000	50,000

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