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PHYSICS

PAPER 1 3117/1

Friday **18 JUNE 2021** 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.

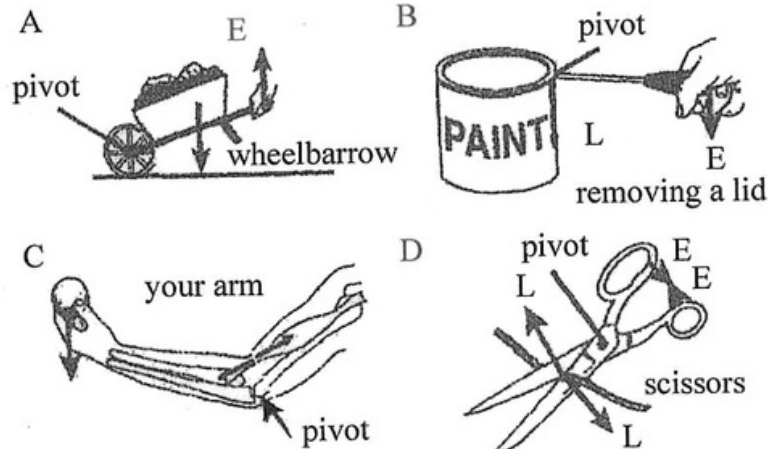


This question paper consists of 22 printed pages and 2 blank pages.

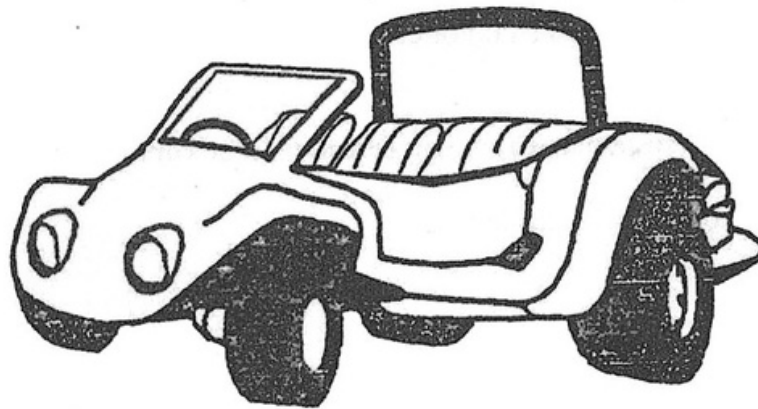
1. What is the definition of pressure?

- A. force per unit area
- B. force per unit volume
- C. mass per unit area
- D. mass per unit volume

2. Which of the following machines is an example of a second order (class) lever? L is Load and E is Effort.



3. The picture shows a dune buggy.

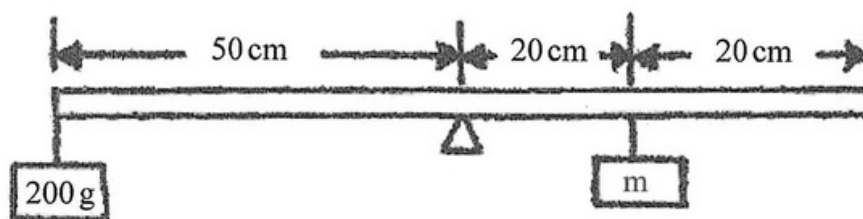


Why is it equipped with wide tyres so it can go on soft surfaces?

- A. to decrease pressure
- B. to increase friction
- C. to increase pressure
- D. to increase weight



4. The diagram shows a balanced uniform horizontal bar.

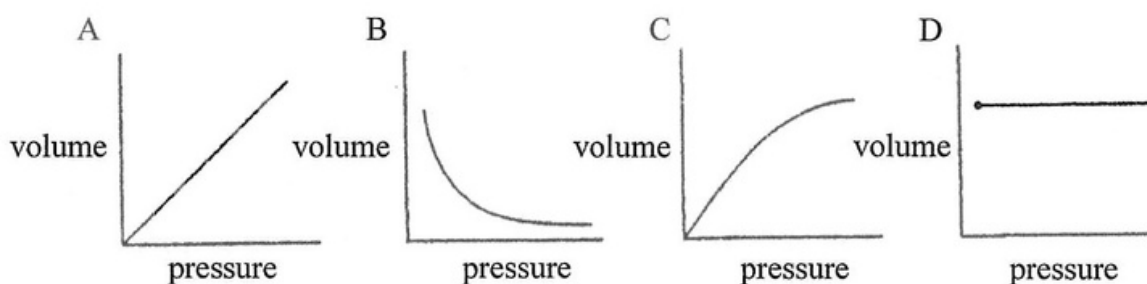


What is the mass of object m ?

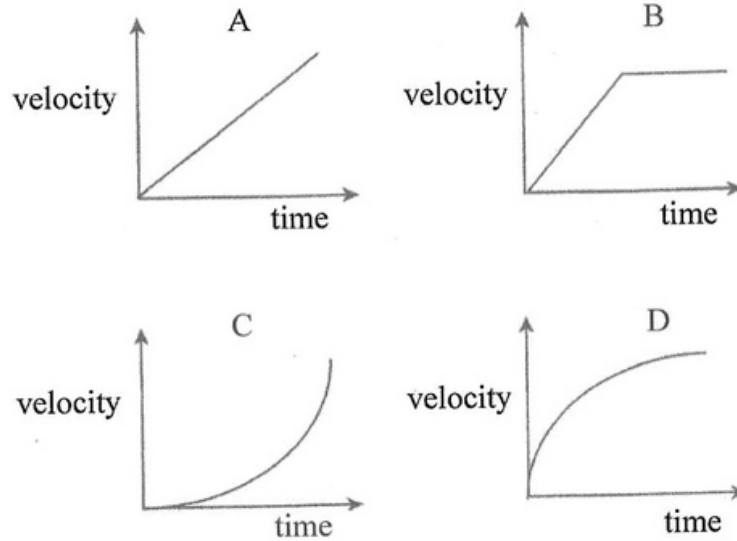
- A. 50 g
 - B. 100 g
 - C. 150 g
 - D. 500 g
5. A man has a weight 500 N. He climbs 40 steps and each step is 0.25 m high.

What is his gain in gravitational potential energy?

- A. 5 000 J
 - B. 50 000 J
 - C. 500 000 J
 - D. 5 000 000 J
6. Which graph correctly shows how the volume of a fixed mass of gas, at constant temperature, varies with pressure?



7. Which velocity/time graph best shows the relationship between velocity and time for a parachutist jumping from an aircraft, before the parachute opens?



8. A steel sphere falls from the upstairs window of a house.

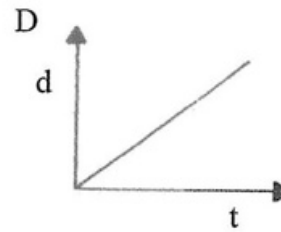
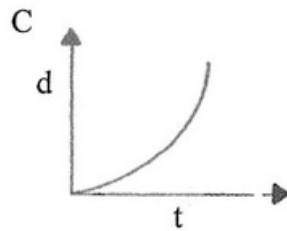
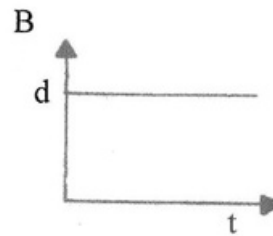
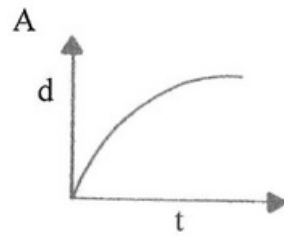
What can be said about the acceleration of the sphere, if the air resistance can be ignored?



- A. it depends on the density of the sphere
- B. it depends on the mass of the sphere
- C. it increases as the sphere falls
- D. it remains constant as the sphere falls

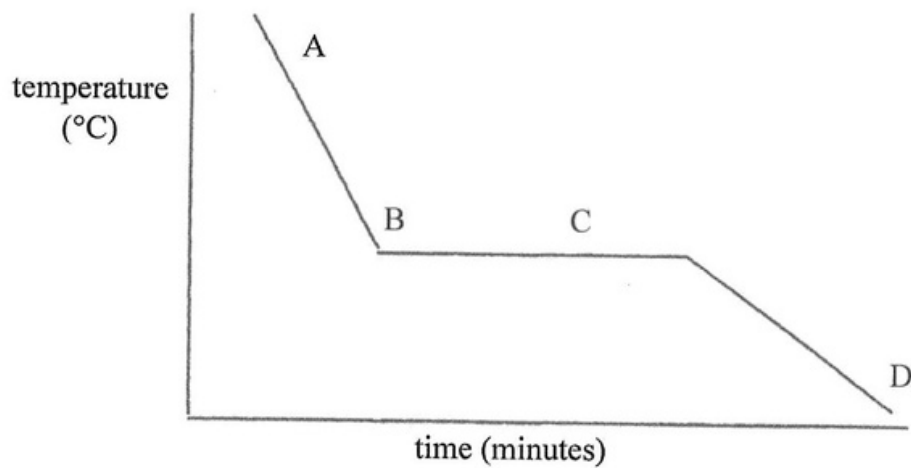


9. What distance (d) vs time (t) graph shows an object moving at uniform speed?



10. The graph shows a cooling curve for the solidification of liquid paraffin wax.

Which letter on the graph shows a point where there was a mixture of liquid and solid?



11. A soccer ball moving with a velocity of 25.0 m/s has a momentum of 12.5 kg m/s .

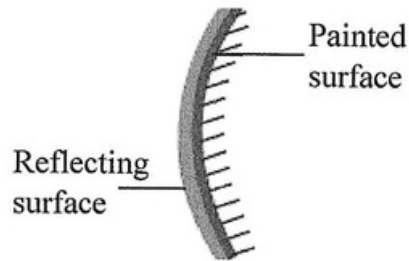


What is its mass?

- A. 0.5 kg
B. 12.5 kg
C. 37.5 kg
D. 312.5 kg
12. A force of 100 N is applied to the handle of a nutcracker. The nutcracker exerts a force of 650 N on the nut. What is the mechanical advantage of the nutcracker?
- A. 5.5
B. 6.5
C. 10
D. 65
13. Which of the following is an example of a scalar quantity?
- A. Acceleration
B. Momentum
C. Speed
D. Velocity
14. An object will stay at rest or in constant motion unless acted on by an external force. This statement represents which Law of Physics?
- A. Law of Conservation of Energy
B. Law of Momentum
C. Newton's 1st Law of Motion
D. Newton's 3rd Law of Motion

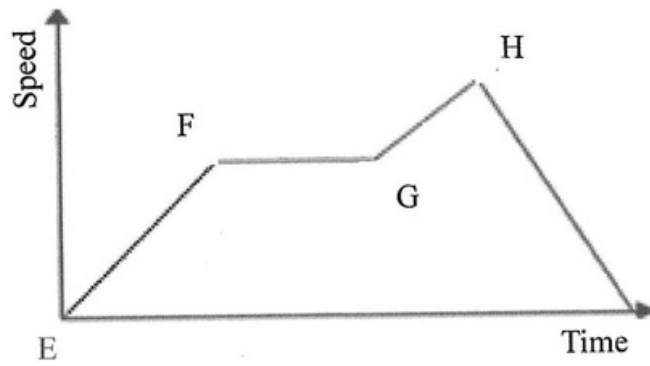


15. Which properties best describe the image formed in a convex mirror?



- A. diminished, inverted, real
B. diminished, upright, virtual
C. magnified, inverted, real
D. magnified, upright, virtual
16. Gasoline storage tanks at The Bahamas Oil Refining Company are painted silver. What does this reduce?
- A. absorption of energy by conduction
B. absorption of energy by radiation
C. loss of energy by conduction
D. loss of energy by convection
17. Which of these waves has the longest wavelength?
- A. infra-red
B. radio
C. ultra-violet
D. x-rays
18. When **must** the total momentum of a flock of identical birds be zero?
- A. if they come down to rest
B. if they fly in different directions
C. if they fly in the same direction
D. if they take off from the ground

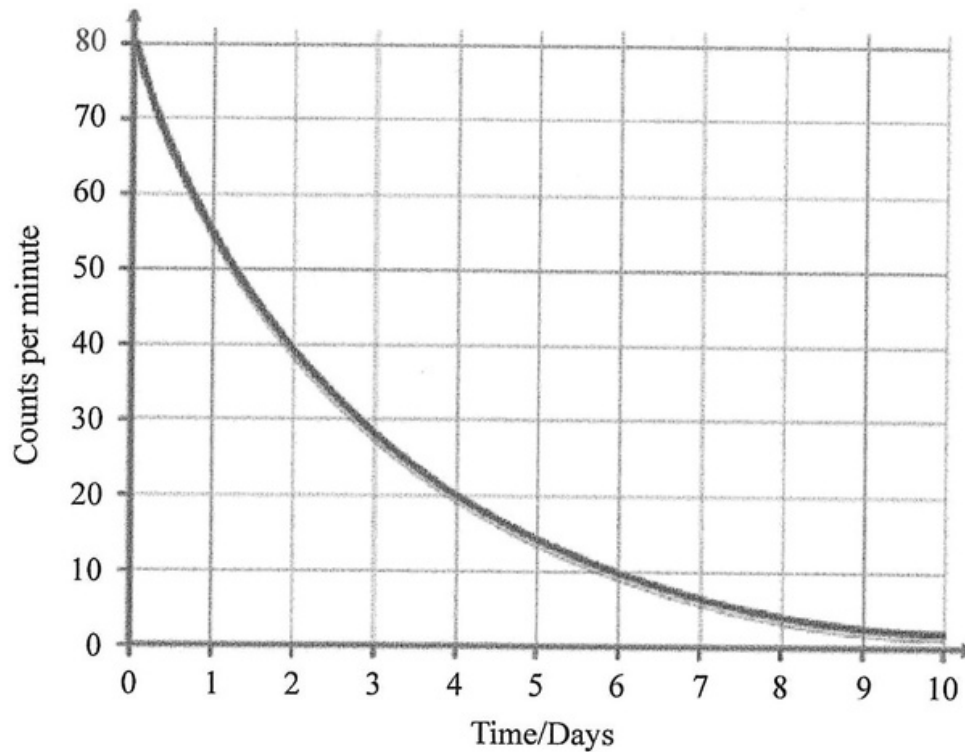
19. The speed/time diagram below shows the motion of a small truck. During which segment is the acceleration equal to zero?



- A. EF
- B. FG
- C. GH
- D. EH



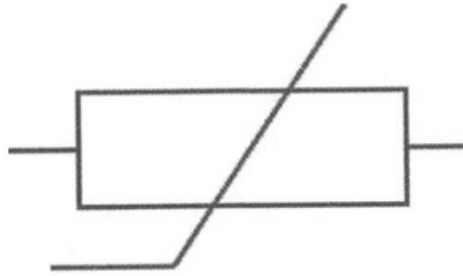
20. The graph below shows how the count rate of a certain radioactive isotope changes with time, as it decays.



What is the half-life of the radioisotope?

- A. 2 days
 - B. 4 days
 - C. 10 days
 - D. 20 days
21. Which device converts electrical energy into kinetic energy?
- A. battery
 - B. generator
 - C. motor
 - D. transformer

22. Which component is shown in the diagram?

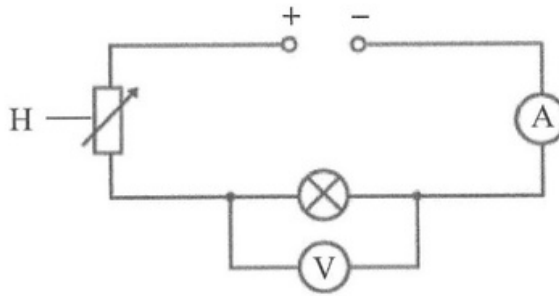


- A. Fuse
 - B. Relay
 - C. Thermistor
 - D. Variable resistor
23. A permanent magnet is made by stroking which type of material with an existing magnet?
- A. Aluminium
 - B. Copper
 - C. Soft Iron
 - D. Hard Steel
24. Which change will **not** increase the strength of the magnetic field in the coil of a simple electric motor?
- A. Adding a soft iron core
 - B. Increasing the current in the wire
 - C. Increasing the number of turns of the wire
 - D. Increasing the resistance of the circuit providing the voltage remains constant
25. An atom consists of three sub atomic particles. Which of the following exists in the nucleus?
- A. electron, neutron and proton
 - B. neutron and electron
 - C. proton and electron
 - D. proton and neutron



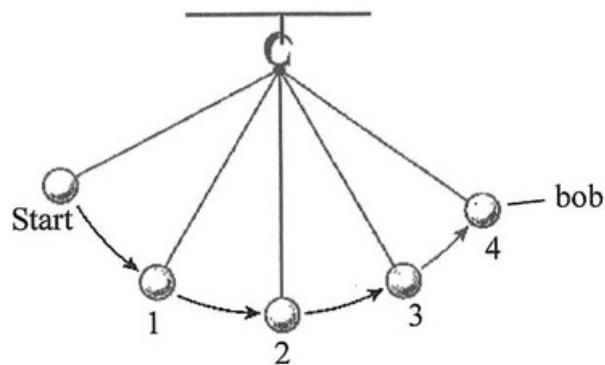
26. Uranium-238 has an atomic number of 92. It decays by alpha decay to become thorium. What is the mass number and atomic number of thorium, respectively?
- A. 234 : 88
 - B. 234 : 90
 - C. 234 : 92
 - D. 242 : 94
27. All radioactive sources have a half-life. Which statement about the half-life of a source is correct?
- A. It is half the time for the radioactive source to become safe.
 - B. It is half the time it takes for an atom to decay.
 - C. It is half the time it takes for the count rate on the detector near the source to decrease to zero.
 - D. It is the time it takes for the count rate on the detector near the source to decrease by half.
28. Strontium 90 is a beta emitter. Which best describes a beta particle?
- A. A fast-moving electron
 - B. A helium nucleus
 - C. A neutron
 - D. A proton
29. Which of the following is a function of insulating materials?
- A. conducting very large currents
 - B. preventing an open circuit between the voltage source and the load
 - C. preventing a short circuit between conducting wires
 - D. storing very large currents

30. What is component H?



- A. Light dependent resistor
- B. Fixed resistor
- C. Thermistor
- D. Variable resistor

31. The diagram shows a swinging pendulum.

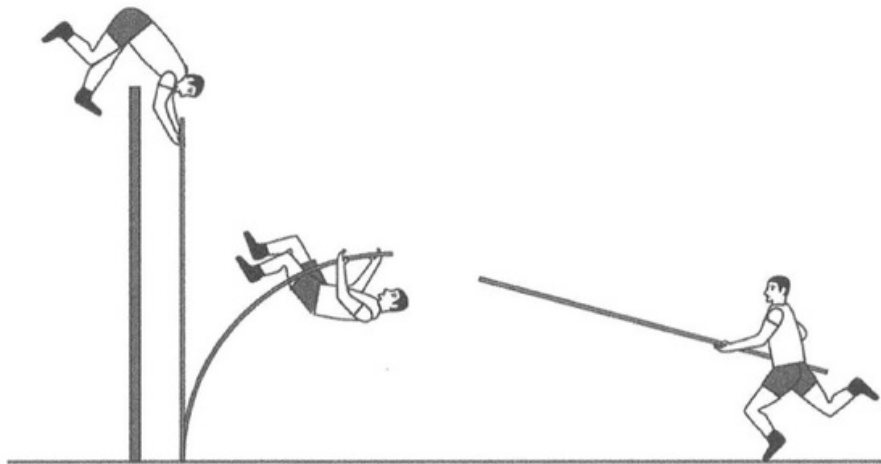


At which point is the kinetic energy of the bob at its maximum?

- A. 1
- B. 2
- C. 3
- D. 4



32. At a track and field meet, a pole vaulter runs with a long flexible pole and uses it as an aid to lunge up into the air in order to jump over a high bar.



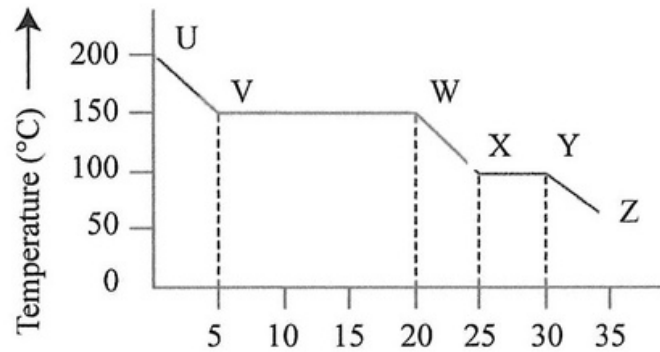
What are the main energy transformations occurring as the athlete runs, bends the pole and reaches the highest point above the bar?

- A. Chemical energy $\longrightarrow$ Elastic Potential Energy $\longrightarrow$ Kinetic Energy
- B. Chemical energy $\longrightarrow$ Gravitational Potential Energy $\longrightarrow$ Kinetic Energy
- C. Kinetic energy $\longrightarrow$ Chemical Energy $\longrightarrow$ Gravitational Potential Energy
- D. Kinetic energy $\longrightarrow$ Elastic Potential Energy $\longrightarrow$ Gravitational Potential Energy

33. Which row in the table shows the symbols of equivalent units for the joule (J)?

A.	kgm^2/s^2	Nm	Ws
B.	kgm/s^2	N/m	W/s
C.	kWh	Nm	Ws
D.	kWh	N/m	W/s

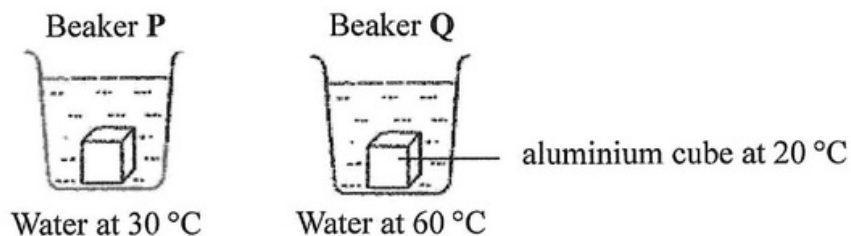
34. The graph represents the cooling graph of a substance.



What is the freezing point of the substance and what is happening to the kinetic energy of the particles in the substance during VW and during XY?

	Freezing Point	Kinetic Energy of Particles during	
		VW	XY
A.	100	remains constant	is decreasing
B.	100	remains constant	remains constant
C.	150	is decreasing	is increasing
D.	150	is increasing	is decreasing

35. The diagram shows two identical beakers, each containing the same mass of pure water. The temperature of the water in **beaker P** is 30°C , while the temperature of the water in **beaker Q** is 60°C . A 50 g aluminium cube at 20°C is placed inside each beaker.

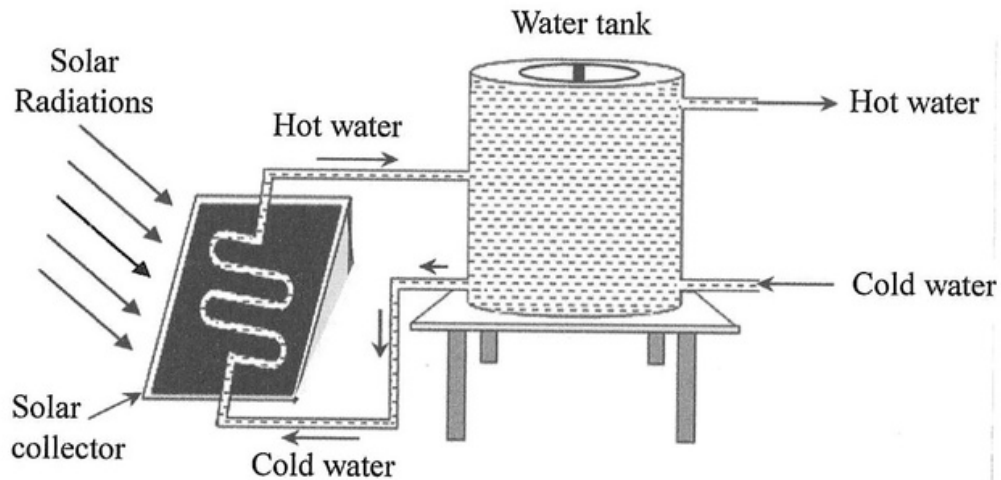


Which substance gains the greatest amount of heat energy?

- A. the aluminium cube in beaker P
- B. the aluminium cube in beaker Q
- C. the water in beaker P
- D. the water in beaker Q

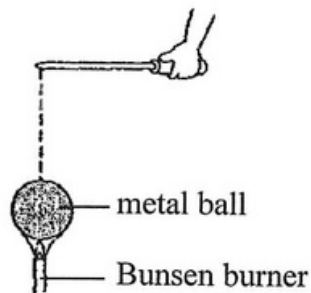


36. The diagram shows a simplified model of a solar heater, which uses energy from the sun to heat water.



What is the reason for painting the panel in the solar collector black? To

- A. improve the rate of absorption of infrared radiation
 - B. improve the rate of emission of infrared radiation
 - C. reduce heat loss by convection currents
 - D. reduce the heater's conducting properties
37. A metal ball is heated.



Which quantity of the ball decreases?

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

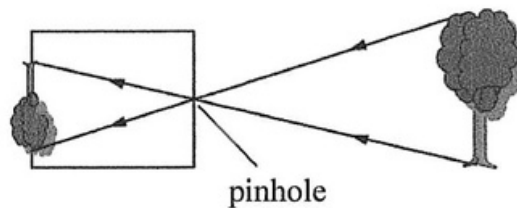
38. A water wave approaches shallow water close to the beach.

What happens to its frequency, speed and wavelength of the water wave?

	Frequency	Speed	Wavelength
A.	decreases	decreases	remains constant
B.	increases	decreases	remains constant
C.	remains constant	decreases	decreases
D.	remains constant	increases	increases

39. A student makes a pinhole camera and uses it to investigate the properties of light.

A simplified model of image formation in the pinhole camera is shown.

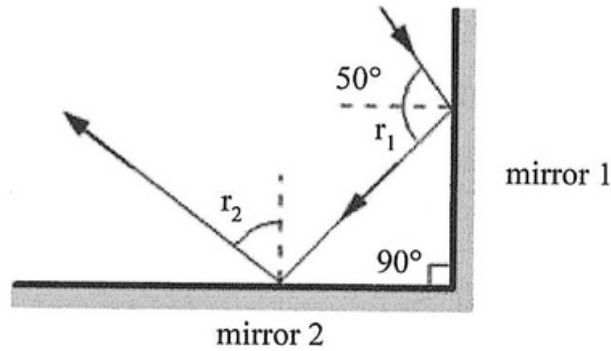


How does the image appear after the pinhole is enlarged?

	Enlarging pinhole
A.	Brighter, blurred image
B.	Brighter, focused image
C.	Dull, blurred image
D.	Dull, focused image



40. Two plane mirrors are placed at right angles to each other as shown in the diagram.

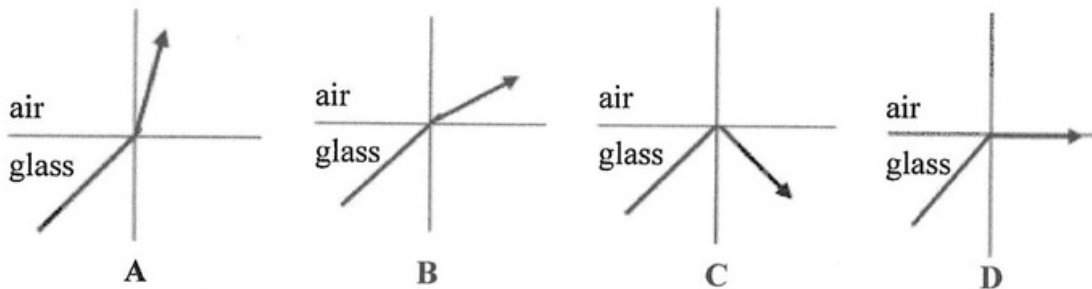


The angles in the diagram have not been drawn exactly and measurements should not be taken from the diagram. The angle r_1 is 50° . A ray of light reflects on mirror 1 and reflects from this mirror into mirror 2, and is once more reflected.

What is the size of angle r_2 ?

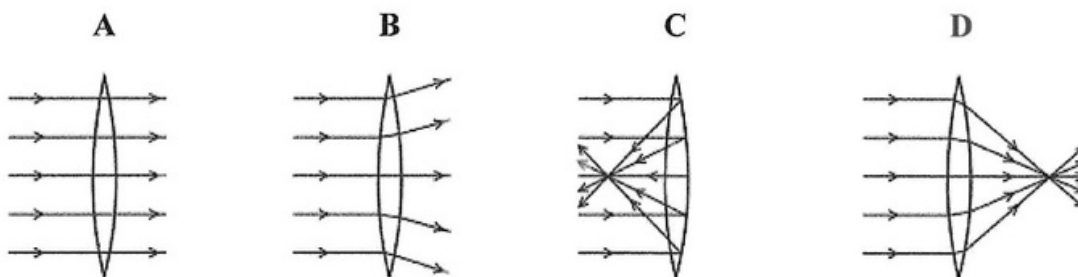
	$r_2 (^\circ)$
A.	40
B.	50
C.	80
D.	90

41. Which ray shows the possible path for a ray of light leaving glass and entering air at an angle of incidence **less than** the critical angle of glass?



42. A parallel beam of light falls on a converging lens.

Which diagram shows what happens to the beam of light?



43. Which two optical devices produce enlarged, upright, virtual images when the object is placed closer than one focal length from the lens or mirror?

- A. concave lens and convex lens
- B. concave lens and convex mirrors
- C. concave mirrors and convex mirrors
- D. concave mirrors and convex lens

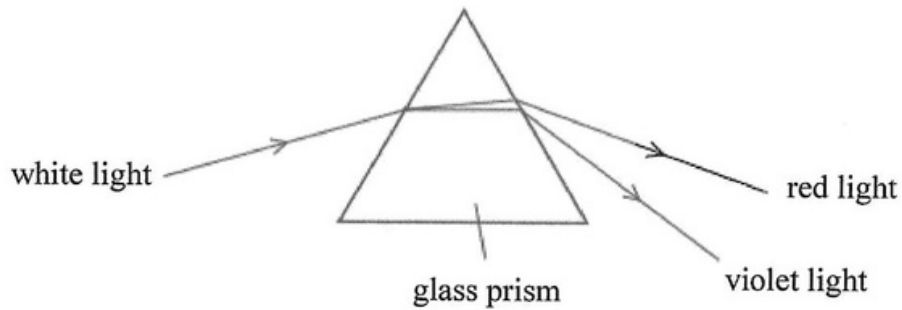
44. A specific electromagnetic wave has a frequency greater than microwaves. The wavelength of this wave is longer than that of visible light.

What is the name of this electromagnetic wave?

- A. Gamma rays
- B. Infrared
- C. Radio waves
- D. Ultra-violet

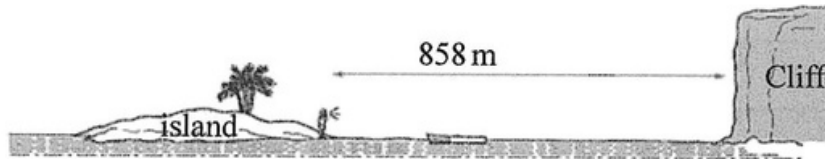


45. The diagram shows the dispersion of white light by a glass prism.



Why does the dispersion occur when the white light enters the glass?

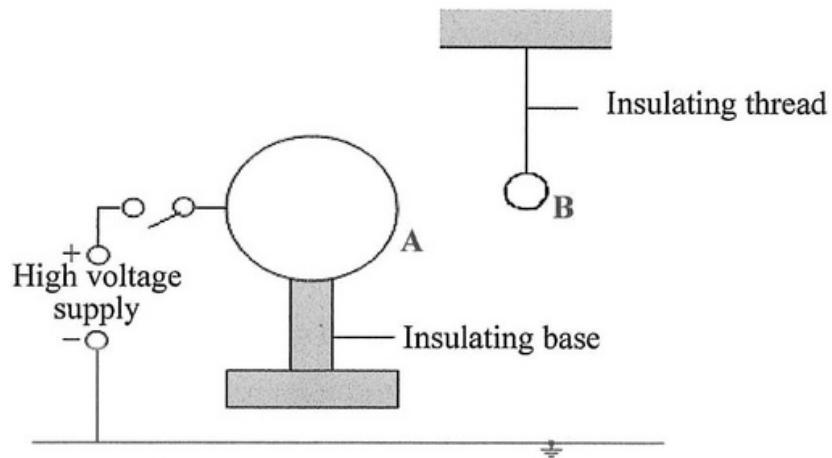
- A. The frequency of red light decreases more than that of violet light.
 - B. The frequency of violet light decreases more than that of red light.
 - C. The speed of red light decreases more than that of violet light.
 - D. The speed of violet light decreases more than that of red light.
46. A man stranded on an island shouts for help but is only able to hear in reply the echo of his shout from a cliff 858 m away.



Given that the speed of sound in air is 330 m/s, how long did it take for the man to hear the echo of his shout?

- A. 1.3 s
- B. 2.6 s
- C. 5.2 s
- D. 6.5 s

47. A large conducting **sphere A**, is charged while in contact with the positive terminal of a high voltage power supply. A light initially uncharged conducting **sphere B** hangs from an insulating thread as shown.

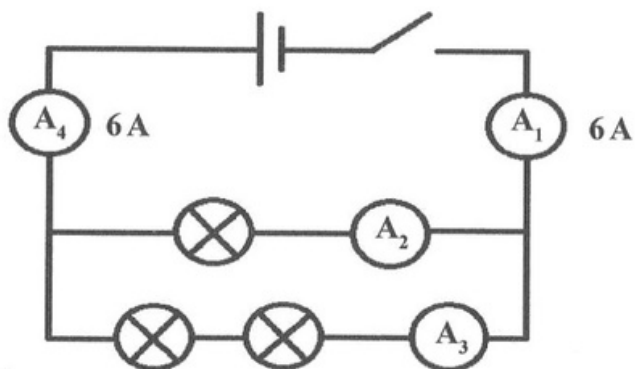


What charge accumulates on **sphere A** and how does **sphere B** move as a result?

	Charge on Sphere A	Movement of Sphere B
A.	negative	towards sphere A
B.	neutral	no movement
C.	positive	away from sphere A
D.	positive	towards sphere A



48. The diagram shows three identical lamps arranged in a circuit.

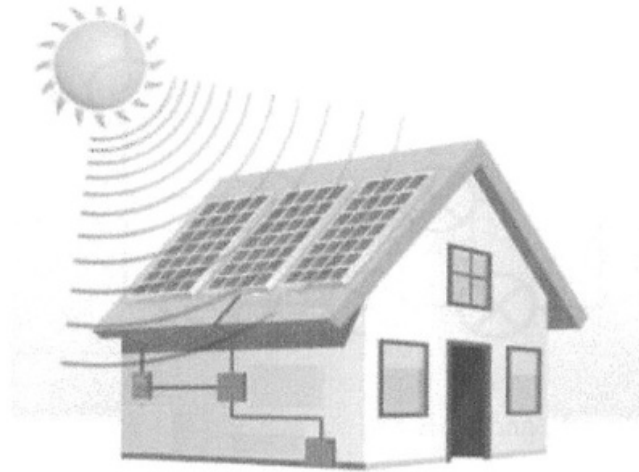


The current in ammeters A_1 and A_4 is 6A.

What current is registered on **ammeters** A_2 and A_3 ?

	Current in A_2	Current in A_3
A.	2A	4A
B.	3A	3A
C.	4A	2A
D.	6A	1A

49. A domestic solar panel has a power output of 350 W. The solar panel receives an average of 5 hours of direct sunlight per day.



What is the average electrical energy produced by the solar panel daily and the cost of this energy if a kWh costs 20 cents?

	Average daily electrical energy produced (kWh)	Cost of energy (\$)
A.	1.75	0.35
B.	70	14.00
C.	355	71.00
D.	1750	350.00

50. After some building work in a house, a bare (uninsulated) live wire is left protruding from a wall.

What is the greatest hazard?

- A. a fire
- B. a fuse blows
- C. an electric shock
- D. no current flows



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