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PHYSICS

PAPER 1 3117/1

Thursday **30 MAY 2024** 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.

Calculators may be used.

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 18 printed pages and 2 blank pages.

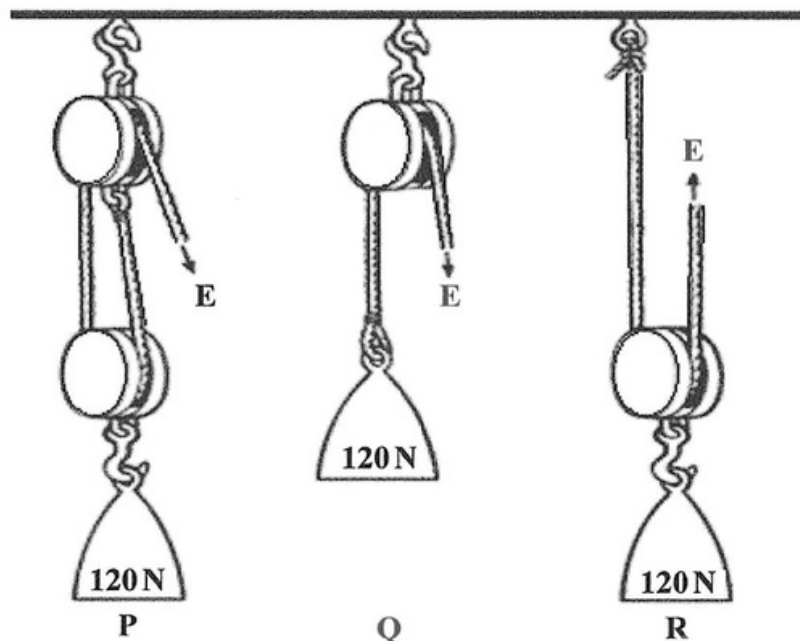
1. What is the atomic number of an element?
 - A. the number of electrons in an atom of the element
 - B. the number of neutrons in a nucleus of an atom of the element
 - C. the number of protons in a nucleus of an atom of the element
 - D. the number of protons and neutrons in a nucleus of an atom of the element

2. The table shows physical quantities and units commonly used in physics.

Which row of the table shows a physical quantity correctly matched with its S.I. base unit?

	Physical Quantity	S.I. unit
A.	length	metre
B.	mass	newton
C.	temperature	degree fahrenheit
D.	time	kilowatt hour

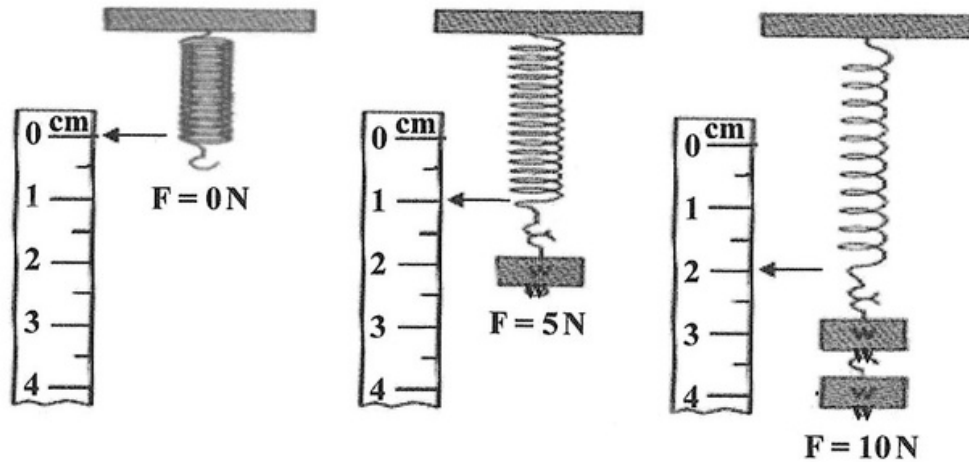
3. Three pulleys **P**, **Q** and **R** were used to lift 120 N loads.



Which pulleys would require an effort (**E**) of 60 N to lift the 120 N load, if friction and weight of the moveable pulley are negligible?

- A. P and Q only
- B. P and R only
- C. Q and R only
- D. P, Q and R

4. A spiral spring which obeys Hooke's Law is used in an experiment to investigate the effect of force on extension.

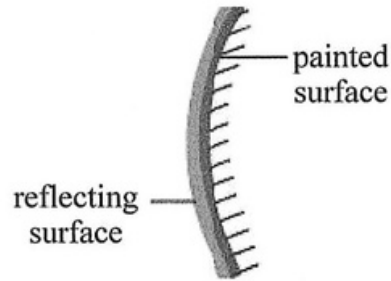


The spring used in this experiment has an original length of 1.5 cm.

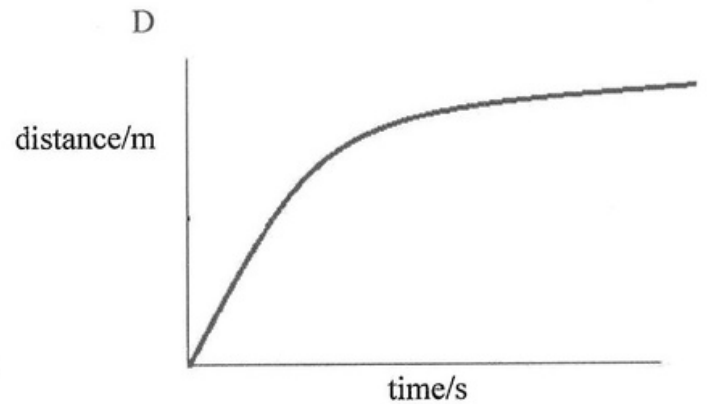
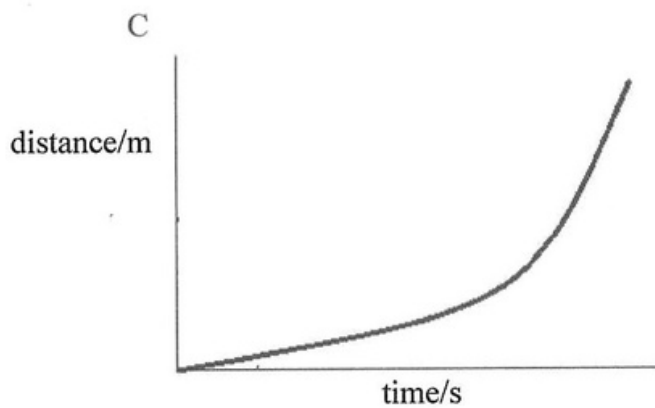
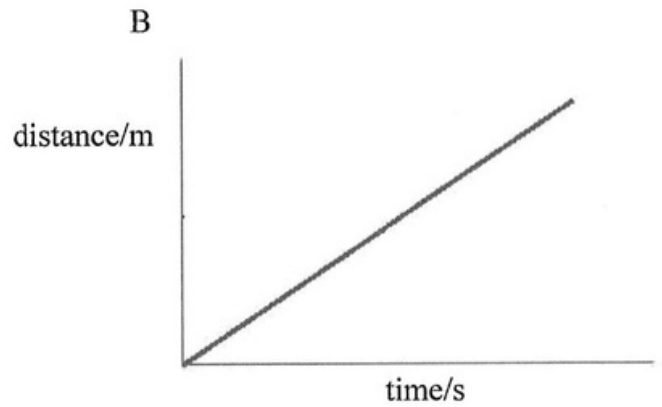
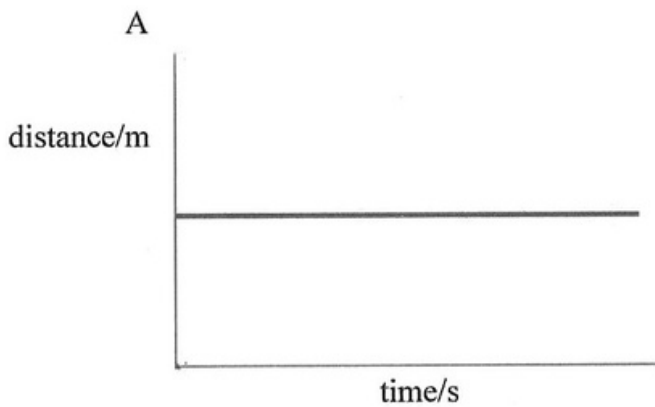
What is the length of the spring when a force of 25 N is suspended on it?

- A. 6.5 cm
B. 7.5 cm
C. 10.0 cm
D. 12.5 cm
5. Which type of force always causes the change in position of a body?
- A. balanced force
B. gravity
C. mass
D. unbalanced force

6. Which properties best describe the image formed when an object is placed on the left of the convex mirror shown?



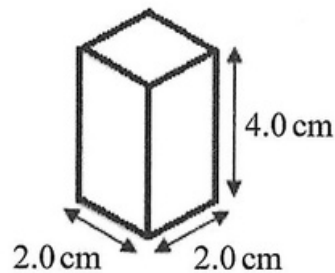
- A. diminished, inverted, real
B. diminished, upright, virtual
C. magnified, inverted, real
D. magnified, upright, virtual
7. Which distance-time graph shows an object at rest?



8. An astronaut took a flask from the Earth to the Moon. The flask has a mass of 250 g on Earth. (The gravitational field strength on the earth and moon are 10 N/kg and 1.6 N/kg respectively.)

What is its weight on the Moon?

- A. 0.20 N
 - B. 0.25 N
 - C. 0.4 N
 - D. 2.5 N
9. Which quantity is a vector quantity?
- A. length
 - B. mass
 - C. temperature
 - D. velocity
10. The diagram shows a rectangular block made of lead.



The mass of the block is 180 g

What is the density of the block?

- A. 11 g/cm³
- B. 16 g/cm³
- C. 29 g/cm³
- D. 89 g/cm³



11. A skateboarder is skating on a horizontal surface, the combined mass of the skater and board is 65 kg. The skateboarder applies a force of 75 N parallel to the surface and experiences 25 N of frictional force.

What is the acceleration experienced by the skateboarder?

- A. 0.38 m/s^2
- B. 0.77 m/s^2
- C. 1.2 m/s^2
- D. 2.6 m/s^2

12. The momentum of a train is calculated as 1800 kg m/s .

The train travelling at a constant velocity, covers 600 m in 2 minutes.

What is the estimated mass of the train?

- A. 3 kg
- B. 60 kg
- C. 180 kg
- D. 360 kg

13. An eagle flaps its wings and pushes on the air below with a force X.

What is the value of the force exerted by the air on the eagle?

- A. equal to force X
- B. exactly twice as great as force X
- C. between one and two times larger than force X
- D. less than force X

14. A small steel ball is dropped from a low balcony.

Ignoring air resistance, which statement describes its motion?

- A. It falls with constant acceleration.
- B. It falls with constant speed.
- C. It falls with decreasing speed.
- D. It falls with increasing acceleration.



15. The slope of a speed-time graph represents which physical quantity?

- A. acceleration
- B. distance
- C. momentum
- D. speed

16. One type of glass does not expand when heated.

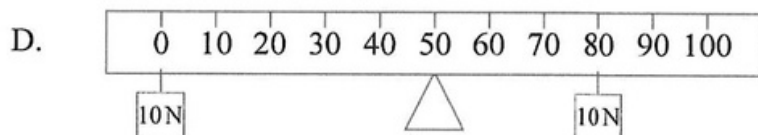
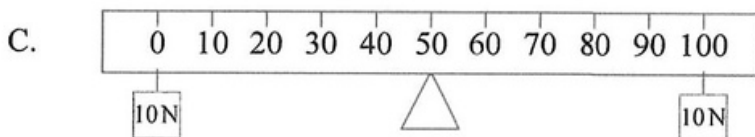
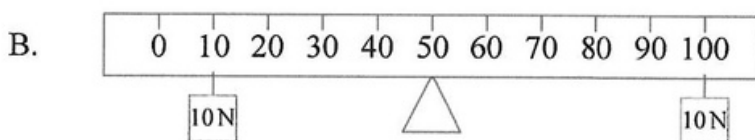
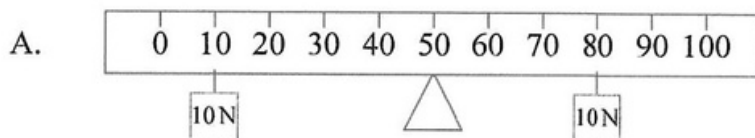
What happens to a gas in a container of this type of glass when the temperature of the gas increases?

- A. the volume decreases
- B. the volume increases
- C. the pressure decreases
- D. the pressure increases

17. The diagrams show a metre ruler which was originally balanced at the 50 cm mark.

Identical weights were then placed on either side of the pivot.

Which labelled diagram will have an overall moment of 200 N cm counterclockwise?



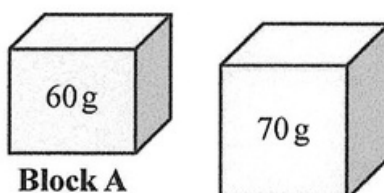
18. What is the name of the process when a gas turns into a liquid?
- A. condensation
 - B. evaporation
 - C. freezing
 - D. melting
19. Which factor does **not** affect the rate of diffusion of particles in a liquid through a membrane which has a fixed area?
- A. the concentration of the particles in the liquid
 - B. the size of the holes in the dividing membrane
 - C. the temperature of the liquid
 - D. the volume of the liquid
20. Which movement will require the greatest amount of work to be done?
- A. a force of 10N moving an object a distance of 3 m
 - B. a force of 10N moving an object a distance of 5 m
 - C. a force of 15N moving an object a distance of 3 m
 - D. a force of 15N moving an object a distance of 5 m
21. What energy changes take place in a microphone when a person speaks into it?
- A. electrical to kinetic
 - B. electrical to sound
 - C. kinetic to mechanical
 - D. sound to electrical
22. What is a unit of energy?
- A. ampere
 - B. joule
 - C. kelvin
 - D. watt



23. Why is the ice-point chosen as one of the fixed points of a thermometer scale?

- A. All ice has a temperature of 0°C .
- B. Ice has zero heat energy.
- C. It is an accurate, easily reproducible temperature.
- D. It is the coldest temperature that can exist.

24. A student heats two blocks of aluminum **P** and **Q** of masses 60 g and 70 g respectively from 28°C to 50°C .



Which row correctly explains the energy gains by the aluminum blocks P and Q and the average kinetic energy of their particles at 50°C ?

	Energy gained by blocks	Average Kinetic Energy of Particles in blocks
A.	P gained less energy than Q	particles in P have less average kinetic energy than particles in Q
B.	P gained less energy than Q	particles in P have the same average kinetic energy as particles in Q
C.	P gained more energy than Q	particles in P have more average kinetic energy than particles in Q
D.	P gained the same energy as Q	particles in P have the same average kinetic energy as particles in Q

25. The cooling fins of a refrigerator are painted black.

Which method of heat transfer does this improve?

- A. conduction only
- B. convection only
- C. radiation only
- D. all of the above



26. A thermistor is a non-ohmic resistor, whose resistance depends on its temperature.

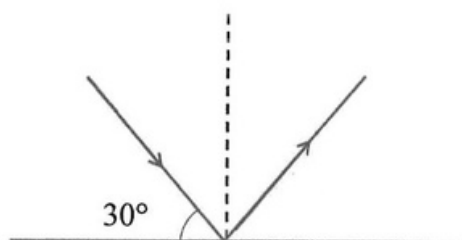
In which piece of equipment can a thermistor best be used?

- A. automatic security lighting
 - B. burglar alarm circuits
 - C. digital cameras to control shutter speeds
 - D. fire alarm circuits
27. Which type of wave involves the oscillation of matter?
- A. gamma ray
 - B. radio
 - C. sound
 - D. visible light
28. Which of the following best describes the behaviour of a water wave after it passes through a gap?
- A. diffraction
 - B. diffusion
 - C. reflection
 - D. refraction
29. Which of the following is a characteristic of **both** a sound and a visible light wave?
- A. They are transverse waves.
 - B. They can exhibit diffraction.
 - C. They need a medium to travel.
 - D. They travel at the same speed.



30. A ray of light is reflected as shown.

What is the angle of reflection?



- A. 30°
B. 40°
C. 60°
D. 180°
31. When light moves from glass to air, which statement is true?
- A. frequency increases
B. speed decreases
C. wavelength increases
D. wavelength stays the same
32. Why does a ceiling fan have a cooling effect on people?
- A. Condensation can take place more readily.
B. Evaporation can take place more readily.
C. Hot air rises.
D. The temperature of the air is lowered.
33. Which property of images produced by plane mirrors, is the main reason for the word AMBULANCE being written as shown in the diagram?



- A. Image distance is the same as object distance.
B. Image size is the same as object size.
C. The images produced are laterally inverted.
D. The images produced are real images.

34. Which is the best material for creating a shield from nuclear radiation?

- A. aluminium
- B. copper
- C. lead
- D. plastic

35. Which of the colours shown has the longest wavelength?

- A. blue
- B. red
- C. violet
- D. yellow

36. A person claps their hands while standing 100 m from a tall cliff.

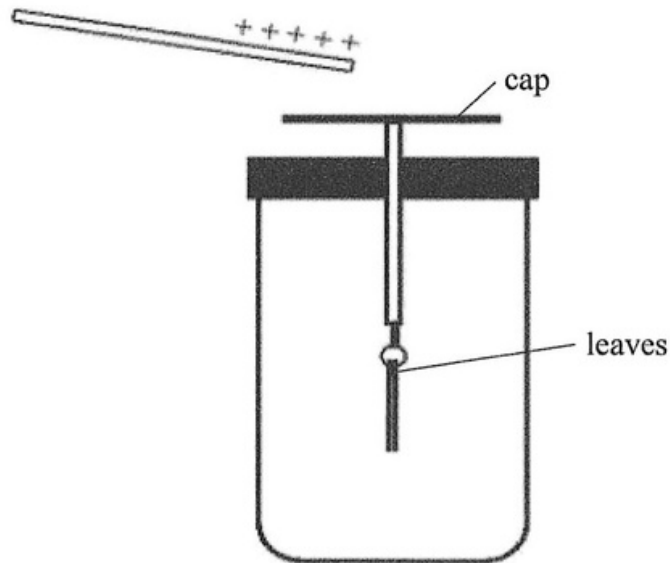
The speed of sound in air is 330 m/s.

What is the time taken to hear the echo?

- A. 0.30 s
- B. 0.61 s
- C. 3.3 s
- D. 6.6 s



37. A positively charged rod is brought near to an uncharged electroscope. The rod does not touch the electroscope.



What are the charges on the cap and the leaves of the electroscope?

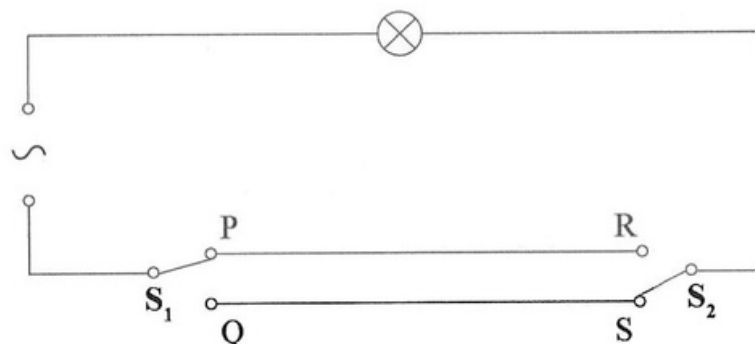
	Charge on cap of Electroscope	Charge on leaves of Electroscope
A.	negative	negative
B.	negative	positive
C.	positive	negative
D.	positive	positive

38. Why should the lights in a house be connected in parallel rather than in series?

- A. It is cheaper.
- B. Less electric current is used.
- C. The lights are dimmer.
- D. When one light goes out the rest of the lights stay on.



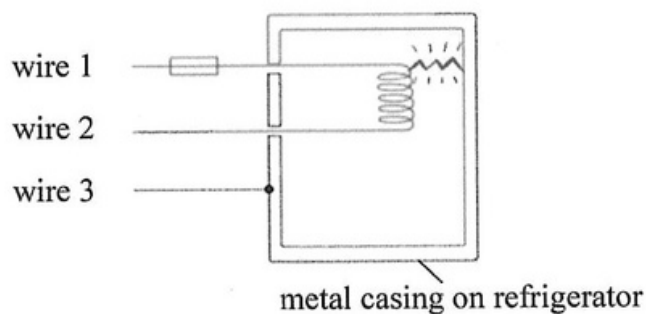
39. A simplified circuit with two switches, S_1 and S_2 , is used to operate a lamp from different points of a room, as shown in the diagram below.



Which row in the table correctly identifies the type of current used in homes and the positions of switches S_1 and S_2 when the lamp is on?

	Current	S_1	S_2
A.	alternating	P	R
B.	alternating	P	S
C.	direct	Q	R
D.	direct	Q	S

40. Wires 1, 2 and 3 are connected to a three-pin plug of a refrigerator which is in use.

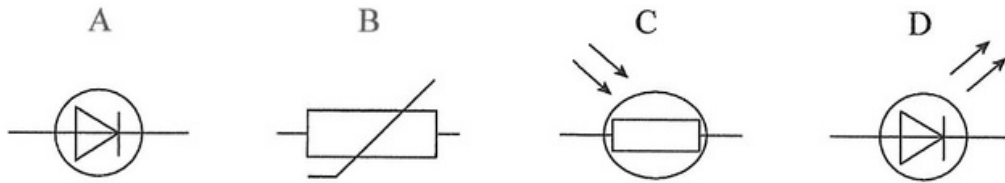


What are the names of wires 1, 2 and 3?

	Wire 1	Wire 2	Wire 3
A.	earth	live	neutral
B.	live	earth	neutral
C.	live	neutral	earth
D.	neutral	earth	live



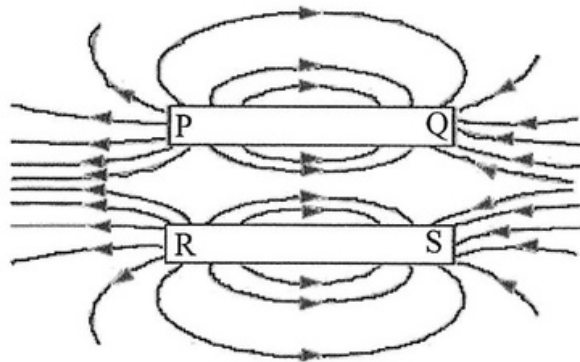
41. Which symbol shows a light emitting diode?



42. In an electrical circuit, what is the purpose of a fuse?

- A. to connect the metal case of an appliance to the earth
- B. to keep an electrical appliance dry in damp conditions
- C. to maintain a steady voltage as the current varies
- D. to turn off the electrical supply if the current is too large

43. The diagram below shows the magnetic field lines around two bar magnets close to each other.

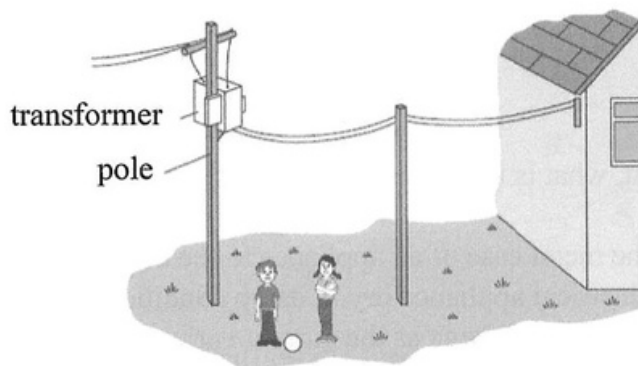


What is the name of the poles labelled **P**, **Q**, **R** and **S**?

	P	Q	R	S
A.	North	North	South	South
B.	North	South	North	South
C.	South	North	South	North
D.	South	South	South	South

44. The diagram shows a standard transformer used in electrical distribution. The input voltage is 960V.

What is the output voltage given that the ratio of turns on the primary and secondary coils is 4:1?



- A. 96 V
 B. 120 V
 C. 240 V
 D. 1920 V
45. Which particle has a negative charge?
- A. alpha particle
 B. electron
 C. neutron
 D. proton
46. Uranium-238 decays to thorium by alpha decay as shown in the equation below.

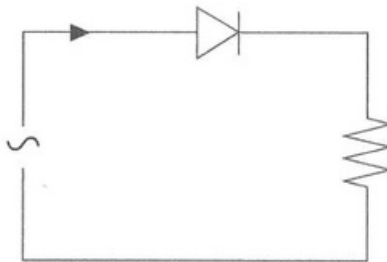


What is the mass number and atomic number of thorium in the equation?

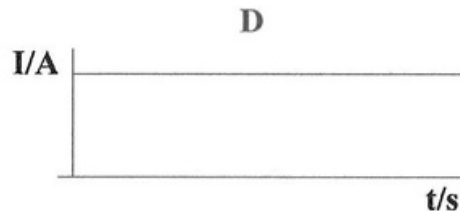
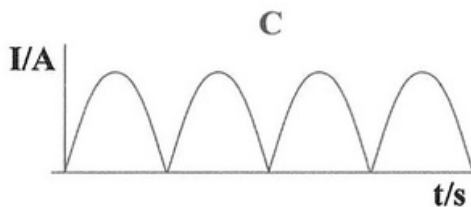
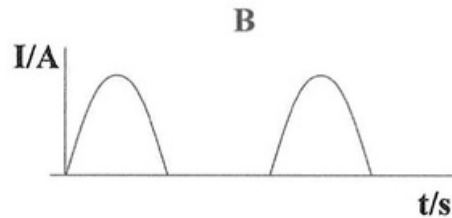
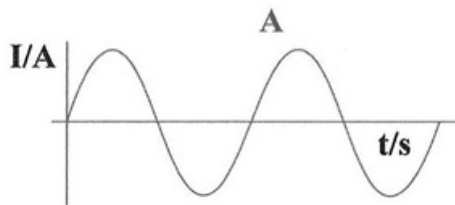
	Mass number of Thorium	Atomic number of Thorium
A.	234	90
B.	234	92
C.	240	88
D.	240	90



47. Which of the following is not a use of radioactive isotopes?
- A. as tracers in medical examinations
 - B. dating dinosaur remains
 - C. generating hydroelectric power
 - D. radiotherapy
48. Which properties of a radioactive tracer, are most suitable for use in the human body?
- A. alpha emitter, long half-life
 - B. alpha emitter, short half-life
 - C. beta emitter, long half-life
 - D. beta emitter, short half-life
49. The diagram shows one use of a semiconductor diode.



Which graph correctly represents the output current?



50. Which group shows only good electrical conductors?
- A. air, carbon (graphite), plastic
 - B. air, gold, mercury
 - C. carbon (graphite), copper, mercury
 - D. copper, gold, plastic



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