

COPERNICUS OLYMPIAD

Physics and Astronomy – Category 2 Sample Questions

Q: Heat loss occurs during flow of current in a conducting wire because

- (a) Speed of charge is slow in it
- (b) It is a bad conductor of heat
- (c) It offers some resistance
- (d) It generates very small voltage.

Q: If density of a metal is 8.2 g/cc, its relative density is:

- (a) 8.2
- (b) 1/8.2
- (c) 0.82
- (d) None of these

Q: According to one of the Kepler's laws of planetary motion:

- (a) $r^2 \propto T^3$
- (b) $r \propto T^2$
- (c) $r^3 \propto T^2$
- (d) $r^3 \propto 1/T^2$

Q: A potential difference of 10V is needed to make a current of 0.02A flow through a wire. What potential difference is needed to make a current of 250mA flow through the same wire?

- (a) 125 V
- (b) 250 V
- (c) 500 V
- (d) 225 V

Q: A wave is moving in air with a velocity of 340 m/s. Calculate the wavelength if its frequency is 512 vibrations/sec.

- (a) 0.69 m
- (b) 66 m
- (c) 66 cm
- (d) 0.66 m

Q: How do we know that fission isn't responsible for the Sun's energy?

- (a) Fission doesn't produce enough energy per gram of fuel.
- (b) If fission were going on in the Sun, the Sun would explode.
- (c) If fission were going on in the Sun, the Sun's mass would increase.
- (d) There isn't very much fissionable material in the Sun.

Q: A newly planted sapling usually grows and mature into a tree in more than:

- (a) 50 years

- (b) 25 years
- (c) 45 years
- (d) 15 years


Q: The speed of light in substance X is $1.25 \times 10^8 \text{m/s}$ and that in air is $3 \times 10^8 \text{m/s}$. The refractive index of this substance will be:

- a) 2.4
- b) 0.4
- c) 4.2
- d) 3.75

Q: Three charges $4q$, Q and q are placed in a straight line of length l at points distant 0 , $1/2$ and l respectively. What should be Q in order to make the net force on q equal to zero?

- (a) $-4q$
- (b) $-2q$
- (c) $-q/2$
- (d) $-q$

Q: In the given figure, distance $[d]$ between conductors carrying currents I_1 and I_2 is varied. Which of the following graphs correctly represents the variation of force (F) between the conductors and distance $[d]$?

- 
- (a)
 - (b)
 - (c)
 - (d) None of these

Q: Food chains generally do not exceed above 3, 4 trophic levels because _____.

- (a) There are limited number of organisms in an ecosystem
- (b) Larger food chains increase complications of food web

- (c) A producer cannot be eaten by more than two herbivores
- (d) Transfer of energy from one trophic level to other is associated with energy loss

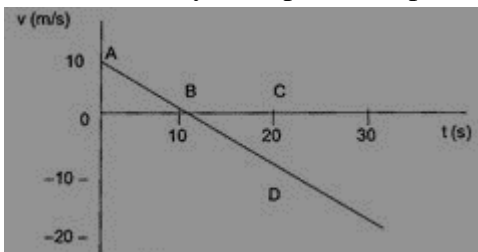
Q: Use of high temperature for waste disposal is called _____.

- (a) Composting
- (b) Land filling
- (c) Recycling
- (d) Incineration

Q: One atomic mass unit is equal to:

- (a) $1.492 \times 10^{-10} \text{J}$
- (b) $1.492 \times 10^{-8} \text{J}$
- (c) $1.7 \times 10^{-10} \text{J}$
- (d) $1.7 \times 10^{-8} \text{J}$

Q: The velocity-time plot for a particle moving on a straight line is shown in figure.



- a. The particle has a constant acceleration
- b. The particle has never turned around.
- c. The particle has zero displacement.
- d. The average speed in the interval 0 to 10s is the same as the average speed in the interval 10s to 20s.

Which of the above statements are correct?

- (a) only c is correct
- (b) only b is correct
- (c) both a & d are correct
- (d) none of these

Q: The fuel having a calorific value of 55 KJ/g is likely to be:

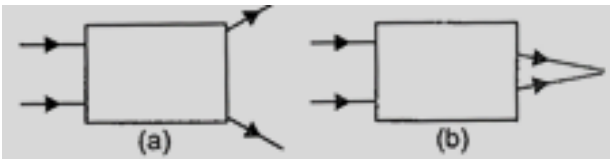
- (a) Biogas
- (b) Methane gas
- (c) Hydrogen gas
- (d) Charcoal

Q: The mass of the Earth is 80 times the mass of a planet and diameter is twice that of the planet.

Then the acceleration due to gravity on the planet's surface is

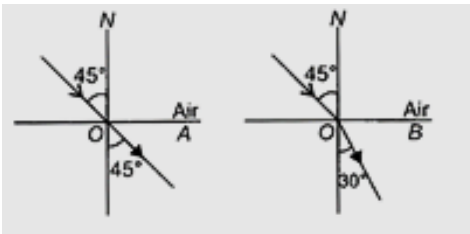
- (a) 0.49m/s^2
- (b) 9.8m/s^2
- (c) 1.6m/s^2
- (d) 0.8m/s^2

Q: In the following figures, optical instruments are placed inside boxes (a) and (b). Which of the following options is correct for these?



- (a) In (a), the incident rays are diverged after refractions, so lens is concave.
- (b) In (b), the incident rays are converged after refraction so mirror is convex.
- (c) In (a), the incident rays are diverged after refraction so mirror is convex.
- (d) In (b), the incident rays are converged after refraction so lens is concave.

Q: Direction: Read the passage carefully and answer the following question. The path of a light ray from air to two different media A and B for a given angle of incidence is as shown.



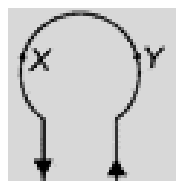
If n_A and n_B are the refractive indices of two media, then

- (a) $n_A = n_B$
- (b) $n_A > n_B$
- (c) $n_A < n_B$
- (d) Cannot be said.

Q: Which of the following types of soil is very fertile and enriched with organic material?

- (a) Chalky
- (b) Loamy
- (c) Silty
- (d) Clayey

Q: Current is passed through the circular loop as shown in figure. What is the direction of magnetic field at X and Y?



- (a) Clockwise at both X and Y
- (b) Anticlockwise at both X and Y
- (c) Clockwise at X and anticlockwise at Y
- (d) Anticlockwise at X and clockwise at Y

Q: The vertical movement of air is:

- (a) Wind current
- (b) Wind
- (c) Air cycle
- (d) Smog

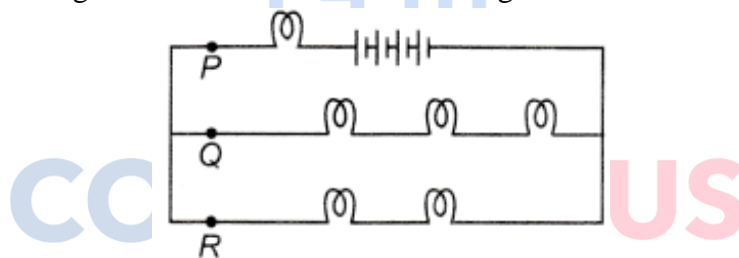
Q: A tank of size $1\text{m} \times 2\text{m} \times 2\text{m}$ is to be filled with water lifting from a well of average depth 5m. Find the work done.

- (a) 0.96×10^5 J.
- (b) 1.96×10^5 J.
- (c) 0.96×10^8 J.
- (d) 1.96×10^8 J.

Q: Which of the following substances is not an example of ODS?

- (a) Chlorofluorocarbon
- (b) Methane
- (c) Nitrous oxides
- (d) None of these

Q: Which of the following statements about the current in given circuit is correct?



- (a) Current at Q is greater than the current at R.
- (b) Current at R is greater than the current at P.
- (c) P has maximum current.
- (d) R has maximum current.

Q: A long-jumper runs before jumping to

- (a) Cover greater distance
- (b) Maintain momentum conservation
- (c) Gain energy by running
- (d) Gain momentum

Q: Weight of a body would not be zero

- (a) At the centre of the earth
- (b) During a free fall
- (c) In interplanetary space
- (d) On a frictionless surface

Q: The frequency of a source is 20 kHz. The frequencies of the sound waves produced by it in water and air will

- (a) Be the same as that of the source
- (b) Depend upon the velocity of the waves in these media
- (c) Depend upon the wavelength of the waves in these media
- (d) Depend upon the density of the media.

Q: Magnetic field lines inside a long current carrying solenoid are:

- (a) Straight
- (b) Circular
- (c) Parabolic
- (d) Elliptical

Q: A body of mass 5 kg is travelling with a uniform velocity of 2 m/s. Its momentum is

- (a) 10 kg m/s
- (b) 7 kg m/s
- (c) 2.5 kg m/s
- (d) 3 kg m/s

Q: Two bodies of masses 4 kg and 5 kg are acted upon by the same force. If the acceleration of lighter body is 2 m/s^2 , the acceleration of heavier body is

- (a) 1 m/s^2
- (b) 1.2 m/s^2
- (c) 1.6 m/s^2
- (d) 1.8 m/s^2

Q: If speed of a car becomes 2 times, its kinetic energy becomes

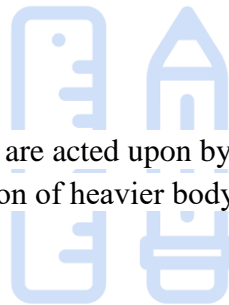
- (a) 4 times
- (b) 8 times
- (c) 16 times
- (d) 12 times

Q: A block weighing 18 N is lifted 7 m vertically upward. The potential energy stored in it is

- (a) 126 J
- (b) 120 J
- (c) 130 J
- (d) 124 J

Q: A container has 2.4 liters of water at 20°C . The heat required to boil the water is

- (a) 1500 kJ
- (b) 1258 kJ
- (c) 1344 kJ
- (d) 698 kJ



COPERNICUS

A TRADITION OF EXCELLENCE

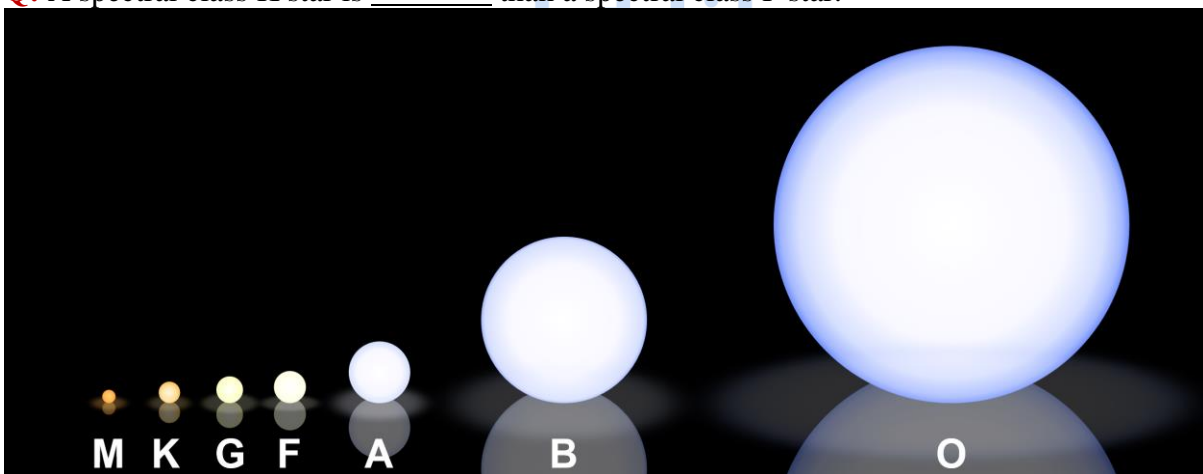
Q: Collisions between galaxies are likely _____ and result in _____.



- a. common; new star formation
- b. uncommon; new star formation
- c. common; frequent star collisions
- d. uncommon; frequent star collisions



Q: A spectral class K star is _____ than a spectral class F star.

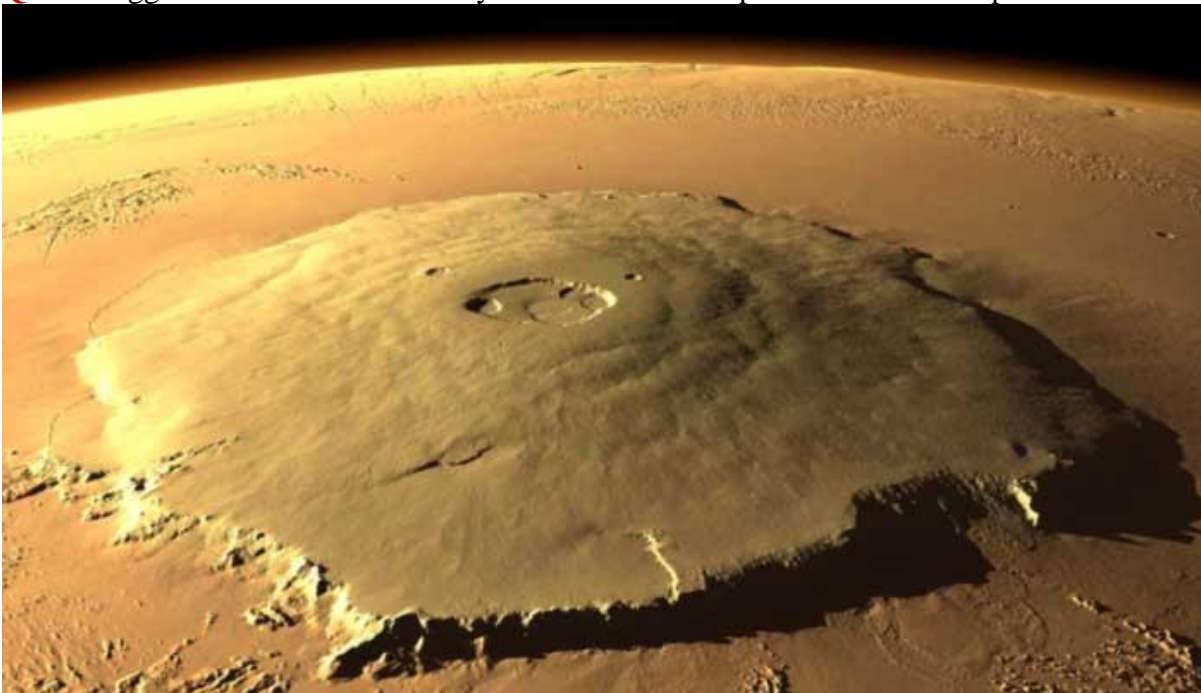


- a. hotter
- b. cooler
- c. brighter
- d. dimmer

Q: Who first proposed that the galaxy was expanding?

- A. Einstein
- B. Kepler
- C. Hubble
- D. Stephen Hawking

Q: The biggest volcano in the solar system shown in this picture is on which planet?



- a. Io
- b. Jupiter
- c. Venus
- d. Mars



Q: Approximately how old is the Sun?

- a. 450,000 years
- b. 4.5 million years
- c. 4.5 billion years
- d. 4.5 trillion years

COPERNICUS

A TRADITION OF EXCELLENCE

Q: Which planet is 1.00 au from the Sun?

- a. Mercury
- b. Earth
- c. Neptune
- d. Mars

Q: Name this constellation.



- (a) Cepheus
- (b) Draco
- (c) Ursa Major
- (d) Lynx

