A TRADITION OF EXCELLENCE

2nd Copernicus Olympiad

Physics and Astronomy Discipline, Category II,

Global Round Exam.

Name and Surname:

Country:

Date:

Grade:

Rules and Regulations:

- This exam has 25 multiple choice and classical type questions. Each question weighs 4 points. Maximum point student can get is 100. Four (4) incorrect answers will eliminate one correct answer.
- Time allocated for this exam is 90 minutes. You will start when proctor tells you to start and will stop when proctor tells you that time is over.
- Students are not allowed to use any kind of electronic device.
- This exam contains 8 pages. Before starting the exam please check and let your proctor know if any page is missing.
- Students can use both pen and pencil, but we recommend to use pencil, so it will be easier to clean when you make mistake.
- Each question has to have only one answer. Questions with more than one answer will be counted as incorrect.
- Students cannot consult the proctor as to the meaning of any question.
- Students must not give or receive assistance of any kind during the exam. Any cheating, any attempt to cheat, assisting others to cheat, or participating therein, or engaging in such improper conduct is a serious violation and will generally result in disqualifying.
- Students must sign each page of their exam paper. Candidates who fail to do so will have their exams disqualified.

End of rules and regulations. **Good luck!**

Q1: The table given below shows the resistivity of three Materials X, Y and Z.

Samples	X	Y	Z
Resistivity	3×10^{-9}	11.1×0^{-6}	$18X10^{-17}$

Arrange the samples in increasing order of conductivity.

A. Y< X< Z
B. Y<Z<X
C. X<Y<Z
D. X<Z<Y

Q2: When brakes are applied to a moving vehicle, the distance it travels before stopping is called stopping distance. It is an important factor for road safety and depends on the initial velocity (V_0) and the braking capacity, or deceleration, that is caused by the braking. A car travelling at speed 72km/h suddenly applies the brake with the deceleration of $5m/s^2$. Find the stopping distance of the car?

A. 20m
B. 25m
C. 50m
D. 40 m

Q3: Arrange the following stages of the life cycle of a star of one solar mass in chronological order - Red-giant branch, Planetary nebula, White dwarf, Main sequence star, Helium Flash.

A. Main sequence star, Red-giant branch, Helium Flash, Planetary nebula, White dwarf
B. Main sequence star, Helium Flash, Red-giant branch, Planetary nebula, White dwarf
C. Main sequence star, Red-giant branch, Helium Flash, White dwarf, Planetary nebula
D. Main sequence star, Helium Flash, Red-giant branch, White dwarf, Planetary nebula

Q4: In a free fall the velocity of a stone is increasing equally on equal intervals of time under the effect of gravitational force of the Earth. Then what can you say about the motion of this stone?

A. Uniform acceleration
B. Non-uniform acceleration
C. Retardation
D. Constant speed

Q5: Which of the followings is Sagittarius Constellation?

(a) 

(b) 

(c) 

(d) 

Q6: If an object moves 3.14 km in a circular path of radius 1000m, then the value of displacement is___

A. 4 km
B. 8 km
C. 2 km
D. 0 km

Q7: Pressure of a point in a liquid at a given depth is _____ to its density.

A. Equal
B. Directly proportional
C. Indirectly proportional
D. None of these

Q8: Mark the statement as True or False.

(i) A piece of wood if left underwater comes to the surface of the water because the upthrust on the body due to its submerged part is equal to its own weight.

(ii)A body shall weigh less in a vacuum.

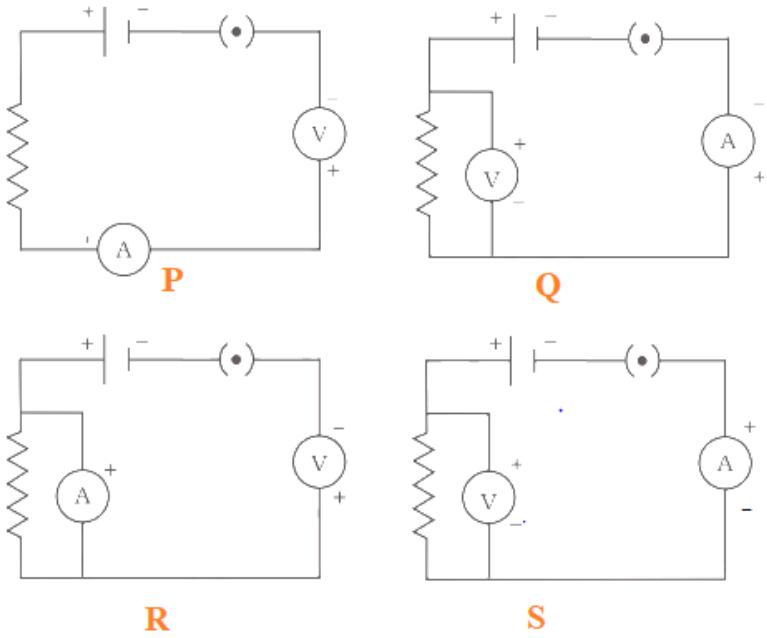
A. (i) True (ii) False

B. (i) False (ii) True

C. (i) True (ii) True

D. (i) False (ii) False

Q9: Which one of the below circuits is properly connected with the electrical components?



A. P

B. Q

C. R

D. S

Q10: Alex leaves his house at 8.30 AM for his school. The school is 2 km away and classes start at 9.00 AM. If he walks at a speed of 3 km/h for the first kilometre, at what speed should he walk the second kilometre to reach just in time?

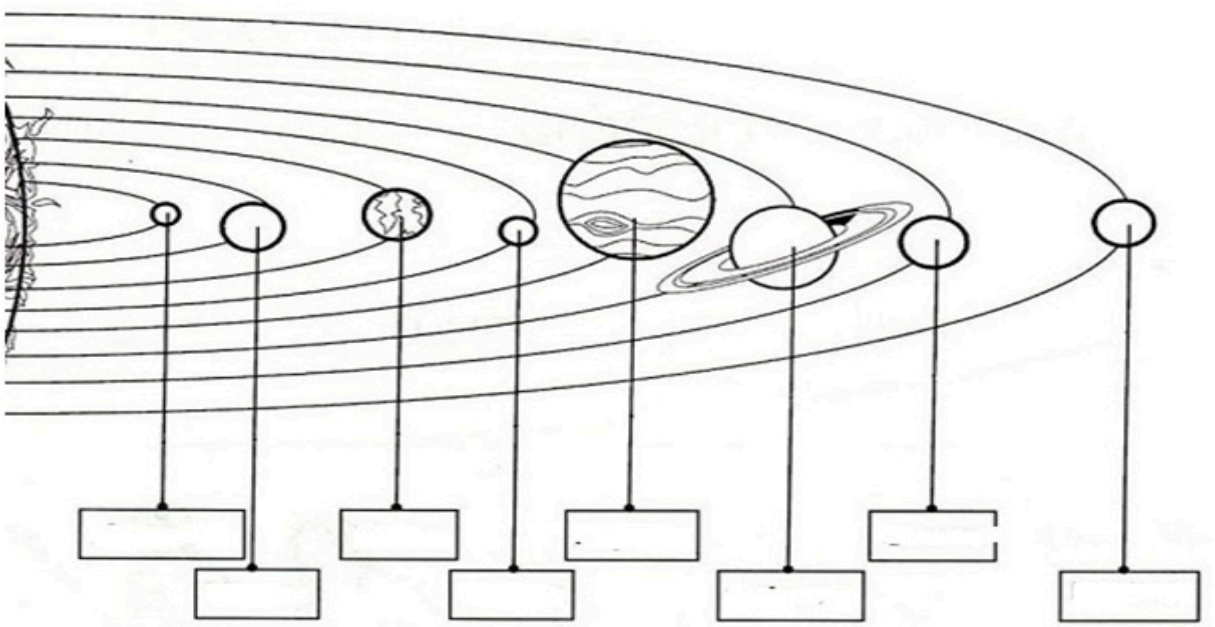
A. 3 km/h

B. 4 km/h

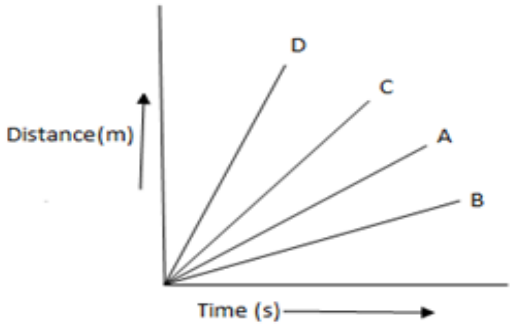
C. 6 km/h

D. 18 km/h

Q11: Label the planets in the solar system.



Q12: Four cars A, B, C and D are moving on a levelled, straight road. Their distance time graphs are shown in the figure below. Which of the followings is the correct statement regarding the motion of these cars?



A. Car A is faster than car D
B. Car B is the slowest
C. Car C is faster than car D
D. Car C is the slowest

Q13: The gravitational force between two bodies is decreased by 36% when the distance between them is increased by 3m. The initial distance between them is

A. 6 m
B. 9 m
C. 12 m
D. 15 m

Q14: What kind of energy is present in a rotating wheel?

A. Kinetic energy
B. Electrical energy
C. Potential energy
D. Wind energy

Q15: Hydroelectric power plants are located in the

A. desert area
B. plane area
C. hilly terrains
D. none-of above

Q16: What is the minimum resistance which can be made using five resistors each of 1/2 Ohm?

A. 1/10 ohm
B. 1/25 ohm
C. 10 ohm
D. 2 ohm

Q17: Four optical media A, B, C and D have optical densities 1.35, 1.21, 1.58 and 1.002 respectively. In which optical medium will the light travel fastest?

A. A
B. B
C. C
D. D

Q18: What are the two gases that mainly compose the Sun?

1. helium
2. hydrogen
3. methane
4. oxygen

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

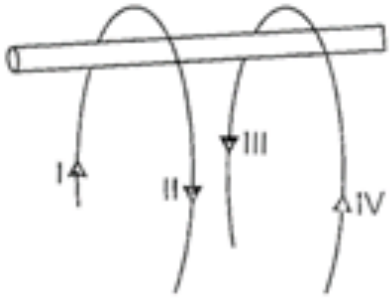
Q19: Which phrase describes a nebula?

A. a galaxy
B. a kind of star
C. a cloud of gas and dust
D. a system of planets and stars

Q20: A 5 cm tall object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 30 cm. Find the position of the image.

A. 60 cm
B. -60 cm
C. 90 cm
D. -90 cm

Q21: Two current - conducting wires are hung on a plastic rod. A large current is passed through two wires in the direction shown. Which of the following options is correct regarding this?



(i) I and III parts of wire repel each other.
(ii) II and IV parts of wire repel each other.
(iii) I and IV parts of wire repel each other.
(iv) II and III parts of wire repel each other.

A. Only (i) and (ii)
B. Only (i) and (iii)
C. Only (iii) and (iv)
D. Only (i) and (iv)

Q22: 1 Kilo calorie= _____ Joule

A. 42 joule
B. 4184 joule
C. 4000 joule
D. 40 joule

Q23: A battery of 10 volt carries 20,000 C of charge through a resistance of 20 Ω. The work done in 10 seconds is

A. $2 \times 10_3$ joule
B. 2×10^5joule
C. 2×10^4 joule
D. 2×10^2 joule

Q24: On which of the following planets of the Solar System does the Sun rise in the West and set in the East?

A. Saturn
B. Mars
C. Jupiter
D. Venus

Q25: A car starts from rest and acquires a velocity of 54 km/h in 2 sec. Find

(i) the acceleration

Answer: _____

(ii) distance travelled by car (assume motion of car is uniform)

Answer: _____

(iii) If the mass of the car is 1000 Kg, What is the force acting on it?

Answer: _____

(iv) Convert this force in kilogram force.

Answer: _____

(v) The seat belts are provided in the cars so that if the car stops suddenly due to an emergency braking, the persons sitting on the front seats are not thrown forward violently and saved from getting injured. Please write down the law due to which a person falls in forward direction on the sudden stopping of the car.

Answer: _____