Maximum Marks: 40   Time Allowed: 1:30 hours.
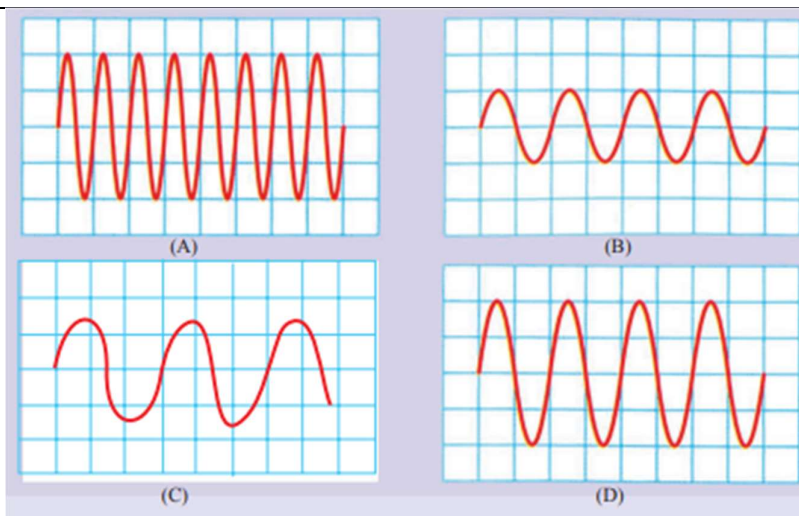
All questions are compulsory

Q1.)	A particle is moving in a circular path of radius r. The displacement after half a circle would be : (a) 0 (b) πr (c) 2r (d) $2\pi r$	**(1)**
Q2.)	The numerical ratio of displacement to distance for a moving object is : (a) always less than 1 (b) equal to 1 or more than 1 (c) always more than 1 (d) equal to 1 or less than 1	**(1)**
Q3.)	A boy is sitting on a merry-go-round which is moving with a constant speed of 10 m/ s. This means that the boy is : (a) at rest (b) moving with no acceleration (c) in accelerated motion (d) moving with uniform velocity	**(1)**
Q4.)	In which of the following cases of motion, the distance moved and the magnitude of displacement are equal ? (a) if the car is moving on straight road (b) if the car is moving on circular road (c) if the pendulum is moving to and fro (d) if a planet is moving around the sun	**(1)**
Q5.)	The speed of a moving object is determined to be 0.06 m/s. This speed is equal to : (a) 2.16 km/h (b) 1.08 km/h (c) 0.216 km/h (b) 0.0216 km/h	**(1)**
Q6.)	The inertia of an object tends to cause an object : (a) to increase its speed (b) to decrease its speed (c) to resist a change in its state of motion (d) to decelerate due to friction	**(1)**
Q7.)	When we talk of a force acting on a body, it usually means : (a) electrical force (b) balanced force (c) unbalanced force (d) nuclear force	**(1)**
Q8.)	A passenger in a moving train tosses a coin which falls behind him. This shows that the motion of train is : (a) accelerated (b) uniform (c) retarded (d) along circular track	**(1)**
Q9.)	'When a hanging carpet is beaten with a stick, the dust particles start coming out of it'. This phenomenon can be best explained by making use of :	**(1)**

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	(a) Newton's third law of motion (b) Newton's law of gravitation (c) Newton's first law of motion (d) Newton's second law of motion	
Q10.)	The value of quantity G in the formula for gravitational force : (a) depends on mass of the earth only (b) depends on the radius of earth only (c) depends on both mass and radius of earth (d) depends neither on mass nor on radius of earth	**(1)**
Q11.)	Two particles are placed at some distance from each other. If, keeping the distance between them unchanged, the mass of each of the two particles is doubled, the value of gravitational force between them will become : (a) 1/4 times (b) 1/2 times (c) 4 times (d) 2 times	**(1)**
Q12.)	The work done on an object does not depend on the : (a) displacement (b) angle between force and displacement (c) force applied (d) initial velocity of the object	**(1)**
Q13.)	Water stored in a dam possesses : (a) no energy (b) electrical energy (c) kinetic energy (d) potential energy	**(1)**
Q14.)	The momentum of a bullet of mass 20 g fired from a gun is 10 kg.m/s. The kinetic energy of this bullet in kJ will be : (a) 5 (b) 1.5 (c) 2.5 (d) 25	**(1)**
Q15.)	Each of the following statement describes a force acting. Which force is causing work to be done ? (a) the weight of a book at rest on a table (b) the pull of a moving railway engine on its coaches (c) the tension in an elastic band wrapped around a parcel (d) the push of a person's feet when standing on the floor	**(1)**
	Questions 16 to 18 are Assertion- Reasoning based questions **Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.** a) Both A and R are true and R is the correct explanation of A b) Both A and R are true and R is NOT the correct explanation of A c) A is true but R is false d) A is false and R is also false.	

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Q16.)	**Assertion** : Two persons on the surface of moon cannot talk to each other. **Reason :** There is no atmosphere on moon.	1
Q17.)	**Assertion :** Echo is produced when sound is incident on hard and polished surface. **Reason :** Sound energy can be totally reflected by objects with soft and loose texture.	1
Q18.)	**Assertion :** Compression and rarefaction involve changes in density and pressure. **Reason :** When particles are compressed, density of medium increases and when they are rarefied, density of medium decreases.	1
Q19.)	An electric bulb consumes 7.2 kJ of electrical energy in 2 minutes. What is the power of the electric bulb ?	2
Q20.)	A source is producing 1500 sound waves in 3 seconds. If the distance covered by a compression and an adjacent rarefaction be 68 cm, find : (a) frequency, (b) wavelength, and (c) velocity, of the sound wave.	2
Q21.)	A sonar device attached to a ship sends ultrasonic waves in the sea. These waves are reflected from the bottom of the sea. If the ultrasonic waves take 4 seconds to travel from the ship to the bottom of the sea and back to the ship (in the form of an echo), what is the depth of the sea ? (Speed of sound in water = 1500 m/s).	2
Q22.)	Consider the following sound waves marked A, B, C and D : (a) Which two waves represent sounds of the same loudness but different pitch? (b) Which two waves represent sounds of the same frequency but different loudness ? (c) State whether all these sound waves have been produced by the same vibrating body or different vibrating bodies ? (d) Which vibrating body/bodies could have generated the sound waves shown here ?	4

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(A) (B) (C) (D)

| Q23.) | There are two towns Ramgarh and Arjangarh which are separated by a hill. The people of one town have to travel on a zig-zag road which goes over the hill so as to reach the other town. Gaurav is a student of class IX in Ramgarh. Once Gaurav went from Ramgarh to Arjangarh on a scooter with his father. Driving at a constant speed of 50 km/h on the hilly road, it took exactly 30 minutes to reach Arjangarh. One day Gaurav told his father that if a straight tunnel could be dug through the hill, then it would become very easy for the people of two towns to visit each other. Keeping this in mind, Gaurav invited the people of both the towns and took a delegation to the Collector's office. This delegation demanded the construction of a straight tunnel road through the hill. Gaurav explained the various advantages of connecting Ramgarh and Arjangarh through a tunnel road in the hill. The Collector liked the idea and a straight tunnel road was constructed after some time. One day Gaurav went from Ramgarh to Arjangarh through the straight tunnel road on the scooter with his father. Driving at a constant speed of 50 km/h, it took them just 12 minutes to reach Arjangarh. Both, Gaurav and his father were very happy.

(ANY 4)

(a) What was the distance covered by Gaurav on going from Ramgarh to Arjangarh by travelling on road over the hill ?
(b) What is the distance covered by Gaurav on going from Ramgarh to Arjangarh by travelling on straight tunnel road ?
(c) How much less distance is to be covered now in going through the tunnel than on going over the hill ? | **(4)** |

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	(d) What is the displacement of Gaurav from Ramgarh on reaching Arjangarh ? (e) State two advantages of construction of the tunnel road for the people of two towns.	
Q24.)	What is the range of frequencies associated with (a) infrasound (b) audible sound, and (c) ultrasound ?	**2**
Q25.)	Radha is a student of class IX in a school in Ambala city in Haryana. Radha's father, Mr. Vijay Kumar, is the Deputy Commissioner of Police in Ambala zone. Radha's family including her father, mother and five year old brother Pulkit, were invited for the celebrations of Air Force Day at the Ambala Air Force Base. During these celebrations, the final item was a fly-past by the fighter jet planes of Indian Air Force. Suddenly there was a loud, explosive noise in the sky over the celebration venue. All the eyes turned up towards the sky. Everybody saw the Indian Air Force's fighter jet planes flying at tremendous speed in a special formation. All the people started clapping for this beautiful and daring fly-past by Indian Air Force pilots. The thunderous sound produced by the speeding fighter planes was so loud that all the birds sitting on the nearby trees flew away. Radha's brother Pulkit was already undergoing treatment for some ear ailment. So, Pulkit got too much pain in his ears due to this intolerable explosive sound. Pulkit was carrying two sharpened pencils with him at that time. He tried to put these pencils inside his ears to get relief from severe pain in the ears. Radha snatched the pencils from Pulkit and warned him not to do it again. Radha was carrying some cotton ear buds in her purse. So, she put cotton ear buds into the ears of Pulkit. These ear buds reduced Pulkit's pain so he enjoyed the remaining part of fly-past by fighter planes thoroughly. Everyone was praising Indian Air Force for putting up a great show. Jai Ho ! (a) What term is used for the extremely loud burst of sound produced by extremely fast, low flying fighter jet planes ? (b) What can you say about the speed of fighter jet planes which produce loud bursts of sound (or explosive noise) when they fly ? What special name is given to this speed ? (c) A fighter jet is flying low at a speed of 1100 km/h. State whether it will	**6**

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produce extremely loud burst of sound or not. Give reason for your answer.

(d) Why did Radha prevent Pulkit from putting sharpened pencils into his ears ?

(e) Why did Radha put cotton ear buds into Pulkit's ears ?

(f) Name one object which travels at a speed greater than that of a fighter jet plane producing loud burst of sound.

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