

Entrance prep tutorial private class

Physics model exam

Full Name :

School and city:

Phone number :

User name:

1. Two vectors, A and B, are such that $|A + B| = |A - B|$. Which of the following must be true?

- a) A and B are parallel.
- b) A and B are anti-parallel.
- c) A and B are perpendicular.
- d) $|A| = |B|$

2. A car is moving around a circular track at a constant speed. What type of acceleration is it experiencing?

- (A) Tangential acceleration
- (B) Centripetal acceleration
- (C) Zero acceleration
- (D) Linear acceleration

3. In uniform circular motion, which of the following remains constant?

- (A) Velocity
- (B) Speed
- (C) Acceleration
- (D) Direction of motion

4. What is the relationship between centripetal force and the direction of motion in circular motion?

- (A) Parallel
- (B) Tangential
- (C) Opposite
- (D) Perpendicular

5. What causes the apparent outward force in a rotating reference frame (centrifugal force)?

- (A) Gravity
- (B) Inertia
- (C) Friction
- (D) Applied force

6. A car moving on a straight highway with speed of 108km/hr. is brought to stop within a distance of 200m. What is the retardation of the car and how long does it take for the car to stop?

- | | |
|-----------------------------------|---------------------------------|
| A. 2.25m/s ² , 13.3sec | B. 2.25m/s, 2. 1sec |
| C. 2.25sec, 1.5sec | D.2.25m/s ² , 1.4sec |

7. Spectroscopy is used in both physics and chemistry to study:

- (A) Fluid Dynamics
- (B) Interaction of matter and electromagnetic radiation

- (C) Mechanics of motion
- (D) Thermodynamic properties

8. In biology, Newtonian mechanics is used to explain:

- (A) The flow of blood.
- (B) How animals and their body parts move
- (C) The propagation of sound
- (D) Photosynthesis

9. If the dot product of two non-zero vectors is zero, what can you conclude about the angle between them?

- a) The angle is 0 degrees.
- b) The angle is 90 degrees.
- c) The angle is 180 degrees.
- d) The angle can be any value between 0 and 180 degrees.

10. what is the purpose of the scientific method?

- (A) To prove theories correct
- (B) To gather opinions on world events
- (C) To gain knowledge about the world
- (D) To create new technologies

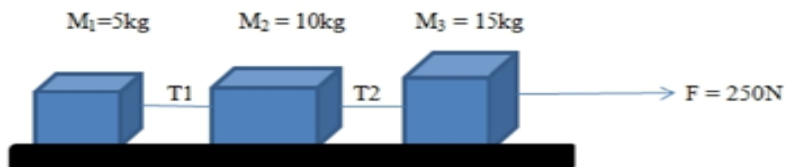
11. Which of the following fields is directly related to physics and the study of the Earth and its atmosphere, according to the source?

- (A) Astrology

- (B) Geophysics and meteorology
- (C) Paleontology
- (D) Botany

12. A mass of 8 kg is accelerating at $5 \text{ m}\cdot\text{s}^{-2}$. What acceleration would be produced if we doubled the force and reduced the mass by half?

- A. $1/4$ as small a_0 .
- B. $1/8$ as small a_0 .
- C. eight times as great a_0
- D. 4 times great a_0



13. Three boxes of fruits on a horizontal surface are connected by a light string as shown in fig. where $m_1 = 5\text{kg}$ and $m_2 = 10\text{kg}$ and $m_3 = 15\text{kg}$. A force of 300N is applied to the 15kg box. What is the tensions T_1 and T_2 in the string for the case where friction is zero?

- A. 50N, 110N.
- B. 50N, 150N.
- C. 5N, 15N.
- D. 500N, 1500N

14. What does quantum cryptography deal with?

- (A) Studying Black holes
- (B) Discovering Exoplanets
- (C) Secure communication

(D) High Energy Physics

15. If a movable pulley is used to lift a 100N weight and due to friction, the actual mechanical advantage is 1.5, what is the effort required to lift the load?

- a) 50N
- b) 66.67N
- c) 150N
- d) 200N

16. What is the purpose of a simple machine?

- A.To multiply either force or distance
- B. To multiply energy, force, and speed
- C. To multiply work speed, and change direction.,
- D. To multiply both force and speed at the same time

17. Pascal's principle is utilized by which type of animals for body motion?

- (A) Animals with skeletons
- (B) Soft-bodied animals
- (C) Flying animals
- (D) Swimming animals

18. A body of mass 2kg moving with a velocity of 3m/s collides head on with a body of mass 1kg moving with a velocity of 4m/s in opposite direction. After collision the two bodies stick together and move with common velocity of :-

- A.1/4 m/s. B.2/3 m/s. C.1/3 m/s. D.3/4 m/s

19. What do astronomers use to study the birth and death of stars?

- (A) Sound waves
- (B) Magnetic fields
- (C) Radiation from space objects
- (D) Gravitational forces

20. What is the inverse square law of apparent brightness used to measure in astronomy?

- (A) Temperature
- (B) Distance
- (C) Velocity
- (D) Mass

21. A force is considered conservative when:

- a) The work done depends on the path taken.
- b) The work done is always positive.
- c) The work done is path-dependent for round trips.
- d) The work done depends only on the initial and final positions

22. A simple machine is able to move a 1200 N load a distance of -400 cm when a force of 600 N is moved through a distance of 10 m what is the efficiency of the machine?

- A. 40%
- B. 60%

C. 80%

D. 90%

23. Shown below are two carts connected by a cord that passes over a small frictionless pulley. Each cart rolls freely with negligible friction. What are the acceleration of the carts and the tension in the cord respectively?

A. 4m/s^2 , 100N .

B. 1.2m/s^2 , 84N

C. 2.4m/s^2 , 42N .

D. 2.4m/s^2 , 84N

24. Which of thermodyna

(A) Civil En_

(B) Electrical engineering

(C) Mechanical Engineering

(D) Chemical engineering



25. During exercise, blood flow to the muscles increases significantly. However, the overall viscosity of blood does not change. Which principle explains why the flow rate also increases?

- A. Bernoulli's principle
- B. Law of conservation of mass
- C. Poiseuille flow
- D. Equation of continuity

26. A cube of wood 10cm on each side has a mass 0.8kg what is the force required to submerging it when it is put in a liquid of density 1.2g/cm³ ?

- A. 2N.
- B. 4N.
- C. 0.4N.
- D. 0.2N

27. The length of metal rod is 5m at 0°C and becomes 5.01m on heating up to 100°C. what is the coefficient of linear expansion of the metal?

- A. 2.33×10^{-5}
- B. 4×10^{-5}
- C. 6×10^{-5}
- D. 2×10^{-5}

28. In a CT scan, how are images of the body created?

- (A) By using magnetic fields.
- (B) By using sound waves.
- (C) By rotating X-ray machines.
- (D) By using chemical reactions

29. Which of the following is NOT a form of potential energy?

- a) Gravitational potential energy
- b) Elastic potential energy

- c) Kinetic energy
- d) Potential energy stored in a compressed spring

30. Vector C has a magnitude of 10 and makes an angle of 30 degrees with the positive x-axis. What is the x-component of vector C?

- a) 5. b) $5\sqrt{3}$. c) 10. d) $10\sqrt{3}$

31. Which engineering discipline applies the principles of mechanics, elasticity, and material properties to design and build structures like bridges and buildings?

- | | |
|---------------------------|---------------------------|
| A. Civil engineering | C. Chemical engineering |
| B. Electrical engineering | D. Mechanical engineering |

32. What does anechoic mean in ultrasound imaging?

- (A) Reflects many sound waves.
- (B) Reflects some sound waves
- (C) Does not send back any sound waves.
- (D) Sends back all sound waves

33. What type of radiation is typically used in radiation therapy for cancer treatment?

- (A) Radio waves
- (B) Microwaves
- (C) X-rays
- (D) Infrared waves

34. Which of these technologies uses heat emissions to identify objects?

- (A) Radar
- (B) Ultrasound

- (C) Infrared detection
- (D) MRI

35. Displacement of a particle is given by the expression $x = 3t^2 - 2t^3$, where x is in meter and t is in seconds. What is the average acceleration in m/s^2 over the interval from $t=0\text{s}$ to $t = 2\text{sec}$?

- A. -6 B. -24 C. -12 D. -18

36. Which of the following communication technologies uses the principle of complete internal reflection of light?

- (A) Wireless communication
- (B) Radio communication
- (C) Fiber optics
- (D) Satellite communication

37. A ball is dropped from the top of a building 100m high. At the same instant another ball is thrown upwards with a velocity of 40 m/s from the bottom of the building. The two balls will meet after

- A. 3 s B. 2 s. C. 2.5 s. D. 5 s

38. The temperature of 50 gm of water has to be risen from 14 to 85 by using steam at 120 . What is the amount of steam, in gms, required for the same? [$C_{\text{water}} = 1/g$, $L_v = 540$ cal/gm, $C_{\text{steam}} = /g$]

- A. 6.29 gm B. 8.34 gm C. 7.22 gm D. 6.19 gm

39. Which principle explains the mechanical advantage of a hydraulic lift?

- (A) Archimedes principle
- (B) Bernoulli's principle

- (C) Pascal's principle
- (D) Hooke's law

40. A 2kg block initially at rest is pulled along a horizontal smooth surface by a constant horizontal force of 12N. What is the speed of the block after it has traveled 3 meters?

- a) 6 m/s b) 3 m/s c) 12 m/s d) 5 m/s

41. The rotational inertia of a disk about its axis is 0.7 kg m^2 . When a 2kg weight is added to its rim, 0.4m from the axis, the rotational inertia becomes:

- A. 0.38 kg m^2 B. 0.54 kg m^2 C. 0.70 kg m^2 D. 1.02 kg m^2

42. Which modulus measures the resistance of solids or liquids to changes in their volume?

- (A) Young's Modulus
- (B) Bulk Modulus
- (C) Shear Modulus
- (D) Tensile Modulus

43. A pulley is a wheel over which a rope or belt is passed. The ideal mechanical advantage of a pulley is directly dependent on what?

- a) The diameter of the wheel
- b) The type of material used in the pulley
- c) The number of support strings
- d) The length of the rope used

44. What are the four assumptions made in an ideal fluid flow?

- (A) Viscous, turbulent, compressible, rotational
- (B) Non-viscous, steady, compressible, irrotational
- (C) Non-viscous, steady, incompressible, irrotational
- (D) Viscous, unsteady, compressible, rotational

45. Which of the following is NOT true about pressure at a depth for a fluid statics?

- A. All points at the same level in a fluid have same pressure.
- B. Fluid pressure increases with increase in the depth of the fluid.
- C. Fluid pressure depends on the height of the liquid column. .
- D. Fluid pressure depends on the shape of the liquid surface.

46. The buoyant force on a block of wood floating in water

- A. Is equal to the weight of a volume of water with the same volume as the wood.
- B. Is equal to the weight of the wood.
- C. Is greater than the weight of the wood.
- D. Cannot be calculated because the block is not completely submerged.

47. A homogeneous disc of mass 2 kg and radius 15 cm is rotating about its axis (which is fixed) with an angular velocity of 4 radian/s. The linear momentum of the disc is:

- A. 1.0 kg m/s
- B. 1.2 kg m/s
- C. 0.6 kg m/s
- D. 1.6kgm/s

48. What type of expansion is observed when liquid are heated in a container?

- (A) Linear Expansion
- (B) Volume expansion

(C) Real and apparent expansion

(D) Areal expansion

49. A person standing on a 60-meter tower throws an object upwards at a speed of 40 m/s and at a 30° angle to the horizontal. Calculate the total time it took the object to reach its maximum height and then fall to the ground (using $g=10\text{m/s}^2$).

- A. 3 sec. B. 10 sec . C. 20 sec. D. 6 sec.

50. If a projectile rises vertically upward, as it is fired from the surface of the earth, what would happen to its kinetic energy (KE), potential energy (PE) and mechanical energy (ME)?

(Assume that air resistance is negligible)

- A. PE increase. KE increases and ME increases
B. PE increase. KE remain constant and ME increase
C. PE increase KE decrease and ME remain constant
D. PE decrease KE increase and ME remain constant

GOOD LUCK!

