

AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

ANNUAL EXAMINATIONS (THEORY) 2025

Physics Paper I

Time: 1 hour 30 minutes Marks: 50

INSTRUCTIONS

1. Read each question carefully.
2. Answer the questions on the separate answer sheet provided. DO NOT write your answers on the question paper.
3. There are 100 answer numbers on the answer sheet. Use answer numbers 1 to 50 only.
4. In each question there are four choices A, B, C, D. Choose ONE. On the answer grid black out the circle for your choice with a pencil as shown below.

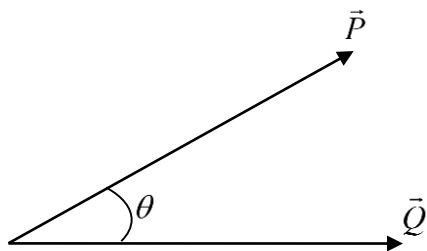
Correct Way		Incorrect Ways	
1		1	
		2	
		3	
		4	

Candidate's Signature

5. If you want to change your answer, ERASE the first answer completely with a rubber, before blacking out a new circle.
6. DO NOT write anything in the answer grid. The computer only records what is in the circles.
7. You may use a scientific calculator if you wish.

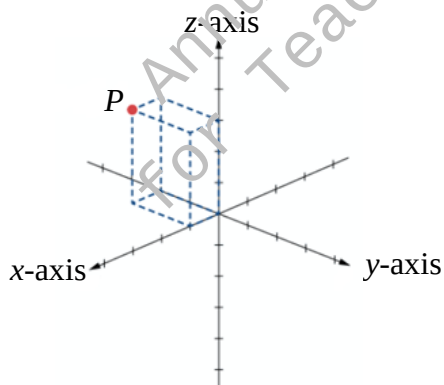
1. Recently physicists have detected the first ray of light from a Big Bang in the universe with the help of a/an
 - A. solar telescope.
 - B. radio telescope.
 - C. optical telescope.
 - D. astronomical telescope.
2. The option that shows three base units in System International (SI) is
 - A. gram, joule and second.
 - B. gram, centimetre and dyne.
 - C. kilogram, metre and second.
 - D. kilogram, newton and second.
3. The decimal equivalent of $\frac{1}{215}$ up to three significant figures is
 - A. 4.65116×10^{-3}
 - B. 4.6511×10^{-3}
 - C. 4.651×10^{-3}
 - D. 4.65×10^{-3}
4. An accurate measurement is the one which has
 - A. less precision.
 - B. more precision.
 - C. less fractional uncertainty.
 - D. more fractional uncertainty.
5. If a vector is multiplied by a negative number, then its direction will
 - A. be reversed.
 - B. remain the same.
 - C. be changed by 45° .
 - D. be changed by 90° .

6. The given diagram shows two vectors $\vec{P}$ and $\vec{Q}$ having an angle θ between them.



How is the scalar product of vectors $\vec{P}$ and $\vec{Q}$ maximised?

- I. By maximising the magnitude of $\vec{P}$
 - II. By maximising the magnitude of $\vec{Q}$
 - III. By maximising the angle θ
- A. I only
 - B. III only
 - C. I and II
 - D. II and III
7. When the line of action of force passes through the pivot then torque will be
- A. zero.
 - B. positive.
 - C. negative.
 - D. equal to one.
8. The coordinates of the point P in the given diagram are

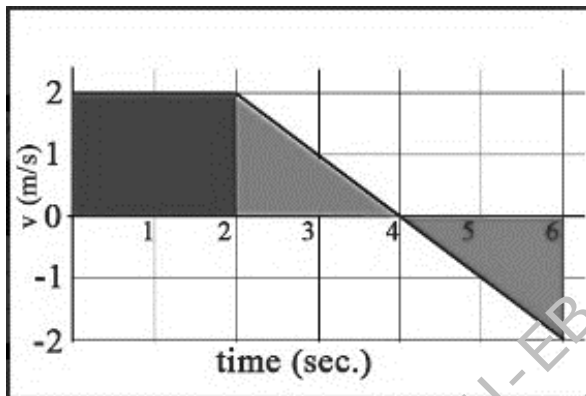


- A. (1, 2, 3)
- B. (1, -2, 3)
- C. (1, 2, -3)
- D. (-1, 2, -3)

9. For an object, the second condition of equilibrium is satisfied only when the
- A. vector sum of all the torques is zero.
 - B. vector sum of all the forces is zero.
 - C. linear acceleration becomes zero.
 - D. linear velocity becomes zero.

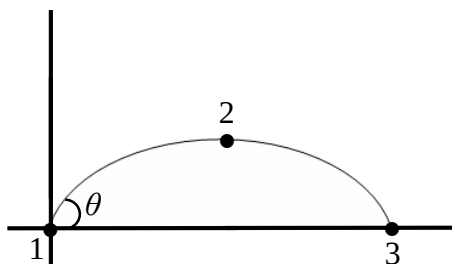
Use the given information to answer Q.10 and Q.11.

The given figure represents a velocity-time graph of a moving car.



10. At what time the car comes to rest?
- A. 2 s
 - B. 4 s
 - C. 6 s
 - D. 8 s
11. The total displacement covered is
- A. 2 m.
 - B. 4 m.
 - C. 6 m.
 - D. 8 m.
12. A bomb released from a jet plane is an example of
- A. linear motion.
 - B. circular motion.
 - C. random motion.
 - D. projectile motion.

13. The given diagram shows the path of a projectile.



- At which of the following points does the projectile have a maximum speed?
- A. 1 only
B. 2 only
C. 1 and 3
D. 2 and 3
14. In a battlefield, to obtain the maximum range by a missile fired by an army tank, the missile must be launched at an angle of
- A. 0°
B. 30°
C. 45°
D. 60°
15. A windmill raises 500 kg of water from a well of depth 50 m in 1 hr. What is the power generated by the windmill?
- (Note: Take the value of acceleration due to gravity 'g' as 10 m/s^2 .)
- A. 69.4 W
B. 100 W
C. 416.6 W
D. 500 W
16. The work done in the Earth's gravitational field by an object is always independent of the
- A. mass of the object.
B. time taken by the object.
C. path followed by the object.
D. power applied by the object.
17. The escape velocity of a body depends on the
- A. value of 'g'.
B. mass of the body.
C. velocity of the body.
D. gravitational constant.

18. Which of the following energy changes takes place when a cyclist pedalling a cycle uses a dynamo to turn on his bicycle lamp?

- A. Kinetic $\longrightarrow$ light $\longrightarrow$ electrical
- B. Electrical $\longrightarrow$ kinetic $\longrightarrow$ light
- C. Kinetic $\longrightarrow$ electrical $\longrightarrow$ light
- D. Electrical $\longrightarrow$ light $\longrightarrow$ kinetic

19. When a ball falls from a height in a non-resistive medium, its

(Note: Here, P.E. = Potential Energy and K.E. = Kinetic Energy)

- A. P.E. loss = K.E. loss
- B. P.E. loss = K.E. gain
- C. P.E. gain = K.E. loss
- D. P.E. gain = K.E. gain

20. One of the sources of non-conventional energy is

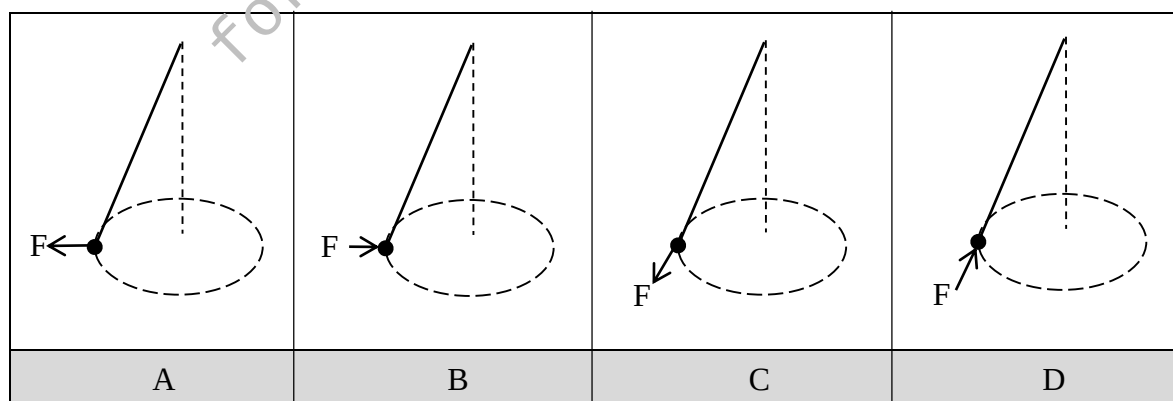
- A. coal.
- B. nuclear.
- C. petroleum.
- D. geothermal.

21. Artificial gravity is produced in an orbiting spaceship to overcome the

- A. mass of the spaceship.
- B. speed of the spaceship.
- C. weight of the spaceship.
- D. weightlessness in the spaceship.

22. A pendulum is set in motion in a horizontal plane.

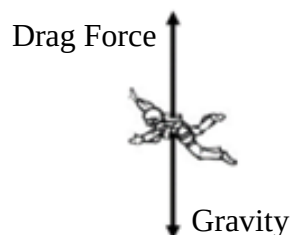
The diagram that BEST represents the direction of the resultant centripetal force is



23. The acceleration produced by virtue of changing direction of velocity of an object moving in a circular path is called
- A. average acceleration.
 - B. tangential acceleration.
 - C. centripetal acceleration.
 - D. instantaneous acceleration.
24. Artificial gravity is provided to a satellite by
- A. the help of external engine.
 - B. moving it in a linear motion.
 - C. circulating it in its own orbit.
 - D. rotating it around its own axis.
25. An artificial satellite revolves around the Earth. If the radius of the satellite is nearly equals to the radius of the Earth that is 6.4×10^6 m, the mass of the Earth is 5.9×10^{24} kg and Gravitational constant is 6.67×10^{-11} Nm²/kg², then the orbital velocity of the Earth will be
- A. 8.5×10^{-15} m/s.
 - B. 8.5×10^{-4} m/s.
 - C. 7.8×10^3 m/s.
 - D. 7.5×10^{20} m/s.
26. Water is flowing through a pipe with a diameter of 0.2 m at a velocity of 2 m/s. If the pipe narrows to a diameter of 0.1 m, then the velocity of the water at the narrow section will be
- A. 4 m/s.
 - B. 8 m/s.
 - C. 16 m/s.
 - D. 32 m/s.
27. Bernoulli's equation is the fundamental equation in fluid dynamics that relates pressure of fluid to its speed and height.
- According to the Bernoulli's equation, where the speed of the fluid is high, the pressure will be
- A. low.
 - B. zero.
 - C. high.
 - D. constant.
28. The fluid that would exert the STRONGEST drag force on a small falling sphere is
- A. water.
 - B. glycerol.
 - C. olive oil.
 - D. castor oil.

29. In the given diagram, when the drag force and the gravitation force become equal, then the skydiver will experience a velocity called

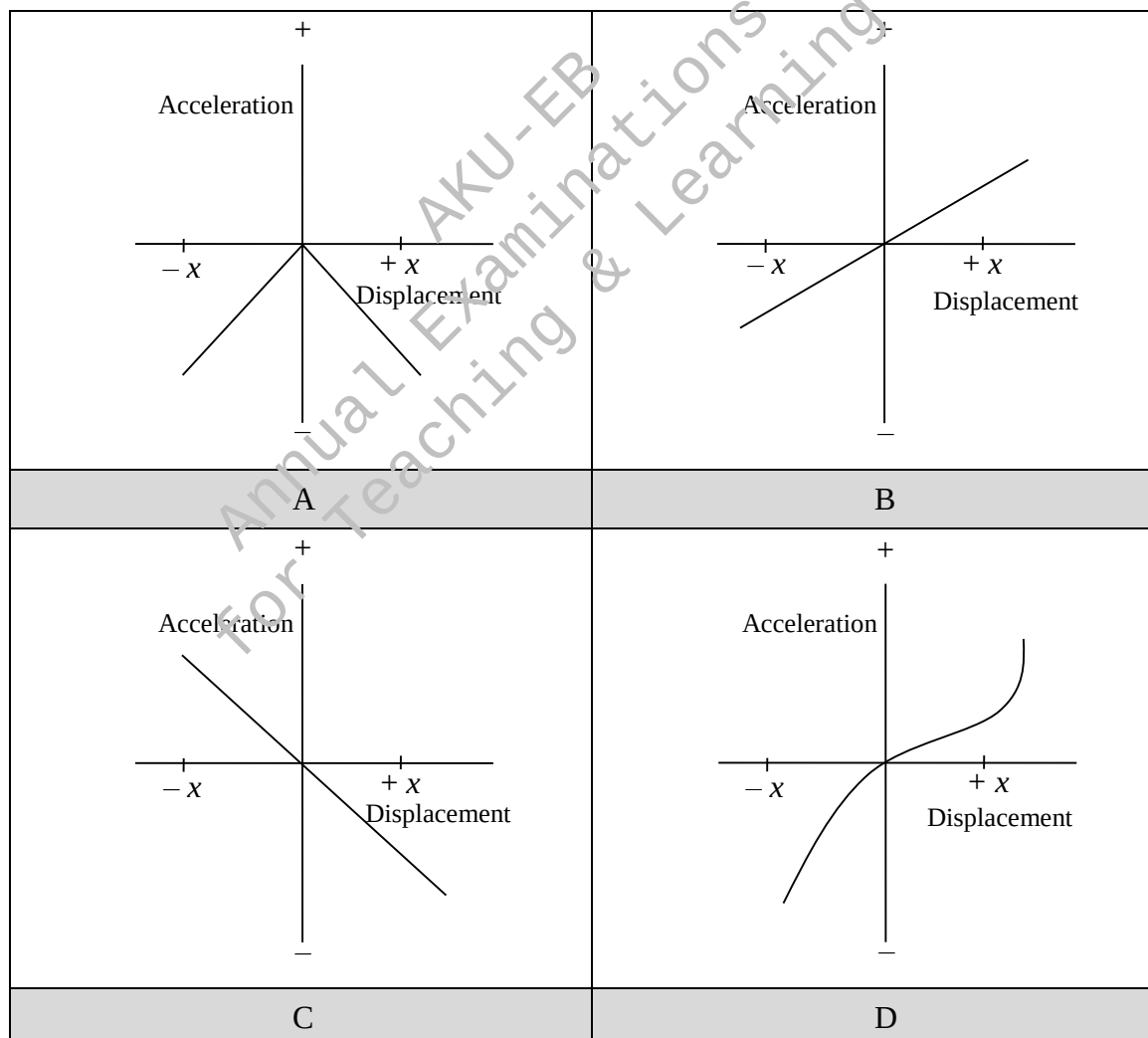
- A. orbital velocity.
- B. escape velocity.
- C. terminal velocity.
- D. instantaneous velocity.



30. If the density of a fluid increases, then the terminal velocity of an object falling through it will

- A. increase.
- B. decrease.
- C. vary unpredictably.
- D. remain the constant.

31. Which of the following graphs shows the relationship between displacement and acceleration for a body executing simple harmonic motion (SHM)?



32. If the amplitude of a simple pendulum is increased by 4 times, then its time period will

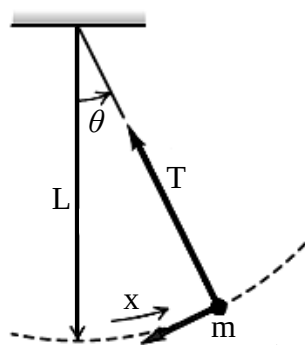
- A. become half.
- B. increase 2 times.
- C. remain the same.
- D. decrease 4 times.

33. What is the length of a simple pendulum if it has the time period of 1 second?

(**Note:** Take the value of acceleration due to gravity 'g' as 10 m/s^2 .)

- A. 0.25 m
- B. 0.50 m
- C. 1.00 m
- D. 2.00 m

34. The given figure shows a simple pendulum executing simple harmonic motion (SHM).



The restoring force in the given simple pendulum is equal to

- A. $-mg\theta$
- B. $-mg$
- C. $mg\theta$
- D. mg

35. The speed of sound is lesser in gases than in liquids because as compared to liquids, gases have

- A. low density.
- B. high pressure.
- C. high elasticity.
- D. low temperature.

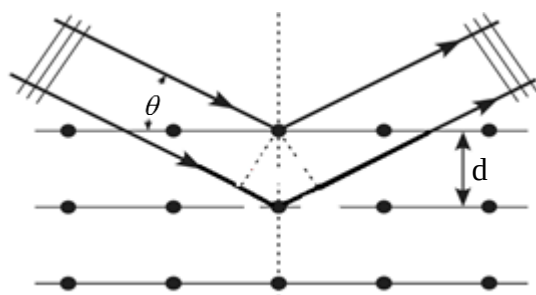
36. All of the following produce sound waves EXCEPT

- A. a cry in air.
- B. a bell ringing under water.
- C. an explosion in outer space.
- D. a gun fired in a room with no echoes.

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37. Beats occur when two waves have
- A. unequal amplitudes and equal frequencies.
 - B. equal amplitudes but highly different frequencies.
 - C. equal amplitudes but slightly different frequencies.
 - D. unequal amplitudes and highly different frequencies.
38. In a stationary wave, the velocity of particles of a medium at the nodes
- A. becomes zero.
 - B. becomes maximum.
 - C. varies unpredictably.
 - D. remains constant but non-zero.
39. When the source of sound moves away from a stationary listener, there is an apparent
- A. increase in the pitch of sound.
 - B. increase in the amplitude of sound.
 - C. decrease in the frequency of sound.
 - D. decrease in the wavelength of sound.
40. The speed of distant stars and galaxies can be calculated using
- A. Doppler's effect.
 - B. Compton's effect.
 - C. Bernoulli's effect.
 - D. Photoelectric effect.
41. All of the following are the conditions necessary for the interference of light EXCEPT that the
- A. slits should be very thin and narrow.
 - B. source of light should be monochromatic.
 - C. amplitude of the light waves should be the same.
 - D. light waves should travel in the opposite direction.
42. The type of light that illuminates air films in the Newton's rings is
- A. dichromatic light.
 - B. monochromatic light.
 - C. light produced by a bulb.
 - D. light produced by the Sun.

43. What is the path difference of two incident rays in the given figure?



X-ray Diffraction

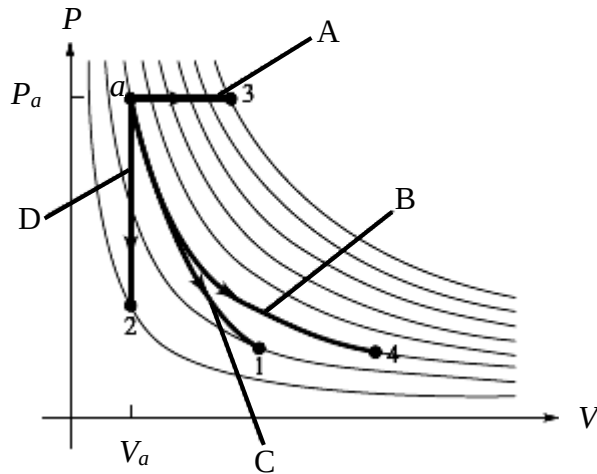
- A. d
 B. $2d$
 C. $d \sin \theta$
 D. $2d \sin \theta$
44. Colours seen from an oil film on water depends on the following factors EXCEPT
- A. density of oil.
 B. angle of view.
 C. index of refraction.
 D. thickness of the film.
45. If the volume of an ideal gas in an insulated container increases from 10 m^3 to 20 m^3 under a constant pressure of $2 \times 10^5 \text{ Pa}$, then the work done by the gas will be
- A. $1 \times 10^4 \text{ J}$.
 B. $2 \times 10^4 \text{ J}$.
 C. $2 \times 10^6 \text{ J}$.
 D. $6 \times 10^6 \text{ J}$.
46. The first law of thermodynamics gives the relationship between heat
- A. and workdone only.
 B. and internal energy of a system.
 C. workdone and properties of a system.
 D. workdone and internal energy of a system.
47. Which of the following options is CORRECT according to the different processes of thermodynamics?

	Thermodynamics	Equation
A	Isothermal process	$q = + W$
B	Isochoric process	$\Delta U = - q$
C	Adiabatic process	$\Delta U = + W$
D	Isobaric process	$q = - W$

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48. In the given figure, four different processes for a constant amount of an ideal gas, all starting at state a , are shown.

In which of the given processes, the system does ZERO work on its surrounding?



49. The efficiency (E) of a Carnot engine is always
- $E < 0\%$.
 - $E = 0\%$.
 - $E < 100\%$.
 - $E = 100\%$.
50. An increase in the thermal pollution of the environment means an increase in
- entropy.
 - soil erosion.
 - adiabatic expansion.
 - isothermal compression.

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