ICSE 2027 EXAMINATION

QUESTION BANK

PHYSICS

(SCIENCE PAPER – 1)

Chapter-wise compilation with years of appearance

Chapters covered

1. Force, Work, Power and Energy

Papers included

ICSE 2023 Board & Specimen • ICSE 2024 Board & Specimen • ICSE 2025 Board & Specimen • ICSE 2026 Board & Specimen • ICSE 2027 Specimen

How to use this bank

- Questions that appear word-for-word in more than one paper are merged into one question, and the years in which it appeared are written under it in blue: [2026] = Board paper, [2026S] = Specimen paper (e.g. [2023] [2025S] [2026]).
- The chapter is divided into three categories: A. Multiple Choice Questions (1 mark each), B. Short Questions (1 or 2 marks), C. Long Questions (3 marks and above). Category C includes 4, 5 and 6 mark questions because the physics papers carry them.
- Question parts and marks [ ] are shown as in the original papers. Where a question is only one part of a larger question in the paper, the note under it says so and gives the total marks of the larger question.
- Questions are merged when their wording is identical (ignoring capital letters, punctuation and the word “the”). Diagram-based questions are kept.

Chapter 1: Force, Work, Power and Energy

A. Multiple Choice Questions (1 mark each)

1. Clockwise moment produced by a force about a fulcrum is considered to be: [1]
   (a) Positive
   (b) Negative
   (c) Zero
   (d) None of these

   [2023]

2. When the speed of a moving object is doubled, then its kinetic energy: [1]
   (a) remains the same
   (b) decreases
   (c) is doubled
   (d) becomes four times

   [2023]

3. The energy conversion in a washing machine is from _____. [1]
   (a) magnetic to electrical
   (b) electrical to mechanical
   (c) electrical to magnetic
   (d) magnetic to electrical

   [2023]

4. S.I. unit of moment is: [1]
   (a) kgf.m
   (b) Nm
   (c) gf.m
   (d) Ncm

   [2023S]

5. Which of the following is the correct expression for gain in kinetic energy, if initial velocity is not zero? [1]
   (a) $k = \frac{1}{2}mv^2$
   (b) $k = mv^2/4$
   (c) $k = mv^2/2t$
   (d) $k = \frac{1}{2}m(v^2 - u^2)$

   [2023S]

6. The energy conversion, when an oscillating pendulum moves from mean to extreme position is: [1]
   (a) Kinetic to potential
   (b) Potential to kinetic
   (c) Potential to kinetic to potential
   (d) Kinetic to potential to kinetic

   [2023S]

7. When a bell fixed on a cycle rings, then the energy conversion that takes place is: [1]
   (a) gravitational potential energy to sound energy
   (b) kinetic energy to sound energy
   (c) sound energy to electrical energy
   (d) sound energy to mechanical energy

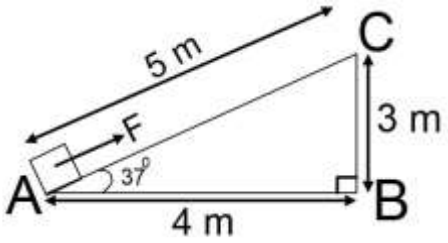
   [2024]

8. A door lock is opened by turning the lever (handle) of length 0.2 m. If the moment of force produced is 1 Nm, then the minimum force required is: [1]

(a) 5 N
(b) 10 N
(c) 20 N
(d) 0.2 N

[2024]

9. A force 'F' moves a load from A to C as shown in the figure below. For the calculation of the work done, which of these lengths would you use as the displacement? [1]



(a) 3 m
(b) 4 m
(c) 5 m
(d) 7 m

[2024]

10. Which of the following is a class III lever? [1]

(a) Pair of scissors
(b) Wheel barrow
(c) Crowbar
(d) Human forearm

[2024] [2024S]

11. A moment of couple has a tendency to rotate the body in an anticlockwise direction. Then the moment of couple is taken as: [1]

(a) positive
(b) negative
(c) maximum
(d) zero

[2024S] [2025S]

12. The kinetic energy of a given body depends on the: [1]

(a) position
(b) centre of gravity of the body
(c) momentum
(d) displacement

[2024S] [2025S]

13. For burning of coal in a thermoelectric station, the energy conversion taking place is: [1]

(a) chemical to heat to mechanical
(b) chemical to heat to mechanical to electrical
(c) chemical to heat to light
(d) heat to chemical to mechanical

[2024S] [2025S]

14. A body is acted upon by two equal and opposite forces, that are NOT along the same straight line. The body will: [1]

(a) remain stationary
(b) have only rotational motion
(c) have only rectilinear motion
(d) have both rectilinear and rotational motion

[2025]

15. Which among the following is a vector quantity? [1]

(a) work
(b) power
(c) energy
(d) moment of couple

[2025]

16. What is the correct energy transformation during burning of a candle? [1]

(a) heat → kinetic + potential
(b) heat → chemical + light
(c) chemical → heat + light
(d) mechanical → chemical + heat

[2025]

17. For a lever, a graph is plotted with load on Y-axis and effort on X-axis. Which of the following represents the slope of the graph? [1]

(a) Mechanical advantage
(b) Velocity ratio
(c) 1 / Velocity ratio
(d) 1 / Mechanical advantage

[2025]

18. The adjacent diagram shows the movable block of a block and tackle system with effort in a convenient direction. From the diagram we can conclude that the number of pulleys used in the fixed block are: [1]



(a) 1
(b) 3
(c) 2
(d) 4

[2025S]

19. For a body to be in dynamic equilibrium, its: [1]

(a) momentum should be zero
(b) acceleration should be zero
(c) kinetic energy should be zero
(d) velocity should be zero

[2026]

20. The energy transformation taking place during photosynthesis in plants is: [1]

(a) heat to chemical
(b) chemical to light
(c) light to chemical
(d) chemical to heat

[2026] [2027S]

21. The Velocity Ratio (VR) of a block and tackle system of two pulleys with the effort in the upward direction is: [1]

(a) 1
(b) 2
(c) 3
(d) 4

[2026]

22. A fast-moving cyclist stops pedalling on reaching a hilly track. If he continues to move with the acquired energy, then assuming no loss of energy: [1]

(a) his kinetic energy remains constant at all times.

(b) his potential energy remains constant at all times.

(c) his total mechanical energy continuously increases.

(d) his total mechanical energy remains constant.

[2026]

23. A moment of couple has a tendency to rotate the body in an anticlockwise direction. The moment of couple is taken as: [1]

(a) positive

(b) negative

(c) maximum

(d) zero

[2026S]

24. The kinetic energy of a given body depends on the: [1]

(a) position

(b) centre of gravity

(c) momentum

(d) displacement

[2026S]

25. During power production in a coal-based thermoelectric power plant, the correct sequence of energy conversions taking place is: [1]

(a) heat → mechanical → chemical

(b) heat → mechanical → electrical

(c) chemical → heat → light

(d) heat → chemical → electrical

[2026S]

26. Anita used a single movable pulley to lift a bucket of water from a well. She lubricates the pulley. Which of the following statements is true regarding the performance of the pulley used? [1]

(a) Mechanical Advantage decreases and efficiency increases.

(b) Velocity Ratio increases and efficiency decreases.

(c) Mechanical Advantage remains unchanged and efficiency increases.

(d) Velocity Ratio remains unchanged and efficiency increases.

[2026S]

27. A heavy object and a light object are placed on a seesaw. Which arrangement produces the maximum turning effect about the pivot? [1]

(a) Both objects near the pivot on opposite sides.

(b) Heavy object close to the pivot; light object at the far end on the opposite side.

(c) Light object close to the pivot; heavy object at the far end on the opposite side.

(d) Both objects at the ends of the seesaw, on opposite sides of pivot.

[2027S]

28. Two balls, A and B have the same gravitational potential energy. Ball A is six times the mass of ball B. How do their heights above the ground compare? [1]

(a) Height of A is the same as height of B.

(b) Height of A is twice the height of B.

(c) Height of A is one-sixth the height of B.

(d) Height of A is six times the height of B.

[2027S]

29. The Velocity Ratio (V.R.) of a block and tackle system of three pulleys with the effort in upward direction is: [1]

(a) 1

(b) 2

(c) 3

(d) 4

[2027S]

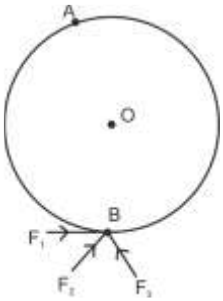
B. Short Questions (1 or 2 marks)

1. (a) What is the position of centre of gravity of a triangular lamina? [2]

(b) When this triangular lamina is suspended freely from any one vertex, what is the moment of force produced by its own weight in its rest position?

[2023]

2. The diagram shows wheel O pivoted at point A. Three equal forces F1, F2 and F3 act at point B on the wheel. [2]



(a) Which force will produce maximum moment about A?

(b) Give a reason for your answer in (a).

[2023]

3. (a) What should be the angle between the direction of force and the direction of displacement, for work to be negative? [2]

(b) Name the physical quantity obtained using the formula U/h, where U is the potential energy and h is the height.

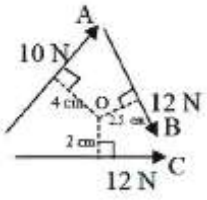
[2023]

4. Calculate the power spent by a crane while lifting a load of mass 2000 kg, at velocity of 1.5 m s-1. (g = 10 m/s²) [2]

[2023]

5. (a) Name the force which produces maximum moment about [sentence incomplete in source paper]. [2]

(b) Calculate this moment in SI unit.

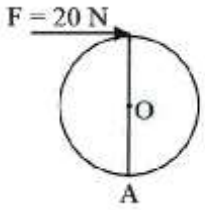


[2023S]

6. State two factors that affects the centre of gravity of the body. [2]

[2023S]

7. If the moment of F about the centre of a wheel O is 6 Nm then calculate the moment of F about A. [2]



[2023S]

8. If kinetic energy of a moving body is 40 J then what will be its kinetic energy when its velocity is doubled? [2]

[2023S]

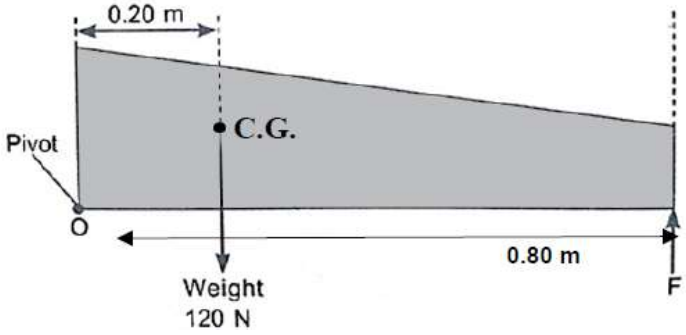
9. Fill in the blanks: [2]

(a) When a stone tied to a string is rotated in a horizontal plane, the tension in the string provides _____ force necessary for circular motion.

(b) Work done by this force at any instant is _____.

[2024]

10. A non uniform beam of weight 120 N pivoted at one end is shown in the diagram below. Calculate the value of F to keep the beam in equilibrium. [2]



[2024]

11. Meera chose to use a block and tackle system of '9' pulleys instead of a single movable pulley to lift a heavy load. [2]

(a) What is the advantage of using a block and tackle system over a single movable pulley?

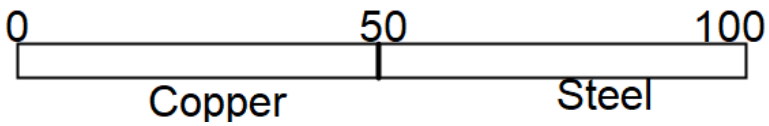
(b) Why should she connect more number of pulleys in the upper fixed block?

[2024]

12. Sumit does 600 J of work in 10 min and Amit does 300 J of work in 20 min. Calculate the ratio of the powers delivered by them. [2]

[2024]

13. A metre rod made of copper and steel as shown in the diagram. Weights of copper and steel are 10 N and 8 N respectively. [2]

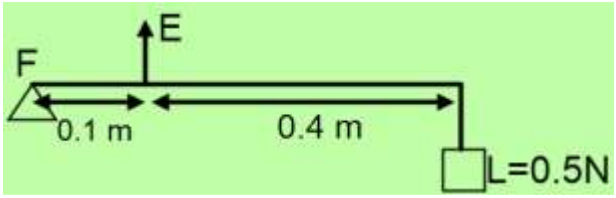


(a) On which part does the centre of gravity lie (0 to 50 or 50 to 100).

(b) Justify your answer.

[2024S]

14. A lever is shown below. [2]



(a) Identify the type of lever.
(b) Calculate its mechanical advantage.

[2024S]

15. Two bodies A and B have same kinetic energies. Compare their velocities if mass of A is four times the mass of B. [2]

[2024S]

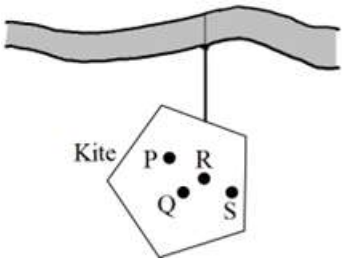
16. Draw a graph of potential energy vs height from the ground for a body thrown vertically upwards. [2]

[2024S]

17. In uniform circular motion the centrifugal force acts _____ [towards the centre / away from the centre / along the tangential direction]. [1]

[2025]

18. A non-uniform kite is hanging freely from the branch of a tree as shown. [2]



(a) Fill in the blank. _____ (P, Q, R or S) is the most probable position of its centre of gravity.
(b) Support your answer to (a) with a reason.

[2025]

19. Draw a graph of potential energy vs height for a body thrown vertically upwards. [Assume no friction is present.] [2]

[2025S]

20. A car is moving in uniform circular motion. The direction of friction between the tyres and the path is _____ [towards the centre / tangential to the path]. [1]

[2026]

21. State two factors on which the position of Center of Gravity of a body depends. [2]

[2026]

22. Case 1: Lata cuts a potato into two halves, using a cutter which belongs to a Class II lever. She needed effort E1. Case 2: Then she cuts one half of this potato again, but this time she needed effort E2. If E1 > E2 then: [2]

(a) In which case (1st or 2nd) was the potato closer to her hand applying the effort? (Assume normal reaction of the surface of the potato is same in both cases).
(b) Give a reason for your answer in (a) above.

[2026]

23. A _____ [Class II/Class III] lever will always have M.A. > 1. [1]

[2026S]

24. Match the movement of the body part in Column A to the class of lever in Column B. [2]

(a) Nodding head

(b) Lifting body weight on your toes.

options: Class III, Class II, Class I.

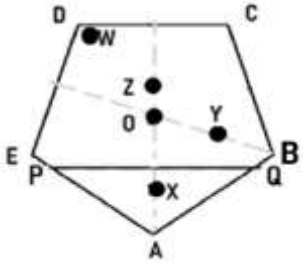
[2026S] [2027S]

25. The image given below displays kilowatt-hour meter readings recorded at two distinct points in time. Assuming a continuously running 2000 W air conditioner as the sole electrical device in use, calculate the time interval, in hours, between these two meter readings. [2]



[2026S] [2027S]

26. ABCDE is a regular pentagon with its centre of gravity at O. What will be the most probable position (W, X, Y, Z or O) of the new centre of gravity: [2]



(a) if a piece of clay is attached at point A?

(b) if the pentagon is cut along the line PQ? (Of the remaining part DCBQPE)

[2026S] [2027S]

27. Friction acts _____ [tangential / radial] to a car undergoing circular motion. [1]

[2027S]

C. Long Questions (3 marks and above)

1. (a) Name a single pulley in which displacement of load and effort is not the same.

(b) State one advantage of this pulley. [3]

[2023]

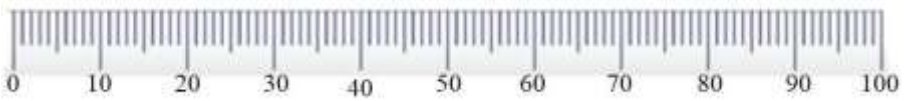
2. A block and tackle system of 4 pulleys. [3]

(a) Draw a labelled diagram of the system indicating clearly the direction of the load and the effort.

(b) What is the value of the mechanical advantage of the given pulley system if it is an ideal pulley system?

[2023]

3. A metre scale of weight 50 gf can be balanced at 40 cm mark without any weight suspended on it. [3]



(a) If this ruler is cut at its centre then state which part [0 to 50 cm or 50 to 100 cm] of the ruler will weigh more than 25 gf.

(b) What minimum weight placed on this metre ruler can balance this ruler when it is pivoted at its centre?

[2023]

4. A car of mass 120 kg is moving at a speed 18 km/h and it accelerates to attain a speed of 54 km/h in 5 seconds. Calculate: [4]

(a) the work done by the engine.

(b) the power of the engine.

[2023]

5. How many pulleys are there in a movable block of a block and tackle system with velocity ratio 5? [1]

[2023S]

6. Name the class of the lever shown in the picture below. [1]



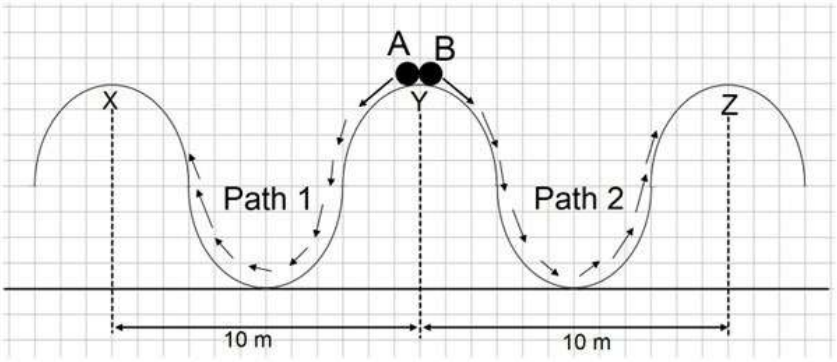
[2024]

7. (a) Define Centre of Gravity. [3]

(b) A hollow ice cream cone has height 6 cm. 1. Where is the position of its centre of gravity from the broad base? 2. Will its position change when it is filled completely with honey? Write Yes or No.

[2024]

8. Two identical marbles A and B are rolled down along Path 1 and Path 2 respectively. Path 1 is frictionless and Path 2 is rough. [3]



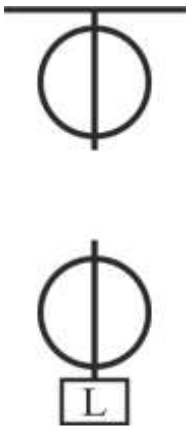
(a) Which marble will surely reach the next peak?

(b) Along which path/s the mechanical energy will be conserved?

(c) Along which path/s is the law of conservation of energy obeyed?

[2024]

9. Given are two pulleys. [4]



(a) Copy and complete the labelled diagram connecting the two pulleys with a tackle to obtain Velocity Ratio = 2.

(b) If Load = 48 kgf and efficiency is 80% then calculate: 1. Mechanical Advantage. 2. Effort needed to lift the load.

[2024]

10. Name the principle on which a lever works. [1]

[2024S]

11. Sumit and Sachin went for a trek and during the journey they visited a cottage. They suspended their bags to the two ropes hanging from P and Q on a wheel capable of rotating around O. Sumit suspended his bag to the rope Q and Sachin suspended his bag from the rope P. The wheel remained in equilibrium. [3]

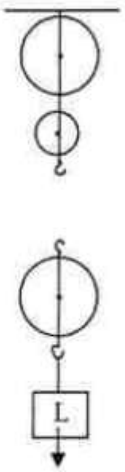


(a) State with a reason who is carrying a heavier bag.

(b) Based on the principle of moments, write a mathematical relation that can be used to determine the weight (W) of Sachin's bag, given that the weight of Sumit's bag is 18 kgf.

[2024S]

12. The diagram below shows a block and tackle system. [3]

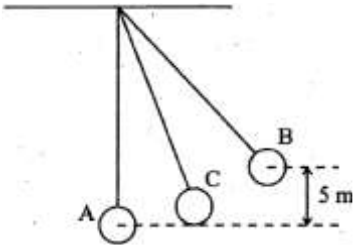


(a) Copy and complete the labelled diagram showing the correct connection of the tackle, the direction of the forces involved to obtain maximum V.R. with the convenient direction.

(b) Calculate the M.A. of this pulley system if its efficiency is 80%.

[2024S]

13. The figure below shows a simple pendulum of mass 200 g. It is displaced from the mean position A to the extreme position B. The potential energy at the position A is zero. At the position B the pendulum bob is raised by 5 m. [4]



(a) What is the potential energy of the pendulum at the position B?

(b) What is the total mechanical energy at point C?

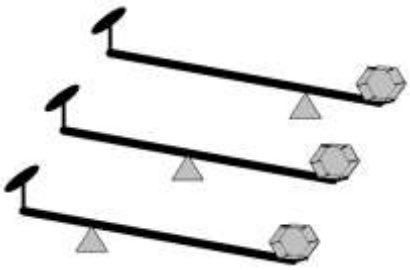
(c) What is the speed of the bob at the position A when released from B? (Take g = 10 m/s² and given that there is no loss of energy.)

[2024S] [2025S]

14. Akash takes a uniform meter scale and suspends a weight of 2 N at one end 'X' and a weight of 5 N on the other end 'Y'. He then balances the ruler horizontally on a knife edge placed at 70 cm from X. Draw a diagram of the arrangement and calculate the weight of the ruler. [3]

[2025]

15. Three levers X, Y, Z of equal lengths are shown in the diagram. [3]

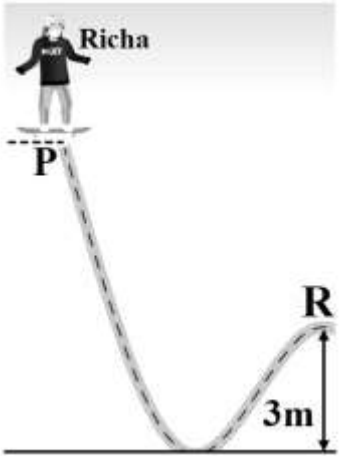


(a) Which class of lever do these belong to?

(b) Among these (X, Y or Z) which one will give the maximum mechanical advantage? Justify your answer.

[2025]

16. Richa weighing 40 kgf leaves point P on her skateboard and reaches point Q on the ground with velocity 10 ms-1. Calculate: [4]



(a) the kinetic energy of Richa at point Q.

(b) the vertical height of point P above the ground. (Use g as 10 m/s² and neglect friction)

(c) the kinetic energy of Richa at point R. (While moving from Q to R, she loses 500 J of energy against friction.)

[2025]

17. Draw a block and tackle system of pulleys with velocity ratio equal to 3. [3]

[2025]

18. (a) A [class I / class II / class III] lever will always have M.A. > 1. [6]

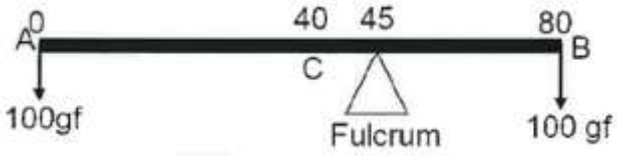
(b) In a block and tackle system, increase in the weight of the movable block [decreases / does not affect / increases] the efficiency of the pulley system.

(c) If the mass as well as the velocity of a body is doubled then the kinetic energy of the body [is doubled / becomes eight times / becomes four times] the initial kinetic energy.

(d) Unit of power used in mechanical engineering is [watt / horse power / erg per second].

[2025S]

19. A metal rod AB of length 80 cm is balanced at 45 cm from the end A with 100 gf weights suspended from the two ends. [3]



(a) If this rod is cut at the centre C, then compare the weight of AC to the weight of BC.

(b) Give a reason for your answer in (a).

[2025S] [2026S] [2027S]

20. For each of the following scenarios, state whether the work done by gravity is positive, negative, or zero. [3]

(a) A person walks on a levelled road.

(b) A person climbs a ladder.

(c) A car in neutral gear is coming down the slope.

[2025S]

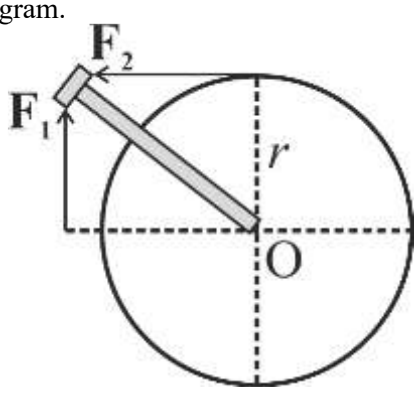
21. A block and tackle system of pulleys has velocity ratio 4. [3]

(a) Draw a labelled diagram of the system indicating clearly the direction of the load and effort.

(b) Calculate the potential energy of the load 100 kgf lifted by this pulley to a height 5 m.($g = 10\ m/s^2$)

[2025S]

22. The diagram shows a wheel with a handle. Two forces, F1 and F2 of equal magnitudes are acting on the handle as shown in the diagram. [3]



(a) Which force produces negative moment?

(b) Is the wheel in equilibrium? (Yes or No)

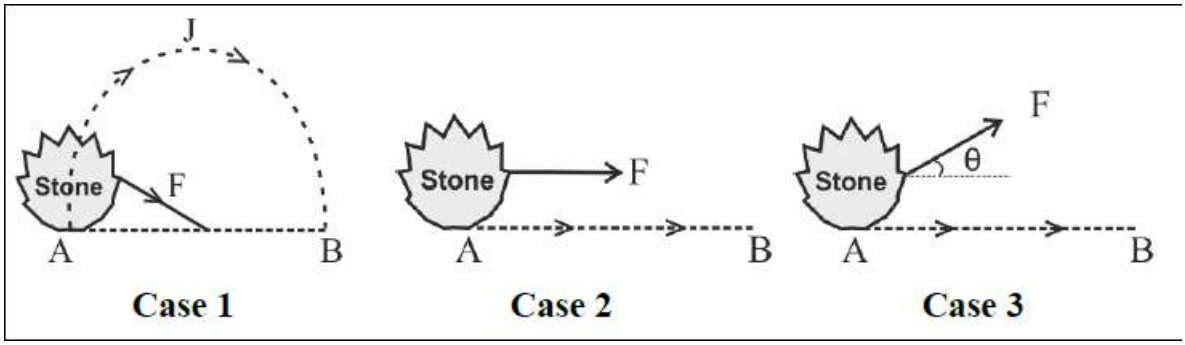
(c) Justify your answer stated in (b).

[2026]

23. (a) Name the unit of work done, used in subatomic scale. [3]

(b) To which class of lever does a pair of scissors belong?

(c) A stone is tied to a string and displaced from A to B by application of constant force F in three different ways as shown in the diagram below. Arrange the three cases in ascending order of the work done by the force. (Given AJB is a semi-circle, $\theta < 90°$ and AB = 20 m)



[2026]

24. A ball of mass 20 g falls from a height of 45 m. It rebounds from the ground to a height of 40 m. Calculate: [4]

(a) the initial potential energy of the ball.

(b) the speed of the ball at which it hits the ground.

(c) the loss in kinetic energy on striking the ground. [g = 10 m/s²]

[2026]

25. To lift a load of 30 kgf, Suhas uses a single fixed pulley, while Radha uses a single movable pulley. The displacement of efforts in both the cases are equal. In an ideal situation calculate the ratio of: [3]

(a) the efforts in the two cases.

(b) the potential energy gained by the loads in the two cases.

(c) the efficiencies in the two cases.

[2026]

27. For each of the following scenarios, state whether the work done by gravity is positive, negative, or zero. [3]

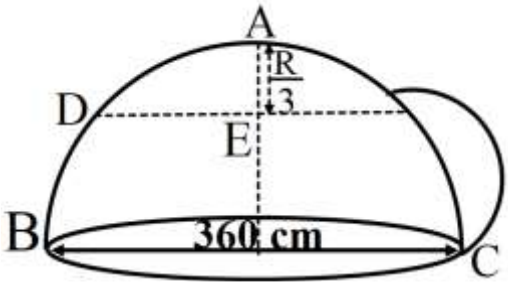
(a) A person walks on a levelled road.

(b) A person climbs a ladder.

(c) A car in a neutral gear is coming down the slope.

[2026S] [2027S]

28. A, B, C and D are four points on a hemispherical cup placed inverted on the ground. Diameter BC = 360 cm and AE = R/3 (R is the radius of the cup). A small spherical mass 500 g at rest at the point A, slides down along the smooth surface of the cup. Assuming that there is no loss of energy, calculate its: [4]



(a) Potential Energy at A relative to B.

(b) Speed at the point B (lowest point).

(c) Kinetic Energy at D (g = 10 m/s²).

[2026S]

29. A block and tackle system of pulleys has velocity ratio 4. [3]

(a) Draw a labelled diagram of the system indicating clearly, the direction of the load and effort.

(b) Calculate the potential energy gained by load of 100 kgf, lifted by this pulley to a height of 5 m. (g = 10 m/s²)

[2026S]

30. An empty supermarket trolley of mass 10 kg is moving with a speed of 8 m/s. An identical trolley is loaded with 10 kg of goods and moves with a speed of 4 m/s. Both trolleys are brought to rest over the same stopping distance. [4]

(a) Calculate the kinetic energy of the empty trolley.

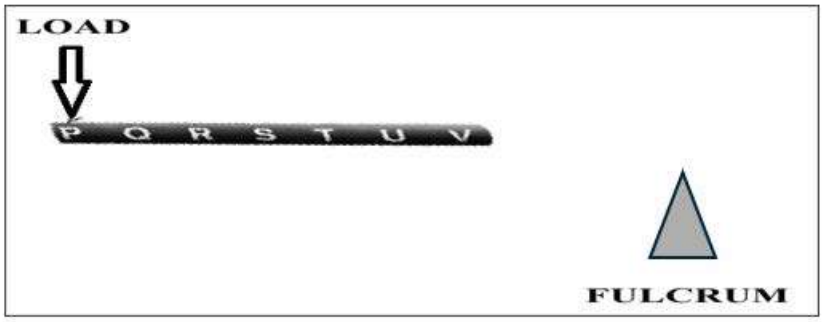
(b) Calculate the kinetic energy of the loaded trolley.

(c) Compare the braking force required to stop the empty trolley and the loaded trolley.

(d) Name the principle applied in solving part (c).

[2027S]

31. A bar of length 120 cm is used as a lever to raise a load placed at point P. Seven equidistant points are marked along the bar: P, Q, R, S, T, U, and V, each 20 cm apart. You are permitted to place the fulcrum at any of the marked points and exert the effort at a different point. [3]



(a) Specify the fulcrum and effort points that yield the greatest mechanical advantage.

(b) Compute the maximum mechanical advantage based on the given distances.

(c) To which class of lever does this arrangement belong?

[2027S]