

Class 9 Science Chapter 7 – Important Questions

Work, Energy, and Simple Machines

 **New NCERT *Exploration* | 2026–27**

This chapter covers **work done by a constant force, positive/negative/zero work, work-energy theorem, forms of energy, kinetic energy, potential energy, conservation of mechanical energy, power, pulleys, inclined planes, levers and mechanical advantage.**

SECTION A – VERY SHORT ANSWER QUESTIONS

1. What is work in science?
2. What are the two essential conditions for work to be done?
3. What is the SI unit of work?
4. What is energy?
5. What is the SI unit of energy?
6. What is mechanical energy?
7. What is kinetic energy?
8. What is potential energy?
9. What is power?
10. What is the SI unit of power?

11. What is mechanical advantage?
 12. What is a simple machine?
 13. Name the three simple machines covered in this chapter.
 14. What is a pulley?
 15. What is an inclined plane?
 16. What is a lever?
 17. What is a fulcrum?
 18. What is load?
 19. What is effort?
 20. State the law of conservation of energy.
-



SECTION B – WORK DONE BY A FORCE

21. Define work done by a constant force.
22. Write the formula for work done when force and displacement are in the same direction.
23. When is work said to be positive?
24. When is work said to be negative?
25. When is work said to be zero?
26. Give an example of positive work.
27. Give an example of negative work.

28. Give an example of zero work.
29. Why is work done zero when there is no displacement?
30. Why is work done zero when the force is perpendicular to displacement?
31. A person pushes a wall but the wall does not move. Is scientific work done on the wall? Explain.
32. A student carries a bag horizontally at constant height. Is the work done by the upward supporting force on the bag zero? Explain.
33. How does the angle between force and displacement affect work?
34. What happens to work if the force is doubled while displacement remains constant?
35. What happens to work if displacement is doubled while force remains constant?
-



SECTION C – WORK NUMERICALS

36. A force of 20 N moves an object through 5 m in the direction of the force. Calculate the work done.
37. A force of 50 N moves a box through 4 m. Calculate the work done.
38. A force of 100 N acts on an object but produces no displacement. Calculate the work done.
39. A force of 30 N acts opposite to the direction of displacement of 5 m. Calculate the work done.
40. A force of 25 N moves an object 8 m in the direction of the force. Find the work done.

41. A student pushes a box with a force of 40 N through 3 m. Find the work done.
42. A force of 60 N acts on an object and does 300 J of work. Find the displacement.
43. A force does 500 J of work while moving an object through 10 m. Find the force.
-



SECTION D – ENERGY

44. What is energy?
45. Why is energy described as the capacity to do work?
46. Name different forms of energy.
47. What is mechanical energy?
48. What are the two main forms of mechanical energy?
49. What is kinetic energy?
50. What is potential energy?
51. Give two examples of kinetic energy.
52. Give two examples of potential energy.
53. How can one form of energy change into another?
54. Give examples of energy conversion in everyday life.
55. What happens to energy when a battery powers a bulb?
56. Why is energy conversion important in everyday devices?
-



SECTION E – KINETIC ENERGY

57. Define kinetic energy.
58. Write the formula for kinetic energy.
59. On which factors does kinetic energy depend?
60. How does kinetic energy change if the mass is doubled?
61. How does kinetic energy change if the velocity is doubled?
62. Why does a fast-moving object have greater kinetic energy than the same object moving slowly?
63. Derive the expression for kinetic energy.
64. Why does velocity have a greater effect on kinetic energy than mass?
65. Calculate the kinetic energy of a 2 kg object moving at 5 m/s.
66. Calculate the kinetic energy of a 10 kg object moving at 4 m/s.
67. An object of mass 5 kg moves at 10 m/s. Calculate its kinetic energy.
68. A body has kinetic energy of 100 J and mass 2 kg. Find its speed.

The syllabus specifically requires students to **define kinetic energy, derive its expression and calculate it using the mathematical expression.**



SECTION F – POTENTIAL ENERGY

69. What is gravitational potential energy?
70. On which factors does gravitational potential energy depend?
71. Write the formula for gravitational potential energy.

72. What happens to potential energy when an object is raised higher?
73. What happens to potential energy when the mass of an object is increased?
74. Why does an object placed at a greater height possess more gravitational potential energy?
75. Give two examples of objects possessing potential energy.
76. Derive the expression for gravitational potential energy.
77. Calculate the potential energy of a 5 kg object raised to a height of 4 m. Take $g = 10 \text{ m/s}^2$.
78. A 2 kg object is raised to a height of 10 m. Calculate its potential energy.
79. An object has potential energy of 500 J at a height of 5 m. Find its mass if $g = 10 \text{ m/s}^2$.
-



SECTION G – WORK-ENERGY THEOREM

80. State the work-energy theorem.
81. How is work related to change in kinetic energy?
82. What happens to kinetic energy when positive work is done on an object?
83. What happens to kinetic energy when negative work is done?
84. Explain the work-energy theorem using a moving object.
85. Why does friction generally reduce the kinetic energy of a moving object?

86. How can work done by a force change the energy of an object?



SECTION H – CONSERVATION OF ENERGY

87. State the law of conservation of energy.

88. Can energy be created or destroyed?

89. How does potential energy change into kinetic energy during free fall?

90. What happens to the total mechanical energy of an object during ideal free fall?

91. Explain energy transformation during the fall of an object.

92. Explain energy transformation in a swinging pendulum.

93. What happens to kinetic and potential energy at the highest point of an ideal pendulum?

94. What happens to kinetic and potential energy at the lowest point?

95. Why does the total mechanical energy remain constant in an ideal system?

96. What happens to mechanical energy when friction is present?

The chapter specifically requires explaining the conversion between **potential and kinetic energy during free fall** and the **law of conservation of energy**.



SECTION I – POWER

97. What is power?

98. Write the formula for power.
99. What is the SI unit of power?
100. What does 1 watt mean?
101. How is power different from work?
102. Can two people do the same amount of work but have different powers? Explain.
103. Why does a person who performs the same work in less time have greater power?
104. Calculate the power of a machine that does 500 J of work in 10 s.
105. A machine does 2000 J of work in 20 s. Find its power.
106. A person does 600 J of work in 30 s. Calculate the power.

The textbook defines power as the **rate at which work is done** and uses $P = W/t$.



SECTION J – SIMPLE MACHINES

107. What is a simple machine?
108. Why are machines useful?
109. Can a machine create energy?
110. What is mechanical advantage?
111. Write the formula for mechanical advantage.
112. What is effort?
113. What is load?

- 114. What is a pulley?**
- 115. What is an inclined plane?**
- 116. What is a lever?**
- 117. What is a fulcrum?**
- 118. Give two examples of simple machines used in everyday life.**
- 119. Why do simple machines make work easier?**
- 120. How can a machine change the direction of effort?**

The chapter explains that simple machines can make tasks more convenient by changing the **magnitude or direction of the required force**, while machines do not create energy.



SECTION K – PULLEY

- 121. What is a pulley?**
- 122. What is a fixed pulley?**
- 123. What is a movable pulley?**
- 124. What is the main advantage of a fixed pulley?**
- 125. How does a fixed pulley change the direction of effort?**
- 126. How can a movable pulley reduce the effort required?**
- 127. What is the mechanical advantage of an ideal fixed pulley?**
- 128. Why can a system of pulleys provide greater mechanical advantage?**
- 129. Give examples of pulleys used in everyday life.**
- 130. Draw and label a fixed pulley.**

131. Draw and label a movable pulley.

132. Differentiate between fixed and movable pulleys.



SECTION L – INCLINED PLANE

133. What is an inclined plane?

134. How does an inclined plane make lifting a load easier?

135. Why does an inclined plane reduce the effort required?

136. What is the disadvantage of using a longer inclined plane?

137. Give examples of inclined planes used in everyday life.

138. Why is a ramp useful for moving heavy objects?

139. How does the length of an inclined plane affect mechanical advantage?

140. Why does a machine reduce the required force but not create energy?



SECTION M – LEVERS

141. What is a lever?

142. What is a fulcrum?

143. What is load?

144. What is effort?

145. What is load arm?

146. What is effort arm?

147. State the principle of moments for a lever.
148. What are the three classes of levers?
149. What is a Class I lever?
150. What is a Class II lever?
151. What is a Class III lever?
152. Give two examples of Class I levers.
153. Give two examples of Class II levers.
154. Give two examples of Class III levers.
155. Differentiate between the three classes of levers.
156. Why does increasing the effort arm reduce the effort needed?

The chapter identifies the three lever classes by the relative positions of **fulcrum**, **load** and **effort** and uses the moment relationship for levers.



SECTION N – MECHANICAL ADVANTAGE NUMERICALS

157. A machine lifts a load of 200 N using an effort of 50 N. Calculate its mechanical advantage.
158. A machine has an effort of 100 N and lifts a load of 500 N. Find its mechanical advantage.
159. A machine has a mechanical advantage of 5 and the effort applied is 40 N. Find the load.
160. A lever lifts a load of 300 N using an effort of 100 N. Calculate its mechanical advantage.

161. A machine has a load of 600 N and mechanical advantage of 3. Find the effort.

162. A lever has a load of 30 N acting 2 m from the fulcrum. The effort acts at a distance d and is 15 N. Find d .

163. A load of 30 N is placed 1 m from the fulcrum. An effort of 15 N balances it. Find the effort arm.

SECTION O – APPLICATION-BASED QUESTIONS

164.  A student lifts a school bag from the floor to a table.

- a) Is work done on the bag?
 - b) What happens to its gravitational potential energy?
 - c) What energy is supplied by the student?
-

165.  A moving ball gradually comes to rest because of friction.

- a) What happens to its kinetic energy?
 - b) Where does the mechanical energy go?
-

166.  A stone falls from a height.

- a) What happens to its potential energy?
 - b) What happens to its kinetic energy?
 - c) What happens to total mechanical energy in an ideal situation?
-

167.  A roller coaster moves from a high point to a low point.

- a) Which form of energy decreases?
- b) Which form increases?
- c) Explain the energy conversion.

168. 🚧 A worker uses a ramp to move a heavy box into a truck.

- a) Which simple machine is being used?
 - b) How does it reduce effort?
 - c) Does it reduce the total work in an ideal situation?
-

169. 🪣 A person uses a pulley to lift a bucket from a well.

- a) What type of simple machine is used?
 - b) What advantage does it provide?
 - c) How does a fixed pulley change the direction of effort?
-

170. ✂️ A pair of scissors is used to cut paper.

- a) Which type of simple machine is involved?
 - b) What acts as the fulcrum?
 - c) Which class of lever is it?
-

SECTION P – COMPETENCY-BASED QUESTIONS

171. 🏔️ Case Study – Falling Object

A 2 kg object is held at a height of 10 m and then released. Take $g = 10 \text{ m/s}^2$.

- a) Calculate its gravitational potential energy initially.
 - b) What happens to its potential energy as it falls?
 - c) What happens to its kinetic energy?
 - d) What is the total mechanical energy in an ideal situation?
-

172. ⚡ Case Study – Power

Two students perform the same amount of work.

Student A completes it in 10 s, while Student B takes 20 s.

- a) Who has greater power?
 - b) Why?
 - c) If each does 500 J of work, calculate their powers.
-

173. Case Study – Inclined Plane

A worker has to move a heavy box to a higher platform.

- a) Why might the worker use a ramp instead of lifting the box vertically?
 - b) What happens to the force required?
 - c) What happens to the distance over which the force is applied?
-

174. Case Study – Lever

A load of 30 N is placed 2 m from the fulcrum. An effort of 15 N is used.

- a) How far from the fulcrum should the effort act for balance?
 - b) Which principle is used?
 - c) What happens if the effort arm is increased?
-

SECTION Q – HIGHER-ORDER THINKING QUESTIONS

175. Why is no scientific work done when a person pushes a wall that does not move?

176. Why can a force do negative work?

177. Why does friction reduce mechanical energy?

178. Why is energy not destroyed even when mechanical energy decreases due to friction?

179. Why does a moving object have kinetic energy?

180. Why does an object at a height have potential energy?

181. Why does kinetic energy increase as a falling object moves downward?

182. Why does potential energy decrease during free fall?

183. Why can two machines perform the same work but require different amounts of effort?

184. Why does a longer inclined plane require less force?

185. Why does a simple machine not reduce the total work required in an ideal system?

186. Why does a fixed pulley mainly change the direction of effort?

187. Why does increasing the effort arm make a lever more effective?

188. Why is a machine unable to produce energy from nothing?

189. A student says, "A machine reduces work." Is this statement correct? Explain.

190. A student says, "If an object has zero velocity, it has zero energy." Is this always correct? Explain.



SECTION R – LONG ANSWER QUESTIONS

191. Define work and explain positive, negative and zero work with examples.

192. Explain the relationship between work and energy.
193. State and explain the work-energy theorem.
194. Explain kinetic energy and derive its expression.
195. Explain gravitational potential energy and derive its expression.
196. Explain the law of conservation of energy using the example of a freely falling object.
197. Explain the conversion between kinetic and potential energy during the motion of a pendulum.
198. Define power and explain how it differs from work.
199. Explain the purpose and advantages of simple machines.
200. Explain fixed and movable pulleys with their uses.
201. Explain an inclined plane and its mechanical advantage.
202. Explain the three classes of levers with examples.
203. Define mechanical advantage and explain how it helps compare machines.
204. Explain why simple machines make tasks easier without creating energy.
-

MOST IMPORTANT QUESTIONS FOR EXAM

If students have limited time, prepare these **first**:

- ★ 1. Define work and explain positive, negative and zero work.
- ★ 2. Write the formula and SI unit of work.

- ★ 3. State the work-energy theorem.
 - ★ 4. Define energy and explain its different forms.
 - ★ 5. Derive the expression for kinetic energy.
 - ★ 6. Derive the expression for gravitational potential energy.
 - ★ 7. Solve numerical problems on kinetic energy and potential energy.
 - ★ 8. Explain conservation of mechanical energy during free fall.
 - ★ 9. Define power and solve numerical problems using $P = W/t$.
 - ★ 10. What is a simple machine? Why is it useful?
 - ★ 11. Define mechanical advantage and solve numericals.
 - ★ 12. Explain fixed and movable pulleys.
 - ★ 13. Explain an inclined plane and its advantages.
 - ★ 14. Explain the three classes of levers with examples.
 - ★ 15. Solve lever problems using the principle of moments.
-



IMPORTANT FORMULAS



Work

$$W = F \times s$$



Kinetic Energy

$$KE = \frac{1}{2} mv^2$$



Potential Energy

$$PE = mgh$$



Mechanical Energy

$$\text{Mechanical energy} = \text{Kinetic energy} + \text{Potential energy}$$

Power

$$P = W / t$$

Mechanical Advantage

$$MA = \text{Load} / \text{Effort}$$

Principle of Moments

$$\text{Effort} \times \text{Effort arm} = \text{Load} \times \text{Load arm}$$

Symbols

W = Work

F = Force

s = Displacement

m = Mass

v = Velocity

g = Acceleration due to gravity

h = Height

P = Power

t = Time

MA = Mechanical advantage

The 2026–27 syllabus explicitly requires calculation of **work, kinetic energy, potential energy, power and mechanical advantage**, so these formulas should receive special attention.



QUICK REVISION BOX

 **Work** → Force × displacement

 **Energy** → Capacity to do work

 **Kinetic energy** → Energy due to motion

 **Potential energy** → Energy due to position/height

 **Conservation of energy** → Energy cannot be created or destroyed

 **Power** → Rate of doing work

 **Simple machine** → Makes a task easier/convenient

 **Pulley** → Changes direction/reduces effort depending on arrangement

 **Inclined plane** → Reduces force by increasing distance

 **Lever** → Rigid bar rotating about a fulcrum

 **Fulcrum** → Fixed turning point of a lever

 **Effort** → Applied force

 **Load** → Resistance/force to be overcome

 **Mechanical advantage** → Load / Effort

TOP NUMERICALS TO PRACTISE

1.  **Work = Force × displacement**
2.  **Kinetic energy = $\frac{1}{2} mv^2$**
3.  **Potential energy = mgh**
4.  **Conservation of mechanical energy**
5.  **Power = Work / time**
6.  **Mechanical advantage = Load / Effort**
7.  **Principle of moments**
8.  **Energy conversion during free fall**
9.  **Kinetic + potential energy**
10.  **Simple-machine applications**

★ Exam Tip

For numerical questions, use:

Given → Formula → Substitution → Calculation → Answer with unit

For machine questions, remember:

Machine makes the task easier → it may reduce effort or change its direction → but it does not create energy.