

Force, Work and Energy

Science · Class 5 · Topic-wise Practice Worksheet

TIME 40 minutes	QUESTIONS 18	TOTAL MARKS 24	MAX. SCORE ___ / 24
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Name: _____ Class/Sec: _____ Date: _____

INSTRUCTIONS

- There are **18 questions** in this worksheet. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–15 carry **1 mark** each. Questions 16–18 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Do not use a calculator.
- Study every diagram and table carefully before answering.

Section A — Forces and Machines

Q1–Q7 · 1 mark each

- A push or a pull acting on an object is called a _____.
 (A) Weight (B) Machine
 (C) Speed (D) Force
- The force that opposes the motion of one surface sliding over another is called _____.
 (A) Gravity (B) Friction
 (C) Magnetic force (D) Muscular force
- The energy possessed by a body because of its motion is called _____ energy.
 (A) Potential (B) Chemical
 (C) Kinetic (D) Sound
- A ripe mango falls to the ground because of the force of _____.
 (A) Friction (B) Magnetism
 (C) Muscles (D) Gravity
- A see-saw in a park is an example of a simple machine called a _____.
 (A) Lever (B) Pulley
 (C) Wheel and axle (D) Screw
- Which of these is a **renewable** source of energy?
 (A) Petrol (B) Sunlight
 (C) Coal (D) Diesel
- In science, work is said to be done only when a force _____.
 (A) Is applied, whether the object moves or not (B) Makes a person feel tired
 (C) Moves an object through some distance (D) Is applied by a machine

8. Two children sit on a see-saw as shown. What will happen to the see-saw?

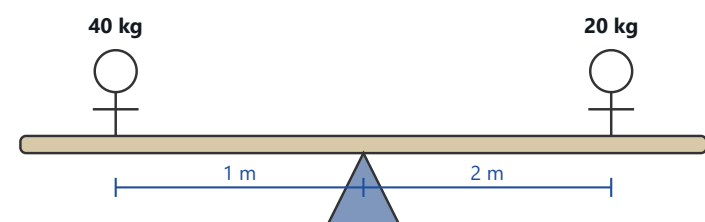


Fig. 8.1 — Two children on a see-saw

- (A) The 40 kg side will go down
(B) The 20 kg side will go down
(C) It will spin round the fulcrum
(D) It will stay balanced
9. **Assertion (A):** A ball rolled across a carpet stops sooner than one rolled across a smooth marble floor.
Reason (R): The rough surface of the carpet produces more friction.
Choose the correct option.
- (A) Both A and R are true, and R explains A
(B) Both A and R are true, but R does not explain A
(C) A is true but R is false
(D) A is false but R is true
10. A heavy drum is loaded onto a truck by rolling it up a sloping plank instead of lifting it straight up. The plank is useful because it _____.
(A) Lets the same job be done with a smaller effort force
(B) Reduces the total work that must be done
(C) Removes the weight of the drum
(D) Removes friction completely
11. When an electric fan is switched on, the main energy change taking place is _____.
(A) Electrical energy → light energy
(B) Electrical energy → mechanical energy
(C) Heat energy → electrical energy
(D) Chemical energy → sound energy
12. In the table below, which row is **incorrectly** matched?

Row	Device	Simple machine used
(A)	Flagpole at the top	Pulley
(B)	Staircase ramp	Inclined plane
(C)	Scissors	Wheel and axle
(D)	Axe head	Wedge

Table 12.1 — Devices and simple machines

- (A) Row (A)
(B) Row (B)
(C) Row (C)
(D) Row (D)
13. Ravi pushes with all his strength against a heavy stone wall for five minutes. The wall does not move. How much work has he done, in the scientific sense?
(A) A very large amount, because he pushed hard
(B) No work at all, because the wall did not move
(C) Half the usual work
(D) It cannot be decided

14. Aeroplanes, fast trains and speedboats are all given a smooth, pointed, streamlined shape mainly to _____.
(A) Look attractive (B) Increase their weight
(C) Reduce the friction of air or water and save fuel (D) Make them float better
15. A single fixed pulley is used at the top of a well to draw up a bucket of water. Its main advantage is that it _____.
(A) Makes the bucket much lighter (B) Doubles the amount of water lifted
(C) Removes the need for any force (D) Lets you pull downwards instead of lifting upwards

Achievers Section

Q16–Q18 · 3 marks each

16. Consider the following statements.
(i) Friction is always harmful and should be removed completely.
(ii) A stretched rubber band possesses potential energy.
(iii) Energy can be created out of nothing when needed.
Which of the statements is/are correct?
(A) (ii) only (B) (i) and (ii) only
(C) (ii) and (iii) only (D) All three
17. A boy weighing 40 kg sits 1.5 m from the pivot of a see-saw. His sister weighs 30 kg. At what distance from the pivot must she sit on the other side so that the see-saw balances?
(A) 2 m (B) 1.5 m
(C) 1 m (D) 2.5 m
18. Water stored high up in a dam is allowed to fall and turn a turbine, which drives a generator and lights a bulb. Which sequence of energy changes takes place?
(A) Kinetic → potential → light → electrical (B) Potential → kinetic → electrical → light
(C) Electrical → potential → kinetic → light (D) Light → kinetic → potential → electrical

Answer Key

1	D	2	B	3	C	4	D	5	A
6	B	7	C	8	D	9	A	10	A
11	B	12	C	13	B	14	C	15	D
16	A	17	A	18	B				

Solutions

1. Answer: (D) Force

A force is any push or pull. It can make a body at rest move, make a moving body stop or go faster, change its direction, or change its shape.

2. Answer: (B) Friction

Friction acts between two surfaces in contact and always acts opposite to the direction of motion. It is what finally brings a rolling ball to rest.

3. Answer: (C) Kinetic

Kinetic energy is the energy of movement — a running child, a flying arrow and flowing water all have it. Potential energy is stored energy due to position, such as that of water held behind a dam.

4. Answer: (D) Gravity

Gravity is the force with which the earth pulls every object towards its centre. It acts on the mango whether or not anything is touching it, so it is a non-contact force.

5. Answer: (A) Lever

A lever is a rigid bar that turns about a fixed point called the fulcrum. In a see-saw the plank is the bar and the central support is the fulcrum.

6. Answer: (B) Sunlight

Renewable sources are replaced by nature as fast as we use them and will not run out — sunlight, wind, flowing water. Coal, petrol and diesel are fossil fuels that took millions of years to form and are being used up.

7. Answer: (C) Moves an object through some distance

Scientifically, work = force $\times$ distance moved in the direction of the force. If the object does not move, the distance is zero and so no work is done, however tired the effort makes you feel.

8. Answer: (D) It will stay balanced

A see-saw balances when weight $\times$ distance from the fulcrum is the same on both sides. Left side: $40 \times 1 = 40$. Right side: $20 \times 2 = 40$. The two turning effects are equal, so the see-saw stays balanced. Sitting further out makes up for being lighter.

9. Answer: (A) Both A and R are true, and R explains A

Both statements are true. Friction is greater between rough surfaces, so the carpet takes away the ball's kinetic energy faster and it stops in a shorter distance. The greater friction is exactly the reason for the earlier stop.

10. Answer: (A) Lets the same job be done with a smaller effort force

A sloping plank is an inclined plane. The drum has to be moved a longer distance along the slope, but at every moment a much smaller force is needed. A simple machine does not reduce the total work — it only makes the effort more manageable.

11. Answer: (B) Electrical energy $\rightarrow$ mechanical energy

The motor of a fan converts electrical energy into the mechanical energy of the spinning blades. A little energy also becomes heat and sound, but that is not the main change. (An electric bulb, by contrast, converts electrical energy mainly into light and heat.)

12. Answer: (C) Row (C)

A pair of scissors is made of **two levers** joined at a pivot, with wedge-shaped blades — there is no wheel and axle in it. A steering wheel or a door knob would be a wheel and axle. The other three rows are correct.

13. Answer: (B) No work at all, because the wall did not move

Work = force $\times$ distance moved. The wall moved no distance at all, so the distance is zero and the work done on it is zero, no matter how great the force or how tired Ravi feels. His muscles do use up energy, but that is a different thing from work done on the wall.

14. Answer: (C) Reduce the friction of air or water and save fuel

A blunt shape has to push air or water aside, which produces a large opposing force called drag — a kind of friction. A streamlined shape lets the fluid flow smoothly around the body, cutting the drag and so saving fuel. Fish and birds have naturally streamlined bodies for the same reason.

15. Answer: (D) Lets you pull downwards instead of lifting upwards

A single fixed pulley changes only the **direction** of the effort — you pull down, which is far easier because you can use your own body weight, while the bucket goes up. The force needed is still equal to the weight of the bucket, so the bucket does not become lighter.

16. Answer: (A) (ii) only

Statement (i) is false — friction wastes energy, but without it we could not walk, write or apply brakes, so it is useful as well as harmful. Statement (ii) is true; stretching stores energy in the rubber, which is released when it is let go. Statement (iii) is false; energy can only be changed from one form into another, never created or destroyed. So only (ii) is correct.

17. Answer: (A) 2 m

For balance, weight $\times$ distance must be equal on both sides.

Boy's turning effect = $40 \times 1.5 = 60$.

Sister's turning effect = $30 \times d$.

So $30 \times d = 60$, giving $d = 60 \div 30 = \mathbf{2\ m}$. Being lighter, she must sit further out.

18. Answer: (B) Potential $\rightarrow$ kinetic $\rightarrow$ electrical $\rightarrow$ light

Water held high in the dam has potential energy because of its position. As it falls, this becomes kinetic energy of moving water, which spins the turbine and generator to produce electrical energy. In the bulb, the electrical energy finally becomes light (and some heat). Notice that the energy is never created — it is only converted from one form to the next.