WORKSHEET 2

CHAPTER 3 – MACHINES

A. Tick (✓) the correct option.

1. The mechanical advantage is given by

   a. $\frac{\text{Effort}}{\text{Load}}$. b. Load + Effort. c. Load × Effort. d. $\frac{\text{Load}}{\text{Effort}}$.

2. If 40% of the energy supplied to the machine is lost in overcoming the friction, the efficiency of the machine is

   a. 40%. b. 100%. c. 60%. d. none of these.

3. Fishing rod belongs to

   a. class I lever. b. class II lever. c. class III lever. d. none of these.

4. The number of pulley in the lower movable tackle are 2 and number of pulleys in the upper fixed block are 3, then the mechanical advantage is

   a. 5. b. 2. c. 1. d. 0.

5. A fixed pulley is an example of

   a. class III lever. b. class II lever. c. class I lever. d. none of these.

B. Fill in the blanks.

1. The work done on the machine by the effort is called _____
2. A pair of scissors is an example of a _____ lever.
3. In class II levers, the effort arm is always _____ than the load arm.
4. A _____ is a device which is used to do work more conveniently and more quickly.
5. _____ is a metallic circular disc having a groove in its edges and capable of rotating about a rod called the axle which passes through its centre.

C. State whether the following statements are true or false.

1. Fishing rod belongs to class II lever.
2. Mechanical advantage of a lever is equal to the ratio of the length of the effort arm to the length of the load arm.
3. Efficiency is the ratio of the velocity ratio to the mechanical advantage.
4. Skull is an example of class I lever.
5. A fixed pulley is an example of class II lever.

Name: ..... Teacher's signature: .....

Class: X ..... Date: .....

D. Match the following.

1. Velocity ratio lever	$MA = VR = 1$
2. Single fixed pulley	$\frac{\text{work output}}{\text{work input}}$
3. Foot	class III lever
4. Efficiency	$\frac{\text{effort arm}}{\text{load arm}}$
5. Fire tongs	class II lever

E. Answers the following questions.

Very short answer questions

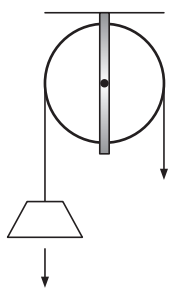
1. Define efficiency of a machine.
2. State the principle of a lever.

Short answer questions

1. Differentiate between single fixed pulley and single movable pulley.
2. Draw a diagram to show the position of the fulcrum, load and effort for class I and class II lever.

Long answer questions

1. A load of 80 N is lifted by applying an effort of 100 N in the downward direction as shown in figure.



   a. Mark the tension in the figure.

   b. What is the velocity ratio of the machine?

   c. Calculate *MA*.

   d. Calculate efficiency of the machine.

2. A machine overcomes a resistance of 400 N through a distance of 0.14 m when an effort of 200 N acts through a distance of 0.50 m. Calculate

   a. velocity ratio.

   b. mechanical advantage.

   c. efficiency.

ANSWERS

WORKSHEET 2

A. Tick (✓) the correct option.

1. d
2. c
3. c
4. a
5. c

B. Fill in the blanks.

1. work input
2. class I
3. longer
4. simple machine
5. Pulley

C. State whether the following statements are true or false.

1. F
2. T
3. F
4. T
5. F

D. Match the following.

1. Velocity ratio lever — $\frac{\text{effort arm}}{\text{load arm}}$
2. Single fixed pulley — $MA = VR = 1$
3. Foot — class II lever
4. Efficiency — $\frac{\text{work output}}{\text{work input}}$
5. Fire tongs — class III lever

E. Answer the following questions.

Very short answer questions

1. It is the ratio of the useful work done by the machine to the work done on the machine.
2. A lever works on the principle of moments, i.e. sum of clockwise moment of load about the fulcrum is equal to the sum of anticlockwise moment of effort about the fulcrum.

Short answer questions

1. Refer Table 3.2, Page 57 of the textbook.
2. Class I lever (Refer Figure 3.3, Page 49 of the textbook.)

   Class II lever (Refer Figure 3.6, Page 50 of the textbook.)

Long answer questions

1. a. Tension is downwards.

   b. $$VR = \frac{d_E}{d_L} = \frac{d}{d} = 1$$

   c. $$MA = \frac{L}{E} = \frac{80}{100} = 0.8$$

   d. $$\eta = \frac{MA}{VR} \times 100 = \frac{0.8}{1} \times 100 = 80\%$$

2. Here,

Load (L) = 400 N

Effort (E) = 200 N

d_L = 0.14 m

d_E = 0.50 m

a. $VR = \frac{d_E}{d_L} = \frac{0.50}{0.14} = 3.58$ (approx.)

b. $MA = \frac{L}{E} = \frac{400}{200} = 2$

c. $\eta = \frac{MA}{VR} \times 100 = \frac{2}{3.58} \times 100 = 55.86\%$