Science

Grade 9

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Grade 9 – Unit 15 **Simple Machines**

Science

1. What is not a simple machine?
   i. Nut-cracker ii. Staircase iii. Pulley iv. Car engine

2. A load of 48N can be lifted by applying an effort of 12N. The mechanical advantage of this is
   i. 1 ii. 2 iii. 3 iv. 4

3. To calculate the efficiency of a machine
   i. Work-output should be divided by work-input
   ii. Work-input should be divided by work-output
   iii. Distance travelled by effort should be divided by distance travelled by load
   iv. Velocity ratio should be divided by mechanical advantage.

4. The mechanical advantage of a single fixed pulley is
   i. Less than one ii. One iii. Between l and 2 iv. two

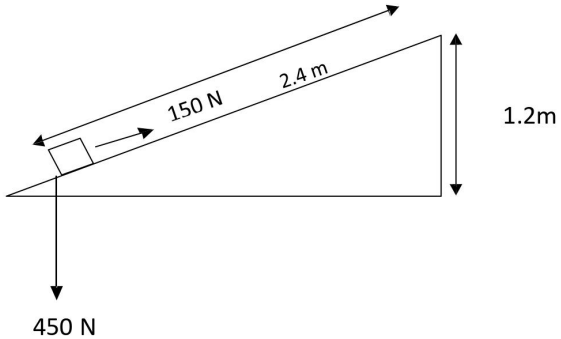
5. What is not an instance where inclined plane is used?
   i. Wedge ii. Screw nail iii. Ladder iv. Rotating handle

6. Select the false statement.
   i. The windlass is a type of wheel and axel.
   ii. The ratio of the radius of the wheel to the radius of the axel is equal to the velocity ratio of the machine with wheel and axel.
   iii. The ratio of the radius of the axel to the radius of the wheel is equal to the velocity ratio of the machine with wheel.
   iv. The device which is used to dismantle screws in tires is a machine that belongs to the type wheel and axel.

7. The answer with the same type of lever group is
   i. See-saw, plier, nut-cracker ii. Nut-cracker, wheelbarrow, plier iii. Broom, ekle broom, fishing rod iv. Pair of scissors, fishing rod, ekle broom

8. The mechanical advantage of a machine is 3. Its velocity ratio is 4. What is the efficiency of the machine?
   i. 75% ii. 60% iii. 65% iv. 70%

9. The mechanical advantage and velocity ratio of the inclined plane shown below is
   i. 3,2 ii. 2,3
   iii. 4,3 iv. 2,4



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10. Select the correct statement.
    i. When using third order lever, the effort is always higher than the load.
    ii. When using a single pulley, a higher effort than the load should be applied.
    iii. The force applied to a machine is the effort.
    iv. A lower effort than the load should be applied when using the screw jack.

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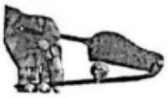
(01) i. What is a simple machine?

ii. Name four types of simple machines.

i. Name the types of lever shown in each of the pictures below.

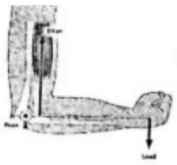
Pair of scissors 

Nut-cracker 

Fishing rod 

Forceps 

Wheel barrow 

Lifting something with hand 

Iv. Define the terms mechanical advantage and velocity ratio.

v. Write an equation to show the relationship among mechanical advantage, velocity ratio Efficiency.

vi. Complete the table.

	Load(N)	Effort(N)	Velocity ratio	Mechanical advantage	Efficiency (%)
a	50	10	8	.....	.....
b	400	.....	12	8	.....
c	3000	.....	8	.....	75
d	.....	250	.....	20	40
e	4000	.....	.....	80	80

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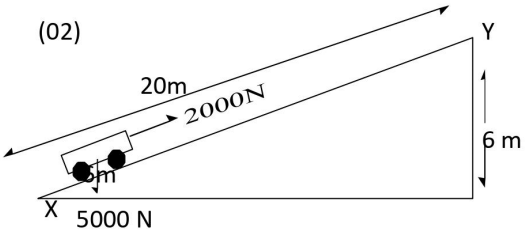
(02)



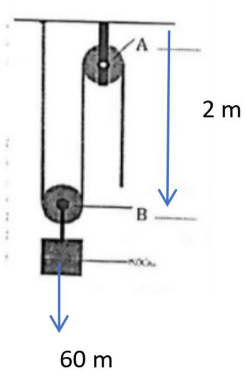
A trolley of 500 N was towed from X to Y along an inclined plane by applying a force of 2000 N parallel to the plane as shown in the figure. The length of the plane was 20 m and the height was 6 m.

i. Find the work-output of lifting the trolley.

ii. Find the work-input of the people who pulled the rope used to pull the trolley.

iii. Calculate
a) Mechanical advantage
b) Velocity ratio
c) Efficiency of the system

Iv.



(a) Identify the stationary pulley and the moving pulley of the system shown in the figure.
(b) What is the velocity ratio of this?
(c) What is the mechanical advantage of this system of pulleys?
(d) What is the advantage of using a pulley to draw water from a well?

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