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## PHYSICS

## BOOKS - PEARSON IIT JEE FOUNDATION

## THE MACHANISM OF MACHINES

Exeample

1. A boy able to lift a bag containing books of 30 N placed at an end of the see-saw by applying a force of 5 N at another end. Find the mechanical advantage of the see-saw.

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2. If mechanical advantage of an inclined plane is 3 and its height is 2 m , then what will be its length?

# Very Short Answer Type Qusetions 

1. Work done by a machine equals to $\qquad$ .

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2. A rod which is free to move around a point is called $\qquad$ .

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3. See-saw is an example of order lever.

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4. If the mechanical advantage of a lever is equal to 1 , then the effort applied on it $\qquad$ the load.

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5. If the slope of an inclined plane is steeper, the effort required to push a load through it is $\qquad$ .

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6. If MA of a simple machine is greater than 1 , then effort arm is $\qquad$ than the load arm.

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7. For $\qquad$ order lever, mechanical advantage (MA) is always greater than
8. For a single movable pulley, MA is $\qquad$ .

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9. Forceps are an example of $\qquad$ order lever.

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10. If mechanical advantages of two inclined planes $A$ and $B$ are in the ratio of $1: 3$, the slope of A must be $\qquad$ than that of $B$.

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11. If the effort arm of a lever is twice of its load arm, it is a $\qquad$ .
A. First-order lever
B. Second-order lever
C. Third-order lever
D. 1 or 2

## Answer: B

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12. Name a machine which can be used to :
change the direction of force applied.
A. Inclined plane
B. Single-fixed pulley
C. Scissors
D. Screw jack

## Answer: B

13. which of the following is wrong?
A. $I^{s t}$ order lever : $M A>1$
B. $I I^{\text {nd }}$ order lever: $M A>1$
C. $I I I^{r d}$ order lever : $M A>1$
D. single-fixed pullery : $M A=1$

## Answer: C

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14. Which of the following planes cannot be used to push load to a certain height?
A. A plane of slope 2
B. A plane of slope $\infty$
C. A plane of slope 0
D. Both (b) and (c)

## Answer: D

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15. If load is between the fulcrum and effort of a lever, it is called order lever.
A. $I^{s t}$
B. $I I^{n d}$
C. $I I I^{r d}$
D. $I V^{t h}$

## Answer: B

16. Efficiency of an ideal machine is $\qquad$ .
A. 0
B. 0.5
C. 0.9
D. 1

## Answer: D

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17. Which of the following is an example of wedge?
A. Axe
B. Needle
C. Knife
D. All of the above

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18. Ghat road is an example of
A. Wedge
B. Inclined plane
C. Block of pulleys
D. None of these

## Answer: B

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19. What is the principle used in wheel and axle? Mention its applications.
A. Screw driver
B. Tap
C. Screw
D. Door knobs

## Answer: C

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20. Regular oiling of parts increases their
A. Output work
B. Efficiency
C. Mechanical advantage
D. None of these

## Answer: B

1. Define machine.

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2. Define effort.

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3. Define load.

## - <br> Watch Video Solution

4. Define mechanical advantage.
5. Write a short note on maintenance of machinery.

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6. If an effort of 10 N is applied on a single-fixed pulley to lift a weight of 10 N , then find out its mechanical advantage.

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7. If an inclined plane of length 2 m is used to lift a load of 20 N to a height of 1 m , find the effort required to lift the load to that heiht using inclined plane.

8. A crowbar of length 0.75 m is used to dispace a body. Find its mechanical advantage, if the load arm is 0.25 m .

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9. A see-saw of length 2 m is pivoted at 50 cm form one end in a public park. What is the effort applied at the near end to the fulcrum to lift a load of 150 N at the far end to fulcrum?

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10. Find the mechanical advantage of the below figure:


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11. Ram used a crowbar of length 1.5 m as a $I I^{\text {nd }}$ order lever to displace a heavy sphere placed on the horizonat surface. If the crowbar applies a force of 240 N on the sphere at a distance of 100 cm from effort, then find the minimum effort applied by Ram to displace it.

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12. A tailor purchased a scissors fo length 25 cm through online shopping. He sent a feedback to the manfacturer saying 'I cannot cut the Jeans cloth even if I apply my maximum force 83.3 N on it, so please modify it, so please modify it without changing its length so that I can cut the Jeans cloth at least with my maximum effort'. If you are the manufacturer, how can you modify the scissors as per the feed-back given by the tailor? Initially fulcrum is exactly midway between two ends of the scissors and the minimum force required to cut the jeans cloth is 500 N . The position of the load should always be at 7.5 cm from the free end of load arm.

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13. Roopa observed that her mother is using a cutting plier instead of fire tongs to hold a hot container and she prevented her from doing so. Why?

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14. To open the lid of bottle, 50 N force is needed, Siri wanted to open the lid with her maximum effort of 10 N , which of the following openers is suitable for doing it?


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15. vO_newFlow

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Concept Application

1. Hari is studying in 6th standard and is interested in science related experiments. While reading simple machines topic from his text book,he started wondering as to which lever a pen belongs to in its writing position? The length of the pen he is using is 14 cm and he holds it at distance of 4 cm from its nib. If the force applied by Hari to write is 0.02 N , the mechanical advantage of the pen is $\qquad$ and it is acting as a
$\qquad$ order lever.
A. 5 , second
B. 0.25 , first
C. 2.5, third
D. 0.243 , third

## Answer: D

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2. A nut is placed in a nut cracker at 5 cm from the fixed end. If the force experienced by the nut is 100 N when a force of 20 N is applied at the free end of the nut cracker, find the length of the nut cracker.
A. 5
B. 25
C. 15
D. 20

## Answer: B

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3. Anil has a two-wheeler that weighs 120 kg . After completing his work, he used to park his vehicle in the regular parking place which is in connected to the ground with a ramp of inclination $45^{\circ}$. If the length of ramp is 1 m , then calculate the work done by Anil to park the vehicle anginst gravity. ( $\left(g=10 m s^{-2}\right)$
A. 10500 J
B. 1005 J
C. 1050 J
D. 1500 J

## Answer: C

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4. Krishna had parked his two-wheeler at "no parking" place as he did not find any board regarding the notice NO PARKING. After some time, the traffic police took away his bike to a nearby police station, by lifting it with a rope attached to a pulley arrangement. If the mass of the bike is 150 kg , the what is its weight in dynes?
A. $15 \times 10^{7}$ dynes
B. 1500 dynes
C. 150 dynes
D. 15 dynes

## Answer: A

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5. A farmer was cutting mangoes from a tree with a long stick of length 2 m . He cut almost all mangoes at the lower branches of tree and wanted to cut the mangoes at higher branches of it. To do this he attached another stick to the top of the first stick so that the overall length increases by 1 m . If the distance between his hands position is the same as before at 40 cm and weight of each mango is 5 N , then calculate the change in mechanical advantage of stick to do this, for the same effort of 20 N.
A. Mechanical advantage increases by 0.26
B. Mechanical advantage decreases by 0.0066
C. Mechanical increases by 0.0066
D. Mechanical advantage decreases by 1.87

## Answer: B

## D View Text Solution

## Assesment Test

1. Find the MA of first-order lever of length 50 cm , if the fulcrum is exactly midway between the effort and load.

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2. Find the ratio of the load arm to that of the effort arm of a secondorder lever if its mechanical advantage is 5 .

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3. Explain why, a single-fixed pullery is used to lift a load even if its MA is
4. How can you increase the mechanical advantage of a see-saw without their changing its length?

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5. How can use third order levers as machines even though their MA is less than one?

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6. If you are using a Screwdriver to twist out a screw, they?

## - View Text Solution

7. A rod attached to the center of a which is called $\qquad$ .
8. What is the efficiency of a machine, given mechanical advantage is 2 and velocity ratio is 4 ?

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9. A crowbar is of 150 cm length. Its fulcrum is at a distance of 50 cm from the load. Find out the mechanical advantage.

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10. Give two examples where we use wedges as simple machines.

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11. Although, mechanical advantage is less than 1 for class-three levers, we still use them. Give reason.

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12. If the mechanical advantage of a lever is 2.5 , what will be the effort you need to apply to lift a load of 50 N ?

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## Crossword

Across

1. Pulley whose axis of rotation is not fixed (2 Words)
2. This is a second-order lever used for a fruit cutter
3. Greater the number of pullcys, $\qquad$ is the force needed to lift heavy lc
4. Scissors are an example of $\qquad$ (3 Words)
