



Dr. Blosa Science

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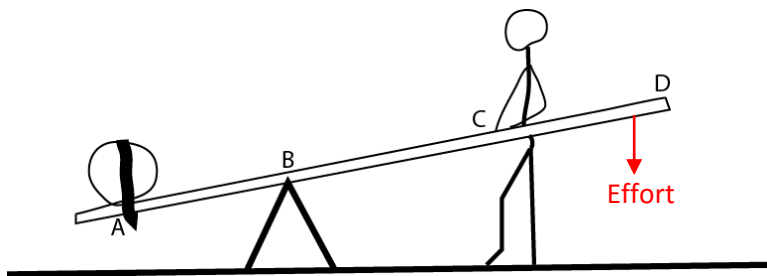
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Simple machines

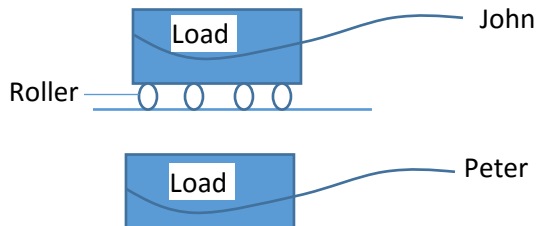
The diagram below shows a man using a pole for lifting a piece of stone. Use it to answer questions 1 and 2.



1. On the diagram, show the direction of the effort.
2. What should the man do to lift the load more easily?

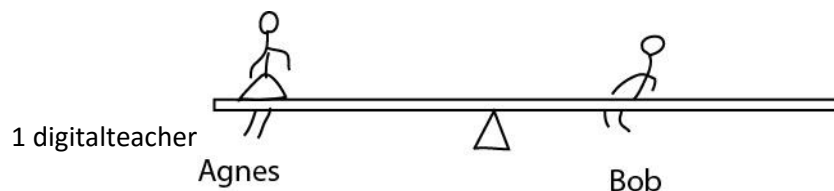
He should apply effort on position D to make work easier.

3. Blosa pulls a load of 50kg over a set of metal rollers. Peter pulls another load of the same weight along the ground (see diagram below)



- (a) Explain why one of the two (people) uses less force.
John uses less force because the rollers minimize friction at the surface
- (b) What is the advantage of a driver pouring sand on a slippery road?
To increase friction to facilitate movement.
- (c) Explain your answer in (b) above?
Sand makes slippery road rough which increases friction

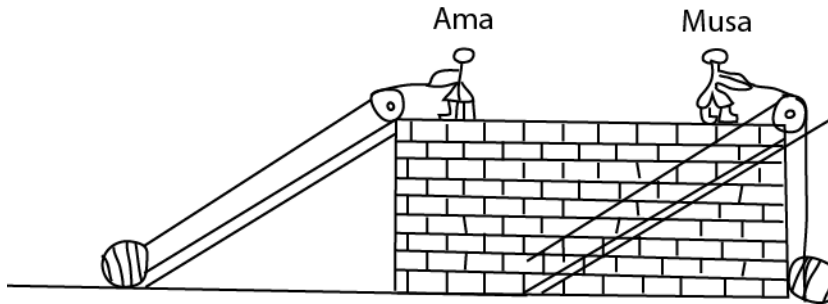
4. Bob and Agnes are sitting, balanced, on a seesaw as shown in the diagram below.



How does the diagram show that Bob is heavier?

Bob balances Agnes who sits further from the fulcrum

The diagram below shows two boys, Musa and Juma pulling pieces of wood of equal weight up the wall. Use it to answer questions 5 and 6.



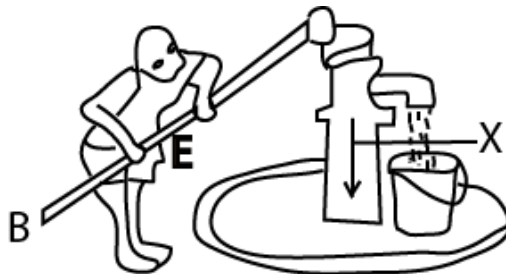
5. Which boy uses less force to pull wood?

Ama

6. Explain your answer to question 5 above.

Ama has a higher mechanical advantage hence work is made easier by using lesser effort.

7. The diagram below shows a boy collecting water from a water pump. Use it to answer the questions that follow.



- (a) Mark on the diagram with letter E the position of the effort.

- (b) What does the part marked X represent?

Atmospheric pressure

- (c) What change would the boy experience if he moved the hands to position B?

He would use less effort to pump water

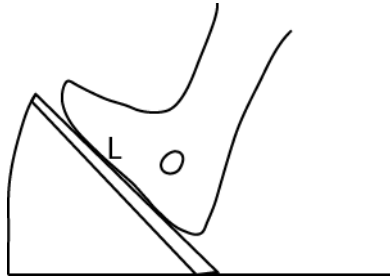
- (d) If the effort is 20, and the load is 80, what is the mechanical advantage of the pump?

$$\text{Mechanical advantage} = \frac{\text{load}}{\text{effort}} = \frac{80}{20} = 4$$

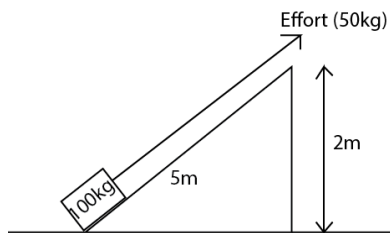
8. When drawing water from a borehole, why is the handle led far from the fulcrum?

To use less effort

9. The diagram above shows the foot of a driver accelerating the car. Indicate on it with letter L, the position of the load



10. The diagram below shows a machine used to lift a load using an effort of 50kg



(a) Name the machine.

Inclined plane

(b) What distance does the load and effort move through?

Load moves 2m while effort 5m

(c) How can you use less than 50kg to pull the load?

Reduce the angle of inclination

Use the diagram below to answer question 11.



11. Isaac who weighs 30kg and Susan who weight 45kg sit on seesaw above, such that Isaac sits at point X and Susan at point Y. which side of the seesaw go down?

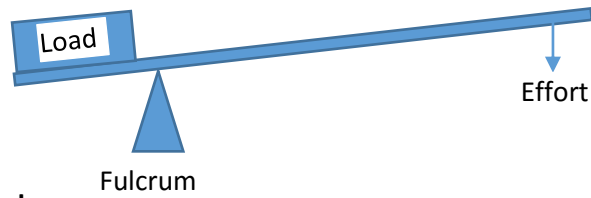
Taking moments at the fulcrum

Clockwise moment = $4 \times 45 = 180\text{gm}$

Anticlockwise moment = $30 \times 6 = 180\text{gm}$

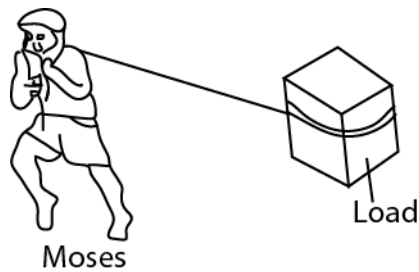
Since clockwise moment = anticlockwise moment, the seesaw balances.

12. In the diagram below, what class of lever is represented?



First class lever

13. In the diagram, Moses is pulling a load the ground surface, as shown below.



How could Moses make his work easier?

By using rollers

14. What is the First Aid for high fever?

Sponging with wet lukewarm cloth

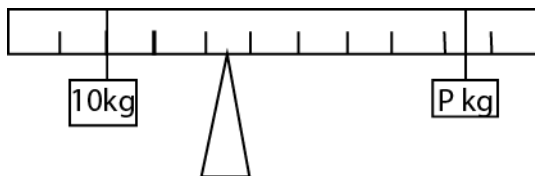
15. In terms of machines, how is the hammer similar to the human arm?

Both make work easy

16. How do road builders increase friction on the surface of the road?

By adding sand or tarmacking

The diagram below shows a lever which is balanced. Use it to answer question 45.



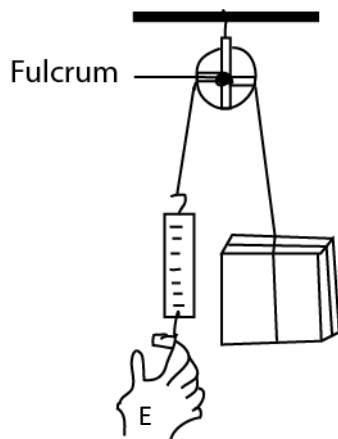
17. The diagram shows a lever which is balanced, calculate the weight of P.

Clockwise moment = anticlockwise moment

$$P \times 5 = 10 \times \frac{5}{2}$$

$$P = 5\text{kg}$$

18. Use the diagram of the machine below to answer the question that follow.



(a) What is the name of such a machine?

Pulley

(b) What class is it?

First class lever

(c) Use letter E to show effort on the diagram.

(d) Which important activity in school is done using this machine?

Digging pit latrine, digging underground well

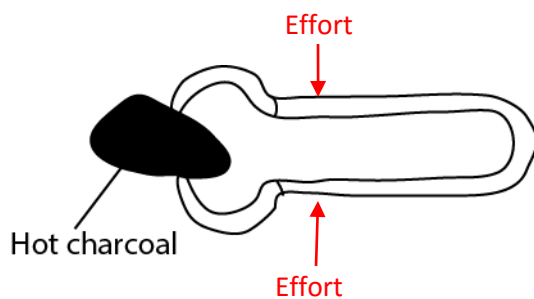
19. Apart from using more energy, name one other disadvantage of friction.

Wears out surfaces

Creates unnecessary heat

Creates unnecessary noise

The diagram below is of a simple machine. use it to answer questions 20 and 21



20. Indicate with letter E the position of the effort.

21. What class of lever is this machine?

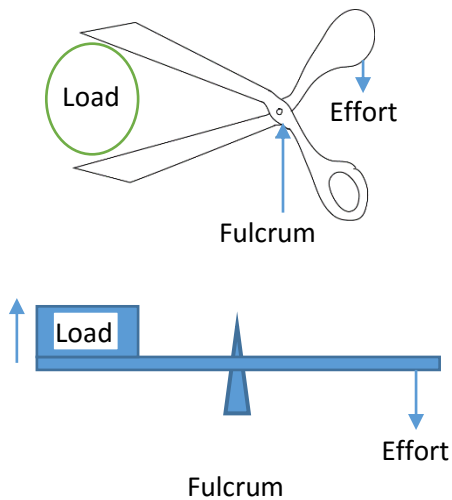
Third class level

22. Why do tyres of cars wear out more quickly on tarmac roads than marram roads?

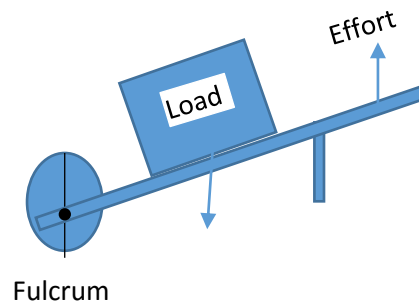
Tarmac roads have high friction than marram roads

23. Show the difference between the first-class lever and the second –class lever by drawing and labeling the two diagrams.

(a) First –class lever



(b) Second –class lever

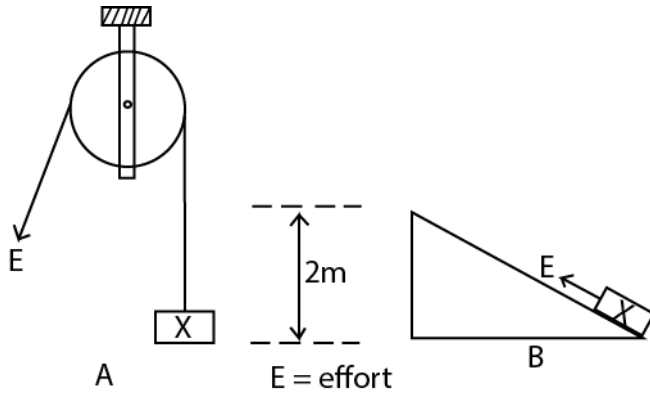


24. Peter uses a wheel barrow to carry potatoes from his garden to the market. What is the advantage of using such a machine?

Less effort is required

25. The diagram bellow show two types of simple machines labelled a and b

Use it to answer the questions that follow.



(a) Name each of the machines shown in the diagram

(i) **A: single fixed pulley**

(ii) **B: inclined plane**

(b) Which of the two machines would you choose to use to lift the load **X** to a height of two metres?

Pulley

(c) Give a reason for your choice of machine in (b) above.

Uses less effort

26. Give any one form of energy produced when a carpenter driver drives a nail into a piece of wood a harmer.

Sound energy

Heat energy

The diagram below shows a simple lever system

Use it to answer question 27, 28 and 29.



27. Show on the diagram, with an arrow, the direction of movement of the effort at P as load is being lifted.

28. At which of the two points D and P shown on the diagram will less effort be used to lift the load?

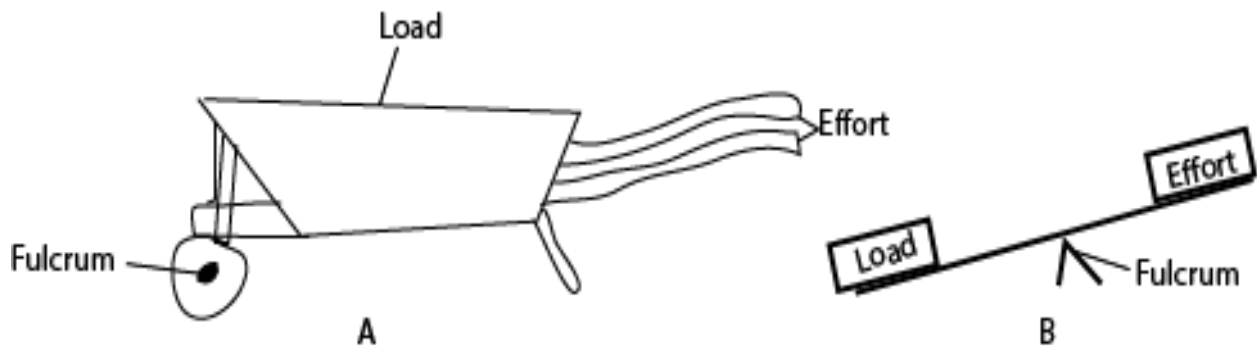
At P

29. Give a reason for your answer in 38 above.

It is far from the pivot.

30. The diagram below shows two simple machines

Use it to answer the question that follow



(a) Name the machine marked with the letter A

Wheel burrow

(b) State the class of lever to which each of the above machines belongs:

(i) Machine A: **second class lever**

(ii) Machine B: **first class lever**

(c) Give any one example of a machine which works in the same way as the machine marked with letter B

Pair of scissor

Pliers

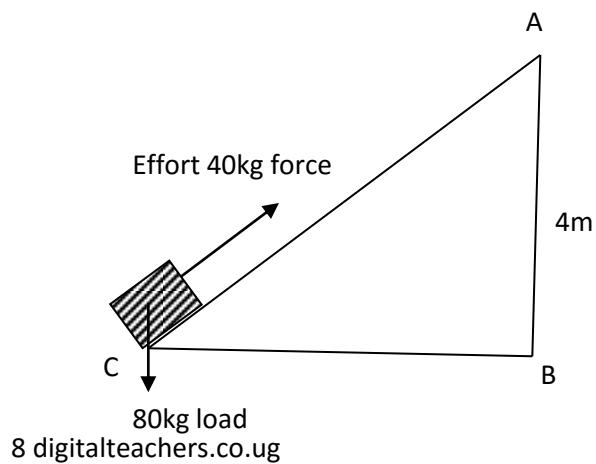
31. Give any one form of energy that is produced during the process of splitting firewood with an axe.

Heat energy

Sound energy

32. The diagram below shows a machine used for lifting loads

Use it to answer the question that follow.



(a) What distance is the load to be lifted?

4m high

(b) Give the advantage of lifting the load alongside CA.

Less effort is used to make work easier

(c) Find the mechanical advantage of the machine above.

$$MA = \frac{\text{Load}}{\text{Effort}} = \frac{80}{40} = 2$$

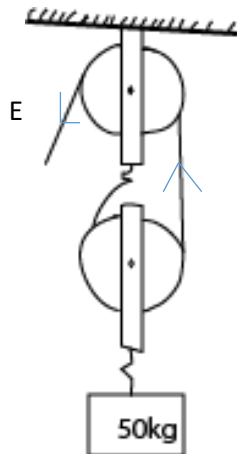
(d) How can the machine be improved so that less effort is used to lift loads.

By reducing the angle of inclination of the plane

33. Whenever peter opens or closes his door, the hinges makes noise. What can he do to stop the noise when he is opening?

Oiling the hinge to reduce friction

34. The diagram below is of a pulley system. Use it use to answer questions that follow.



(a) Name the types of pulley system shown above

Block and tackle pulley system

(b) Use an arrow to show the direction of effort.

(c) If the mechanical advantage of the machine is 2 and the load being carried by the machine is 50kg. Find the effort needed to raise that load.

$$MA = \frac{L}{E} = \frac{50}{E} = 2$$

$$E = \frac{50}{2} = 25kg$$

$$E = 25 \times 10 = 250N$$

35. Name the class of simple machines to which an axe belongs.

An axe is an example of **wedge** type of simple machine

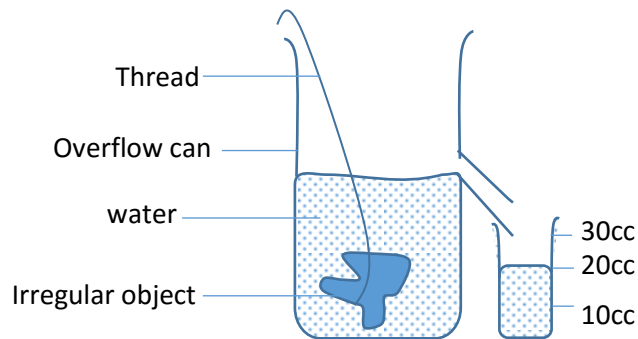
36. Name the turning point of a machine.

Fulcrum

37. State any one way in which friction in moving parts of a machine can be reduced.

- **By oiling**
- **By greasing**
- **by using roller**
- **By using ball bearings**

38. An irregular object was lowered into an overflow can **A** containing water. The water it displaced was collected in container **B** as shown below.



(a) What is the volume of the irregular object?

20cm³

(b) Calculate the density of the irregular object if its mass is 60 g

$$\text{Density} = \frac{\text{mass}}{\text{volume}} = \frac{60}{20} = 3 \text{ gcm}^{-3}$$

39. To which class of levers does a wheel barrow belong?

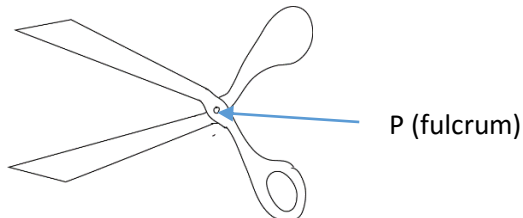
Second class lever

40. State the difference in units to measure weight and mass.

Mass is measured in kilogram (kg) whereas weight is measured in newton (N)

The diagram below shows a simple machine

Use it to answer questions 41 and 42.



41. To which class of levers does the machine above belong?

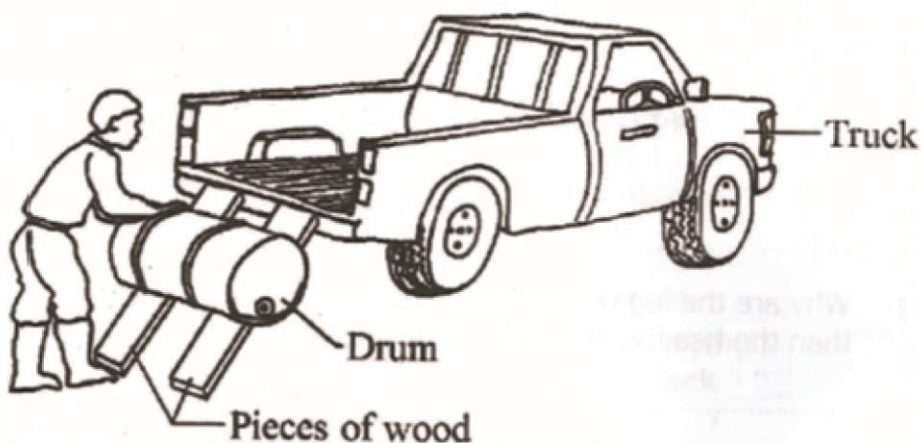
First class lever

- In first class lever, the fulcrum is between the load and effort:
- In second class lever the load is between the fulcrum and the efforts e.g. wheelbarrow
- In third class lever, the load and the fulcrum e.g. fore arm

42. Give one reason why less effort is applied to move a load using first class levers

In a first class lever, the fulcrum is located between the load and the effort. **If the fulcrum is closer to the load**, then less effort is needed to move the load a shorter distance

43. The diagram below shows a man using a simple machine to load a drum onto a truck. Study and use it to answer the questions that follow



(a) What type of simple machine is the man using?

Inclined plane

(b) Give any two examples of the type of simple machine you have named in (a) above

- (ii) Sloping ramps,
- (iii) flyovers,

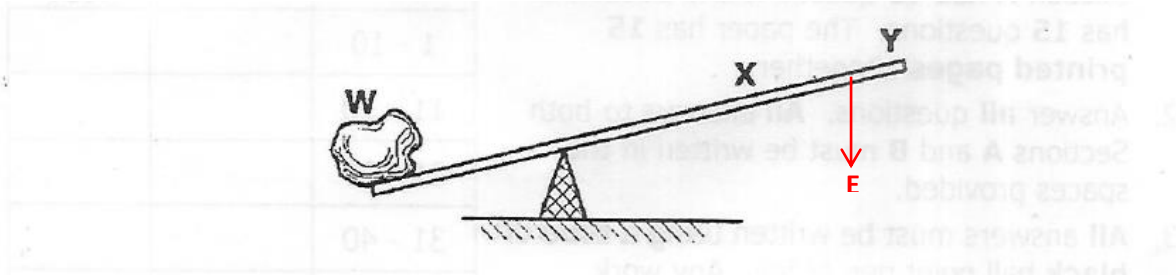
(iv) roads on hills

(v) staircases

(c) How can the man improve on the simple machine above in order to to make his work easier?

By using longer pieces of wood to reduce the nagle of inclination

The diagram below is of a crow bar. Study and use it to answer questions 44 and 45.



44. Which of the two positions X and Y requires less effort to overcome the load W

Position Y

45. Indicate on the diagram with an arrow E, the direction of the effort used to overcome the load W