G8 Science: Class 8 Homework

1. If the output force is five times larger than an input force, what is the mechanical advantage? Use the GRASS method. **[5 marks]**

2. If an input of 0.6N is required to lift a rock of 36N, what is the actual mechanical advantage? Use the GRASS method. **[5 marks]**

3. The mechanical advantage of a class 3 lever will always be less than 1. Explain why.
   [2 marks]

4. If there is no mechanical advantage to class 3 levers, why are they considered useful?
   [2 marks]

5. With a class 1 lever, does mechanical advantage increase or decrease as the fulcrum is moved closer to the load? Explain why. **[3 marks]**

6. What is the mechanical advantage of a lever than can lift a 100N load with an input force of 20N? Use GRASS method. **[5 marks]**

7. a) A single movable pulley is being used to move a 140N load. The pulley is a little dirty so it adds another 5N of frictional force. Can this load be moved with a 75N input force? Explain your answer. **[3 marks]**

    b) Would a single fixed pulley work? Explain your answer. **[2 marks]**

8. Two ramps of different lengths are used to lift furniture into the same truck. Which ramp requires less force? Justify your answer. **[2 marks]**

9. A metre stick is used as a lever. If the input force is applied at 0 cm and the output force is exerted at 100 cm, what is the ideal mechanical advantage if the fulcrum is at 75 cm? Use the GRASS method. **[5 marks]**

10. To increase the mechanical advantage of a lever, should you increase or decrease the length of the output arm? **[2 marks]**

11. Draw a pulley system that has: **[2 marks]**
    a) Ideal Mechanical Advantage of 2   b) Ideal Mechanical Advantage of 3

12. A ramp that is 5 m long is used to raise an object 2 m vertically. Find the ideal mechanical advantage of this ramp. Use the GRASS method. **[5 marks]**

13. The handle of a screwdriver has a radius of 3 cm. If the shaft of the screwdriver has a radius of 0.5 cm, what is the ideal mechanical advantage of the screwdriver when used to tighten a screw? Use the GRASS method. **[5 marks]**

14. Explain how a lubricant affects the efficiency and the frictional forces of a machine. **[2 marks]**

15. How efficient is a pulley system if an operator has to pull 4.0 m of rope to raise a 250N pail of water a distance of 2.0 m? The operator is pulling with a force of 150N. Use the GRASS method. **[5 marks]**

16. A block and tackle is a rope and pulley system that uses multiple pulleys. It multiplies a small force into a large one. If a motor has a weight of about 2500N and people pull 4.0m of rope with a force of 700N to raise the motor 1.0m, how efficient is the block and tackle? Use GRASS method. **[5 marks]**

17. A student does 25J of work on the handle of a pencil sharpener. If the pencil sharpener does 20J of work on the pencil, what is the efficiency of the sharpener? Use the GRASS method. **[5 marks]**

18. What four criteria are often used when assessing a system? **[4 marks]**

19. Suppose the government passed a law saying "Everyone must use an electric toothbrush." Use the four criteria to assess this change in the system of brushing your teeth. **[4 marks]**