Name _____ Date _____

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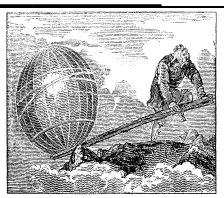
Analysis of Simple Machines

$W=Fd$ $w=mg$

Work Output$=F_r d_r$ Work Input$= F_e d_e$

$IMA = d_e/d_r$ $MA = F_r/F_e$

Eff = Work Output/Work Input x 100



1) A person pushes an object up a 4 m ramp to raise the object 0.5 m. What is the IMA?

2) A person pulls the rope of a pulley system 20 m to raise a crate 5 m. What is the IMA?

3) A person supplies a force of 30 N to a lever to raise a 180 N object off the ground. What is the MA?

4) A person pushes a 20 kg box up a ramp. They use a 50 N force. What was the MA?

5) A person pushes a lever 3 m to raise a 50 N object 2m. The person uses a force of 35 N.
   a) What is the IMA?
   b) What is the MA?

Answers: 1) 8 2) 4 3) 6 4) 3.92 5a) 1.5 b) 1.43

6) A person pushes a 30 kg box 6 m up a ramp. The person uses a force of 150 N. The box is raised 2 m off the ground.
    a) What is the IMA?
    b) What is the MA?

7) A 1400 N engine is raised 3 m by a pulley system. The rope is pulled 25 m by a person who supplies a force of 200 N.
    a) What is the IMA?
    b) What is the MA?
    c) What is the work output?
    d) What is the work input?
    e) What is the efficiency?

Answers: 6a) 3 b) 1.96 7a) 8.33 b) 7 c) 4200 J d) 5000 J e) 84%

8) A person pulls the rope of a pulley system 50 m to raise a 20 kg object 4m. The person uses a force of 25 N.
    a) What is the IMA?
    b) What is the MA?
    c) What is the work output?
    d) What is the work input?
    e) What is the efficiency?

9) A person pushes a 70 N box 5 m up a ramp. The person uses a force of 20 N. The box is raised 1 m off the ground.
    a) What is the IMA?
    b) What is the MA?
    c) What is the work output?
    d) What is the work input?
    e) What is the efficiency?

Answers: 8a) 12.5 b) 7.84 c) 784 J d) 1250 J e) 62.7 % 9a) 5 b) 3.5 c) 70 J d) 100 J e) 70%

10) A group of people use a lever to raise a 90 kg boulder 4 m. They push the lever 15 m and supply a force of 300 N.
    a) What is the IMA?
    b) What is the MA?
    c) What is the work output?
    d) What is the work input?
    e) What is the efficiency?

Answers: 10a) 3.75 b) 2.94 c) 3528 J d) 4500 J e) 78.4%