Directions For Numbers 101-125: Read each of the following multiple-choice items and the possible answers carefully. Mark the letter of the correct answer on your answer sheet or as instructed by your teacher. Remember: Make no marks on this test.

101 The amount of output work required to lift a crate with a pulley system is 2200 J. The effort force on the pulley is 40 N. What is the effort distance in meters?
   A  35
   B  55
   C  72
   D  250

102 What is the study of how a product will be used and how it effects people?
   A Utilities
   B Cyronomics
   C Ergonomics
   D Someone else’s problem

103 The maximum density for a building material should be no greater than 200 kg per cubic meter. This is a design:
   A Control.
   B Criteria.
   C Refinement.
   D Constraint.

104 Before they can be solved, technological problems must be:
   A Constrained.
   B Graphically communicated.
   C Documented.
   D Researched.

105 Design problems usually have:
   A Multiple solutions.
   B Only one possible solution.
   C Clear solutions.
   D Quantified solutions.

106 An engineer must design a booster rocket system capable of launching a load 3.7 times the mass of the space shuttle. This is an example of a design:
   A Control.
   B Criteria.
   C Refinement.
   D Constraint.

107 Requirements of a design such as criteria, constraints, and efficiency:
   A Never conflict.
   B Are independent of each other.
   C Always conflict.
   D Sometimes conflict.

108 Communication systems allow information to be:
   A Transferred.
   B Edited.
   C Understood.
   D Prototyped.
What is the first step in the design process?
A Refine the solution.
B Communicate the results.
C Define the problem.
D Identify the criteria.

A conceptual model:
A Is a scientific way to describe work, force, and power.
B Explains an idea that cannot be easily described by written text.
C Is a visual technique using only three dimensions.
D Has at least one dependent and one independent variable.

Graphic communication systems involve the design, development, and production of what?
A Written text
B Machines
C Visual images
D Procedures

Scientific visualization can be:
A Conceptual.
B Data-driven.
C Both conceptual and data-driven.
D Neither conceptual or data-driven.

What is a prototype?
A Single-cell organism
B Design style
C Working model
D 2-D model

If the mechanical advantage of a machine is 1, then:
A The machine does not work.
B The machine does not multiply force.
C The machine is 100% efficient.
D The work output is greater than the work input.

What is the definition of power?
A Work times time
B Force times time
C Work divided by time
D Distance divided by force
What is the definition of work?
A. Force times distance
B. Power times distance
C. Efficiency divided by force
D. Power divided by force

What is the definition of force?
A. Work times distance
B. Mass times acceleration
C. Effort times mass
D. Mass times time

(Fill in the blank) ______________ is how many times the effort force is multiplied.
A. Resistance
B. Efficiency
C. Power
D. Mechanical advantage

The effort force on a lever being used to move a rock is 700 N. This force is applied through a distance of 0.8 m. What is the work input in Joules?
A. 420
B. 560
C. 780
D. 875

On a pulley, if the input work is 5000 J and the resistance distance (how far something is moved) is 0.5 m, what is the resistance force?
A. 100
B. 1,000
C. 10,000
D. 100,000

If the resistance force applied by an object being moved is 3000 N, what is the object’s mass in kilograms? (Using \( a = 10 \, m/s^2 \))
A. 300
B. 600
C. 1200
D. 6000
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**Objectives measured:** 3

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