

Pre Evaluation Mechanical Challenge 2005



Directions For Numbers 1-25 : 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.**

1

As long as we have movement in a device, there is a need for

- A Machines
- B Wind
- C Electricity
- D Friction

2

Which step of the DEAL design process is a student performing when making repairs and modifications to a completed project?

- A Define
- B Explore
- C Act
- D Look back

3

Which step of the DEAL design process is a student performing reading the Mechanical Challenge rules?

- A Define
- B Explore
- C Act
- D Look back

4

Which statement is the **MOST** accurate in describing the current state of mechanical devices in our society?

- A Present but less visible
- B Quickly disappearing
- C All but gone in our digital world
- D Antiques of the past

5

When attempting to loosen a lug nut on an automobile wheel, increasing the length of the lug wrench will:

- A Increase friction applied.
- B Decrease friction applied.
- C Make it harder to loosen the nut
- D Make it easier to loosen the nut

6

Which simple machine transmits the force used to activate a front wheel brake on a bicycle?

- A Wheel and axle
- B Lever
- C Wedge
- D Pulley

7

Which device would use the **MOST** simple machines?

- A Shovel
- B Butter knife
- C Bicycle
- D Scissors

8

Early stone tools such as a flint knife are examples of which type of machine?

- A Complex
- B Compound
- C Simple
- D Not a machine

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9 If the input of a pulley is to pull the rope, then the lifted object would be called the:

- A Effort force.
- B Potential energy.
- C Output.
- D Kinetic energy.

10 The steering wheel of a car is an example of what type of simple machine?

- A Screw
- B Wheel and Axle
- C Pulley
- D Robot

11 The enemies of all machines are?

- A Friction and heat
- B Gravity and time
- C Light and heat
- D Friction and gravity

12 In 1908 Henry Ford invented the?

- A First automobile
- B First internal combustion engine
- C First production line
- D the Thunder Bird automobile

13 The accurate calculation of longitude was accomplished in 1764 using which device?

- A Lunar telescope
- B Nautical Sextant
- C Transit
- D Mechanical clock

14 Which activities are considered part of the "Act" step in the DEAL design process?

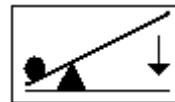
- A Brainstorming
- B Making a final sketch
- C Measuring and drilling holes
- D Reviewing the design a year later

15 Which is considered a prototype?

- A A sketch of the model
- B A working cardboard model
- C A finished Mechanical Challenge device
- D A photograph of the device

16 Which fulcrum placement requires the **LEAST** effort force to lift the round load?

A



B



C



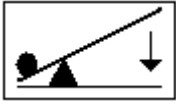
D



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17 Which fulcrum placement would lift the round load the **GREATEST** distance?

A



B



C



D



18 A ramp is used to load a truck. Which action would result in requiring less effort?

- A Increasing its length
- B Decreasing its length
- C Increasing the ramp width
- D Decreasing the ramp width

19 Which are simple machines?

- A Lever, pulley, wedge
- B Inclined plane, lever, computer
- C Wheel and axle, pulley, robot
- D Screw, computer, robot

20 How many simple machines are there?

- A 2
- B 4
- C 6
- D 8

21 Using a lever you are able to lift a 45 lb block with only 15 lbs of effort force. What is the mechanical advantage of the lever?

- A 0.3
- B 1.3
- C 3
- D 30

22 Using the formula $\text{Work} = \text{Force} * \text{Distance}$, how much work is needed to lift a 40 lb weight 5 feet into the air?

- A 8
- B 20
- C 200
- D 2,000

23 A Block and Tackle has a mechanical advantage of 4. To lift a motor that weighs 40 lbs, how much effort force is required?

- A 10
- B 25
- C 40
- D 160

24

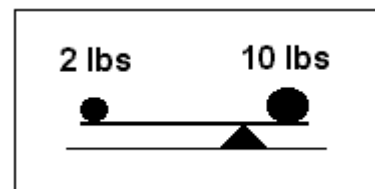


Fig.MC07.01

Using the formula, $\text{Mechanical Advantage} = \text{Resistant Force} / \text{Effort Force}$, what is the mechanical advantage of the lever in Fig.MC07.01

- A 2
- B 5
- C 10
- D 20

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25



Fig.MC07.02

Pulleys A and B are connected with a belt.
Pulley A has two times the circumference of B.
(see Fig.MC07.02) If A turns 5 times, how
many times will B turn?

- A 2.5
- B 5
- C 10
- D 20

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?	⊙	Answer/ Scale	Objective	?	⊙	Answer/ Scale	Objective
1	1	A	MC07.03 Technology	14	14	C	MC07.03 Technology
2	2	D	MC07.03 Technology	15	15	B	MC07.03 Technology
3	3	A	MC07.03 Technology	16	16	A	MC07.02 Science
4	4	A	MC07.03 Technology	17	17	D	MC07.02 Science
5	5	D	MC07.03 Technology	18	18	A	MC07.02 Science
6	6	B	MC07.03 Technology	19	19	A	MC07.02 Science
7	7	C	MC07.03 Technology	20	20	C	MC07.02 Science
8	8	C	MC07.03 Technology	21	21	C	MC07.01 Math
9	9	C	MC07.03 Technology	22	22	C	MC07.01 Math
10	10	B	MC07.03 Technology	23	23	A	MC07.01 Math
11	11	D	MC07.03 Technology	24	24	B	MC07.01 Math
12	12	C	MC07.03 Technology	25	25	C	MC07.01 Math
13	13	D	MC07.03 Technology				

Total questions on test: 25

Minimum points
required to achieve
mastery category

Objectives measured: 3	Items	Points	●	◐	Questions measuring this objective
MC07.03 Technology	15	15	11	10	1 2 3 4 5 6 7 8 9 10 11
MC07.03 Technology					12 13 14 15
MC07.02 Science	5	5	4	3	16 17 18 19 20
MC07.01 Math	5	5	4	3	21 22 23 24 25
Totals		25	19	16	

MC07

? = Test Question Number ⊙ = line on GP Form

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Items used in test

?	Item name	?	Item name	?	Item name
1	MC07.03.00.05	10	MC07.03.00.02	18	MC07.02.00.05
2	MC07.03.00.09	11	MC07.03.00.04	19	MC07.02.00.01
3	MC07.03.00.10	12	MC07.03.00.08	20	MC07.02.00.04
4	MC07.03.00.01	13	MC07.03.00.06	21	MC07.01.00.02
5	MC07.03.00.14	14	MC07.03.00.12	22	MC07.01.00.03
6	MC07.03.00.07	15	MC07.03.00.11	23	MC07.01.00.01
7	MC07.03.00.13	16	MC07.02.00.02	24	MC07.01.00.04
8	MC07.03.00.03	17	MC07.02.00.03	25	MC07.01.00.06
9	MC07.03.00.15				

MC07

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