

Unit Test – Simple Machines – Question 1

Archimedes designed a system for moving water from one place to another. His simple machine is the ...



- A. lever B. wedge C. screw D. ramp

Unit Test – Simple Machines – Question 2

A simple machine that converts rotational motion to linear motion is called ...



- A. lever B. wedge C. screw D. ramp

Unit Test – Simple Machines – Question 3

Scissors are a combination of what two machines?



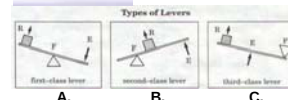
- A. wheel and axle
B. wedge and lever
C. wedge and screw
D. wheel and wedge

Unit Test – Simple Machines – Question 4

A diving board...



Is an example of what class of lever?



- A. B. C.

Unit Test – Simple Machines – Question 5

Simple machines can be used for 4 different purposes. The purpose of a screwdriver is to ...



- A. Transfer the force
B. Multiply the force
C. Increase or decrease the speed
D. Change the direction of a force

Unit Test – Simple Machines – Question 6

The purpose of a wheel and axle is to increase the size of a force, but it can also be used to...



- A. Transfer the force
B. Multiply the force
C. Increase or decrease the speed
D. Change the direction of a force

Unit Test – Complex Machines – Question 7

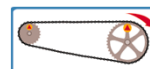
The penny farthing was an early bicycle design - complex machine - that was a combination of these types of simple machines ...

- A. Levers and pulleys
B. Incline plane & Screw
C. Levers & wheel and axle
D. Pulleys & wheel and axle



Unit Test – Complex Machines – Question 8

Linkages and transmissions are parts of a system that perform a specific function. The function they perform is to ...



- A. increase torque
B. increase speed
C. transfer weight
D. transfer force

Unit Test – Complex Machines – Question 9



Within the bicycle, there are many different parts with different functions.

Each of these parts performs a specific function so that the bicycle can perform its overall function – to move you around.

The many different parts of the bicycle are called ...

- A. subsystems
B. components
C. technologies
D. devices

Unit Test – Complex Machines – Question 10



Transmissions are special types of linkages.

They are used to transfer energy from the engine to the wheels in a car. The car transmission contains a number of these that allow the driver to apply a large force to move objects slowly or a small force to move objects quickly.

- They are ... A. chains
B. fan belts
C. gears
D. linkages

Unit Test – Complex Machines – Question 11

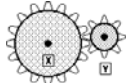
An essential component of most mechanical systems, gears transfer motion and force to other gears and wheels. If the gear wheels are the same size they are called ...



- A. equal gears
- B. parallel gears
- C. reducing gears
- D. multiplying gears

Unit Test – Complex Machines – Question 12

The gear that has the force applied to it (in the illustration it is the Y gear) is called the ...



- A. reduction gear
- B. multiplying gear
- C. driving gear
- D. driven gear

Unit Test – Complex Machines – Question 13

The gear train illustrated here will ...



- A. reduce - change direction - multiply - change direction
- B. multiply - change direction - change direction - reduce
- C. change direction - multiply - reduce - change direction
- D. change direction - reduce - multiply - reduce

Unit Test – Mechanical Advantage – Question 14

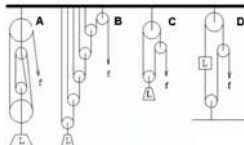
The easiest way to calculate the ideal mechanical advantage (or, real speed ratio) of a pulley system is to count the number of ...

- A. pulleys
- B. ropes all together
- C. ropes supporting the load
- D. rope and pulley combinations



Unit Test – Mechanical Advantage – Question 15

Which pulley system has a speed ratio of 4?



Unit Test – Mechanical Advantage – Question 16

In a stapler, the force that the stapler applies to the paper to be stapled is called the ...

- A. input force
- B. output force
- C. speed ratio
- D. mechanical advantage



Unit Test – Mechanical Advantage – Question 17

A pulley is used to lift a load.

The input force used is 45N, while the output force is 180N.

The mechanical advantage of the pulley is ...

- A. 2
- B. 3
- C. 4
- D. 5



Unit Test – Efficiency – Question 18

Bicycles are very useful machines. The reason they are so useful is because they get us from place to place very quickly (faster than we could walk).

A cyclist riding this bicycle applies a force of 650 N to the pedals. Through the linkage (chain), the output force of the bicycle to the wheels is 72N. The mechanical advantage of this bicycle is ...

Formula

$$MA = F_{out} / F_{in}$$



- A. 1.00
- B. 0.11
- C. 9.02
- D. 4.60

Unit Test – Efficiency – Question 19

Lubricants are used to reduce friction. But, sometimes we need friction in a machine for it to perform properly. Slipping and sliding would occur and proper gripping would be impossible without friction.

Which SPORT (with the action indicated) will decrease friction:

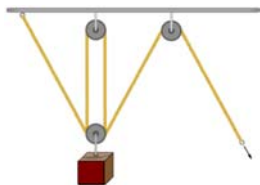
- A. Cycling - tires interacting with the road surface
- B. Baseball - rosin used on the bat or ball
- C. Gymnastics - rosin is used on rings or bars
- D. Curling - sweep the ice in front of the rock



Unit Test – Efficiency – Question 20

Efficiency is a measure of how well a machine does the work it is built for and can be calculated by: Dividing the mechanical advantage of the machine by its speed ratio and multiplying by 100.

A block and tackle that has a mechanical advantage of 12 and a speed ratio of 15, has an efficiency rating of ...



- A. 12.5%
- B. 25.0%
- C. 80.0%
- D. 95.5%

Unit Test – The Science of Work – Question 21

"Work is done when a force acts on an object to move that object through a specific distance". Use the formula $W = F \times d$.

To lift a box onto a table that is .5 m off the floor, you need to use 60N of force. How much work is done ?

- A. 20J B. 30J C. 40J D. 50J



Unit Test – The Science of Work – Question 22

To lift your chair up onto your desk, which is 0.4m off the ground, you exert a force of 50N .

- A. 20J B. 30J C. 40J D. 50J



Unit Test – The Science of Work – Question 23

Pushing a car stuck in the snow is hard work. The people in this picture tried very hard to get the car moving, but they couldn't move it. How much work did they do?



- A. NONE B. 10J C. 40J D. 100J

Unit Test – The Science of Work – Question 24

From the list of statements provided below, indicate which statement is **correct**, based on what you have learned about work in this section.

- A. A machine does all the work for us.
- B. When using a machine we do less work.
- C. It is hard '**work**' memorizing definitions for the Science test.
- D. Just being able to move the file cabinet 10 cm was hard '**work**'.

Unit Test – Efficiency – Question 25

A worker found that 1600J of work was needed to get 1200J of work done by using a ramp.



The efficiency of the ramp he used was ...

- A. 75% B. 85% C. 90% D. 95%

Unit Test – The Science of Work – Question 26

A worker found that he was able to get 2400J of work out of the block and tackle he was using. He put in 2600J of work, but it was much easier than he thought.



The efficiency of the **block and tackle** he used was ...

- A. 78.3% B. 82.6% C. 92.3% D. 99.9%

Unit Test – Hydraulics/Pneumatics – Question 27

Pressure is the measure of a force applied to a specific area. The unit of measurement is named after a scientist, who's work with fluids gave us many important ideas regarding how fluids behave in different situations or conditions. The unit of measurement for pressure is _____ and is named after _____.

- | | | | |
|-----------------|---------------|--------------|------------|
| A. 'Einstein' | B. 'Pascal' | C. 'Newton' | D. 'Meter' |
| Albert Einstein | Blaise Pascal | Isaac Newton | Hugo Meter |

Unit Test – Hydraulics/Pneumatics – Question 28

A hydraulic system is able to have a high mechanical advantage and move very heavy loads because under extreme pressure in a closed system, it uses ...



- A. air B. water C. liquid D. gas

Unit Test – Hydraulics/Pneumatics – Question 29

'Pressure within a confined space is transmitted in all directions equally throughout the fluid.' This science principle enables us to apply it to mechanical systems to increase the mechanical advantage of certain machines, such as those that are operated with hydraulics or pneumatics. A principle such as this one is always true, so it is considered a ...

- A. law B. fact C. theory D. hypothesis

Unit Test – Hydraulics/Pneumatics – Question 30

To calculate the ideal **mechanical advantage** of a hydraulic system, we utilize the size of the input and output pistons.

What is the ratio of this hydraulic device?

- A. $MA = d^{out} / d^{in}$ B. $MA = d^{in} / d^{out}$
- C. $MA = d^{in} \times d^{out}$ D. $MA = d^{out} \times d^{in}$

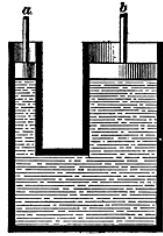


Unit Test – Hydraulics/Pneumatics – Question 31

We can also calculate the **mechanical advantage** of a hydraulic system, when we know the amount of force being applied to the input piston and the output piston.

The force ratio of the two pistons gives us the mechanical advantage of the hydraulic device.

What is the formula you use to determine mechanical advantage of a hydraulic device?

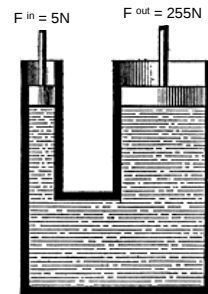


- A. $MA = F^{out} / F^{in}$ B. $MA = F^{in} / F^{out}$
 C. $MA = F^{in} \times F^{out}$ D. $MA = F^{out} \times F^{in}$

Unit Test – Hydraulics/Pneumatics – Question 32

Calculate the **mechanical advantage** of this hydraulic jack, with the information provided.

- A. $MA = F^{out} / F^{in} = 255N / 5N = 51$
 B. $MA = F^{in} / F^{out} = 5N / 255N = 0.02$
 C. $MA = F^{in} \times F^{out} = 5N \times 255N = 1275$
 D. $MA = F^{out} \times F^{in} = 255N \times 5N = 1275$



Unit Test – Hydraulics/Pneumatics – Question 33

A hydraulic system can be used in many different situations (applications). Hair stylists would use hydraulics in their salons to ...



- A. rinse and wash hair
 B. raise and lower chair
 C. rearrange the furniture
 D. stock their shelves

Unit Test – Hydraulics/Pneumatics – Question 34

The heart and the circulatory system in your body could be considered a hydraulic system. What could your lungs be considered? ...

- A. Pressure system
 B. Exchange system
 C. Hydraulic system
 D. Pneumatic system

Unit Test – Hydraulics/Pneumatics – Question 35

Using a jackhammer enables a person to break up concrete because air is forced onto a 'chuck' which hits the ground with a great deal of force.



A construction worker with an air-powered nailer uses their machine to pound in nails with a great deal of force.



- Both of these tools are examples of ...
 A. Force
 B. Power
 C. Pneumatics
 D. Hydraulics

Unit Test – Evaluating Mechanical Devices – Question 36

Advances made in the technological improvement of mechanical devices often comes as a result a scientific discovery. It wasn't until the 1940's that this discovery was widely used outside Canadian towns and cities. The discovery was ...

- A. light
 B. electricity
 C. magnetism
 D. convection

Unit Test – Evaluating Mechanical Devices – Question 37

The reason for the design of mountain bikes is considered to be evaluating a function - **to handle the rough terrain they would be used in** - because of this influence ...



- A. ergonomics
 B. mass appeal
 C. environment
 D. mass demand

Unit Test – Evaluating Mechanical Devices – Question 38

A new device is often designed when someone who thinks there can be an easier way to do something makes an observation. An inventor observed a driver manually cleaning snow and ice off the windshield of a streetcar in freezing cold weather, this observation prompted the invention of this ...



- A. windshield wiper
 B. windshield heater
 C. windshield washer
 D. windshield defroster

Unit Test – Evaluating Mechanical Devices – Question 39

Designing a new and improved mechanical device often takes a long time. Of the criteria listed here, which one would be the **least important** to consider?

- A. function
 B. efficiency
 C. convenience
 D. effectiveness

Unit Test – Evaluating Mechanical Devices – Question 40

Workers were replaced by industrial 'robots' during the beginning of the technological revolution of the 20th century. This enabled industry to ...

- A. reduce worker's stress
- B. improve margin of safety
- C. create unions for the first time
- D. reduce cost of producing products



Unit Test – Evaluating Mechanical Devices – Question 41

Mechanical devices are evaluated so that consumers can make better choices. Another important reason to carefully evaluate a mechanical device is to determine ...

- A. how to lower its cost
- B. what needs to be improved
- C. how to make it more fashionable
- D. what really is its esthetic value

Unit Test – Evaluating Mechanical Devices – Question 42

Opening a can has evolved from the earliest cans which were made from iron in 1810. The only way to open these types of cans were by using a ...



- A. church key
- B. push button
- C. removable tab
- D. hammer and chisel

Unit Test – Evaluating Mechanical Devices – Question 43

To get the liquid out of the can you need one large hole or two smaller holes. If two holes are needed, the first is designed to let air into the can, and the second hole is designed to ...



- A. let the fluid out
- B. restrict the flow
- C. create pressure
- D. be just for show

Unit Test – Evaluating Mechanical Devices – Question 44

By pressing on one of the buttons first - to release the pressure of the contents - before pressing on the second one - to have a hole large enough to drink out of - button cans were less problematic. The pressure in the can came from ...

- A. atmospheric pressure
- B. the contents of the can
- C. force applied to the button
- D. external force causing internal pressure

Unit Test – Evaluating Mechanical Devices – Question 45



The church key was the first practical design for opening a can. It was a simple machine that multiplied the force needed to open the can.

The simple machine it was designed after was the ...

- A. ramp
- B. lever
- C. wedge
- D. screw

Unit Test – Evolution of Mechanical Devices – Question 46

Environmental concerns created further improvements in can-opening devices throughout the 20th century. The 'ecology top' was the name given to the ...

- A. button tab
- B. church tab
- C. removable tab
- D. non-removable tab



Unit Test – Evolution of Mechanical Devices – Question 47

CSA is a non-government association that tests and approves a wide range of products to ensure they are safe for use by the consumer.

- CSA stands for ...
- A. Canadian Standards Association
 - B. Consumer Standards Association
 - C. Consumer Safety Agency
 - D. Canadian Standards Agency



Unit Test – Evolution of Mechanical Devices – Question 48

A huge complex machine that breaks up atoms is called a ...

- A. element creator
- B. particle creator
- C. spatial designer
- D. particle accelerator



Unit Test – Evolution of Mechanical Devices – Question 49

'MAGLEV' technology (powered by electricity and magnets) has led to ...

- A. transport trucks
- B. high speed trains
- C. refrigerated trailers
- D. video components



Unit Test – Evolution of Mechanical Devices – Question 50

Robots are extremely complex devices and vary widely in appearance, depending on the job they are designed to do. A simple robot however has some or all of these basic parts: body, motor devices, power source, sensors, output devices, and microprocessors.

Spirit and Opportunity (robot rovers on the planet Mars)



The 'command centre' in these robots is an example of these basic parts ...

- A. Sensors
- B. Power source
- C. Motor devices
- D. Microprocessors