

EXP. MECHANISMS

eSeries "GRADE SHEET"

NAME: _____

Partner: _____

Period: _____ Rotation: _____

MODULE GRADE: COURSE GR. _____
POST TEST _____ } MODULE AVE.= _____

EXP. MECHANISMS "WORKSHEET" WORKSHEET TOTAL= _____

LAB PERFORMANCE: _____
(If you are absent, write ABS on the line for the day you miss and **DISCUSS** what you need to make up with the teacher)

LAB PERFORMANCE TOTAL= _____

Extra Credit—Discuss this with the instructor before beginning!!!

WORD SEARCH _____(5)

LESSON 9-

MODULE REPORT _____(5)

RESEARCH REPORT _____(5)

MODULE NOTES _____(10)

CHALLENGES _____(5)

TOTAL EXTRA CREDIT= _____

BONUS POINTS *** _____

EXPLORING MECHANISMS "WORKSHEET"

For all of the Activities you will need to ask the teacher each day for the equipment.

LESSON 3- Before you do this activity you need to discuss how to do the activity and fill out the worksheet.

FIRST CLASS LEVER Worksheet Answers: _____(15)

LESSON 4 Write your answers for the Second and Third Class Levers on "WORKSHEET #2".

SECOND CLASS LEVER Worksheet Answers: _____(10)

THIRD CLASS LEVER. Show and Explain. Worksheet Answers: _____(10)

Show Third Class Lever to teacher (and Explain all three levers). T.I.: _____(10)

Skip the Impacts-for this module only!

LESSON 5-WHEEL & AXEL EXERCISE Worksheet Answers: _____(10)

LESSON 6 PULLEY EXERCISE. Worksheet Answers: _____(10)

Explain the PULLEY EXERCISE to the instructor. T.I.: _____(5)

LESSON 7

Part 1-"SCREW EXERCISE"- Worksheet Answers: _____(5)

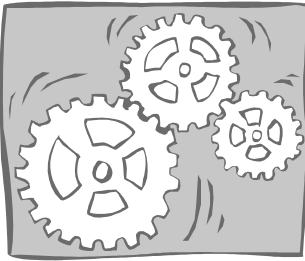
GEAR EXERCISE-(Part2) Show to Instructor and explain.

Part 2-Gear Exercise: Fill out the **two** spreadsheets for Part A and B. T.I.: _____(10)

Study Guide- Study Guide: _____(5)

LESSON 12:Career Guidance Survey- C.G. NOTES: _____(10)

Worksheet Total: _____



Exploring Mechanisms Study Guide for Test

1. The benefit that use of a machine provides is called _____.
machine aid mechanical advantage lifting power
input force
2. _____ is measured in units called foot-pounds or in units called
newton-meters.
Work Distance Energy Force
3. An example of an inclined plane is a(n) _____.
loading bay ramp elevator cart
4. A(n) _____ is a two-sided, movable inclined plane.
entry ramp on a building loading bay wedge escalator
5. The Lever Law is a law of _____ that trades force for distance.
equality simple machines balance strength
6. In a first-class lever, the fulcrum is located _____ the applied force and the load.
in front of between in a varying place near under
7. On a(n) _____ the load (output force) rests between the input (applied) force and the fulcrum.
first-class lever second-class lever third-class lever inclined plane
8. The input force is applied between the load or output force and the fulcrum in a _____.
first-class lever second-class lever third-class lever wheel and axle
9. The mechanical advantage of _____ is always greater than or equal to one.
a first-class lever a second-class lever a third-class lever any lever
10. The line passing through the center of the wheel and the axle acts as the _____ of the wheel.
fulcrum rod force lever
11. The mechanical advantage of a wheel and axle system is the radius of the wheel _____ the radius of the axle.
multiplied by divided by plus subtracted from
12. Fixed pulleys operate just like _____ by only changing the direction of the force.
third-class levers second-class levers first-class levers inclined planes
13. The diameter of a _____ is the input distance and the radius is the output distance.
fixed pulley wheel and axle movable pulley circle
14. The screw is basically a modified _____.
lever inclined plane wedge axle
15. There must be _____ gears in order for the driven gear to turn in the same direction as the driving gear.
closely spaced an even number of a long set of an odd number of

16. The sum of kinetic energy and potential energy is the _____ of the system.
thermal energy chemical energy mechanical energy mechanical advantage

17. The energy of motion that machines have is _____ energy.
mechanical electrical kinetic automatic

18. _____ is friction between two objects that slide against one another.
Rolling friction Sliding friction Air friction Drag

19. The tires of a car grip the road due to _____.
rolling friction sliding friction air friction drag

20. The way that gears and belts control movement, and subsequently transmit force, depends entirely on the _____.
speed of the two connecting wheels sizes of the two connecting wheels
mass of the load strength of the input force

21. Without proper friction between the belt and the pulleys, _____ may occur, resulting in a reduction of power transfer.
belt creep belt stretch belt slip belt skid

22. Torque is a force acting at a _____.
weight distance velocity motion

23. Torque that causes _____ can cause an object to deform, or change shape.
speed twisting velocity force

24. The combination of fluid energy and thermal energy given off by the combustion of gasoline _____ the chemical energy of the fuel.
is greater than cannot be greater than is different than is always less than

25. _____ brought forth the theory that energy and mass are interchangeable.
Isaac Newton Albert Einstein Christopher Columbus Archimedes

Exploring Mechanisms

T	H	I	R	D	C	L	A	S	S	L	E	V	E	R	B	Y	E	O
R	E	V	E	L	S	S	A	L	C	D	N	O	C	E	S	K	L	I
A	T	Q	J	F	R	R	J	B	W	E	R	C	S	T	U	I	X	E
M	B	A	A	T	T	W	C	W	Q	U	U	M	Y	T	R	N	A	Z
E	G	A	T	N	A	V	D	A	L	A	C	I	N	A	H	C	E	M
F	I	R	S	T	C	L	A	S	S	L	E	V	E	R	S	L	D	U
G	K	X	W	Y	M	S	Q	K	C	Y	E	S	C	Q	A	I	I	R
E	X	J	J	C	Y	W	D	H	I	F	Y	G	Z	H	S	N	N	C
O	G	J	D	W	O	R	K	O	V	G	O	L	D	T	L	E	P	L
N	A	A	N	O	I	T	C	I	R	F	E	R	A	E	B	D	U	U
F	O	Z	R	N	Z	H	N	E	Q	V	P	N	C	Y	W	P	T	F
L	P	Y	R	E	Z	N	N	B	E	V	C	F	G	E	B	L	M	M
B	W	L	P	T	V	E	A	R	S	E	B	V	R	G	F	A	F	Y
P	U	L	L	E	Y	E	G	U	Z	L	R	I	N	W	T	N	E	S
E	G	R	S	W	H	M	L	R	I	E	E	T	U	V	G	E	P	G

AXLE

DISTANCE

ENERGY

FIRST-CLASS-LEVERS

SECOND-CLASS-LEVER

THIRD-CLASS-LEVER

FORCE

FRICTION

FULCRUM

INCLINED-PLANE

INPUT

LEVER

LEVERAGE

LOAD

MECHANICAL-ADVANTAGE

PULLEY

SCREW

WEDGE

WORK

“Worksheet 2”

LESSON 3-FIRST CLASS LEVER ACTIVITY

Table Total= _____(10) Page Total= _____(15)

Be sure to set the Spring Scale to zero before you begin !!!!!

LESSON 3-1st Class Lever #1-7 Use the 1.0 lb. weight	Step #7A Distance Formula for Input & Output Formula-A (Set up formula)	Step #7A Formula for distance from Fulcrum to Spring Scale & Weight Formula-B	Step #7A Set up Formula below	Step #7A Answer= M. A.	Step #7B Formula for Input & Output Forces Formula-C	Step #7B Formula for Input & Output Force using Spring Scale & Weight Formula-D (Set up formula)	Step #7B Calcula- tions for Formula	Step #7B Answer M. A. =
Mechanical Advantage (M.A.)	Input Distance ÷ Output Distance =	Distance Fulcrum to Spring Scale ÷ Distance Fulcrum to Weight =	_____ =		Output Force ÷ Input Force =	Force of the Weight ÷ Reading on the Spring Scale =	_____ =	
1 st Class Lever #8-#12 Use the 0.4 lb. weight	Step #11 Distance Formula-A	Step #11 Distance Formula-B	Step #11 Set up Formula	Step #11 Answer= M.A.	Step #12 Formula-C	Step #12 Formula-D	Step #12 Calcula- tions	Step #12 Answer = M.A.
Mechanical Advantage (M.A.)								
1 st Class Lever #13-#17 Use the 1.0 lb. weight	Step #16 Distance Formula-A	Step #16 Distance Formula-B	Step #16 Set up Formula	Step #16 Answer= M.A.	Step #17 Formula-C	Step #17 Formula-D	Step #17 Calcula- tions	Step #17 Answer = M.A.

Explain this activity: _____(5)

LESSON 4-SECOND CLASS LEVER

Be sure to set the Spring Scale to zero before you begin !!!!!

Table= ____ (8) Page Total= ____ (10)

Lesson 4- Second Class Lever #9 & #10	#5 Weight of Beam	#8 Force of 1 lb. Weight	#9 Distance Formula for Input & Output Formula-A	#9 Formula for distance from Fulcrum to Spring Scale & Weight Formula-B	#9 M.A. = Calcula- tions for Formula	#9 M.A. = Answer	#10 Force- Input/Output Formula-C	#10 Force- Weight to Spring Scale Formula-D	#10 Calcula- -tions	#10 Answer
Second Class Lever #15 & 16	Weight of Beam	#14 Force of Weight	#15 Formula-A	#15 Formula-B	#15 Calcula- tions		#16 Formula-C	#16 Formula-D	#16 Calcula- -tions	

Why is the first part of the lesson a Second Class Lever: _____

_____ (2)

(Page Total = 10)

LESSON 4- THIRD CLASS LEVER

Table= ____ (8) Page Total= ____ (10)

Lesson 4 Third Class Lever #7& 8	#2 Dis- tance to 4 th hole	#3 Dis- tance to last hole	#4 Weight of the Beam	#7 Force on Spring Scale minus the weight of the beam	#8 Formula A Write this out (Distance Formula)	#8 Formula B Write this out	#8 Calcula- tions	#8 Answer	#9 Force on Spring Scale minus the weight of the beam	#9 Formula C Write this out (Force Formula)	#9 Formula D Write this out	#9 Calculations	#9 Answer
	#10 Dist- ance to 7 th hole	#10 Dis- tance to last hole	#14 Weight of the Beam	#14 Force on Spring Scale minus weight of the beam	#15 Formula A Write this out	#15 Formula B Write this out	#15 Calcula- tions	#15 Answer	#16 Force on Spring Scale minus the weight of the beam	#16 Formula C Write this out	#16 Formula D Write this out	#16 Calculations	#16 Answer

What makes this activity a Third Class Lever: _____

_____.(Answer 2), (Page Total = 10)

LESSON 5-Wheel and Axle

	# 10 Weight of the 1 lb. in Newton's	Average Weight using the Crank (measured with Spring Scale)	Formula for the Mechanical Advantage	Formula for Force	M.A. Calculated	M. A. Answer
1 lb. weight			Output ÷ Input =	Force of the Weight ÷ Force on the Spring Scale =		

Explain what you did in this exercise and what happened: _____

_____ (Both Total=10)

LESSON 6: Pulley Activity and Exercise

	#6 Single Fixed Pulley Force on Spring Scale	#13 Single Moveable Pulley Force on Spring Scale	#14 Block and Tackle Force on Spring Scale
1 lb. Weight	Force=	Force =	Force=
M.A.Formula	Output ÷ Input	Output ÷ Input	Output ÷ Input
Mechanical Advantage	M.A.=	M.A.=	M.A.=

_____(Total for Table=10)

You will need to explain this activity to the teacher for a T.I. (T.I. Total=5)

LESSON 7:

Part 1-SCREW EXERCISE: Explain the “SCREW EXERCISE” Be sure to write down the Mechanical Advantage: _____

(5).

Part 2-Gear Exercise: Fill out the **two** spreadsheets for this experiment (Total 10 points)

GEAR EXERCISE:

Part A: See BELOW

Gear Exercise 1	Trial 1	Trial 2	Trial 3
Number of Revolutions per 12 seconds			
Convert seconds to 1 minute			
Revolutions per Minute (or RPM)			

(5)

Part 2:

Part B of the “Gear Exercise” BELOW:

Gear Exercise 2	Mechanical Advantage	Time for lift to go UP in seconds	Time for lift to go DOWN in seconds
48 & 24 Tooth Gears			
42 & 30 Tooth Gears			

(Both answers =5)

Why is the second set of gears slower: _____

EXPLORING MECHANISMS

Study Guide 5.0

Circle the correct answers to these questions as you come upon them during your next seven lessons. This study guide can then be used as a resource for your final test!

1. (1- WORK) is defined as force times distance. *Effort - Power - Work - Friction*
2. Mechanical advantage is (1- MECHANICAL ADVANTAGE) .
output force times input force input force divided by output force
output force minus input force output force divided by input force
3. The ability to do work is known as (1- ENERGY) .
effort - energy - mechanical advantage - potential
4. Mechanical advantage always trades (1- MECHANICAL ADVANTAGE) for distance.
time - force - power - potential
5. For an inclined plane that has a vertical leg of 2 feet to have a mechanical advantage of four, the hypotenuse must be (1- MECHANICAL ADVANTAGE) . (HINT: HYPOTENUSE DIVIDED BY TWO EQUALS FOUR) *4 feet - 8 feet - 16 feet - 1 foot*
6. The push or pull of an object in any direction is called (1-FORCE) .
mass - gravity - force - work
7. The attraction that all objects in the universe have for each other is called (1-FORCE) .
mass - gravity - force - work
8. A two-sided, movable inclined plane is called a (2- THE WEDGE) .
lever - screw - wedge - biplane
9. The (2- THE INCLINED PLANE) is the longest leg of a right triangle.
hypotenuse - diameter - perimeter - parallelogram
10. A good example of a wedge would be an (2- REVIEW) .
tin snip - pry bar - ax - hinge
11. To lift a lightweight bucket out of a deep well, you would use a (3- LEVER) .
wedge - lever - pulley - inclined plane

12. The point that a lever rotates on is called the (3- THE LEVER) .
center of gravity - fulcrum - focal point - foundation
13. The output force is between the input force and the fulcrum on a (4- TYPES OF LEVERS) lever. *first class - second class - third class - fourth class*
14. A see-saw is an example of a (4- TYPES OF LEVERS) lever.
first class - second class - third class - fourth class
15. A wheelbarrow is an example of a (4- TYPES OF LEVERS) lever.
first class - second class - third class - fourth class
16. A fishing pole is an example of a (4- TYPES OF LEVERS) lever.
first class - second class - third class - fourth class
17. On a first-class lever, the fulcrum is (4- TYPES OF LEVERS) the input force and the output force. *outside of - inside of - between - on top of*
18. A wheel is an example of a (5- THE WHEEL AND AXLE) .
circular inclined plane - circular wedge - circular lever - combination plane and screw
19. The line that passes through the center of a wheel and its axle acts as the (5- THE WHEEL AND AXLE) of the wheel.
balance point - fulcrum - center of gravity - screw connection
20. To determine the mechanical advantage of a wheel and axle system, the radius of the wheel would be (5- THE WHEEL AND AXLE) the radius of the axle.
multiplied by - added to - subtracted from - divided by
21. The distance from the center of a circle to the edge of the circle is the (5- THE WHEEL AND AXLE) of the circle. *diameter - hypotenuse - radius - circumference*
22. A system of fixed and movable pulleys that are combined to lift heavy objects is called a (5- THE WHEEL AND AXLE) .
hook and ladder - wheel and axle - block and tackle - wheeled lift
23. A fixed pulley is used to (6- THE PULLEY) of a force.

increase the amount - decrease the amount - change the direction - increase and change the direction

24. A movable pulley works like a (6- THE PULLEY) lever.
first class - second class - third class - fourth class
25. A pulley is a wheel that (6- THE PULLEY).
rotates freely - is attached to ropes - drives an axle - is mounted off center
26. The mechanical advantage of a movable pulley is (6- THE PULLEY).
one - two - four - one half
27. The (7- THE SCREW) has the mechanical advantage of an inclined plane without taking up a large space. *pulley - lever - wheel and axle - screw*
28. The distance between the threads of a screw is called the (7- THE SCREW) of the screw.
outside diameter - thread depth - pitch - focal length
29. An inclined plane that is wrapped around a cylinder is called a (7- THE SCREW).
wheel - long axle - pulley - screw
30. An example of a screw which is used to transfer power would be a(n) (7- THE SCREW).
jack - winch - elevator - dump truck lift