Part 4 Simple Machines

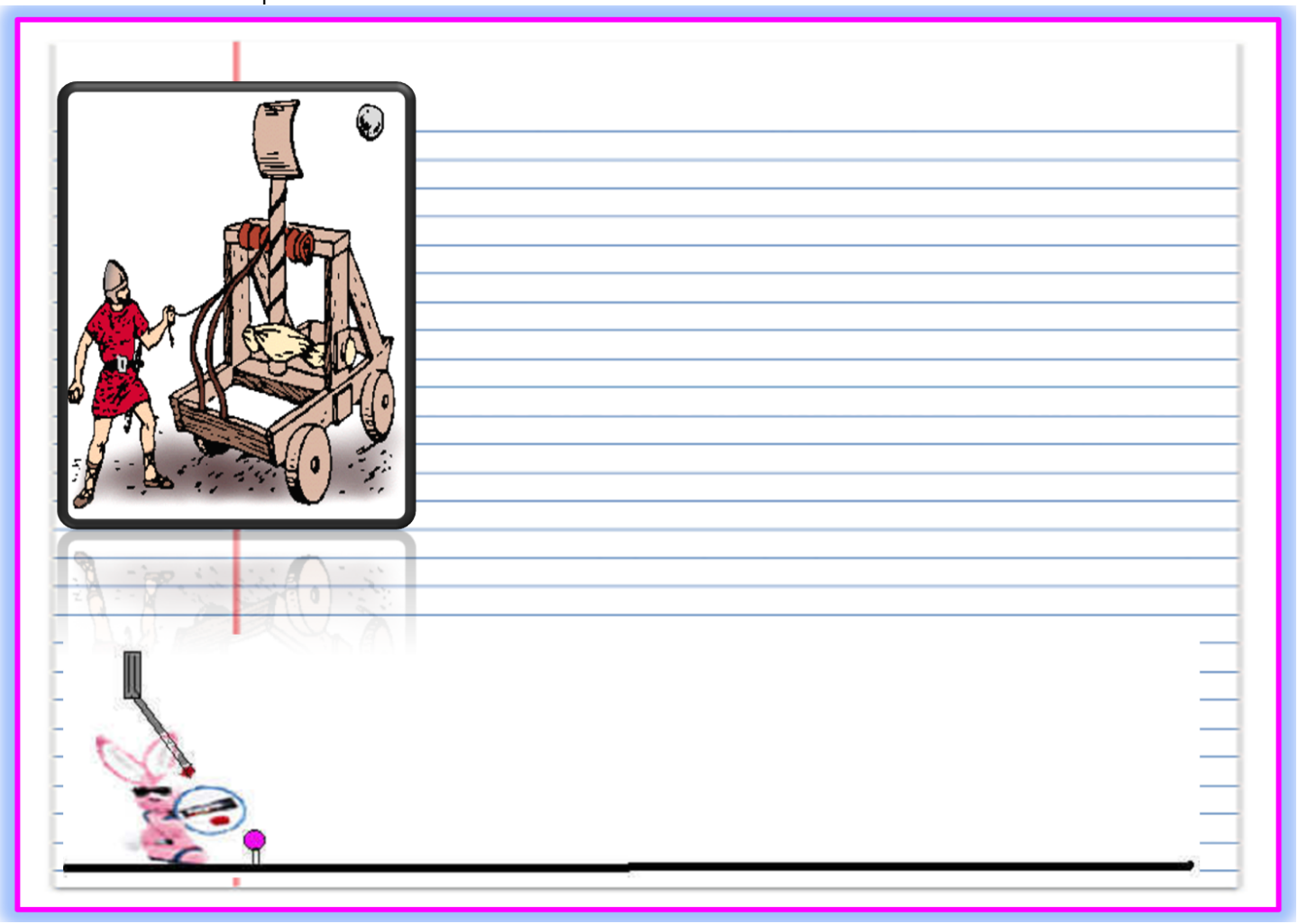
Name:

Part 4 Lesson 1 Machines

Due:

I am aware that I need to show all mathematical work in an organized manner to receive any credit for a question that involves calculations of any kind. Omitting / leaving out the units in the problem or at the end will also result in zero credit ◊ _____

What can you tell me about the picture below? Include Newton's Laws of Motion + Potential and Kinetic Energy and Trajectory. (Apex?) Also feel free to sketch the design of your marshmallow catapult.



T_____: The path that a projectile makes through space under the action of given forces such as thrust, wind, and gravity.

Law Conservation of energy: energy cannot be c_____ or d_____.
Simple machines generally require more work / energy to complete a task.
But they….

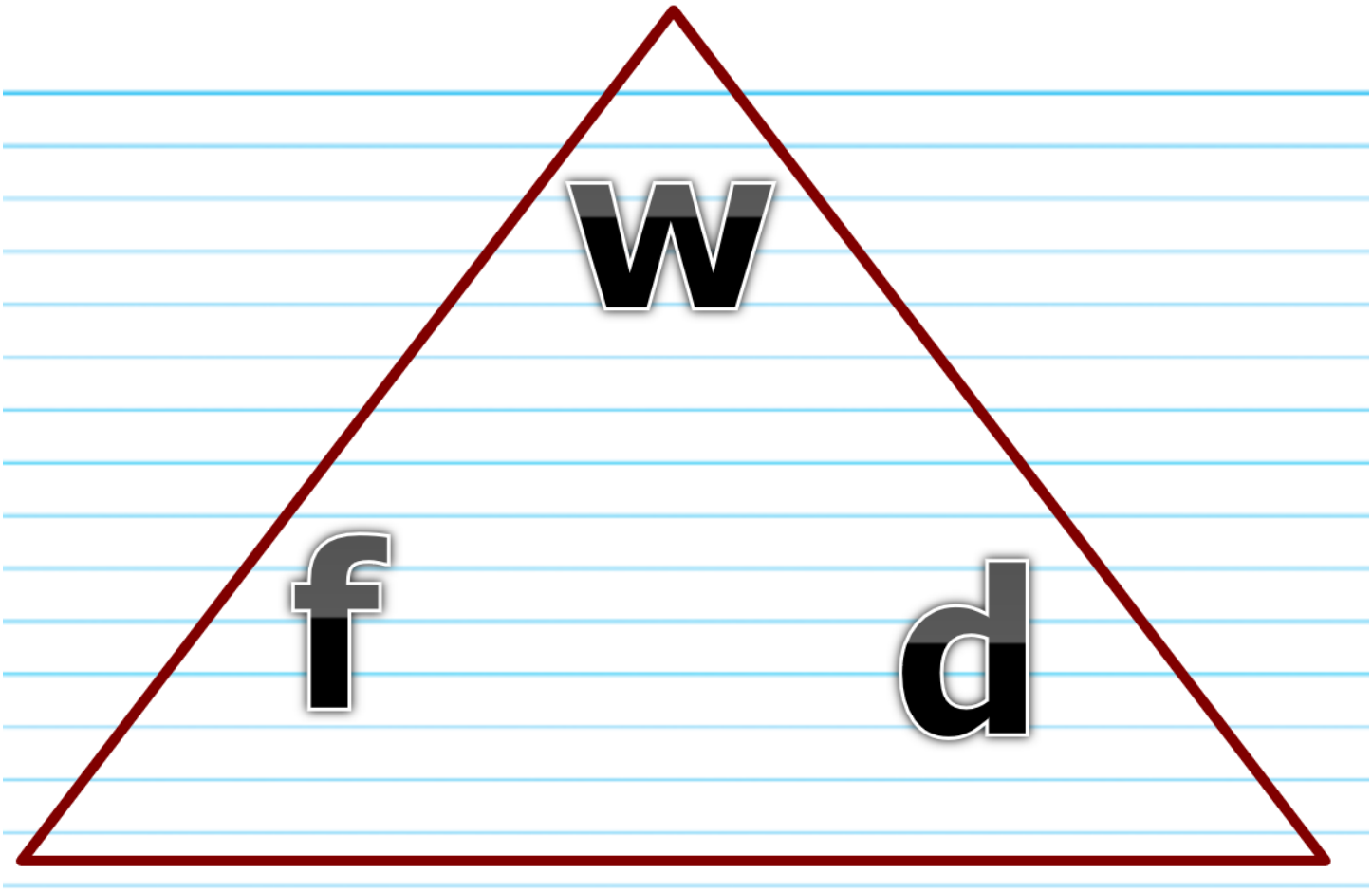
T_____ force from one place to another.
C_____ direction of a force.
Increase the m_____ of a force.
Increase the d_____ or s_____ of a force.
*This makes work **seem** easier.*

Which of the following is <u>not</u> something machines do.

- A.) Machines can make *the force* you put into a machine greater. (ex. Pliers)
- B.) Machines can change the direction of the force you put in. (ex. A Car jack)
- C.) Machines create energy in order to complete a force. (ex. reactor)
- D.) Machines can increase the speed of the force. (ex. Bicycle)

Part 4 Lesson 2 Efficiency

force (N) x distance (m) = work (J) Joules



Please fill in the triad below.

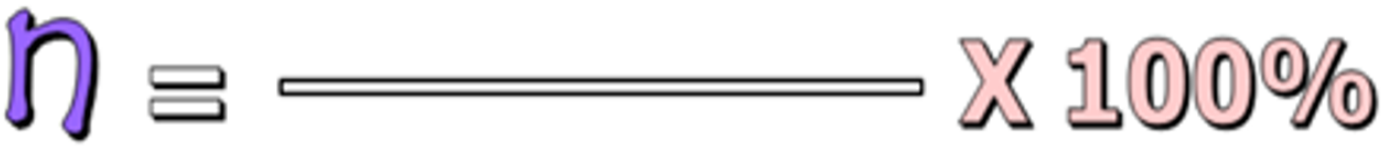
F_____(N) x d_____ (m) = w_____ (J) Joules

Please complete the question below about Work (W=F X d). We will cover them in class slideshow if you want to complete at that time.

A force of 200 newtons pushes a Lego car 10 meters across the road. How much work was done?	Jennifer did 5,000 Joules of Work pushing with 500 newtons. How far did Jennifer move the boxes?

300 Joules of Work was used to lift a dog 2 meters in the air. How much did the dog weigh / N?	A wind up toy takes in 50 J (Joules) and puts out 45 J What's its efficiency?

The formula to find efficiency



Efficiency is the energy output, divided by the energy input, and expressed as a percentage.

Please complete the question below about Work (W=F X d). We will cover them in class slideshow if you want to complete at that time.

A force of 200 newtons pushes a Lego car 10 meters across the road. How much work was done?	Jennifer did 5,000 Joules of Work pushing with 500 newtons. How far did Jennifer move the boxes?
300 Joules of Work was used to lift a dog 2 meters in the air. How much did the dog weigh / N?	A wind-up toy takes in 50J (Joules) and puts out 45J What's its efficiency?
A karate expert puts 100 J of energy into several strikes of his foot. The energy transferred to breaking the boards was 60 J. What is the efficiency of the strike?	A chemical reaction has an efficiency of only 25%. 300 Joules of energy was put into the reaction. What was the energy output?

A Nyan papercraft machine has an efficiency of 70%. 20 Joules of energy was put in. What was the energy output?	Each mousetrap exerted a force of 20 newtons and jumped approximately .25 meters. How much work was **done by all <u>150</u> mousetraps**
I wonder how far I moved this block if I did 10J of work pulling with a force of 20 newtons?	Romeo exerted a force of 1,000 N over a Distance of .5 meters. How much work did Romeo perform?
Gerald exerted 10,000 Joules of work with a force of 500 newtons. How far did he move the wheelbarrow?	A professional cyclist did 1,000,000 Joules of Work pedaling with a force of 200 newtons How far did the cyclist travel?

Part 4 Lesson 3 Simple Machines / Pulley's

Mechanical advantage (MA): The number of times a machine _____ your effort

To find Mechanical Advantage

Divide r_____ force (usually weight in g) by the e_____ force (newton)

Types of machines that do work with one movement.

Pulley Uses grooved w_____ and a r_____ to raise, lower or move a load. Three

A pulley makes work seem easier.

Changes the d_____ of motion to work with gravity. Instead of lifting up, you can pull down.

Uses your body weight against the r_____.

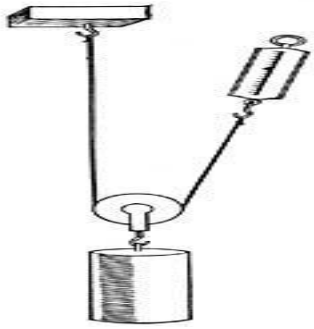
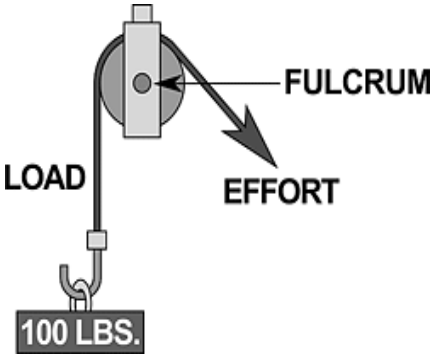
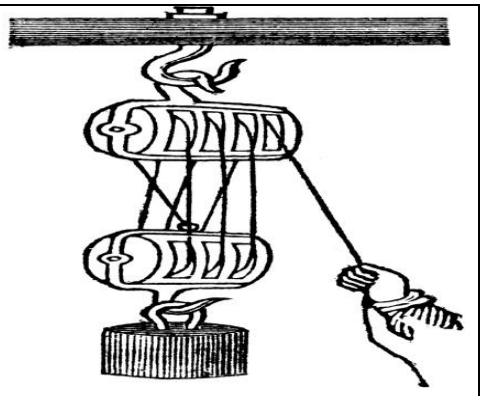
The more pulleys that are used, the more the MA (Mechanical Advantage).

MA = The number of r_____ that support the pulley. The end of the rope doesn't count.

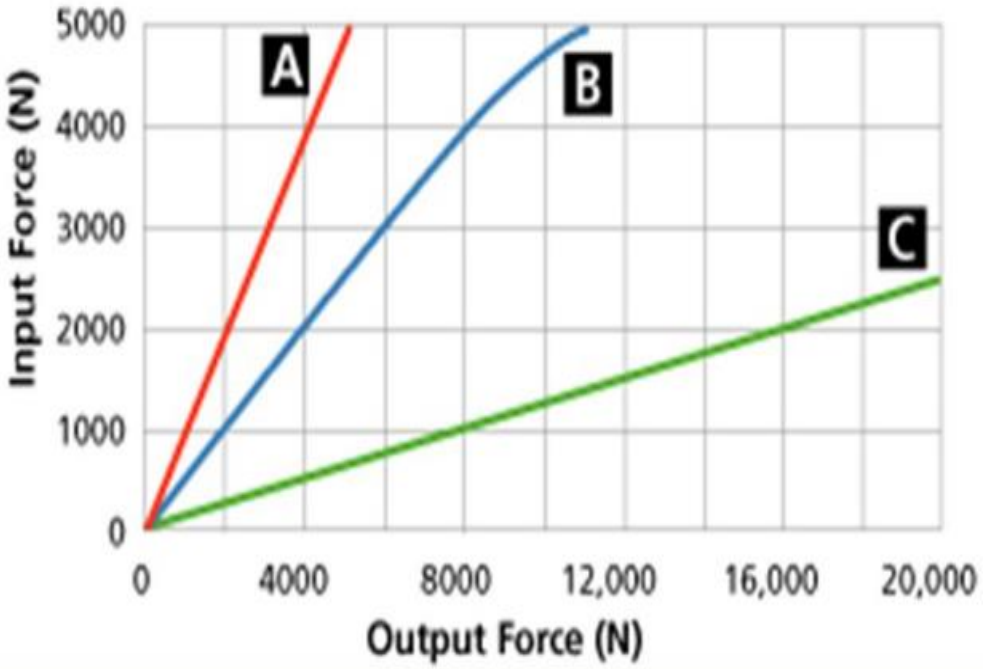
Name the Type of Pulley and Mechanical Advantage when asked.

1)	2)	3)
4)	5)	6)
7)	8)	9)
10)	*11)	

Please provide the name of the correct pulley in the boxes below. Also provide each pulley's Mechanical Advantage.

 MA=	 MA=	 MA=

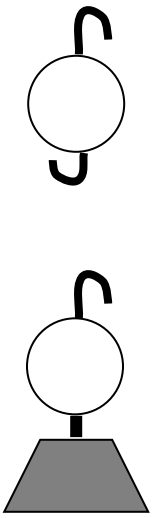
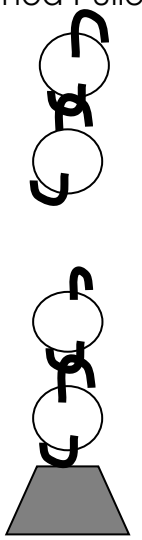
Use the chart below to answer the questions.

Which pulley system is a combined pulley system of 2? Which pulley system is a combined pulley system of 8? Which letter represents a fixed pulley? Why?	

Pulley Activity

	Weight (grams)	newtons
No Pulley		
Fixed Pulley		
Combined Pulley 2		
Combined Pulley 4		
Combined Pulley 8?		

Please sketch the following the boxes below.

Fixed Pulley	Combined Pulley 2	Combined Pulley 4
		

What was the advantage in newtons to use a fixed pulley rather than no pulley at all?

What was the advantage in newtons to use a combined pulley over a fixed pulley?

What was the advantage in newtons to use a combined pulley (4) over a combined pulley (2)?

Did a movable pulley allow you to move the load with minimal effort?

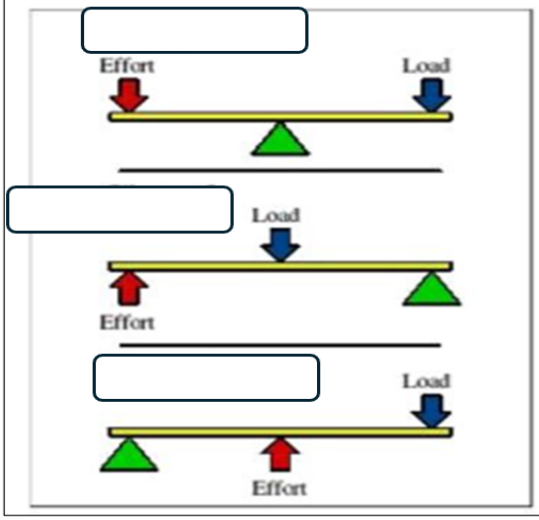
Lever

A stiff b_____ that rests on a support called a f_____ which lifts or moves loads

MA = length of effort arm ÷ length of resistance arm.

Name the 3 types of levers and the mnemonic for FLE or FRE 123

Name the 3 types of levers



FLE

123

Third Class Lever.

Has Mechanical _____advantage.

Requires m_____ force to lift the load.

	Mechanical Advantage	# of newtons to lift lever
Just the weight (_____grams)	No MA	
E arm = 25cm R arm = 5cm		
E arm = 20cm R arm = 10cm		
E arm = 15cm R arm = 15cm		
E arm = 10cm R arm = 20cm		
E arm = 5cm R arm = 25cm		

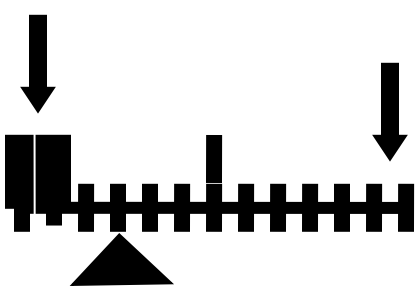
Which fulcrum position (Crayola marker) gave you the best MA or lowest number of newtons? **Please use data in your response.**

Which fulcrum position (marker) gave you the least MA or negative MA or highest number of newtons? **Please use data in your response.**

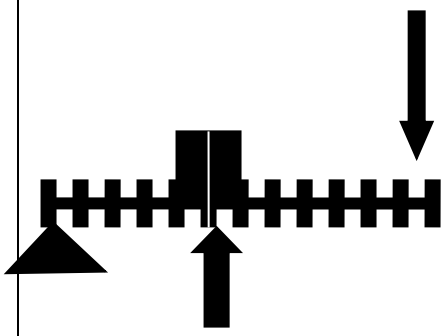
How does changing the fulcrum location affect the lever? **Please use data in your response.**

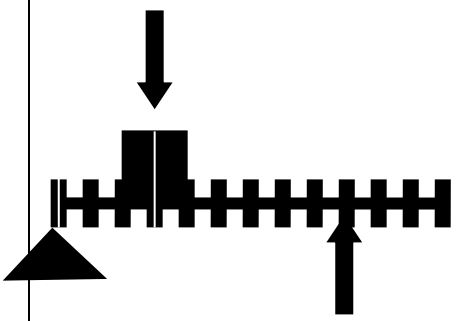
Please draw a second-class lever in the space below. Describe some information about how it lifts a load next to your sketch. Think FLE 123

Please provide the name of the correct class of lever in the boxes below (Label each arrow as the effort force, load, or fulcrum). Think FLE 123



MA=



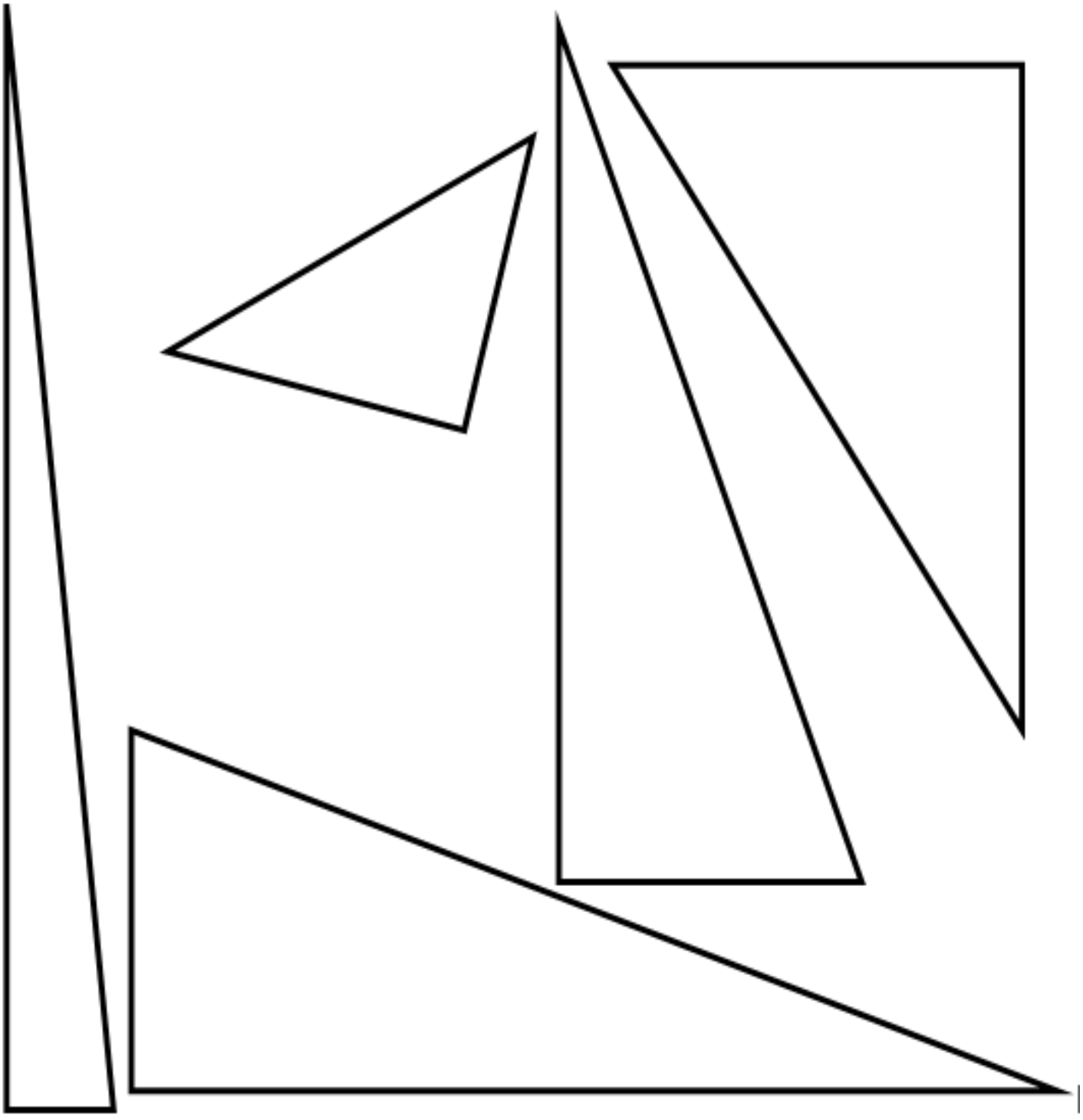


Part 4 Lesson 6 Wheel and Axle, Wedge / Inclined Plane

Wedge: An object with at least one s_____ side ending in a sharp edge, which cuts material apart.

The mechanical advantage of a wedge can be found by d_____ the length of the s_____ (S) by the t_____ (T) of the big end.

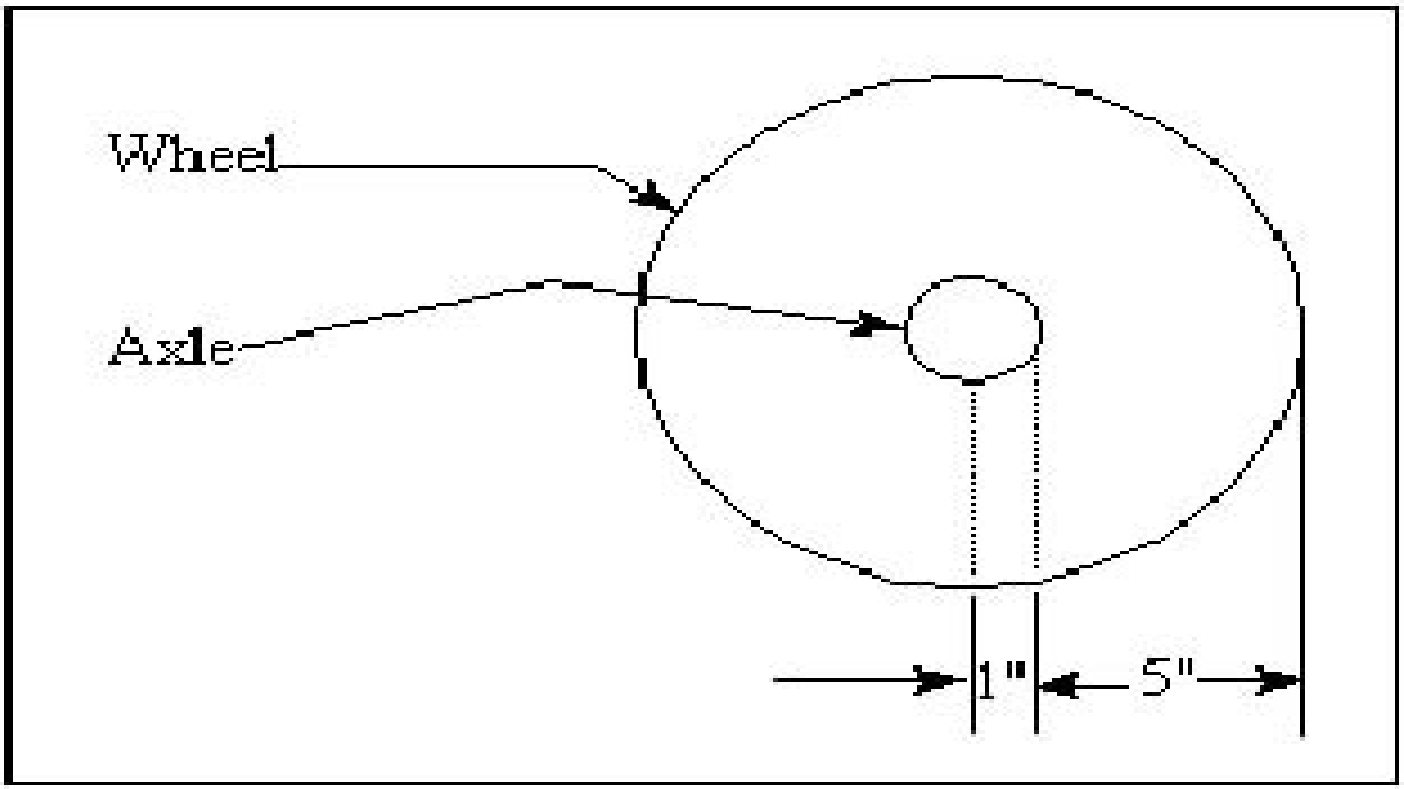
Please find the MA of the wedges below. Use the provided rulers.



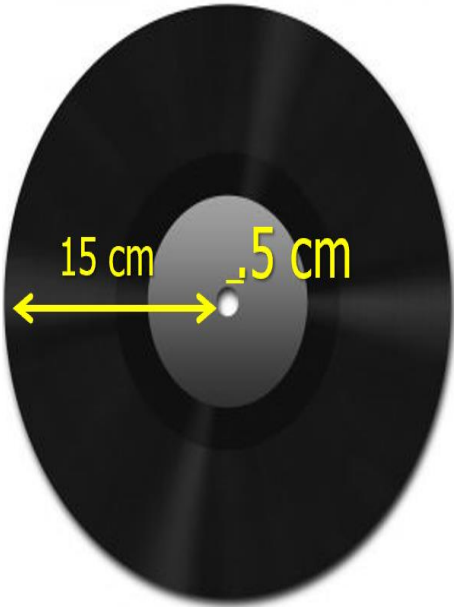
Wheel and Axle: A wheel with a rod, called an a_____, through its center lifts or moves a load.

The mechanical advantage of a wheel and axle is the ratio of the r_____ of the wheel divided by the r_____ of the axle.

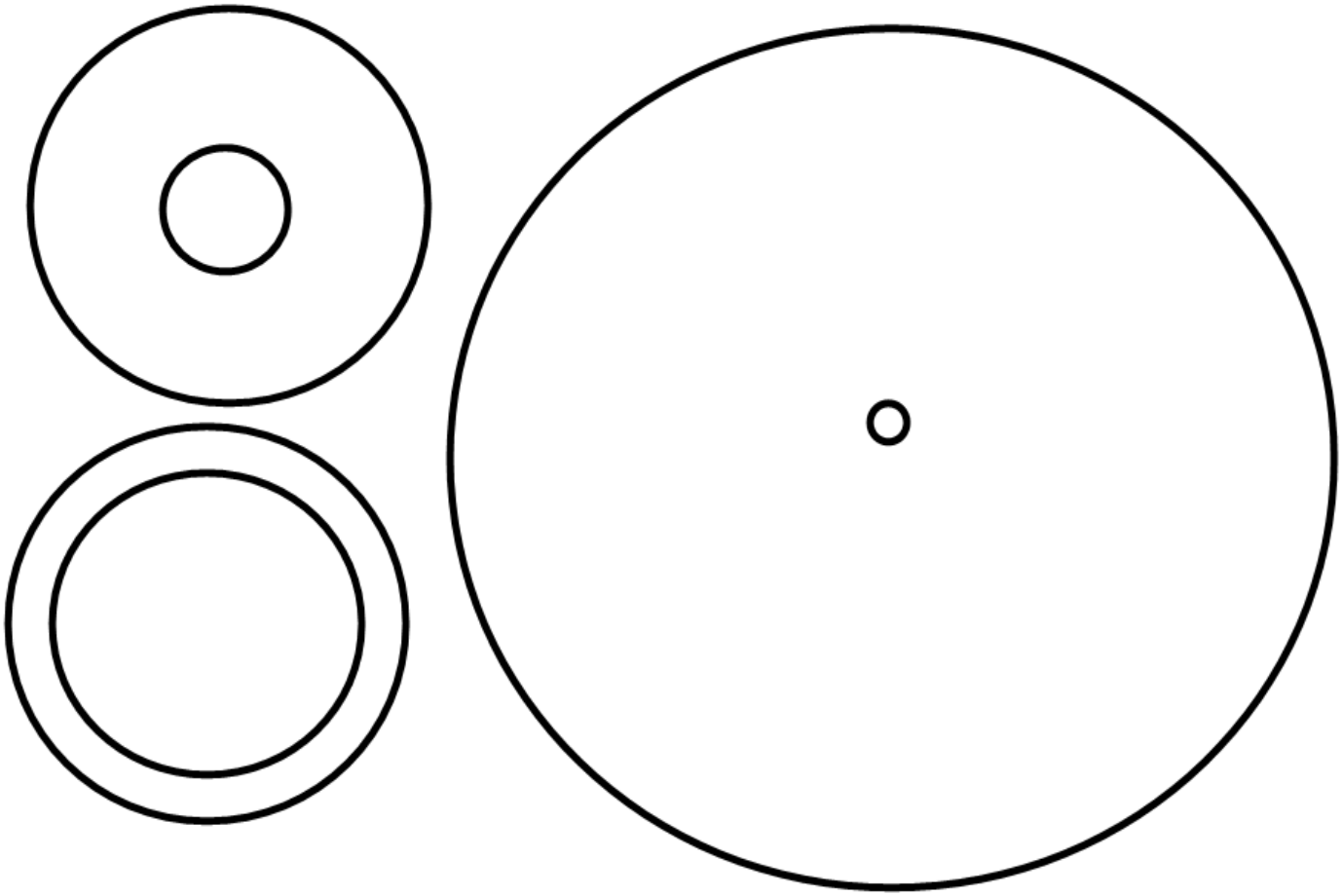
Radius: A straight line from a circles center to its perimeter.



Find the Mechanical Advantage of each wheel and axle below.

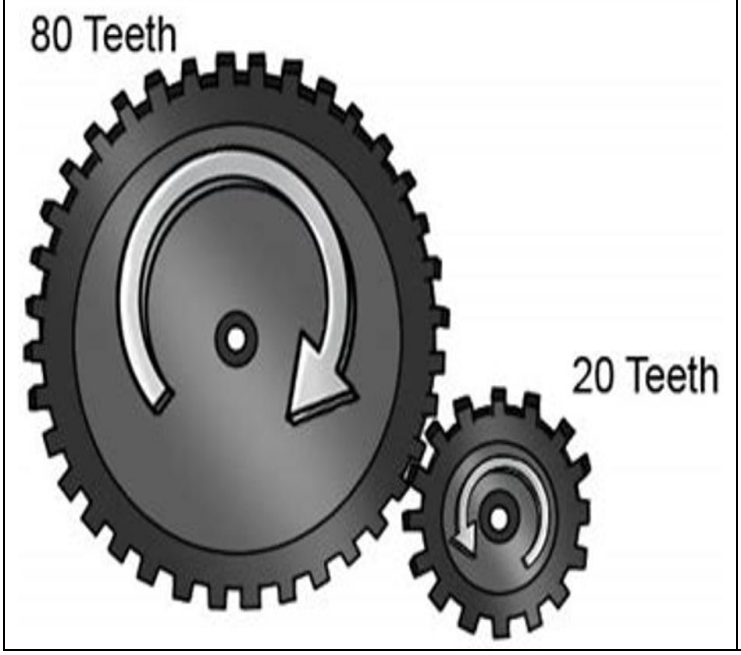
		
MA=	MA=	MA=

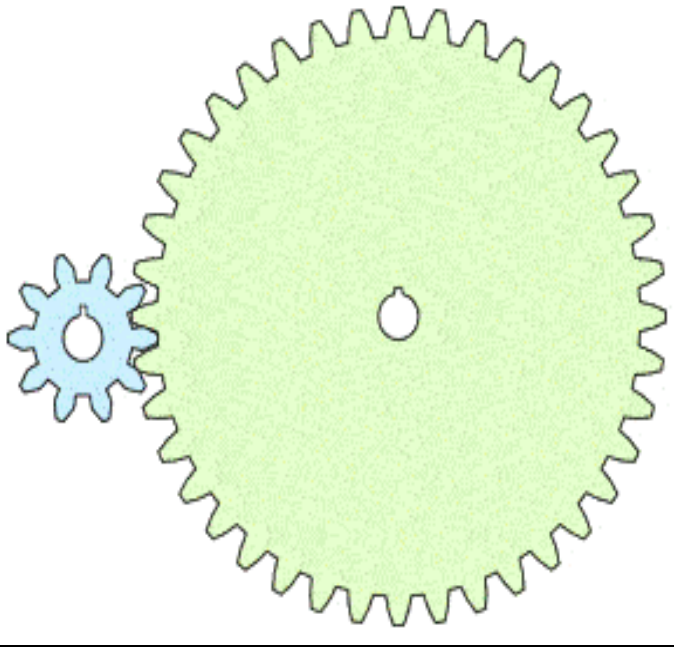
Find the MA of these wheels and axles? You will need to measure in cm.



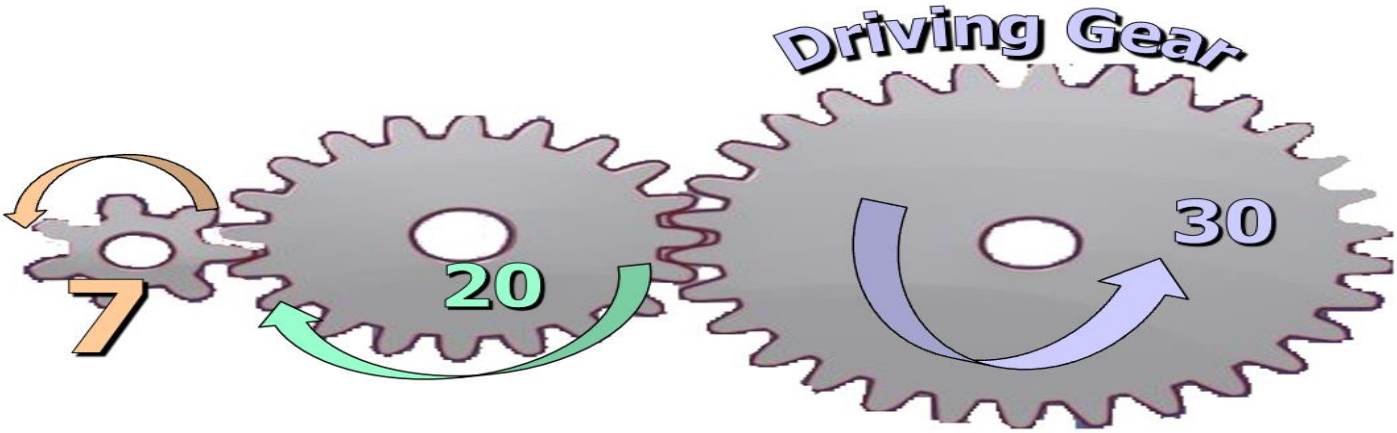
The gear ratio is calculated by dividing the output speed by the input speed or by dividing the number of teeth of the driving gear by the number of teeth of the driven gear (i= Ze/ Zs)

What is the gear ratio below.



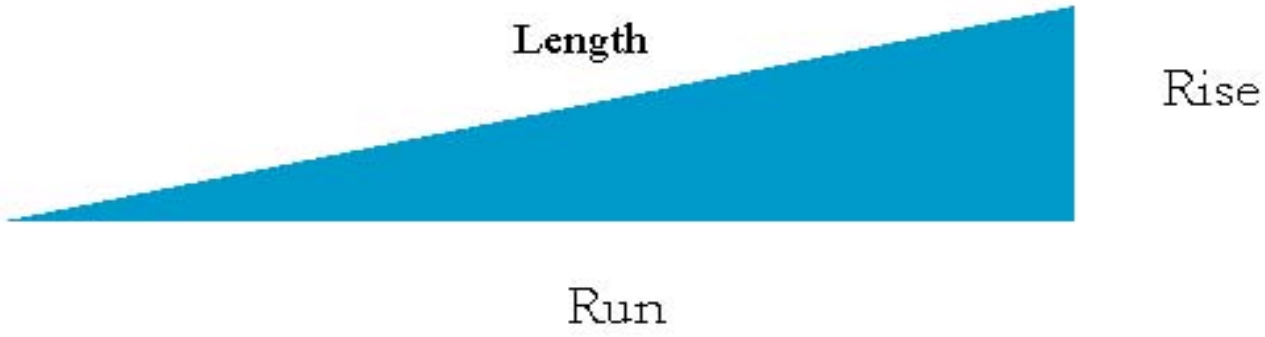


What is the overall Gear Ratio of the gear system below.



An Inclined plane: A slanting surface connecting a lower level to a higher level

MA for an inclined plane is the length of the s_____ divided by the h_____ (Rise).



Use the spring scale and with attached weight to determine the difference in newtons to overcome friction in the following.

- Find MA by measuring height and the slope.
  - Divide the length of the slope by the height.

Ramp Height	Slope	Rise	MA=	newtons
Flat Ramp		0cm		
10 cm Height		10cm		
20 cm Height		20cm		
30 cm Height		30cm		
40 cm Height		40cm		
50 cm Height		50cm		

Using data (newtons) in your response, how did the various inclined planes affect your effort force to carry the weight up the ramp?

Draw an inclined plane below with a cool truck driving up it. Measure the rise and the slope and determine the Mechanical Advantage?

Part 4 lesson 8 Screw

Screw: An inclined p_____ wrapped around a pole which holds things together or lifts materials.

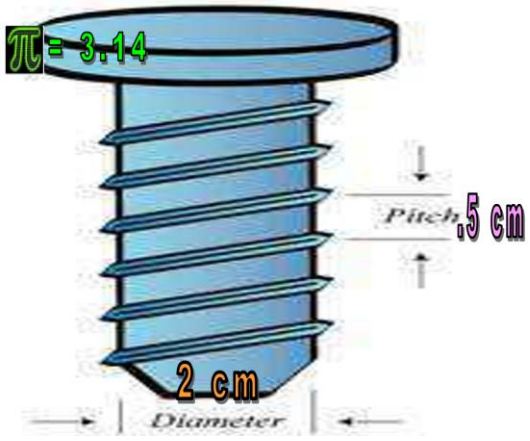
The mechanical advantage of a screw can be found by d_____ the circumference of the screw by the pitch of the screw.

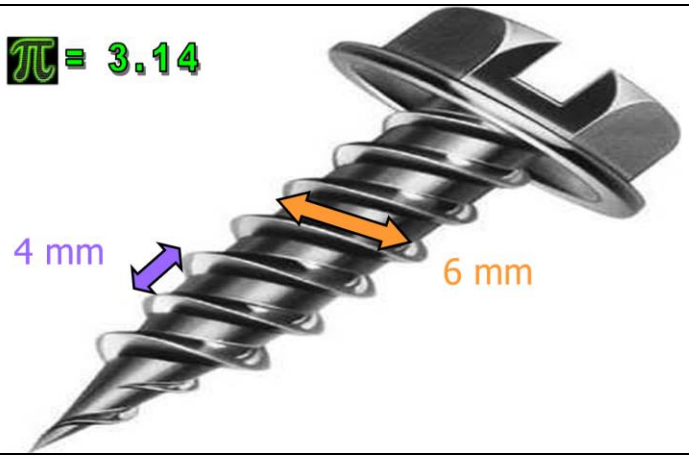
The circumference of a circle is the distance _____ the circle. It is the circle's _____. The formula for circumference is:

Circumference = **π** times Diameter

C = πd

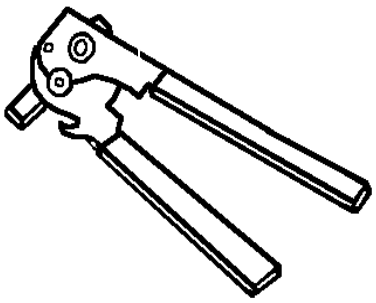
Where π = 3.14

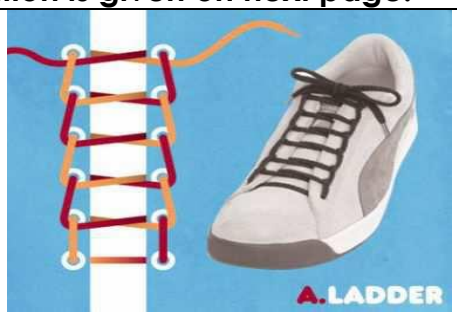


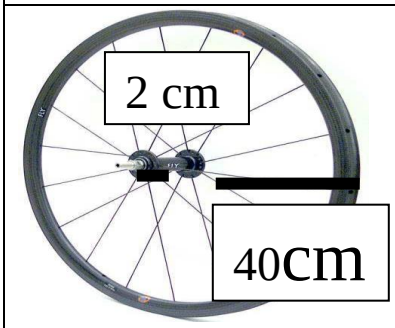


Pretend this is the worlds largest screw. Measure and determine the MA.

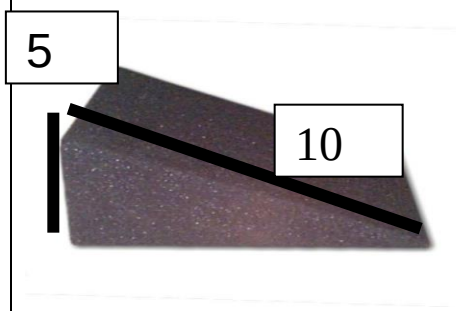
Compound machines: T_____ or more simple machines working
Please label the machines below. There can be more than one answer per square. **Also find the MA where information is given on next page.**







Please show your work
FO
FI



Please show your work
FO
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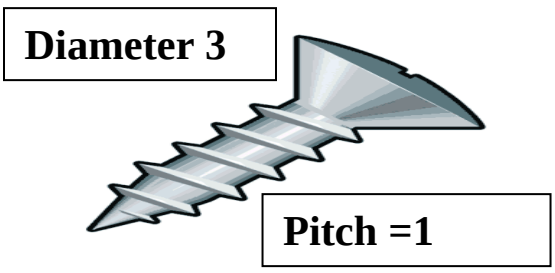

Please show your work
π= 3.14
FO
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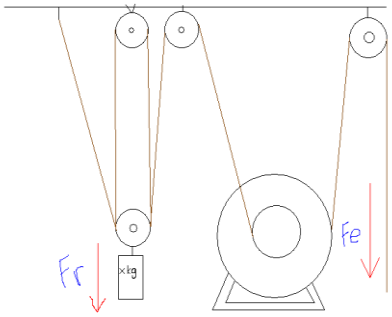
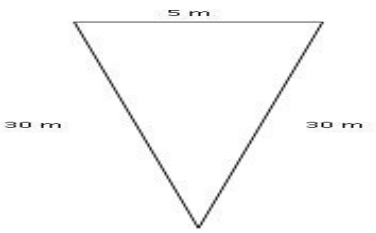
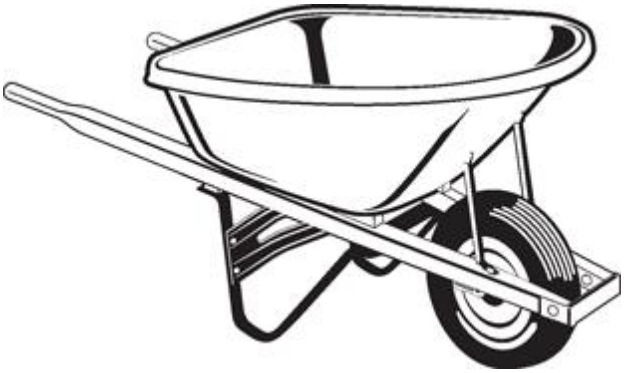


MA=



MA =

Circle the compound machines below. A compound machine is a machine consisting of _____ or _____ simple machines operating together,



Please label all of the simple machines in the pictures below. You must draw arrows to them as you describe them. A strong answer will show more than 10.

Simple Machines Quiz
1-20 = 5 pts
*21 and 22 * = Bonus + 1 pt,
(Secretly write owl in correct space +1 pt) Score ____ / 100

1)	6)	11)	16)	*21)
2)	7)	12)	17)	*22)
3)	8)	13)	18)	
4)	9)	14)	19)	
5)	10)	15)	20)	

Sketch out a Rube Goldberg machine that makes a simple task very complex. Your machine must include all the simple machines we have learned. Please label the machines and your details count.

◊Wheel and Axle ◊Wedge ◊Inclined Plane ◊Pulley ◊Screw ◊Lever

Across

4. A measure of how much more work must be put into a machine than you get out of the machine.
5. A stiff bar that rests on a support called a fulcrum which lifts or moves loads
6. This type of pulley has no Mechanical Advantage
8. Catapults - By the law of conservation of energy, the stored _____ energy (U) is transferred into rotational kinetic energy (K), with some loss due to friction. U = K.
11. Machines - They _____ force from one place to another.
12. Machines - They increase the _____ or speed of a force.
15. A _____ and tackle or only tackle is a system of two or more pulleys with a rope or cable threaded between them, usually used to lift heavy loads. The pulleys are assembled to form blocks and then blocks are paired so that one is fixed and one moves with the load.
18. A wheel with a rod, called an _____ through its center lifts or moves a load.
19. Force is measured in a unit called the _____
20. The efficiency of a machine will always be _____ than 100%.
24. An object with at least one slanting side ending in a sharp edge, which cuts material apart.
25. To find MA Divide _____ force (usually weight in g) by the effort force (Newton)

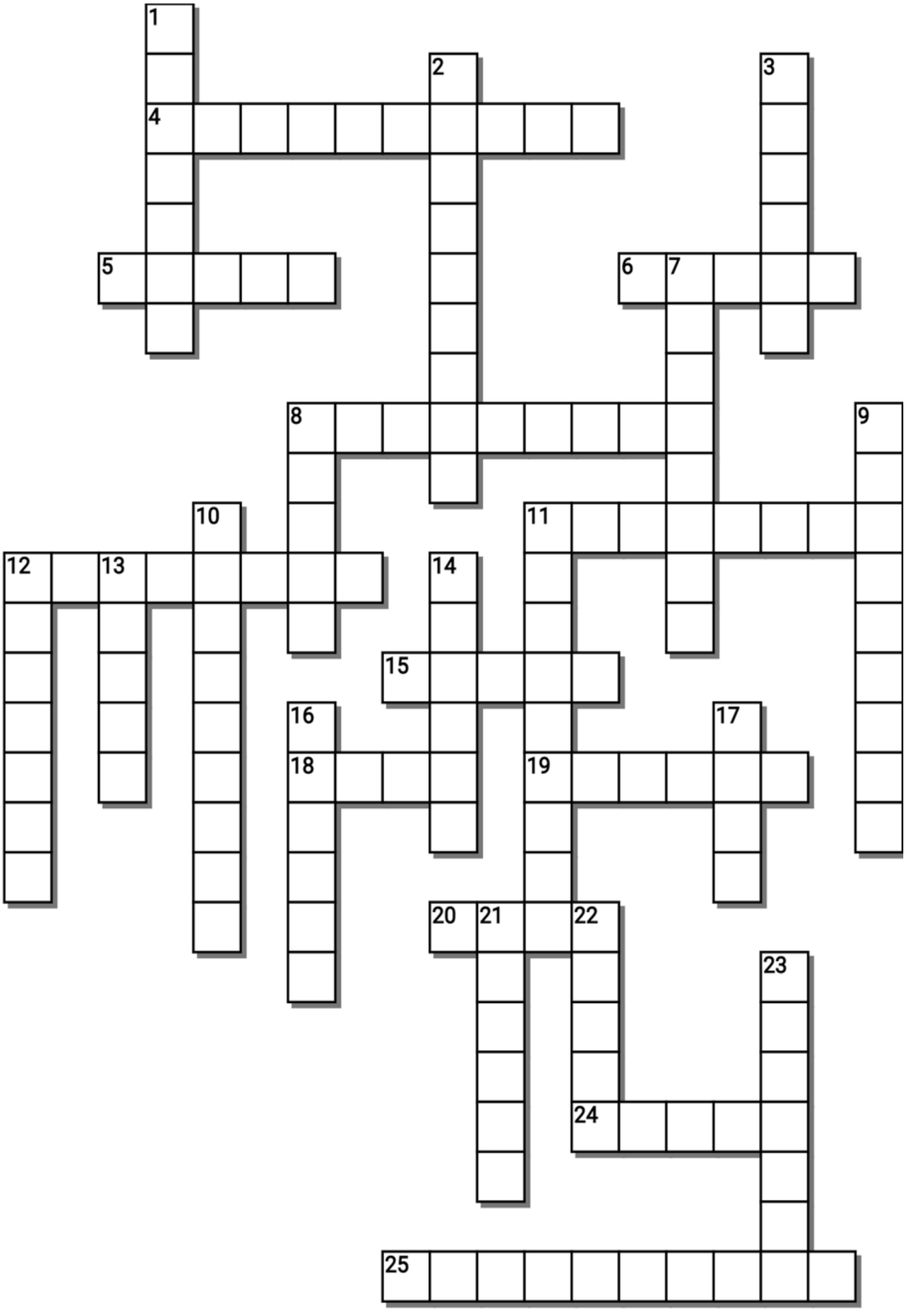
Down

1. Law Conservation of energy: energy cannot be _____ or destroyed.
2. Law Conservation of energy: energy cannot be created or _____.
3. Force (N) x distance (m) = work (J) _____
7. _____ Plane: A slanting surface connecting a lower level to a higher level
8. The mechanical advantage of a screw can be found by dividing the circumference of the screw by the _____ of the screw.
9. Machines - They change _____ of a force.
10. Machines - They Increase the _____ of a force.
11. The mechanical advantage of a wedge can be found by dividing the length of the slope (S) by the _____ (T) of the big end.
12. Efficiency is the energy output, _____ by the energy input, and expressed as a percentage.
13. Machines - They increase the distance or _____ of a force.
14. This uses grooved wheels and a rope to raise, lower or move a load.
16. The mechanical advantage of a wheel and axle is the ratio of the radius of the wheel divided by the _____ of the axle.
17. A pulley makes work seem easier Changes the direction of motion to work with gravity. Instead of lifting up, you can pull _____
21. Mechanical advantage (MA): The number of times a machine multiplies your _____ force.
22. An inclined plane wrapped around a pole which holds things together or lifts materials.
23. Catapults - By the law of conservation of energy, the stored potential energy (U) is transferred into rotational _____ energy (K), with some loss due to friction. U = K.

----------teacher can remove this word bank to make puzzle more challenging----------

Possible Answers

BLOCK, CREATED, DESTROYED, DIRECTION, DISTANCE, DIVIDED, DOWN, EFFICIENCY, FIXED, INCLINED, JOULES, LESS, LEVER, PITCH, PULLEY, RADIUS, SCREW, SPEED, THICKNESS, TRANSFER, WEDGE, AXLE, EFFORT , KINETIC, MAGNITUDE, NEWTON, POTENTIAL , RESISTANCE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Simple Machines Part 4 Lesson 9 Name:

1-20 = 5 pts

*20-*25 * = Bonus + 1 pt,

(Secretly write owl in correct space +1 pt) Score ____ / 100

Final Question = 5 pt wager

PULL OVER	ARE YOU cLEVER ENOUGH?	ON A JET PLANE	WHEELIN AND DEALIN	GREEN MACHINE Bonus round 1 pt each
1)	6)	11)	16)	*21)
2)	7)	12)	17)	*22)
3)	8)	13)	18)	*23)
4)	9)	14)	19)	*24)
5)	10)	15)	20)	*25)

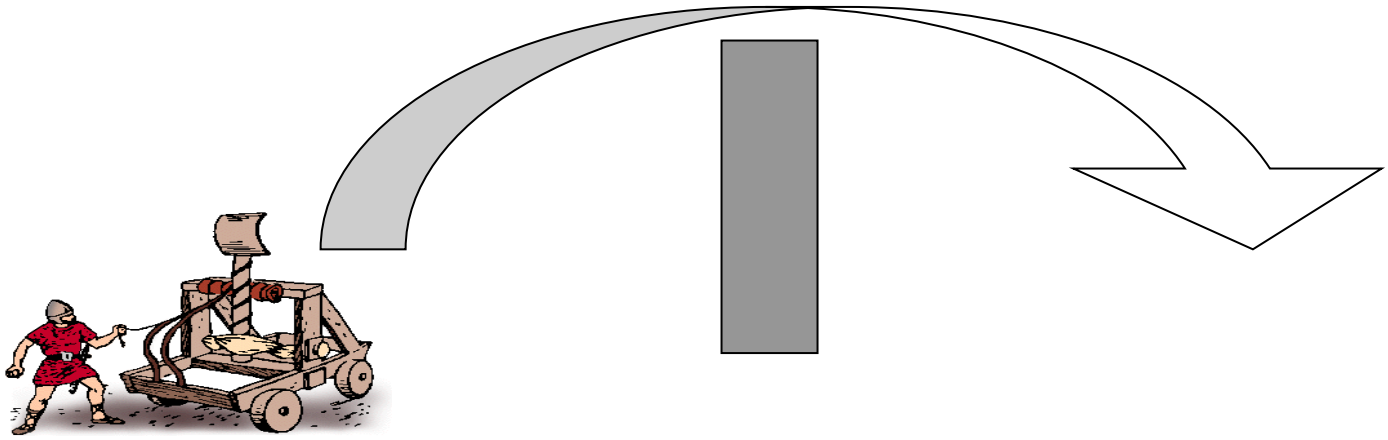
Final Question: 5 Point Wager ___/5 _____

Part 4 Simple Machines

Name:
Due:

I am aware that I need to show all mathematical work in an organized manner to receive any credit for a question that involves calculations of any kind. Omitting / leaving out the units in the problem or at the end will also result in zero credit ◊ _____

What can you tell me about the picture below? Include Newton's Laws of Motion + Potential and Kinetic Energy and Trajectory. (Apex?)



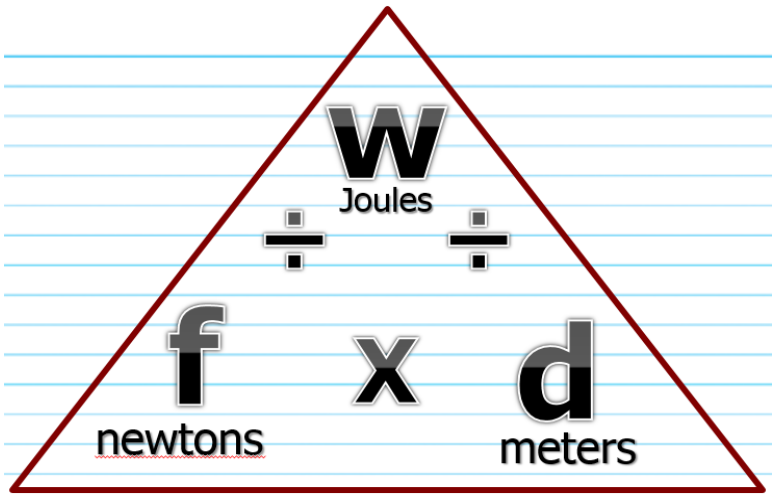
Catapults - By the law of conservation of energy, the stored potential energy (U) is transferred into rotational kinetic energy (K), with some loss due to friction. U = K.
When the rock is shot from the catapult it will travel in the direction of the target (Newton's First Law). Air resistance will slow it down (Newtons First Law), and it gravity will cause it to arc. The rock will stop when it hits something.

- Trajectory – The path of flying object: the path that a projectile makes through space under the action of given forces such as thrust, wind, and gravity.

Law Conservation of energy: energy cannot be created or destroyed.
Simple machines generally require more work / energy to complete a task.
But they….

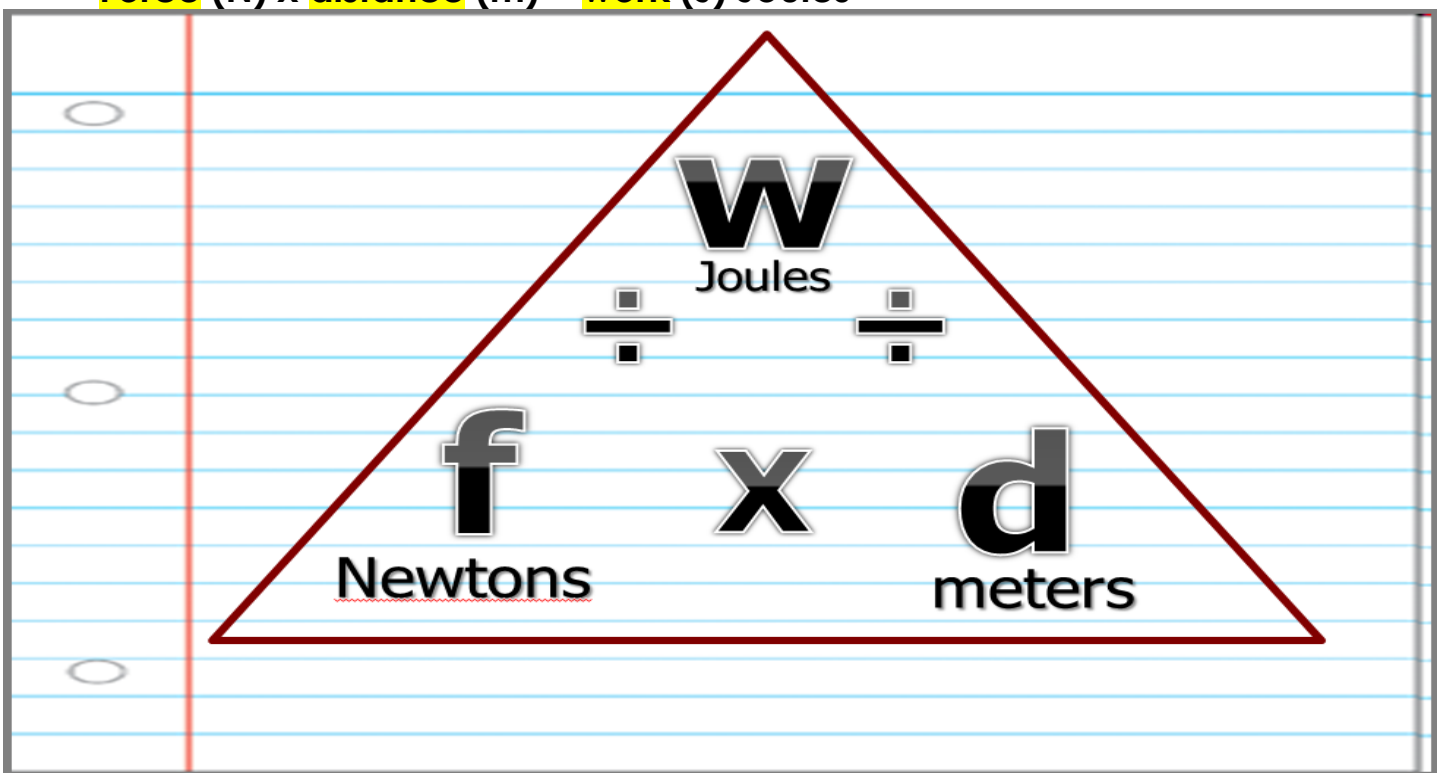
- *Transfer force from one place to another.*
- *Change direction of a force.*
- *Increase the magnitude of a force.*
- *Increase the distance or speed of a force.*
  - *This makes work **seem** easier.*

- **force (N) x distance (m) = work (J) Joules**



Please fill in the triad below.

- **Force (N) x distance (m) = work (J) Joules**



$$\eta = \frac{\text{Energy Output}}{\text{Energy Input}} \times 100\%$$

Please complete the question below about Work (W=F X d). We will cover them in class slideshow if you want to complete at that time.

A force of 200 Newtons pushes a Lego car 10 meters across the road. W = f x d W = 200N x 10m **W = 2,000 Joules** How much work was done?	Jennifer did 5,000 Joules of Work pushing with 500 Newtons. W / f = d 5,000 J / 500 N = d **10 m = d** How far did Jennifer move the boxes?
300 Joules of Work was used to lift a dog 2 meters in the air. F = w/d F = 300J/2m **F = 150 N** How much did the dog weigh / N?	A wind up toy takes in 50 J (Joules) and puts out 45 J n=45J/90J= .9 x 100% **n=90%** What's its efficiency?
A karate expert puts 100 J of energy into several strikes of his foot. The energy transferred to breaking the boards was 60 J. n = 60J/100J .6 x 100% **n= 60%** What is the efficiency of the strike?	A chemical reaction has an efficiency of only 25%. 300 Joules on energy was put into the reaction. Output = input (300J) x .25% **Output = 75 Joules** What was the energy output?
A Nyan papercraft machine has an efficiency of 70%. 20 Joules of energy was put in.	Each mousetrap exerted a force of 20 Newtons and jumped approximately .25 meters.

Output = Input 20 J x .7% **Output = 14 Joules** What was the energy output?	W = f x d W = 20N x .25 m W = 5 Joules **5 J x 150 = 750 J** How much work was done by all 150 mousetraps
I wonder how far I moved this block if I did 10J of work pulling with a force of 20 Newtons? D = w/f D = 10J/20N **D = .5 m**	Romeo exerted a force of 1,000 N over a Distance of .5 meters. How much work did Romeo perform? W = f x d W = 1,000N x .5 m W = 500Nm **W = 500 Joules**
Gerald exerted 10,000 Joules of work with a force of 500 Newtons. d = w/f d = 10,000J / 500N **d = 20 m** How far did he move the wheel barrel?	A professional cyclist did 1,000,000 Joules of Work pedaling with a force of 200 Newtons W / f = d 1,000,000 J / 200 N = d **5,000 m = d** How far did the cyclist travel?

To find Mechanical Advantage

- Divide resistance force (usually weight in g) by the effort force (newton)

Types of machines that do work with one movement.

Pulley

- Uses grooved wheel and a rope to raise, lower or move a load. Three types of pulleys

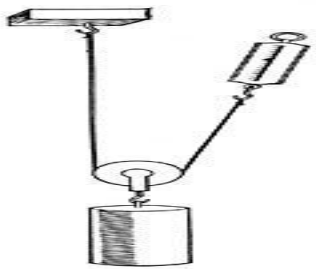
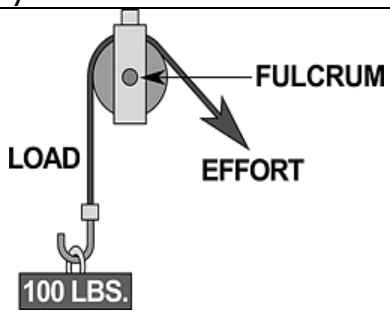
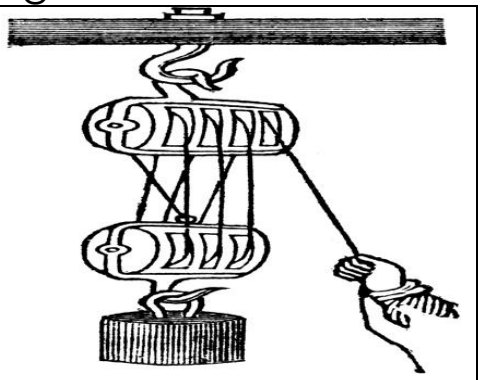
A pulley makes work seem easier

- Changes the direction of motion to work with gravity. Instead of lifting up, you can pull down.
- Uses your body weight against the resistance.

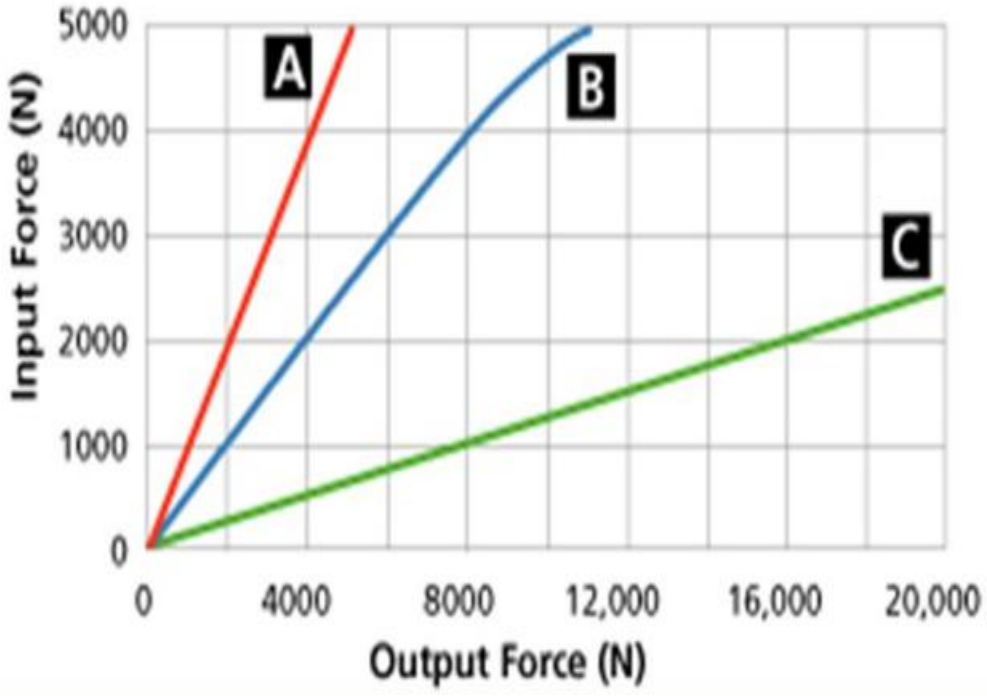
The more pulleys that are used, the more the MA (Mechanical Advantage).

- MA = The number of ropes that support the pulley. The end of the rope doesn't count.

Please provide the name of the correct pulley in the boxes below. Also provide each pulley's Mechanical Advantage.

		
Movable Pulley (2 / MA advantage)	Fixed Pulley MA= 1 / No advantage.	Combined Pulley or Block and Tackle MA = 7

Use the chart below to answer the questions.

Which pulley system is a combined pulley system of 2? The blue line Which pulley system is a combined pulley system of 8? The Green Line - Which letter represents a fixed pulley? Why? Red, No MA, but can use body	

weight against the resistance	

Please create a four pulley system.

Please provide the name of the correct class of lever in the boxes below. Also find the Mechanical advantage of each lever by measuring the pictures below. Each space is one meter.

Lever

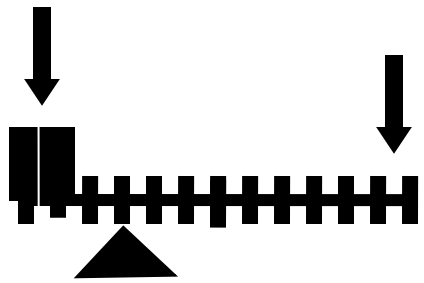
- A stiff bar that rests on a support called a fulcrum which lifts or moves loads
- MA = length of effort arm ÷ length of resistance arm.

Third Class Lever.

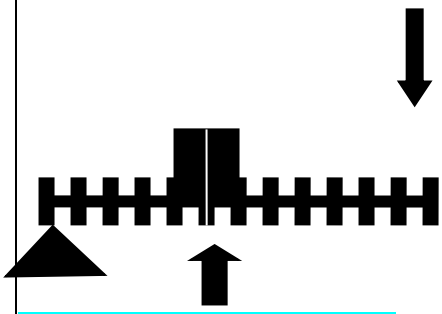
- Has Mechanical disadvantage.
- Requires more force to lift the load.

- Wedge: An object with at least one slanting side ending in a sharp edge, which cuts material apart.
  - The mechanical advantage of a wedge can be found by dividing the length of the slope (S) by the thickness
  - (T) of the big end.
- Wheel and Axle: A wheel with a rod, called an axle, through its center lifts or moves a load.
  - The mechanical advantage of a wheel and axle is the ratio of the radius of the wheel divided by the radius of the axle.
  - Radius: A straight line from a circles center to its perimeter.

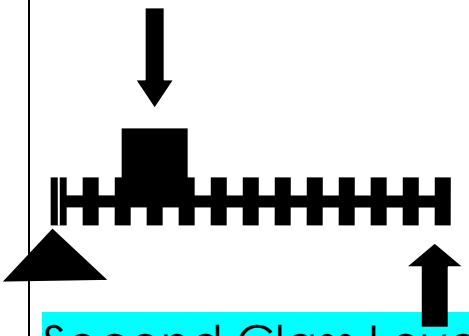
MA = length of effort arm ÷ length of resistance arm.



First Class Lever
E arm = 9
R arm = 3
MA = 9/3
MA = 3

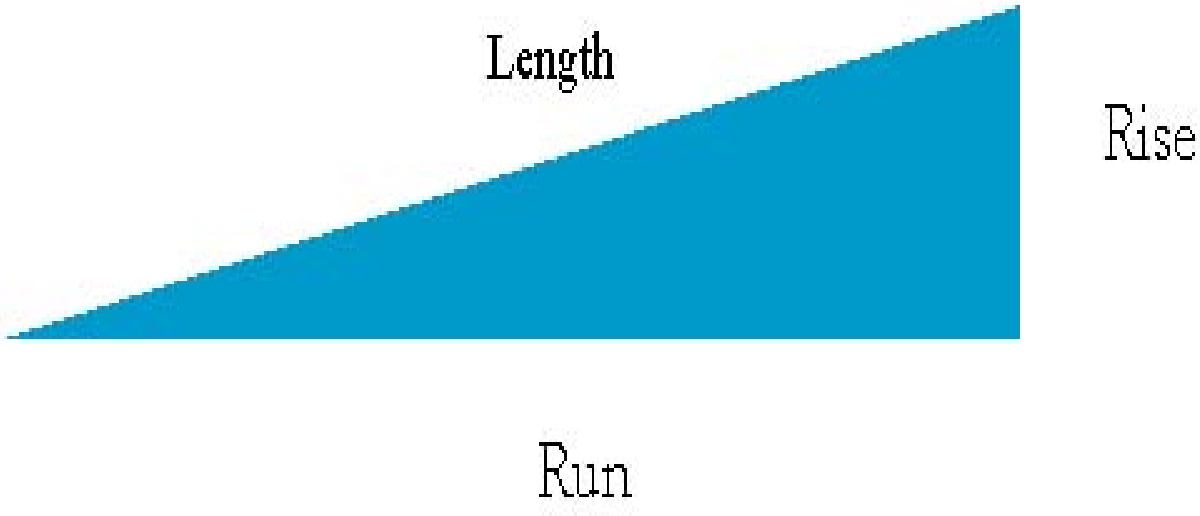


Third Class Lever



Second Class Lever

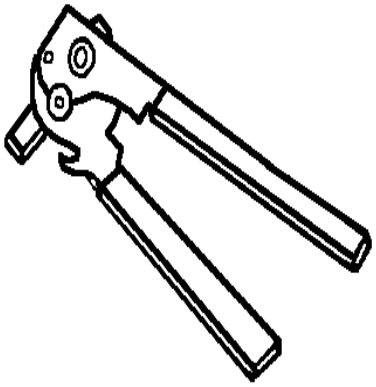
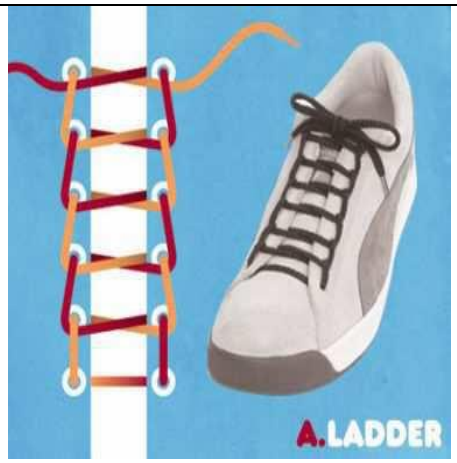
- An Inclined plane: A slanting surface connecting a lower level to a higher level
  - MA for an inclined plane is the length of the slope divided by the height (Rise).



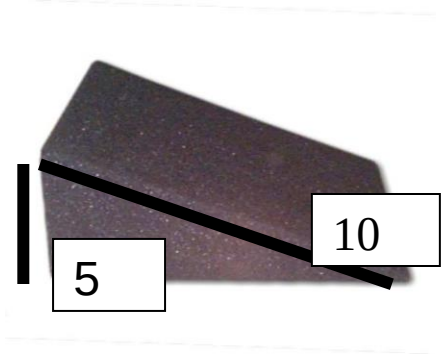
- Screw: An inclined plane wrapped around a pole which holds things together or lifts materials.

- The mechanical advantage of a screw can be found by dividing the circumference of the screw by the pitch of the screw.
- The circumference of a circle is the distance around the circle. It is the circle's perimeter. The formula for circumference is:
  - Circumference = **π** times Diameter
  - C = πd
  - Where π = 3.14

Please label the machines below. There can be more than one answer per square. Also find the MA where information is given.

<table>
<tr>
<td> 
Wheel and Axle
Wedge
Lever</td>
<td> 

Pulley</td>
<td> 
Lever (Class I)
Wheel and Axle (truck)
Screw (Bolts on Wheel)</td>
</tr>
<tr>
<td> 

Wheel and Axle</td>
<td> 
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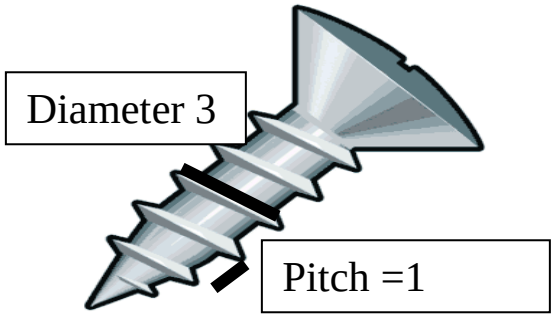
<td> 
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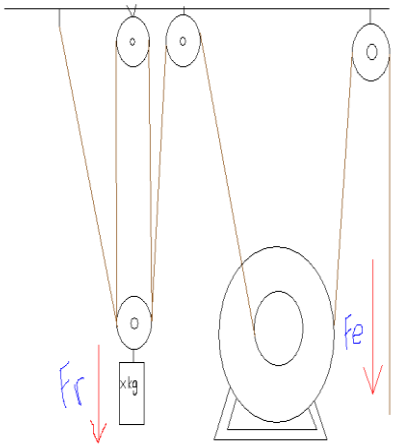
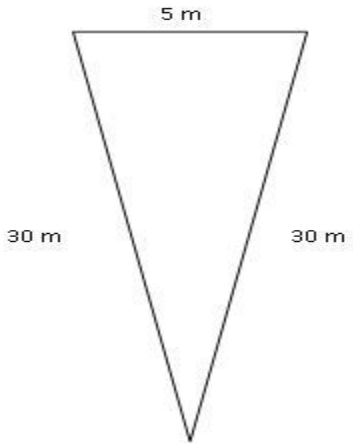
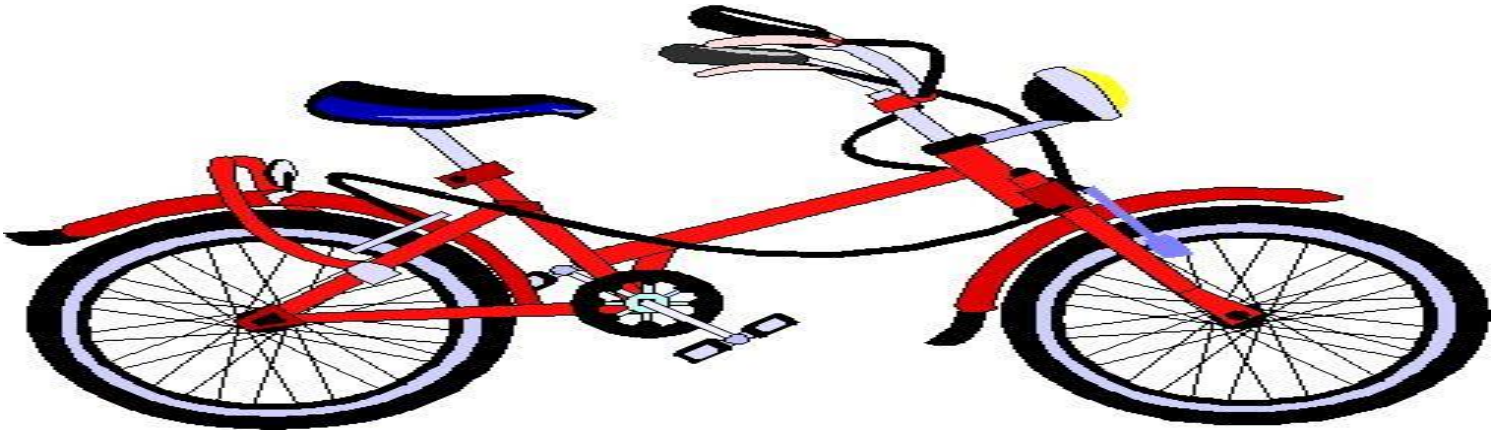
MA= 20	Wedge MA=2	Screw MA=9.42
 Pulley + wheel and axle MA = 6 of Pulley	  Wedge (two inclined planes) MA = 6	 Lever

Please label all of the simple machines in the picture below. You must draw arrows to them as you describe them. A strong answer will show more than 10.



Wheel and Axle – The two wheels, on the pedal, bearing where pedal shaft goes through bike, head below handle bars, seat, all of the chain links if it had any.

Lever – Brake handles, Brakes, Bar from pedals (crank), lever that tightens wheel and axle,

Pulley – Chain system is a pulley (absent)

Wedge – Brake pad,

Inclined plane – These make it easier to bike up hills

Screw – Attaches brake to frame, all of the spokes attach to the wheel, the gas valve screws on, screws attach the light.

The Pizza butter has a wedge, wheel and axle.	The wine opener has a screw, a few wheel and axles, levers, and wedge at the tip.

Sketch out a Rube Goldberg machine that makes a simple task very complex. Your machine must include all of the simple machines we have learned.

◊Wheel and Axle ◊Wedge ◊Inclined Plane ◊Pulley ◊Screw ◊Lever

Example

Across

4. A measure of how much more work must be put into a machine than you get out of the machine.
5. A stiff bar that rests on a support called a fulcrum which lifts or moves loads
6. This type of pulley has no Mechanical Advantage
8. Catapults - By the law of conservation of energy, the stored _____ energy (U) is transferred into rotational kinetic energy (K), with some loss due to friction. U = K.
11. Machines - They _____ force from one place to another.
12. Machines - They increase the _____ or speed of a force.
15. A _____ and tackle or only tackle is a system of two or more pulleys with a rope or cable threaded between them, usually used to lift heavy loads. The pulleys are assembled to form blocks and then blocks are paired so that one is fixed and one moves with the load.
18. A wheel with a rod, called an _____ through its center lifts or moves a load.
19. Force is measured in a unit called the _____
20. The efficiency of a machine will always be _____ than 100%.
24. An object with at least one slanting side ending in a sharp edge, which cuts material apart.
25. To find MA Divide _____ force (usually weight in g) by the effort force (Newton)

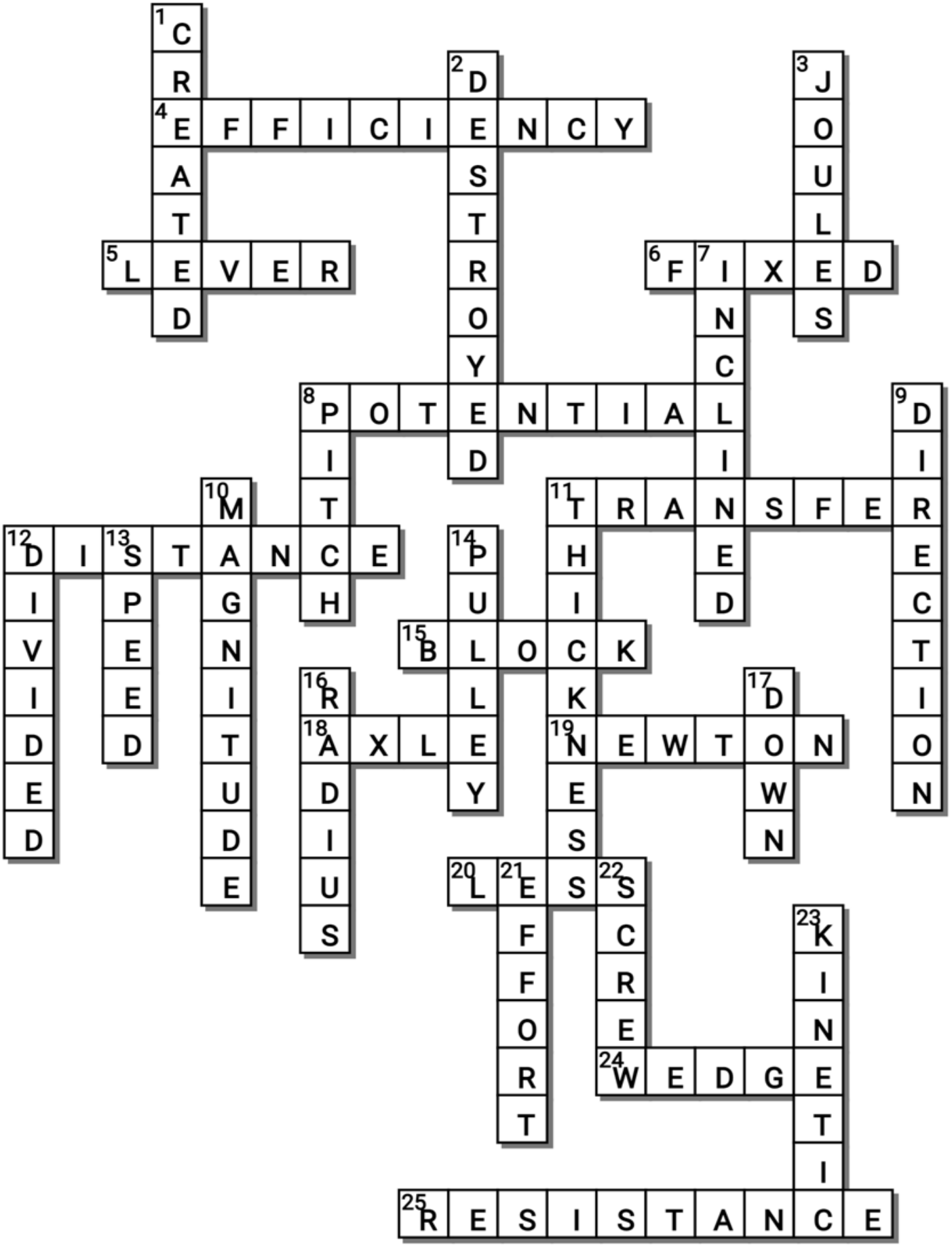
Down

1. Law Conservation of energy: energy cannot be _____ or destroyed.
2. Law Conservation of energy: energy cannot be created or _____.
3. Force (N) x distance (m) = work (J) _____
7. _____ Plane: A slanting surface connecting a lower level to a higher level
8. The mechanical advantage of a screw can be found by dividing the circumference of the screw by the _____ of the screw.
9. Machines - They change _____ of a force.
10. Machines - They Increase the _____ of a force.
11. The mechanical advantage of a wedge can be found by dividing the length of the slope (S) by the _____ (T) of the big end.
12. Efficiency is the energy output, _____ by the energy input, and expressed as a percentage.
13. Machines - They increase the distance or _____ of a force.
14. This uses grooved wheels and a rope to raise, lower or move a load.
16. The mechanical advantage of a wheel and axle is the ratio of the radius of the wheel divided by the _____ of the axle.
17. A pulley makes work seem easier Changes the direction of motion to work with gravity. Instead of lifting up, you can pull _____
21. Mechanical advantage (MA): The number of times a machine multiplies your _____ force.
22. An inclined plane wrapped around a pole which holds things together or lifts materials.
23. Catapults - By the law of conservation of energy, the stored potential energy (U) is transferred into rotational _____ energy (K), with some loss due to friction. U = K.

----------teacher can remove this word bank to make puzzle more challenging----------

Possible Answers

BLOCK, CREATED, DESTROYED, DIRECTION, DISTANCE, DIVIDED, DOWN, EFFICIENCY, FIXED, INCLINED, JOULES, LESS, LEVER, PITCH, PULLEY, RADIUS, SCREW, SPEED, THICKNESS, TRANSFER, WEDGE, AXLE, EFFORT , KINETIC, MAGNITUDE, NEWTON, POTENTIAL , RESISTANCE



Laws of Motion and Machines Unit Crossword

Simple Machines Part 4 Lesson 9 Name:

1-20 = 5 pts

*20-*25 * = Bonus + 1 pt,

(Secretly write owl in correct space +1 pt) Score ____ / 100

Final Question = 5 pt wager

PULL OVER	ARE YOU cLEVER ENOUGH?	ON A JET PLANE	WHEELIN AND DEALIN	GREEN MACHINE Bonus round 1 pt each
1) A=1MA, 2=MA, 3=3MA, 4=4MA	6) First Class Lever	11) Wedge 5 MA	16) Radius 5/1 = 5 MA	*21) Arm and Hammer Banking Soda
2) A=Movable B=Combined C=Fixed	7) 4 meters / 2 meters = MA 2	12) A=2 B=5 C=2.5 D=2	17) W / f = d 20,000 J / 200 N = d 100 m = d	*22) Tony Hawk
3) Changes the Direction of the Force	8) A=Third Class B=First Class C=Second Class	13) Inclined Plane F = w/d F = 4000J/2m F = 2,000 N	18) A=Not so Good B= Better	*23) Green Goblin
4) Work and Newtons were switched	9) Second Class A=Effort B=Load C=Fulcrum	14) 18.84 / 2 = 9.42MA	19) Transfer Direction Magnitude Distance and Speed	*24) Evel Knievel
5) False	10) Third Class A=Fulcrum B=Force C=Load	15) A=Wedge B=Wheel and Axle C=Inclined Plane D=Lever E=Pulley F=Screw	20) n = 150J/300J .5 x 100% 50%	*25) Bumblebee

Final Question: 5 Point Wager ___/5 W = f x d

W = 100N x 60m

W = 6,000 Joules

1nm is equal to 1 Joule