TECHNOLOGICAL DESIGN

The Zombie Turkey's favorite snack is marshmallows! Can you use your technological design skills to create a turkey-proof tower and protect your marshmallow?

6-1.4 Technological Design-Turkey Towers Lab

1. **PROBLEM:** State your problem to solve- _____

2. **SOLUTION DESIGN:** (10 minutes) 1. In pairs, draw 2 designs for the turkey-proof tower in the space provided. 2. Discuss the trade-offs of each design.

1st Model Design

Advantage(s)

Disadvantage(s)

2nd Model Design

Advantage(s)

Disadvantage(s)

3. **IMPLEMENTATION:** Now you have to build your best tower design.
AFTER CONSTRUCTION: Were there any problems with the design?
_____ (If yes, explain) _____

How could you redesign your tower? Draw in the space provided.

Redesigned Model

4. **EVALUATION:**
What do you think would be the trade-offs for the redesigned tower?

Advantage(s)

Disadvantage(s)

Questions

1. In which step of technological design did you generate possible ideas for the product/solution? _____
2. In which step of technological design would you identify any problems with the design? _____
3. In which step of technological design would you build or test your design? _____
4. In which step would you determine the pros and the cons of the solution or product? _____

Facing ☺ Science!

6-5.1 Types of Energy

DIRECTIONS: Find the correct answer and DRAW the object that corresponds with that answer!

Zombie Turkey is protesting the eating of turkeys for holiday meals! Complete the project to see what he thinks we should eat instead!

1. Energy is the ability to _____ .

(a) If your answer is **do work** draw the following head, horns, and ears on the top of the circle.

(b) If your answer is **Show work** draw the following head, horns, and ears on the top of the circle.

2. Another name for heat energy is _____ energy.

(a) If your answer is **thermal** draw the following body around the circle.

(b) If your answer is **solar** draw the following body around the circle.

3. _____ energy powers our math calculators.

(a) If your answer is **solar** draw the following two large hooves on the bottom of the paper.

(b) If your answer is **Chemical** draw the following two large hooves on the bottom of the paper.

4. The food you eat, batteries, and oil all contain _____ energy.

(a) If your answer is **chemical** draw the following large nostrils inside the circle.

(b) If your answer is **electrical** draw the following large nostrils inside the circle.

5. Power plants produce _____ _____ from water, coal and nuclear power.

(a) If your answer is **Chemical energy** draw the following large mouth inside the circle.

(b) If your answer is **Electrical energy** draw the following large mouth inside the circle.

6. Potential energy has energy because of an object's _____ .

(a) If your answer is **motion** draw the following eyes.

(b) If your answer is **position** draw the following eyes.

7. What form of energy comes from the sun?

(a) If your answer is **mechanical** draw the following bell under the circle.

(b) If your answer is **solar** draw the following bell under the circle.

8. A rolling ball has _____ energy.

(a) If your answer is **kinetic** draw curvy spots all over the body.

(b) If your answer is **heat** draw square spots all over the body.

9. Lightning consists of _____ _____ .

(a) If your answer is **Electrical energy** draw the following fence in the background.

(b) If your answer is **Chemical energy** draw the following fence in the background.

Facing ☺ Science!

6-5.1 Types of Energy

***DIRECTIONS*: Find the correct answer and COLOR the object that corresponds with that answer!**

10. Energy can be transformed or _____ from one form to another.

(a) If your answer is **burned** color the eyelids yellow.
(b) If your answer is **changed** color the eyelids black.

11. When you turn on a flashlight an energy _____ occurs.

(a) If your answer is **transformation** color the eyes blue.
(b) If your answer is **surge** color the eyes brown.

12. _____ is a measure of how fast molecules are moving.

(a) If your answer is **electricity** color the spot around the eye black.
(b) If your answer is **heat** color the spot around the eye brown.

13. The Law of Conservation of Energy states that energy can be changed from one type to another, but never _____ or _____.

(a) If your answer is **Created / destroyed** color the horns yellow.
(b) If your answer is **Lost/found** color the horns brown.

14. Music playing on the radio is a form of _____ energy.

(a) If your answer is **sound** color the hair on the head brown.
(b) If your answer is **waves** color the hair on the head black.

15. _____ energy is the energy of an object because of it's motion or position.

(a) If your answer is **kinetic** color the ears brown with orange centers.
(b) If your answer is **mechanical** color the ears black with pink centers.

16. Anything that is warm gives off _____ _____.

(a) If your answer is **Solar energy** outline the head, nostrils, and mouth in orange.
(b) If your answer is **Heat energy** outline the head, nostrils, and mouth in black.

17. What is a form of energy that powers your car?

(a) If your answer is **chemical** color the center of each nostril red.
(b) If your answer is **heat** color the center of each nostril gray.

18. Once a ball stops rolling it has no more _____ _____.

(a) If your answer is **Kinetic energy** color the rest of the circle pink (leave the mouth white).
b) If your answer is **potential energy** color the rest of the circle orange (leave the mouth white).

19. A compass shows direction and works due to _____ energy.

(a) If your answer is **mechanical** color the hooves gray and the spots on the body black.
(b) If your answer is **magnetic** color the hooves brown and the spots on the body gray.

20. Energy saving fluorescent tube lights are more _____ because they turn more of the electrical energy into light and less into wasted heat energy.

(a) If your answer is **efficient** color the bell yellow and blue.
(b) If your answer is **powerful** color the bell orange and red.

21. The car at the top of a roller coaster pauses at the highest point, it's full of _____ energy

(a) If your answer is **kinetic** color the background brown with a gray fence.
(b) If your answer is **potential** color the background green with a brown fence.

6-5.3 Electromagnets & Simple Electric Motors

ELECTROMAGNETS

STEP 1: Go fish for paper clips with with a real electromagnet.
STEP 2: Draw and label the parts of an electromagnet.
STEP 3: Question zone. Discuss the questions with your shoulder partner record your answers.

1. What happens to the magnet if I make more coils of wire around the iron core?

_____
_____

2. What happens to the magnet if I make the nail larger?

_____

3. Identify 5 ways in which the electromagnet would not be able to lift any items.

_____
_____
_____
_____
_____

4. When the battery is connected, does the nail spin? _____

5. What is the purpose of the battery in the electromagnet?

_____
_____

Draw your own electromagnet here: (Be sure to include the nail, coils of wire, battery, & switch.)

SIMPLE ELECTRIC MOTORS

Remember our labs with the device seen below.

1. Draw and describe how this device was used as a simple electric motor in our lab.

2. What are the energy transformations that occur in this device?

GENERATORS

Remember our labs with the device seen below.

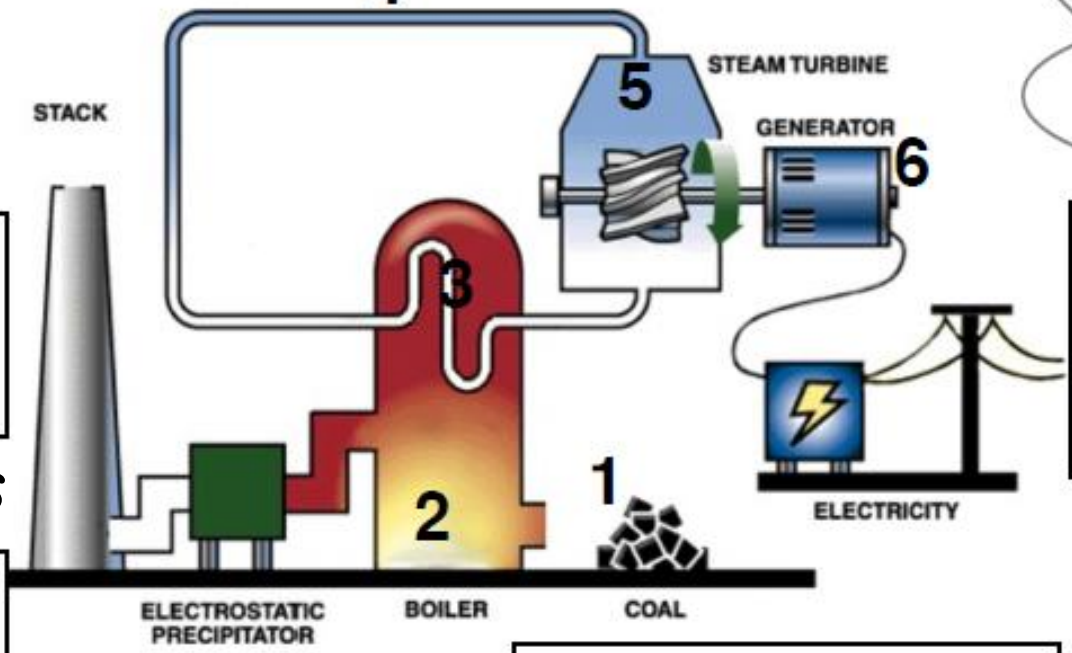
1. Draw and describe how this device was used as a generator in our lab.

2. What are the energy transformations that occur in this device?

GENERATORS

The Zombie Turkey wants an up close and personal tour of the inside of a power plant! Write a description of what is happening to the Zombie Turkey at each stage & answer a few questions, too!

6-5.3 Generators



Aside from steam, what are 2 other ways to turn a turbine?

_____
_____

5.

What is the purpose of the steam?

_____

What kind of energy is in the steam turbine?

_____

4.

6.

What kind of energy is produced from the generator?

_____

3.

2.

1.

What kind of energy transformation occurs in the water at this stage?

_____ _____

What is the purpose of the boiler?

_____

What kind of energy is in the boiler?

_____

What kind of energy is in the coal?

_____

Identify three ways that we transfer the electricity into a useful form.

_____
_____
_____

6-5.5 Convection, Conduction, & Radiation

What are all of these appliances? What are their purposes? I'm so confused!!

Zombie Turkey is not used to seeing all of these "fancy-shmancy" kitchen appliances!
He does not need to cook in order to eat . . . you know, since he's a *zombie*!
You need to help him figure out how the stove, oven and microwave work to help humans cook food.

Brainstorm

Match each <u>appliance</u> to <u>the heat transfer</u> that primarily occurs when we use it.

____Microwave

____Stove

____Oven

A. Convection

B. Radiation

C. Conduction

Match each **heat transfer** with its definition by drawing a line.

- Heat travels from hot to cool through touch/contact.
- Heat travels as warm air/water rises and cold air/water sinks.
- Heat travels through space.

6-5.5 Convection, Conduction, & Radiation

Explain how each appliance uses heat transfer in <u>five (5) or more complete sentences</u>.

Draw a picture to explain each type of heat transfer:

CONDUCTION

CONVECTION

RADIATION

6-5.7 Simple Machines - Scavenger Hunt

Zombie Turkey doesn't know a thing about simple machines, but he heard that you are experts!

You need to take Zombie Turkey on a mental scavenger hunt around the classroom, the school and your home to find examples of the following simple machines.

Inclined Plane

Lever

Wheel & Axle

Screw

Wedge

Gear

Pulley

Explain to Zombie Turkey why the gear and pulley are related to the Wheel & Axle.

Explain to Zombie Turkey how the screw and wedge are related to the inclined plane.

6-5.2, 6-5.4, 6-5.6 Energy Transformations & Work

<u>The Hunter's Second Chance-</u> Now it's your turn to be the hunter and get the Zombie Turkey to be our holiday dinner before he gets you! To do this, you have to do a little SCIENTIFIC WORK!

Directions: In the spaces below, describe different ways that you can get the Zombie Turkey to be the holiday meal. You MUST write out your description, describe the energy transformations that occur, and prove that scientific work was done in the activity.

Example

<u>How I Caught the Zombie Turkey!</u>
I saw the Zombie Turkey and I tackled him to the ground and lifted him a bag with a 5 Newton force and then carried the bag home 10 meters.

<u>Energy Transformations</u>
Potential → Kinetic
(holding bag up) (throwing bag over turkey)

So You did work? PROVE IT! →
Work= Force x distance
Force= lifting the turkey in the bag
Distance= carrying the bag home
Solve: 5N x 10 m = 50 J

<u>How I Caught the Zombie Turkey!</u>

<u>Energy Transformations</u>

So You did work? PROVE IT! →
Work= Force x distance
Force=
Distance=
Solve:

<u>How I Caught the Zombie Turkey!</u>

<u>Energy Transformations</u>

So You did work? PROVE IT! →
Work= Force x distance
Force=
Distance=
Solve:

<u>How I Caught the Zombie Turkey!</u>

<u>Energy Transformations</u>

So You did work? PROVE IT! →
Work= Force x distance
Force=
Distance=
Solve:

<u>How I Caught the Zombie Turkey!</u>

<u>Energy Transformations</u>

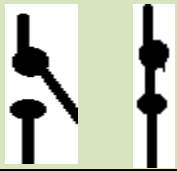
So You did work? PROVE IT! →
Work= Force x distance
Force=
Distance=
Solve:

<u>How I Caught the Zombie Turkey!</u>

<u>Energy Transformations</u>

So You did work? PROVE IT! →
Work= Force x distance
Force=
Distance=
Solve:

6-5.4 Energy Transformations & Circuits

Circuit Part	Color	Symbol to draw
Copper Wire	Orange	
Battery	Brown	
Switch (open or closed)	Black	
Resistors (something you plug in)		
Electric Lamp	Yellow	
Electric motor	Green	
Christmas Santa Singing with lights	Blue	
Hot burner on electric stove	Red	

Using the boxes below use the circuit parts, symbols and color coding to illustrate each energy transformation given.

Series Circuit

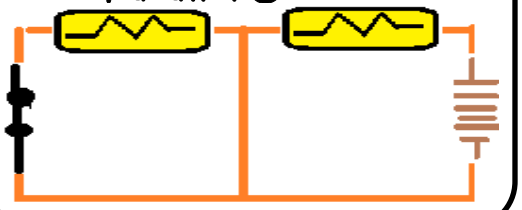
draw only 1 Resistor (1 path)

Parallel Circuit

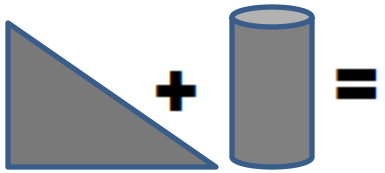
draw 2 or more Resistors (2 or more paths)

Draw the circuit as series on the left and parallel on the right.

6-5.4 Energy Transformations & Circuits

Example	Example	Example
<u>Transformation</u>: Electric Lamp Electrical→ Sound → Light ****Notice the switch is closed because the light is on.*	Series Circuit 	Parallel Circuit 
<u>Transformation</u>: Electric Motor in car running radio and heater (remember cars run on a battery). Chemical →Electrical → Mechanical → Sound → heat	Series Circuit	Parallel Circuit
<u>Transformation</u>: Battery powered Christmas Santa that talks with lights Chemical → Sound → Light	Series Circuit	Parallel Circuit
<u>Transformation</u>: Hot burner on electric stove Electrical → heat → Light	Series Circuit	Parallel Circuit

6-5.7 Simple Machines – Cryptogram & Word Scrambles



uelpyl_____

raeg____

wsrec_____

gedwe_____

revle_____

xael &

ehewl_____ &

_____

neidlnic

lnepa_____

_____

Zombie Turkey LOVES WORD SCRAMBLES and CRYPTOGRAMS when you do them with him!

After you solve the cryptogram answer this question:

How do simple machines make work easier?

They reduce . . .

_____

Cryptogram

Can you figure out what the message says?

Not too hard.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
			26		14							12	5				22	23							

__ S __ M ____ M ____ N __
2 23 3 12 1 16 19 12 2 8 21 3 5 19

__ S __ N __ ____
3 23 2 5 15 4 24 24 16

__ R __ D ____
24 22 26 19 6 3 8 19

____ ____ S __ M ____
4 21 2 4 21 19 16 1 23 4 24 12 2 11 19

__ R __ R D ____
24 10 22 19 6 19 22 15 26 2 15

__ F __ __ S __ R .
16 3 14 19 19 2 23 3 19 22

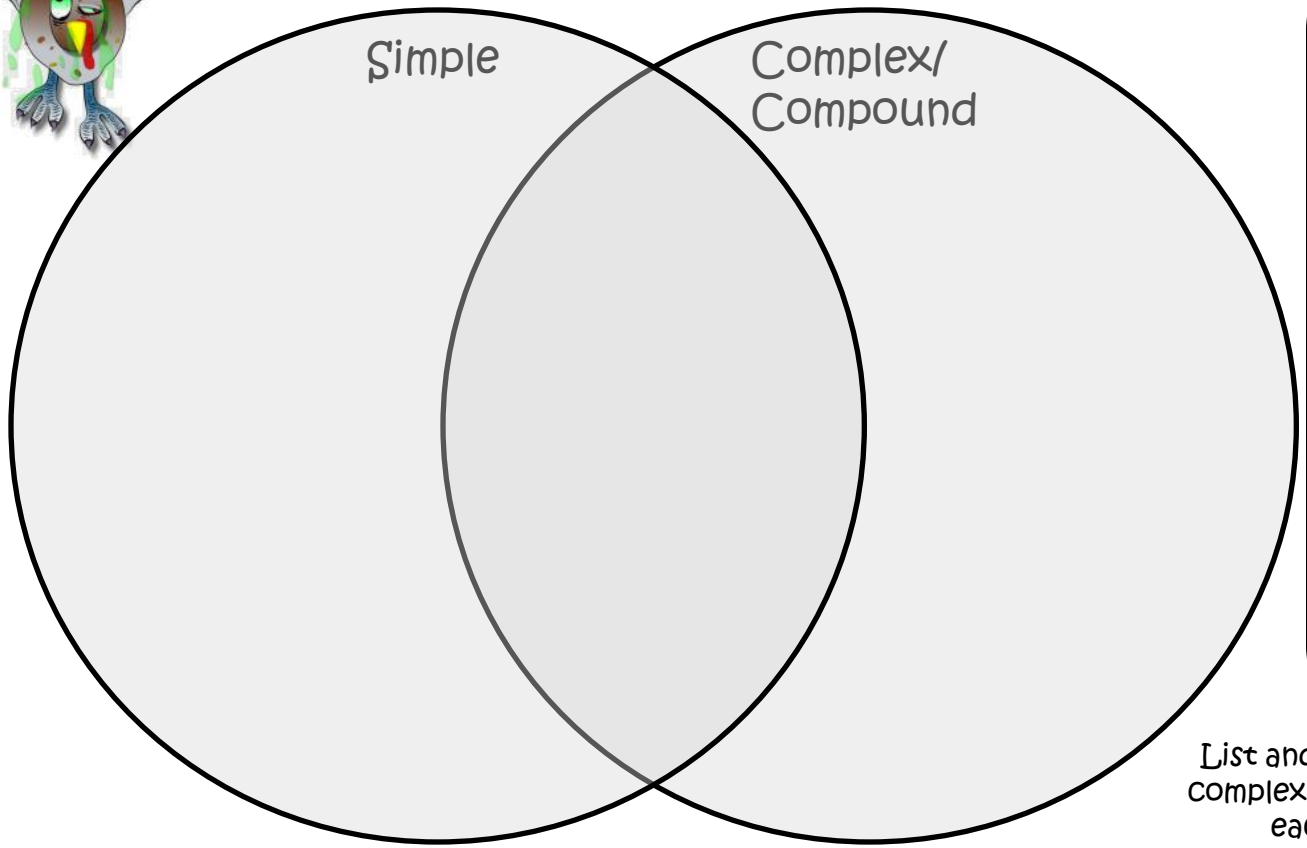
S __ M ____ M ____ N S
23 3 12 1 16 19 12 2 8 21 3 5 19 23

M ____ __ R __
12 2 11 19 7 24 22 11

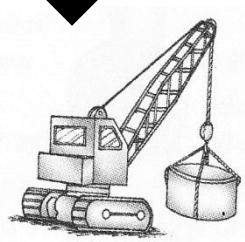
__ S __ R .
19 2 23 3 19 22

6-5.8 Complex Machines –Venn Diagram & List those machines

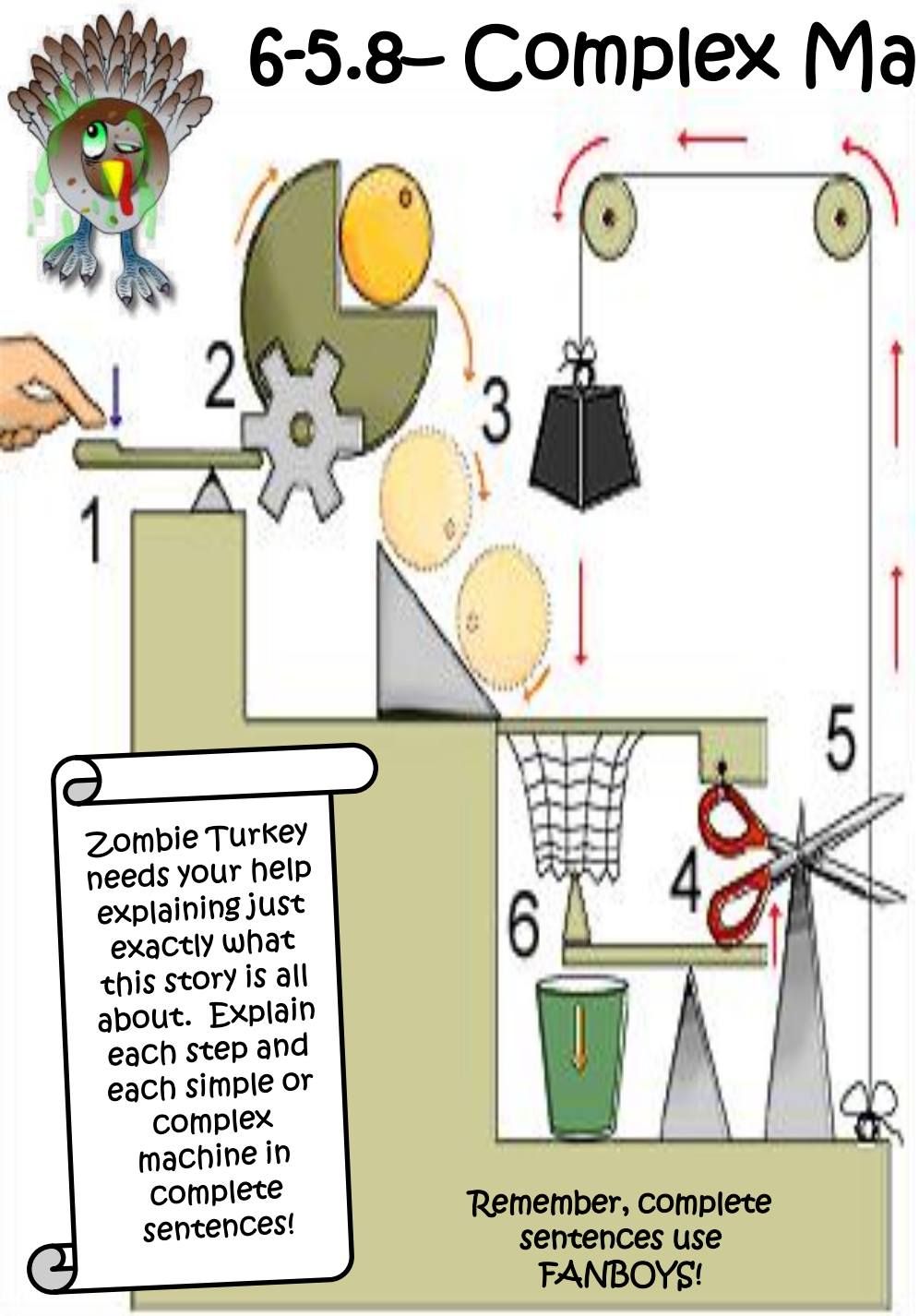
What do simple and complex machines have to do with one another? Help Zombie Turkey fill out this Venn Diagram.



List and explain what simple and complex machines are pictured in each of these devices?



6-5.8– Complex Machine Story



Zombie Turkey needs your help explaining just exactly what this story is all about. Explain each step and each simple or complex machine in complete sentences!

Remember, complete sentences use FANBOYS!

1.

2.

3.

4.

5.

6.