Read the two stories and then answer the questions below.

Sarah

Sarah is a 17 year old girl who lives in Phoenix, AZ. Every week day she wakes up at 6am to get ready for school. Her morning routine includes: waking up, turning off her alarm clock, making her bed, going to the bathroom and flushing the toilet, brushing her teeth, brushing her hair, putting on her clothes, going down the stairs, eating breakfast (cereal and milk) in front of the television, making her lunch, calling her best friend to tell her she is on her way to pick her up, saying bye to her parents, getting into her car, picking up her best friend Jen, and driving to school.

Mwanawa

Mwanawa is a 17 year old girl who lives in Tanzania, Africa. Every week day she wakes up at 4am to get ready for school. Her morning routine includes: getting dressed, waking up her 5 other siblings, eating breakfast (spiced milk tea and bread), walking an hour each way with her siblings where three of the siblings get two buckets of water each and two of her sibling collect firewood, washing her face and saving the water to then use it to brush her teeth, milking the three goats, feeding the one cow, and at 8am walking 1 hour to get to class.

1. In the table below, list where energy is being used in these two stories.

Sarah	Mwanawa

2. Where do you think the fuel is coming from that allows Sarah to perform her activities?

3. Where do you think the fuel is coming from that allows Mwanawa to perform her activities?

4. How is the energy being used in these two stories different?

5. Any other observations?

Sarah

Sarah is a 17 year old girl who lives in Phoenix, AZ. Every week day she wakes up at 6am to get ready for school. Her morning routine includes: waking up, turing off her alarm clock, making her bed, going to the bathroom, turning on the light, and flushing the toilette, brushing her teeth, brushing her hair, putting on her clothes, going down the stairs, eating breakfast (cereal and milk) in front of the television, making her lunch, calling her best friend to tell her she is on her way to pick her up, saying bye to her parents, getting into her car, picking up her best friend Jen, and driving to school.

Mwanawa

Mwanawa is a 17 year old girl who lives in Tanzania, Africa. Every week day she wakes up at 4am to get ready for school. Her morning routine includes: getting dressed, waking up her 5 other siblings, eating breakfast (spiced milk tea and bread), walking an hour each way with her siblings where three of the siblings get two buckets of water each and two of her sibling collect firewood, washing her face and saving the water to then use it to brush her teeth, milking the three goats, feeding the one cow, and at 8am walking 1 hour to get to class.

1. In the table below, list where energy is being used in these two stories.

Sarah	Mwanawa
battery powered tooth brush	human energy
electricity for alarm clock	animal energy
human energy	energy to make food
energy to flush toilet	energy from sun to make light
energy to turn water on/off	energy from the wood to make fire and heat
energy to turn lights on/off	boiling water
energy to make food and get it to house	Energy to walk
power the T.V.	To wake up siblings
keeping the house warm/cool	
make the car	
gas for car	
energy to keep phone charged	

2. Where do you think the fuel is coming from that allows Sarah to perform her activities?

A. coal, oil, gas, maybe some solar energy on top of the roof

3. Where do you think the fuel is coming from that allows Mwanawa to perform her activities?

A. solar energy for light, burning wood to cook food, lots of human energy

4. How is the energy being used in these two stories different? Which girl do you think uses more energy?

A. Energy used to power all of the appliances and house versus human energy and taking advantage of local resources. Sarah uses more energy.

Oil Extraction Data Sheet

Student Name: Oil Company:

Keep track of your oil company's total barrel extraction. Each black bean is equal to 1 barrel of oil. Year totals include all drillers in your company (i.e. all students choosing beans).

	Year 1	Year 2	Year 3
Barrels of Oil Extracted			

1. How many drillers did your company have in Year 1?_____in Year 2?_____in Year 3? _____

2. In which year was the largest number of barrels extracted?
_____

3. In which year was the second largest number of barrels extracted?
_____

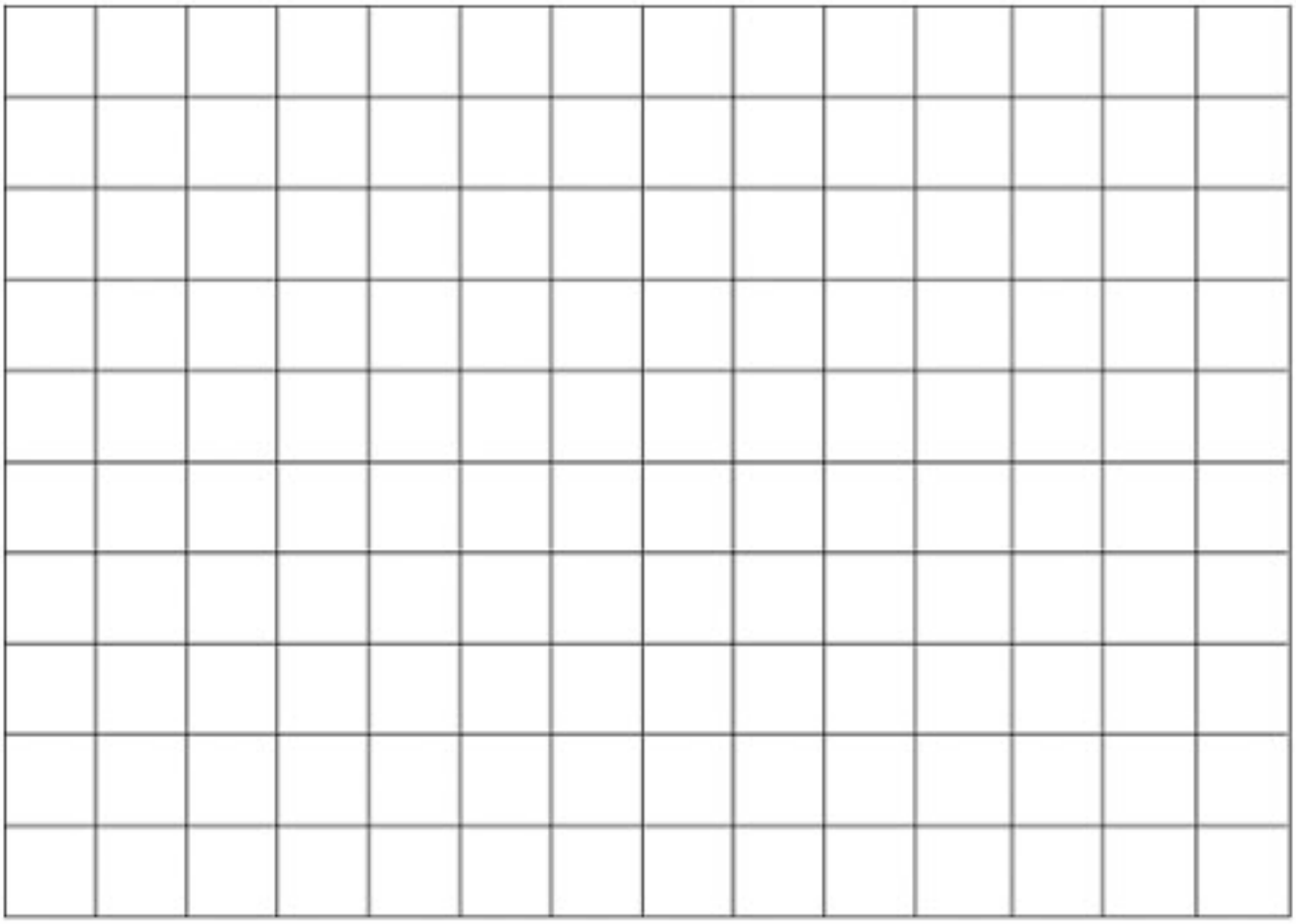
4. Which year had the least number of barrels extracted?
_____

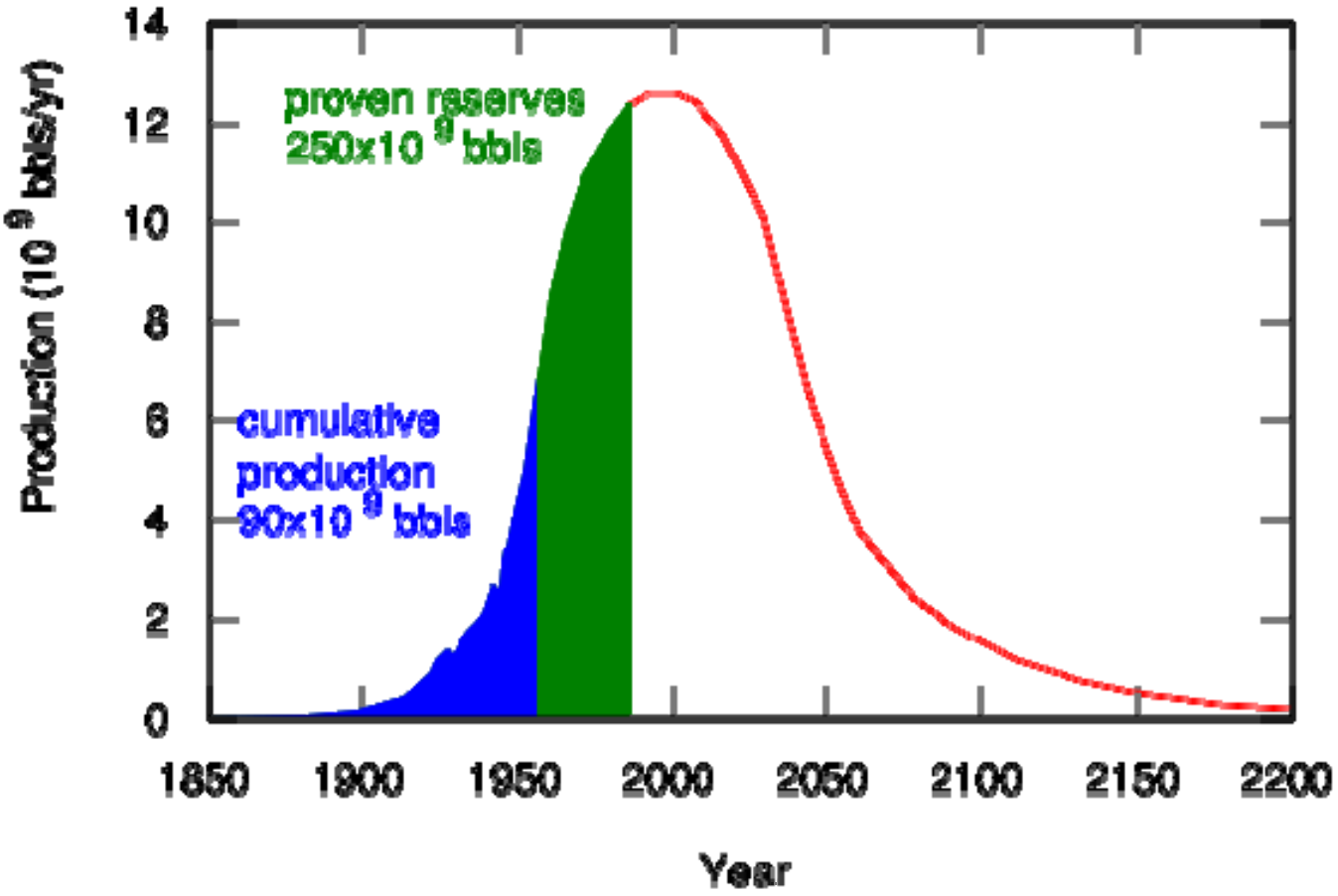
5. With each year, was it easier or harder to extract the oil?
_____
_____
_____
_____

6. Create a graph that shows the number of beans you have in year 1, 2, and 3. Compare the graph of peak oil to your own graph. Are there any similarities or dissimilarities?

_____
_____
_____
_____

Day 2 Worksheet





7. What are some disadvantages of using oil as an energy source?

_____
_____
_____
_____

8. List 3 policies, laws, manufacturing practices, or other types of legislation that could be implemented to reduce dependency on non-renewable energy sources. (i.e. What are some changes that the government could force people to make?)

_____
_____
_____
_____
_____

_____

Oil Extraction Data Sheet

Student Name: Oil Company:

Keep track of your oil company's total barrel extraction. Each black bean is equal to 1 barrel of oil. Year totals include all drillers in your company (i.e. all students choosing beans).

	Year 1	Year 2	Year 3
Barrels of Oil Extracted			

1. How many drillers did your company have in Year 1? in Year 2? in Year 3?
2. In which year was the largest number of barrels extracted? A. Year 1
3. In which year was the second largest number of barrels extracted? A. Year 2
4. Which year had the least number of barrels extracted? A. Year 3
5. With each year, was it easier or harder to extract the oil?

   A. More drillers are able to extract more oil, but oil also runs out faster. As oil supplies are depleted, it becomes increasingly difficult to extract the oil, with wells having to be dug deeper and deeper. This simulates the difficulty of extracting a depleted nonrenewable resource.
6. Create a graph that shows the number of beans you have in year 1, 2, and 3. Compare the graph of peak oil to your own graph. Are there any similarities or dissimilarities?

   A. In both graphs, as the years go by there is less and less oil available.
7. What are some disadvantages of using oil as an energy source?

   A. It is a finite resource. We have to continuously find more oil and dig up other places.
8. List 3 policies, laws, manufacturing practices, or other types of legislation that could be implemented to reduce dependency on nonrenewable energy sources. (i.e. What are some changes that the government could force people to make?)

   A. Renewable energy, oil quotas, energy conservation, reduce dependency on plastic, biodiesel cars, more hybrid cars, ride bike, etc..

Dear Student,

We've just completed the first run of tests on the new blade design. The data is below, along with the data on our standard blades. (Both blades are the same size.) Can you give me a quick analysis?

1. Which variable is the independent variable, and which one is the dependent variable?

2. Plot the data (wind speed vs power) for both blades.

3. As you know, the relationship between the power produced and the speed of the wind should follow this equation:

$$P = kw^3$$

Please find the value of k for the new blade at each wind speed using this equation. (Do this on a separate piece of paper and attach to this handout.)

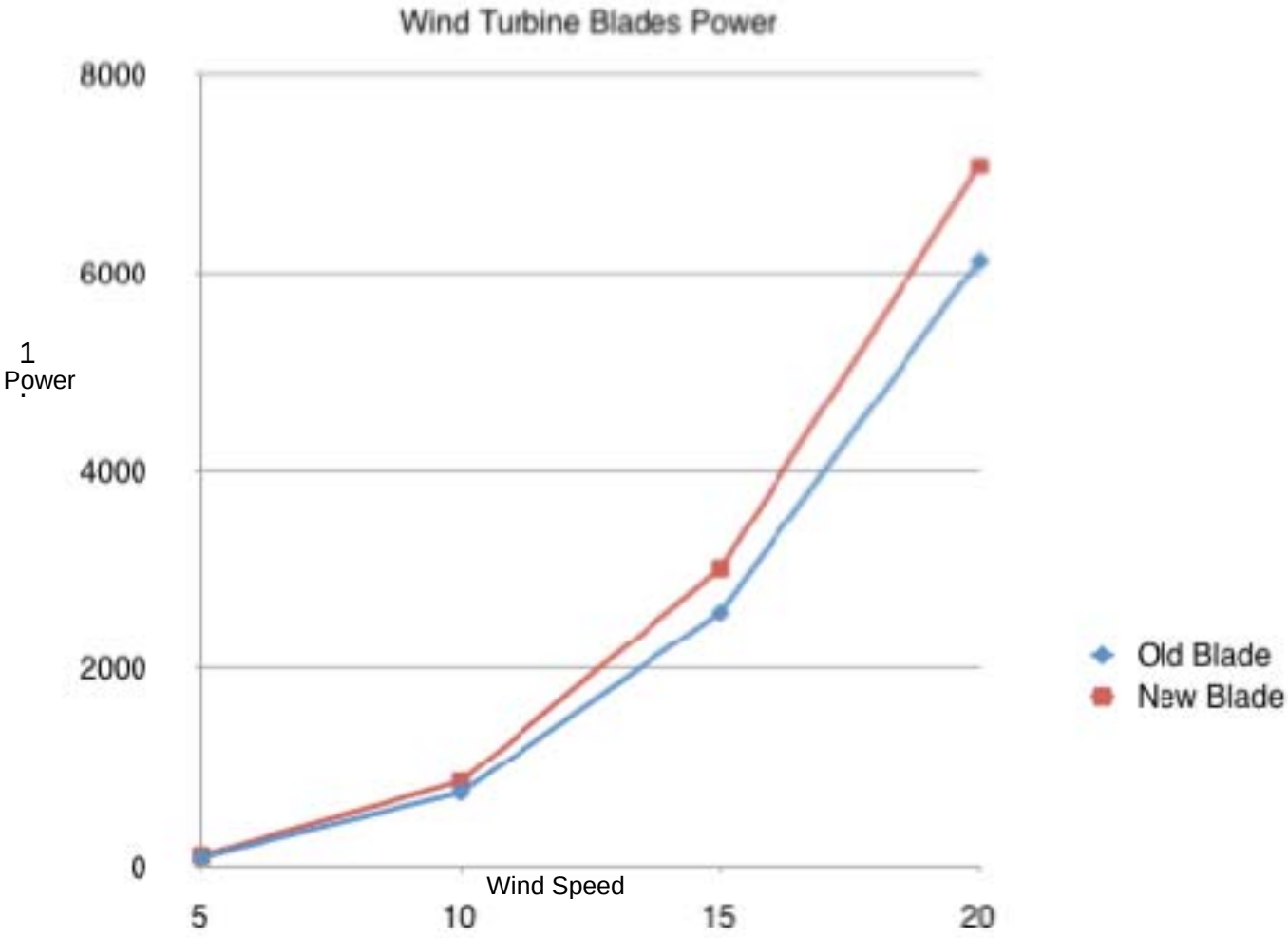
4. For the new blade, what would you predict as the amount of power that would be produced with a wind speed of 25mph?

Wind speed (mph)	Power: Old Blade (watts)	Power: New Blade (watts)
5	98	113
10	743	855
15	2570	3010
20	6130	7080
25	-	

Please have this on my desk by the end of the day.

Sincerely,

Your Boss



Independent: wind speed, Dependent: power

2. Plot the data for both blades

3. As you know, the relationship between the power produced and the speed of the wind should follow this equation:

$$P = kw^3$$

Please find the value of k for the new blade at each wind speed using this equation. (Do this on a separate piece of paper and attach to this handout.)

Power: New Blade (watts)	Equation	k
113	$113 = k5^3$	0.904
855	$855 = k10^3$	0.855
3010	$3010 = k15^3$	0.892
7080	$7080 = k20^3$	0.885

4. For the new blade, what would you predict as the amount of power that would be produced with a wind speed of 25mph?

$P = kw^3$

$P= k25^3$

P= ?

Take the average of the ks to get one “average” k.

k= (0.904+0.855+0.892+0.885)/4

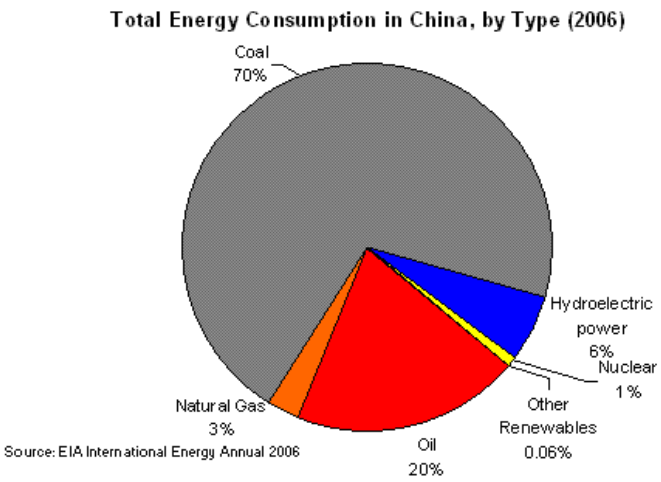
k= 0.884

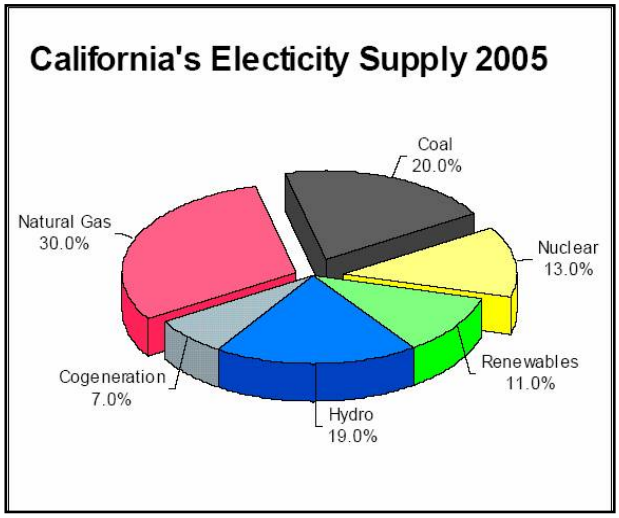
$P= 0.884*25^3$

P= 13,812.5 watts

Energy Portfolios

Examples:





Examples of Activities Requiring Energy at Camp Colley:

Cooking food

Electricity

Powering vehicles

Disposing of waste