

Student Instruction Sheet: Unit 3

LIFE CYCLE OF A FAST FOOD HAMBURGER

Suggested time: 120 minutes

What's important in this lesson:

This lesson helps you understand the impact that a simple fast-food hamburger has on the environment. By tracking the inputs and the outputs you will come to realize that more goes into each fast-food hamburger than you thought did. As well, you will also examine the outputs from the production of a fast-food hamburger, and begin to recognize the impacts that all stages of the production have on the Earth.

Complete these steps:

1. Read the document "Trace Your Waste" as an introduction to the different stages of the production of a fast-food hamburger.
2. Create the input web diagram of a fast-food hamburger.
3. Fill in the output table for a fast-food hamburger.
4. Do Step #1, and read the table.
5. Do Step #2 using the different stages found in Step #1.
6. Complete the flow diagram.
7. Write an eight (8) sentence paragraph.

Hand-in the following to your teacher:

1. Input Web Diagram.
2. Output Table for a Fast Food Hamburger.
3. Flow Charts for Bun, Hamburger Patty, Condiments, Wrapper.
4. Eight (8) sentence paragraph.

Questions for the teacher:

LIFE CYCLE OF A FAST FOOD HAMBURGER

RETRACE YOUR WASTE

Most of us visit fast food restaurants, and rarely do we think about how the food got into our hands. It's not magic. In fact, there are many steps to get to the point of selling that hamburger to you. We are going to examine the different "life cycles" of each of the components of a fast food hamburger – from the very beginning of each of the production process right up until you pay for your hamburger at the cash register of your favourite fast-food restaurant. And you may be surprised to learn how much work, how many resources, and how much waste and pollution are created for your burger.

Put an "X" beside the steps that you have never thought about before.

THE BURGER

- 1) **GRAIN IS GROWN**
 - a) Chemicals are used: fertilizers, herbicides, and pesticides used.
 - b) Water used.
 - c) Machines used to sow, grow, and reap (harvest) the grain.
 - d) Waste = chemical pollution, fossil fuel is burned = greenhouse gases, pollution = transportation pollution.
 - e) Grain is grown.

- 2) **GRAIN IS SHIPPED AND FED TO THE CATTLE**
 - a) Grain is shipped to the farm and fed to the cattle.
 - b) Pollution from the trucks.
 - c) Waste = manure, methane, uneaten grain.

- 3) **CATTLE ARE SHIPPED**
 - a) Cattle are shipped by train or truck to market.
 - b) They are fed and sold.
 - c) They are shipped alive to the processors.
 - d) Waste = transportation pollution, manure, uneaten grain, methane.
 - e) Cattle are at their destination.

- 4) **CATTLE ARE PROCESSED**
 - a) Cattle are slaughtered and cut into large sections called primal cuts.
 - b) Cuts are refrigerated and aged.
 - c) Waste = unusable animal parts, wastewater and manure.
 - d) Beef primal cuts are produced.

Diagnostic Activity: Unit 3

- 5) **BEEF IS SHIPPED AND PROCESSED**
- a) Refrigerated trucks and rail cars are used for transportation.
 - b) Shipped to food service warehouse.
 - c) Beef is ground, formed into patties and boxed and wrapped for use.
 - d) Waste = transportation pollution, packaging materials, unused meat.
- 6) **BEEF PATTIES ARE SHIPPED TO THE RESTAURANT**
- a) Transported by truck to restaurant.
 - b) They are kept in cold storage until needed.
 - c) Waste = transportation pollution, Freon.
- 7) **BEEF PATTIES ARE PREPARED AND SOLD TO RESTAURANT CUSTOMERS**
- a) They are cooked on a broiler or fryer.
 - b) Then they are put on a bun, topped with condiments, wrapped and put under hot lights.
 - c) Waste = energy from cooking and heating, packaging.
- 8) **UNEATEN PORTIONS ARE THROWN AWAY**
- a) Waste management = trucking the garbage away to a landfill, transportation pollution.

THE BUN

- 1) **GRAIN IS GROWN**
- a) Chemicals are used: fertilizers, herbicides, and pesticides used.
 - b) Water used.
 - c) Machines used to sow, grow and reap (harvest) the grain.
 - d) Waste = chemical pollution, transportation pollution.
- 2) **GRAIN IS SHIPPED TO MILLS**
- a) Grain is shipped by truck, train, or boat.
 - b) Grain is milled into flour.
 - c) The flour is then packaged.
 - d) Waste = excess or unusable portions for the grain, excess packaging materials, greenhouse gasses and pollution.
- 3) **FLOUR IS SHIPPED**
- a) Flour is shipped by truck or rail to bakeries.
 - b) Waste = transportation pollution.
- 4) **BUNS ARE MADE**
- a) Flour is mixed with water and other ingredients to make dough.
 - b) The dough is baked in ovens to make buns.
 - c) Buns are packaged and warehoused.
 - d) Waste = energy to bake, excess packaging materials.

Diagnostic Activity: Unit 3

- 5) **BUNS ARE TRUCKED TO LOCAL RESTAURANTS AND PREPARED**
a) Buns are moved by truck to restaurant.
b) They are stored until they are prepared.
- 6) **UNEATEN PORTIONS ARE THROWN AWAY**
a) Waste management = trucking the garbage away to a landfill, transportation pollution.

CONDIMENTS

- 1) **VEGETABLES ARE GROWN**
a) Producing tomatoes, onions, pickles, lettuce, relish, and ketchup.
b) Chemicals are used: fertilizers, herbicides, and pesticides used.
c) Water used.
d) Machines used to sow, grow and reap (harvest) the grain.
e) Waste = chemical pollution, transportation pollution.
- 2) **VEGETABLES ARE SHIPPED**
a) Vegetables are harvested and shipped to a food warehouse or processor.
b) Waste = transportation pollution.
- 3) **VEGETABLES ARE PROCESSED INTO SECONDARY PRODUCTS**
a) Some tomatoes, cucumbers and onions are shipped to processing companies.
b) Using mechanical equipment tomatoes are processed into ketchup, cucumbers are pickled, and cucumbers and onions made into relish.
c) Significant quantities of water are used in these processes.
d) Ketchup production also requires high-heat cooking.
e) Food is vacuum packed.
f) Waste = fuels used for processing, transportation pollution, water, unusable vegetables, excess packaging.
- 4) **VEGETABLES ARE TRUCKED TO LOCAL RESTAURANTS AND PREPARED**
a) Vegetables and condiments are moved by truck to restaurant.
b) They are stored until they are used in the preparation of the hamburger.
c) Waste = transportation fuels, energy used in storage, unusable vegetables.
- 5) **UNEATEN PORTIONS ARE THROWN AWAY**
a) Waste management = trucking the garbage away to a landfill, transportation pollution.

Diagnostic Activity: Unit 3

WRAPPING PAPER

- 1) **TREES ARE CUT DOWN AND HARVESTED**
 - a) Trees are harvested and trucked to the mill.
 - b) Waste = transportation pollution, unusable wood, clearcuts.

- 2) **LUMBER IS MILLED**
 - a) Lumber is pulped using very large quantities of water and corrosive chemicals, such as chlorine.
 - b) Large machines turn the pulp into paper which is wound on rolls and stored.
 - c) Waste = chemicals used in production, water pollution, unusable pulp and/or paper.

- 3) **PAPER IS SHIPPED TO MANUFACTURING PLANTS**
 - a) Raw paper is shipped to manufacturing plants by truck, train or ship.
 - b) Paper is refined into wrapping paper.
 - c) Ink is added for the logo on the paper.
 - d) Polycoating is added in production of wrappers and boxes.
 - e) Waste = transportation pollution, plastic chemicals for polycoating, ink for printing, unused paper products.

- 4) **WRAPPING IS SHIPPED TO RESTAURANT**
 - a) Wrapping is shipped to restaurant by truck, where it is stored until used.
 - b) Waste = transportation pollution.

- 5) **WRAPPING PAPER IS USED IN FINISHED PRODUCT**
 - a) Hamburgers are wrapped in wrapping paper.
 - b) Waste = wrappers that are unusable (soiled, dropped).

- 6) **USED WRAPPERS ARE THROWN AWAY**
 - a) Waste management = trucking the garbage away to a landfill, transportation pollution.

PLASTIC BAG

- 1) **GAS AND OIL ARE DRILLED**
 - a) Oil is drilled, raw materials are shipped to the refinery.
 - b) Waste = transportation pollution, spillage, ground, air, and water pollution.

- 2) **OIL IS REFINED**
 - a) Petrochemicals are converted into ethylene.
 - b) Ethylene is then polymerized to become polyethylene.
 - c) Polyethylene is formed into pellets.
 - d) Pellets are packaged and stored.
 - e) Waste = chemicals used in production, water pollution, large amounts of energy, unusable products at each stage.

Diagnostic Activity: Unit 3

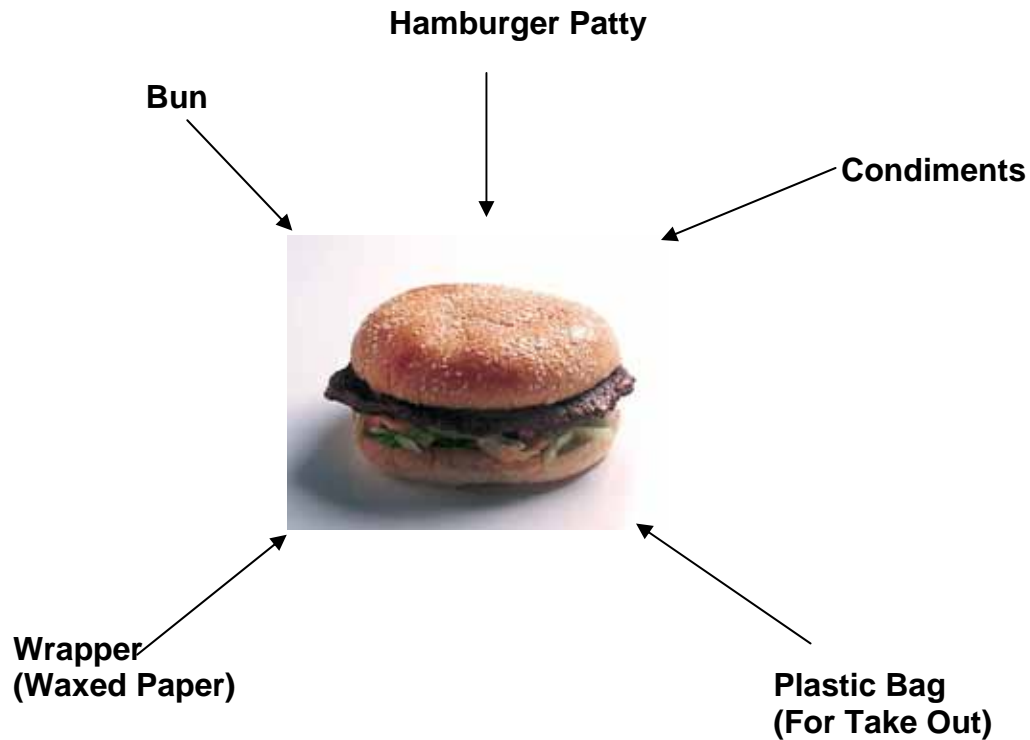
- 3) **POLYETHYLENE PELLETS ARE SHIPPED TO MANUFACTURING PLANTS**
- a) Polyethylene pellets are shipped to manufacturing plants by truck, train or ship.
 - b) Plastic is manufactured into plastic bags.
 - c) Waste = transportation pollution, plastic chemicals for changing polyethylene pellets into bags, ink for printing, unused plastic products.
- 4) **PLASTIC BAGS ARE SHIPPED TO RESTAURANT**
- a) Plastic bags are shipped to restaurant by truck, where they are stored until used.
 - b) Waste = transportation pollution.
- 5) **PLASTIC BAGS ARE USED IN FINISHED PRODUCT**
- a) Hamburgers are placed in plastic bags at time of sale for take-out orders.
 - b) Waste = unusable plastic bags.
- 6) **USED PLASTIC BAGS ARE THROWN AWAY**
- a) Waste management = trucking the garbage away to a landfill, transportation pollution.

WOW! Who knew that there were so many different stages, and so much waste and pollution from each hamburger that we eat? Add to that the distance that each of these components has to travel to make it to your fast food restaurant, and you can see the impact that your decision to have one fast-food hamburger has on the Earth, and on your own personal ecological footprint.



HANDOUT #1 -- LIFE CYCLE INVENTORY OF A HAMBURGER

Ever wonder how that fast-food hamburger you had the other day ever made it into your hands? Now's your chance to think about it. On the flow diagram of a hamburger below are listed the five (5) main components that make up one (1) fast-food take-out hamburger. Beside each of the five (5) main parts of the hamburger, list all of the different resources that are used to "create" your burger, as well as the wrapper and the plastic bag it comes in when you order it for take out.



Now, list all of the waste from all of the different parts of your hamburger:

Bun	Hamburger Patty	Condiments	Waxed Paper Wrapper	Plastic Bag
①	①	①	①	①
②	②	②	②	②
③	③	③	③	③
④	④	④	④	④
⑤	⑤	⑤	⑤	⑤



HANDOUT #1 -- LIFE CYCLE FLOW CHARTS

The five (5) major components in a fast food hamburger are: €condiments, ¢the hamburger patty, ∠bun, ∇wrapper, and ®plastic bag. Each of these components goes through a certain “life cycle” to get to be part of your purchase of a fast food hamburger.

STEP #1: Look at the major life cycle stages of each of the components of a fast food hamburger. Using the six different stages for each of the components, go to Step #2, and fill in the Life Cycle flow charts for each of the components.

	COMPONENT	LIFE CYCLE STAGES
€	Condiments	€Farming ¢Harvesting ∠Condiment production ∇Condiment delivery ®Application to your burger ©Waste = unused vegetables and condiments, packaging
¢	Hamburger Patty	€Grain is grown ¢Cattle are fed ∠Cattle are shipped and processed ∇Beef is processed and shipped ®Beef patties are prepared and sold ©Waste = unused hamburger, packaging, uneaten patties
∠	Bun	€Grain is grown ¢Grain is harvested and shipped to mills ∠Grain is processed and flour is shipped ∇Buns are made ®Buns are shipped to restaurant and prepared ©Waste = packaging, unusable buns, uneaten buns
∇	Wrapper	€Trees are cut down and harvested ¢Lumber is milled ∠Paper is shipped to manufacturing plants, polycoating is added ∇Wrapping is shipped to restaurant ®Wrapping paper is used in finished product. ©Waste = all wrappers are discarded once used, unusable wrappers, packaging
®	Plastic Bag	€Oil is drilled ¢Oil is refined ∠Polyethylene pellets are shipped to manufacturing plants ∇Plastic bags are shipped to restaurants ®Plastic bags are used in finished products ©Waste = used bags, packaging, unusable plastic bags, excess materials (“handle holes” – leftover pieces of plastic where the handles are)

STEP #2: Using the example for plastic bags as a guide (next page), fill in the remaining four (4) life cycle flow charts for condiments, hamburger patty, bun, and wrapper, using

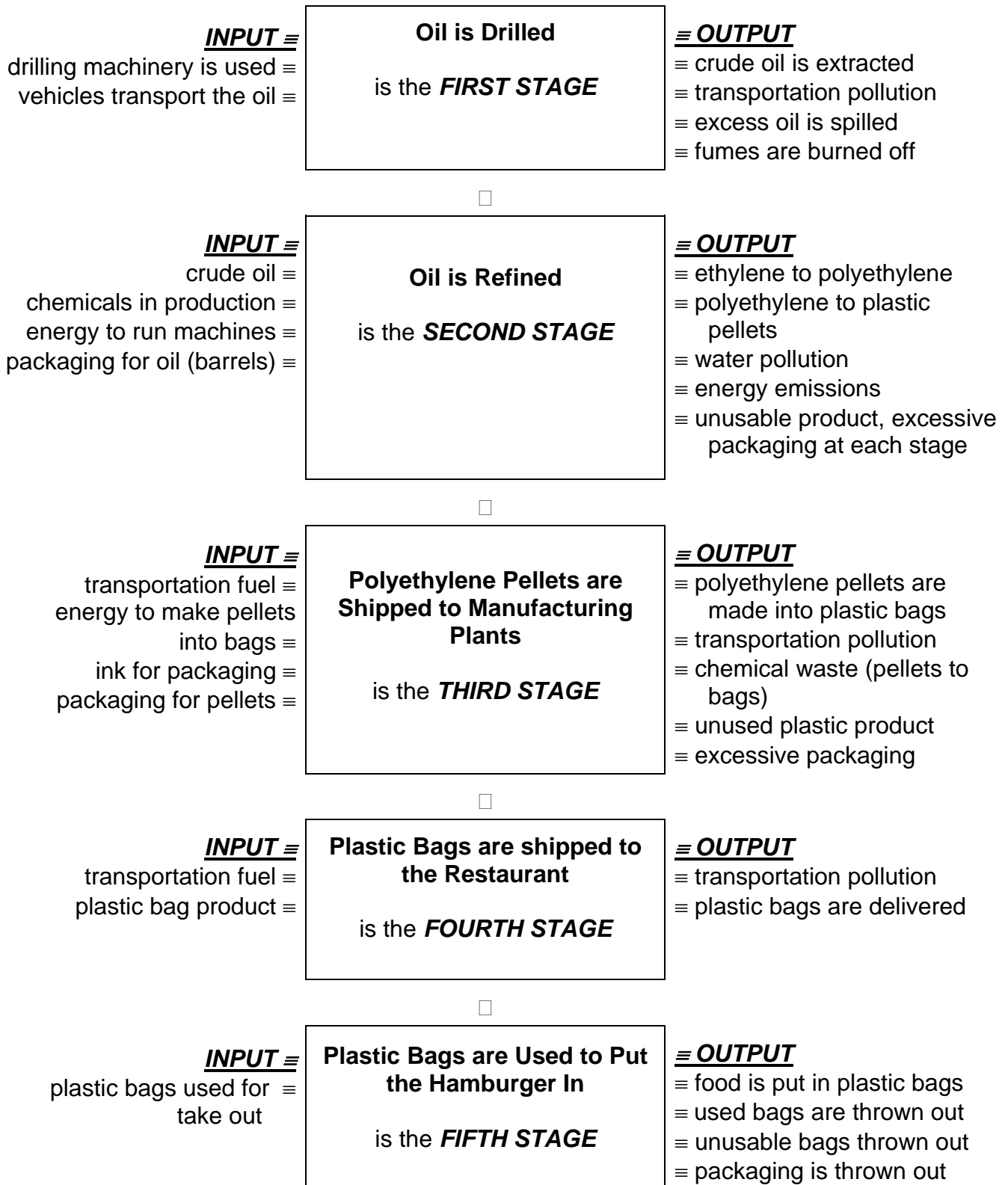
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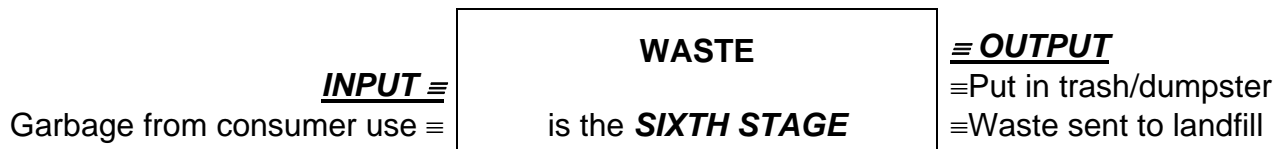
the stages listed in Step #1 for each of the components. (HINT: use this information to fill in the Flow Chart.)



PLASTIC BAG LIFE CYCLE SAMPLE FLOW CHART



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HAMBURGER PATTY LIFE CYCLE SAMPLE FLOW CHART

INPUT ≡ _____
_____ ≡
_____ ≡
_____ ≡

_____ is the **FIRST STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____



INPUT ≡ _____
_____ ≡
_____ ≡
_____ ≡

_____ is the **SECOND STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____



INPUT ≡ _____
_____ ≡
_____ ≡
_____ ≡
_____ ≡

_____ is the **THIRD STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____
≡ _____



INPUT ≡ _____
_____ ≡
_____ ≡
_____ ≡
_____ ≡

_____ is the **FOURTH STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____
≡ _____



INPUT ≡ _____
_____ ≡

_____ is the **FIFTH STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____
≡ _____



INPUT ≡ _____
_____ ≡

_____ is the **SIXTH STAGE**

≡ **OUTPUT** _____
≡ Put in trash/dumpster
≡ Waste sent to landfill

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WRAPPER LIFE CYCLE SAMPLE FLOW CHART

INPUT ≡ _____
≡ _____

_____ is the **FIRST STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____
≡ _____



INPUT ≡ _____
≡ _____

_____ is the **SECOND STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____
≡ _____



INPUT ≡ _____
≡ _____

_____ is the **THIRD STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____
≡ _____



INPUT ≡ _____
≡ _____

_____ is the **FOURTH STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____



INPUT ≡ _____
≡ _____

_____ is the **FIFTH STAGE**

≡ **OUTPUT** _____
≡ _____
≡ _____
≡ _____



INPUT ≡ _____
_____ is the **SIXTH STAGE**

WASTE

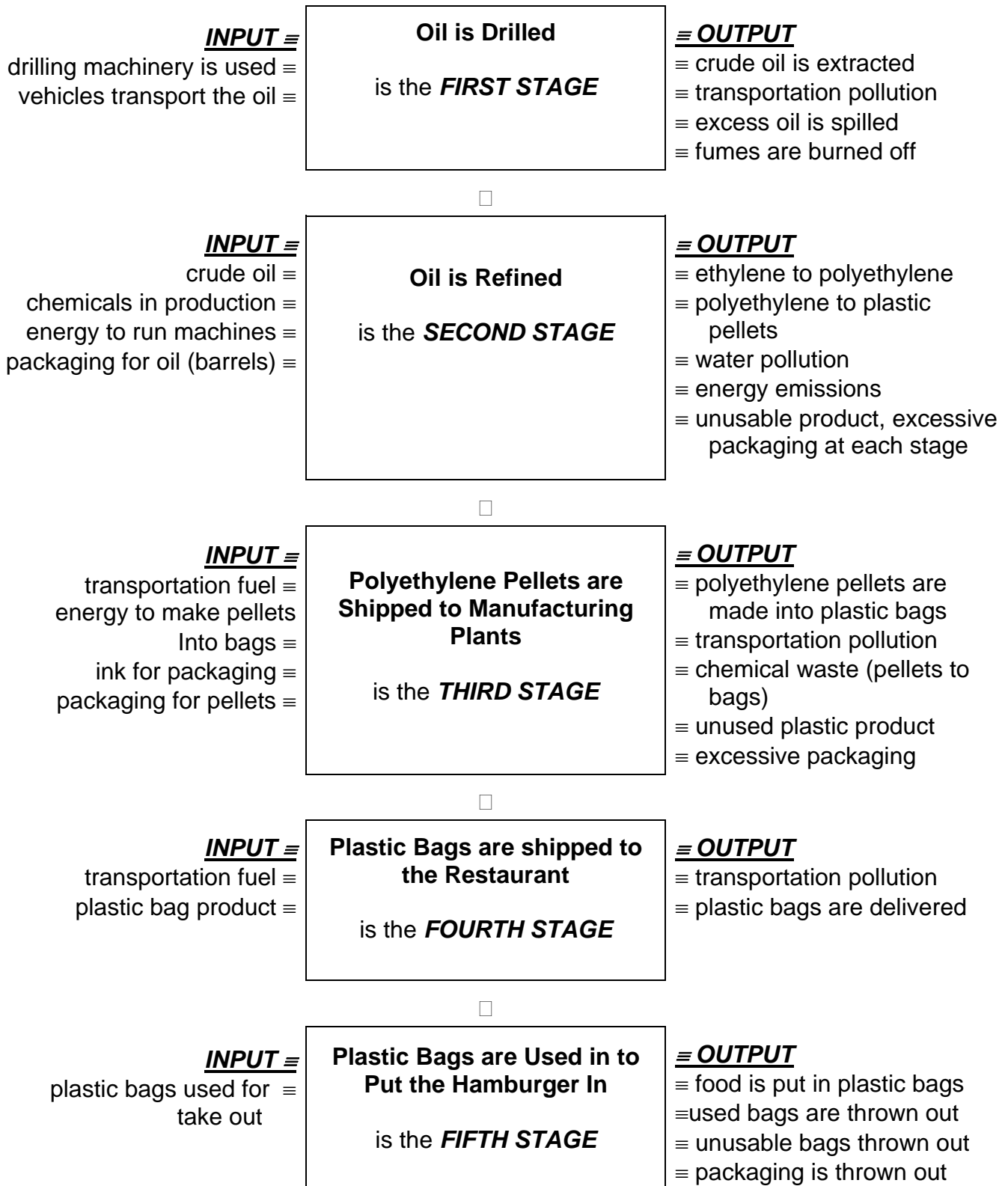
≡ **OUTPUT** _____
≡ Put in trash/dumpster
≡ Waste sent to landfill

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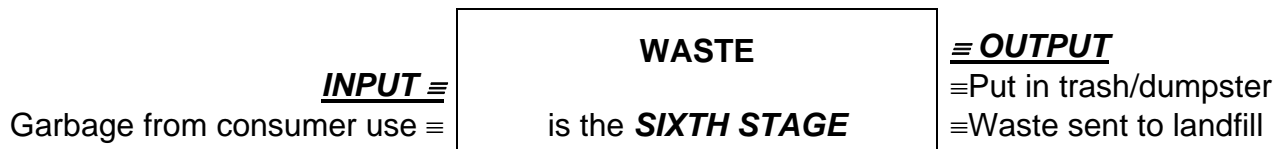




PLASTIC BAG LIFE CYCLE SAMPLE FLOW CHART



Student Handout: Unit 3



Reflection Activity: Unit 3

SUMMATIVE ACTIVITY

- 1) What did you learn about the impact that a fast food hamburger has on the Earth? _____

- 2) Will this change your fast food buying habits? Yes No

- 3) Explain you answer: _____
