

**ACTIVITY: External Tank****Directions:**

Answer these questions based on today's reading and discussion about the External Tank.

1. Height (meters):
2. Weight (empty):
3. Weight (full):
4. Diameter (meters):
5. What fuel does it hold?
6. What oxidizer does it hold?
7. How long is it attached to the orbiter after launch?
8. When does fuel begin to be used by the SSMEs?
9. In inches, how large in diameter is the tube that transports oxygen to the SSMEs?
10. How many gallons can the oxygen tank hold?
11. What is the weight of a full oxygen tank in pounds?
12. What is one function of the intertank?
13. How many gallons can flow from the hydrogen tank per a minute at maximum flow?
14. What is the weight of a full liquid hydrogen tank?
15. The liquid oxygen tank operates in a pressure range of \_\_\_\_\_ to \_\_\_\_\_ psig.
16. Why does the liquid oxygen tank weigh so much more than the liquid hydrogen tank when the hydrogen tank has a much greater volume?
17. What does Monocoque mean?
18. The liquid oxygen tank is a(n)
  - a. aluminum semimonocoque
  - b. steel and aluminum semimonocoque
  - c. aluminum monocoque
19. The Intertank is a(n)
  - a. aluminum semimonocoque
  - b. steel and aluminum semimonocoque
  - c. aluminum monocoque
20. The liquid hydrogen is a(n)
  - a. aluminum semimonocoque
  - b. steel and aluminum semimonocoque
  - c. aluminum monocoque
21. The liquid hydrogen tank operates in a pressure range of \_\_\_\_\_ to \_\_\_\_\_ psig.
22. When sitting on the launch pad, the oxygen's tank pressure must be regulated, because temperature changes can cause the liquid oxygen to revert to \_\_\_\_\_. Pressure is vented from the \_\_\_\_\_.

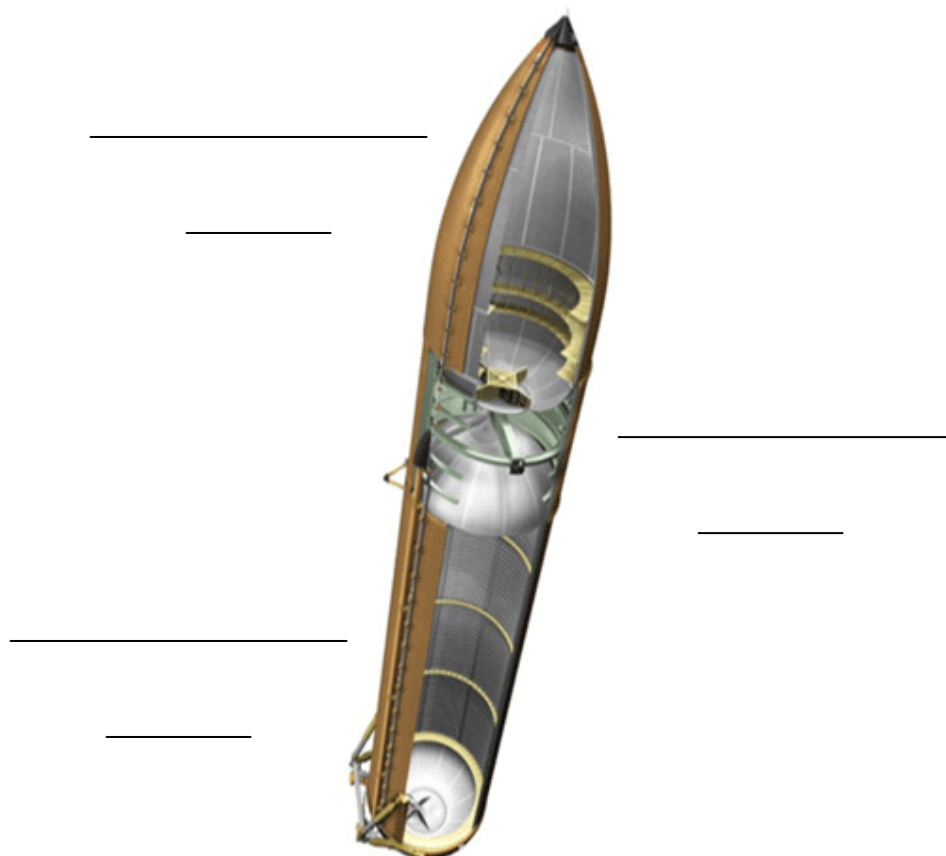
Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Directions:**

Label the parts of the External Tank (ET). Each of the terms below should fit on a line next to the ET.

**Intertank | Liquid Oxygen Tank | Liquid Hydrogen | (LOX or LO<sub>2</sub>) | (Helium) | (LH<sub>2</sub>)**



**Directions:**

As liquid oxygen is stored in the Shuttle's External Tank, it "boils off" by slowly transforming from a liquid into a gas. When it does this, pressure inside the tank increases since oxygen as a gas occupies more volume than liquid oxygen. To prevent rupturing of the tank from built-up pressure, there is a relief vent to release gaseous oxygen. There also is a button on the External Tank console that will turn the relief vent on and off. When the vent is releasing pressure, this button will display, "GOX RELF ON." When the vent is closed, the button will display, "GOX RELF OFF." Observe how the pressure changes when the button is pressed to release pressure.

1. Observe a one-minute sample reading and determine the rate (psi/sec) pressure changes. (For your timed samples, use the Elapsed Time clock in the Console.)
2. Can you predict how much pressure will change after 1 minute? After 5 minutes?
3. LO2 Level is the amount of liquid oxygen in the tank, and LO2 Flow is the rate liquid oxygen is flowing from the tank to the Shuttle's propulsion system. Observe the values for LO2 Level and LO2 Flow and estimate how long it will take for the tank to be depleted of liquid oxygen.
4. Can you also estimate how long it will take for the liquid hydrogen to be completely depleted?
5. In the ET Console, there are Depletion Sensors for both LO2 and LH2. These are important because the engines will need to shutdown before fuel and oxidizer are completely depleted. At what level of LO2 and LH2 should the depletion sensors turn on if the engines need 2 minutes to shut down?