Name: _____   Date: _____

Guts and Bolts Simulation Worksheet

Game Description

Guts and Bolts helps students understand the complex relationships among the circulatory, respiratory, and digestives systems in the human body. Students play from the perspective of Moby, who is trying to create a robot version of Tim. By connecting "parts" (body organs) and "pipes" (arteries and veins) in each of 11 increasingly complex steps, students develop an understanding of the interrelationships that exist among body systems. The goal of the game is to successfully create a robot with functional "guts and bolts." (BrainPOP)

Game Play Instructions

1. Visit http://www.brainpop.com/games/gutsandbolts/
2. Advance through Steps 1-11 by connecting fluid sources with body parts.
3. Note the goal of each step on the clipboard.
4. After you connect all pipes in a step, click the "Start Fluids" button to observe fluid flow.
5. The clipboard will indicate when you have created a successful system and can advance to the next step.
6. Mounted nozzles have portholes displaying fluid and solutes (Fig. 1 a)). Mounted valves start with empty portholes but target tags indicate the fluid and solutes they require (Fig. 1 b)).
7. For the system to work properly, every nozzle must be connected to a valve. To make a pipe connection, click on a nozzle and drag it to a valve (Fig. 1). You must use all the "organs" on the side tray.
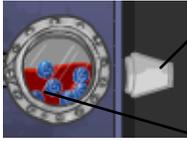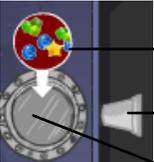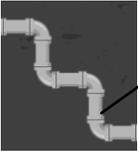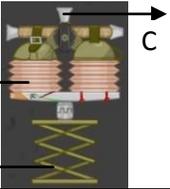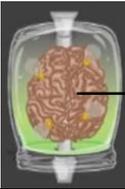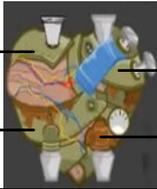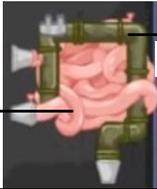
a) Nozzle: Starting position	b) Valve: Ending position	c) Pipe: Connector
Mounted Nozzle (Starting point) Porthole (displays starting fluids and solutes)	Target Tags (indicate the fluids and solutes required in the empty portholes) Mounted Valve (Ending point) Empty Porthole	Pipes (connect nozzles with valves to transport fluids and solutes to organs and systems)

Figure 1: Functions and descriptions of the main components of Guts and Bolts
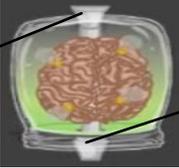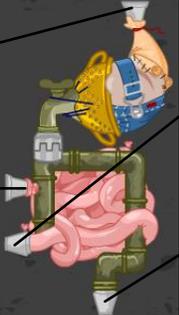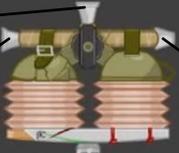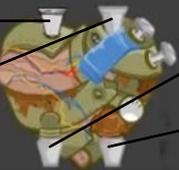
Pre-game analysis

- Label the parts of the 5 organs shown below.
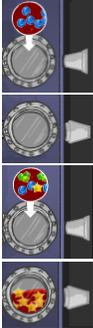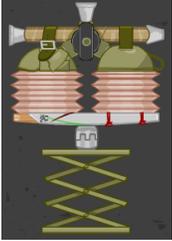
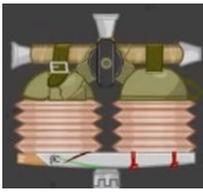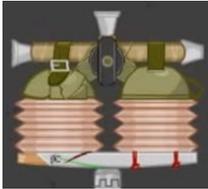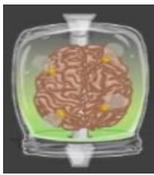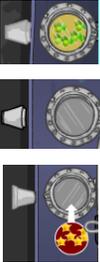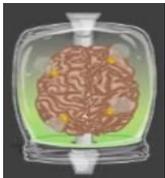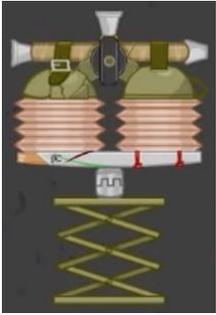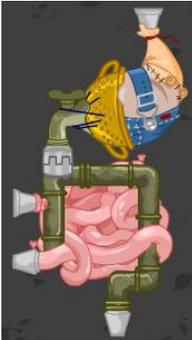| Respiratory System	Nervous System	Circulatory System	Digestive System	Digestive System
A. _____ B. _____ C. _____	D. _____	E. _____ F. _____ G. _____ H. _____	I. _____ J. _____	K. _____ L. _____

In-Game Analysis

- Steps 1-2: Follow the goals stated on the clipboard to understand the mechanics of nozzles, valves, and pipes to transport fluids and gases to various organs.
- Steps 3-11: Move the organ(s) from the side tray to the main screen and connect the appropriate nozzles and valves using the pipes. Fill in the following table to describe the circulation of fluids and gases.

|	a) Which fluids and solutes are entering the organ?		b) Which fluids and solutes are leaving the organ?
STEP 3			
STEP 4			
STEP 5			
STEP 7* (Complete Step 7 before Step 6)			

- Steps 6, 8-11: Move the organ(s) from the side tray to the main screen and connect the appropriate nozzles and valves using the pipes. Use arrows to represent pipes to show the circulation of fluid and gases in the tables below.

STEP 6* (Complete Step 7 before Step 6)				

STEP 8	
STEP 9	
STEP 10	
STEP 11	

Post-game analysis
Based on your understanding of the interconnections between the different organ systems, briefly describe the function of each of the parts of all the systems, as follows:

Respiratory System	Nervous System	Circulatory System	Digestive System	Digestive System
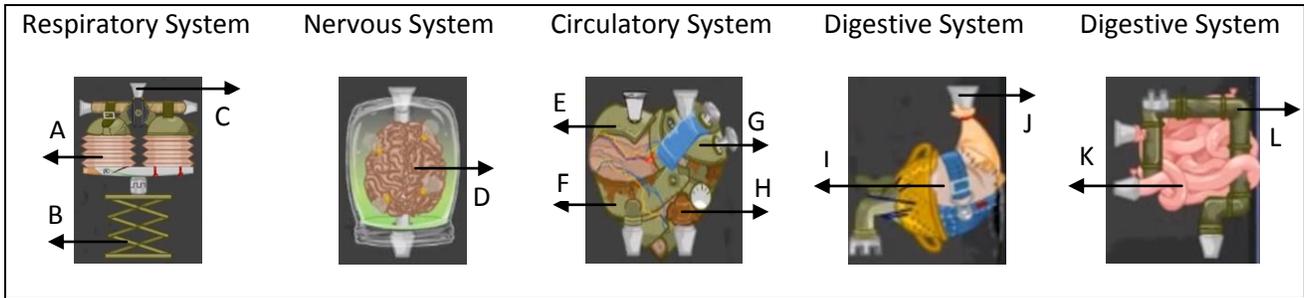
Part Name	Part Function
A.	
B.	
C.	
D.	
E.	
F.	
G.	
H.	
I.	
J.	
K.	
L.	