

## Game Guide / Guts and Bolts

### GAME DESCRIPTION

Guts and Bolts helps students understand the complex relationships among the circulatory, respiratory, and digestive 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.”

### QUICK FACTS ABOUT GUTS AND BOLTS

- *Students are asked to apply their understanding of the circulatory, respiratory, and digestive systems as they connect “parts and pipes” to help Moby create a robot version of Tim.*
- *Play supports learning across multiple standards (state and Common Core) in Grade 3-8 science.*
- *Game is intended for single players but play sessions can be structured for pairs collaborating at a single computer.*
- *A web browser with Adobe Flash and an Internet connection are required; a printer is recommended so students may print and create a “lab journal.” (Note: Teachers may opt to print the journal, double-sided, in advance of class)*
- *This game has awesome sound effects! Headphones are recommended.*



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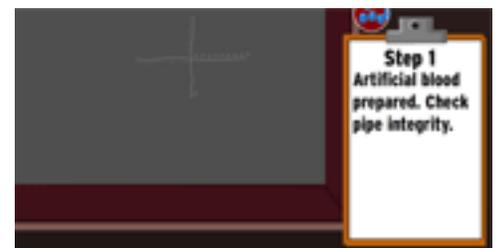
### HOW TO PLAY

Advance through 11 steps by connecting fluid sources with body parts. To make a pipe connection, click on a nozzle and drag it to a valve.

### GAME PLAY



- 1 Note the goal of each step on the clipboard.

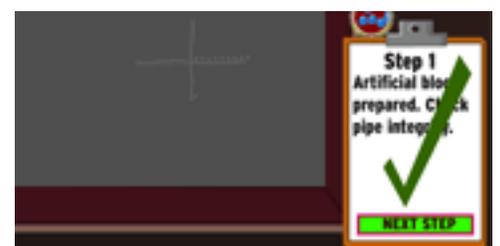


- 2 After you connect all pipes in a level, click the "Start Fluids" button to observe fluid flow.



- 3 The clipboard will indicate when you have created a successful system and can advance to the next step.

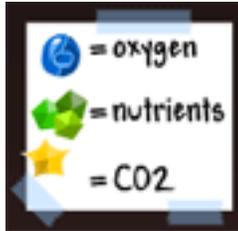
But BEWARE! More advanced steps require more thinking. If you make a mistake, the body parts will fail. Encourage experimentation, making mistakes, and jotting down observations in the lab book.



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### GAME PLAY (CONT'D)

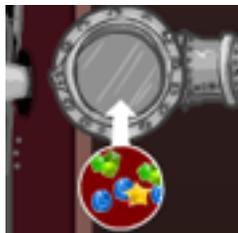
- 4 As blood moves through the pipes, note the solutes being transported between systems and organs. Encourage students to pay close attention to the solutes and document their thinking in the lab books.



- 5 Mounted nozzles have portholes displaying fluid and solutes.



- 6 Mounted valves start with empty portholes. But target tags indicate the fluid and solutes they require.



Each step becomes more complex, so pay attention to all the fluids and solutes in play.

For the system to work properly, every nozzle must be connected to a valve. You must use all the "organs" on the side tray.

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### WAYS TO USE GUTS AND BOLTS IN THE CLASSROOM

As a whole class activity — Project the game or use an interactive whiteboard . Explore as a class and have students take turns connecting parts and pipes. Offer suggestions, especially at more advanced steps.

In pairs at a computer – Have students collaborate with one another so they can share strategies for making connections between parts, pipes, and systems.

As homework — Encourage students to play at home. To connect their play experience with learning goals, encourage them share reflections on how they advanced through each step in their lab book.

### QUESTIONS/SUGGESTIONS

Please share your feedback. We'd love to hear how you're using Guts and Bolts in your classroom. You can contact us at [educators@brainpop.com](mailto:educators@brainpop.com).

To report problems with Guts and Bolts, email us at [gutsandbolts@brainpop.com](mailto:gutsandbolts@brainpop.com).