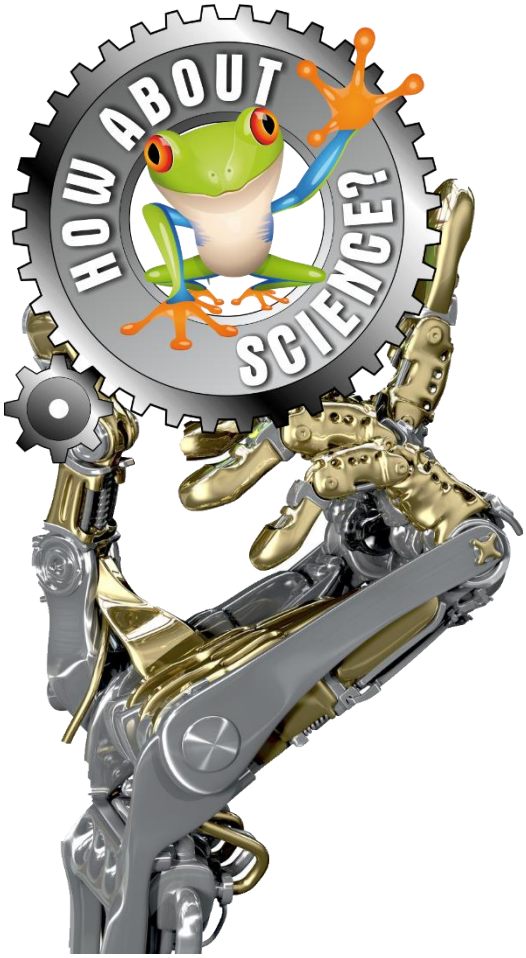
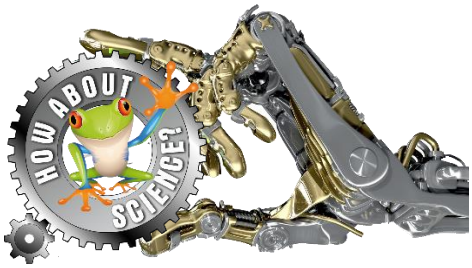
How About Science?

Mini-lessons



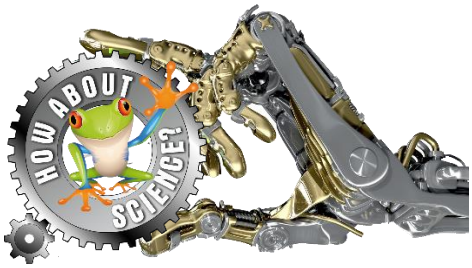
Handouts and Keys

Table of Contents



Title	Page Number
1. Dry Ice Air Hockey (Introduction to Friction)	3 - 5
2. Newton's First Law of Motion	6 - 9
3. Mountain Goat Meet and Greet (Introduction to Vertebrates)	10, 11
4. The Heart, Part 1	12 - 15
5. The Heart, Part 2	16 - 19

Name _____



Dry Ice Air Hockey (Introduction to Friction)

1. What is friction?

2. Fill in the table.

Type of Friction	Example	Why?

3. Watch the Jeep. What types of friction do you see?

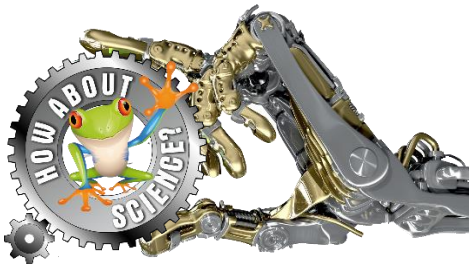
4. What is dry ice? Why shouldn't you touch it?

5. What is sublimation?

6. What type of friction is dry ice air hockey an example of? Explain.

7. Where is there no friction at all? How does this help us visit other planets?

Key



Dry Ice Air Hockey (Introduction to Friction)

1. What is friction? **Friction is a force. It occurs when two surfaces rub against each other.**

2. Fill in the table.

Type of Friction	Example	Why?
Rolling	Cars on road	Anything that rolls along a surface creates rolling friction
Sliding	Inner tube slides on snow	Occurs when two solid surfaces slide against each other
Fluid	Sea lion in water, airplane in air	Occurs when a solid surface rubs against a fluid like water or air.
Static	Walking	Occurs between two objects that are not moving

3. Watch the Jeep. What types of friction do you see?

Rolling Friction: wheels rolling on ground

Sliding Friction: wheels sliding on ground

Static Friction: wheels on ground not sliding or rolling

Fluid Friction: Jeep moving against air (not much)

4. What is dry ice? Why shouldn't you touch it?

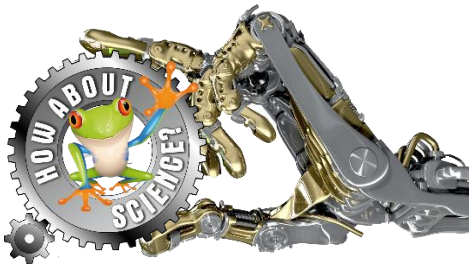
Dry ice is frozen carbon dioxide, it can freeze your cells if you hold it for more than a few seconds

5. What is sublimation?

Sublimation occurs when a solid changes directly into a gas.

6. What type of friction is dry ice air hockey an example of? Explain.

Fluid Friction: the dry ice is changing into gas. The chuck of dry ice is riding on a cushion of gas, kind of like a hovercraft.



7. Where is there no friction at all? How does this help us visit other planets?

In space. A spacecraft can coast for great distances when there is no friction to slow it down.

Name _____

Newton's First Law of Motion

1. When and where did Isaac Newton live?

2. What did Isaac Newton do that was so important?

3. What is Newton's First Law of Motion?

4. Why is the balloon considered to be at rest?

5. Why does the water begin to fall after it is popped by the dart?

6. Give an example of something where the forces are balanced? Give an example where the forces are unbalanced. Draw pictures and label them.

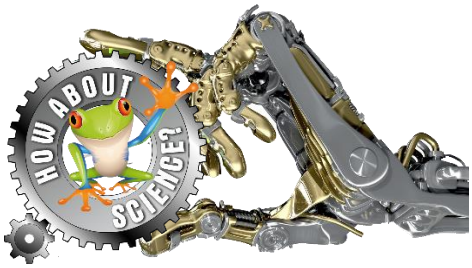
7. What is inertia? Give an example.

8. Why do the pennies have inertia?

9. Why does the penny keep rolling inside the balloon? What causes it to stop?

10. Which will roll longer, the penny or the nickel? Why?

11. What does inertia have to do with the egg on the car?



12. Use the word inertia to explain why you should always wear your seatbelt.

Key

Newton's First Law of Motion

1. When and where did Isaac Newton live?

He lived in England from 1642 - 1726

2. What did Isaac Newton do that was so important?

He is one of the most famous scientists of all time. His ideas about motion and gravity still hold true today.

3. What is Newton's First Law of Motion?

An object at rest will stay at rest and an object in motion will stay in motion, unless acted on by an unbalanced force.

4. Why is the balloon considered to be at rest?

The forces are balanced. The upward force is equal to the downward force.

5. Why does the water begin to fall after it is popped by the dart?

The forces are now unbalanced. The upward force is gone after the balloon pops.

6. Give an example of something where the forces are balanced? Give an example where the forces are unbalanced. Draw pictures and label them.

Answers will vary. Anything that is not moving has forces acting on it that are balanced. Anything moving has forces acting on it that are not balanced. One force must be greater than another.

7. What is inertia? Give an example.

Inertia is the tendency of an object to remain at rest or in motion.

8. Why do the pennies have inertia?

Anything that has mass has inertia. They have inertia whether they are moving or sitting still.

9. Why does the penny keep rolling inside the balloon? What causes it to stop?

It has inertia. It keeps rolling until friction slows it down enough that it falls over.

10. Which will roll longer, the penny or the nickel? Why?

The nickel. It has more mass so it has more inertia. It is harder to stop. Sometimes this is difficult to recreate because when the penny falls over the nickel runs into it and falls over too.

11. What does inertia have to do with the egg on the car?

The car stops but the egg continues. The egg has mass so it has inertia.

12. Use the word inertia to explain why you should always wear your seatbelt.

If the car you are in hits a tree or a wall, the car will stop but you will keep moving. You won't stop until you hit the ground, the windshield or something else. You have inertia and will follow Newton's First Law of Motion, just like any other object would.

Name _____

What is a Mountain Goat? (Introduction to Vertebrates)

1. What do all vertebrates have in common?

2. What are some examples of vertebrates? (draw some pictures and label them)

3. How are mammals related?

4. Which animal in the picture of mammals is not a mammal? (why not?)

5. What family of mammals includes mountain goats? What are the mountain goats closest relatives?

6. What are some things all mountain goats have in common?

7. What makes mountain goats great at climbing?

8. Why do humans need to be cautious of mountain goats?

9. What are some threats mountain goats face?

Key

What is a Mountain Goat? (Introduction to Vertebrates)

1. What do all vertebrates have in common?

They all have a backbone or spinal column

2. What are some examples of vertebrates? (draw some pictures and label them)

Fish, amphibians, reptiles, birds and mammals (pictures will vary)

3. How are mammals related?

All mammals are warm-blooded, have hair, and females produce milk.

4. Which animal in the picture of mammals is not a mammal? (why not?)

The ostrich. It has feathers instead of hair.

5. What family of mammals includes mountain goats? What are the mountain goats closest relatives?

Bovidae. Sheep, cattle, bison, antelopes, and muskoxen

6. What are some things all mountain goats have in common?

Sharp pointy unbranched horns, 3 feet tall and 5 feet long, 100 to 300 pounds, two toes, wool undercoat, herbivores, etc.,

7. What makes mountain goats great at climbing?

Two toes can spread apart and have two inner pads that improve grip and balance

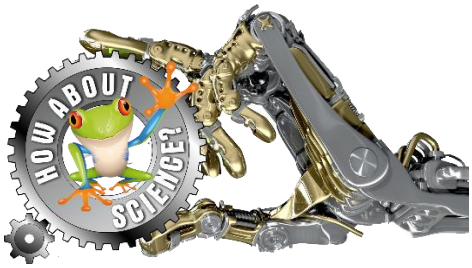
8. Why do humans need to be cautious of mountain goats?

Want to lick salt off of your skin, take handouts, can harass and even gore people

9. What are some threats mountain goats face?

Logging and road building is affecting their habitat, golden eagles and cougars are predators

Name _____



The Heart, Part 1

1. What are hearts mostly made of?

2. How many chambers are found in a mammal or bird heart? What are their names?

3. What does the left ventricle do? What does the right ventricle do?

4. What is an auricle and why is it important?

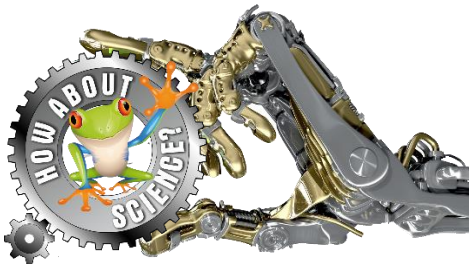
5. Why is the coronary artery important?

6. What are the two large blood vessels at the top of the heart? Which one carries blood to the body? Which one carries blood to the lungs?

7. How are veins different from arteries?

8. How is the left ventricle different from the right ventricle?

9. Why is the right ventricle not as muscular as the left ventricle?

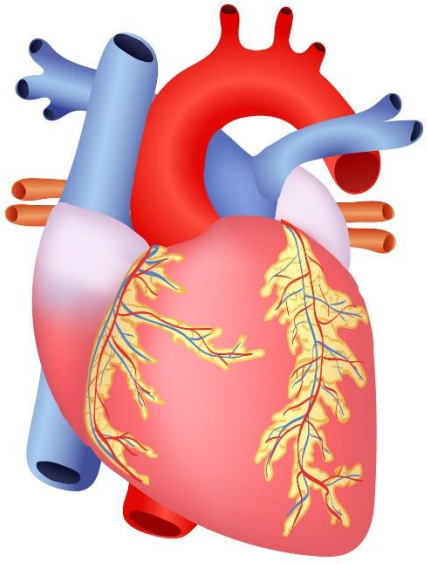


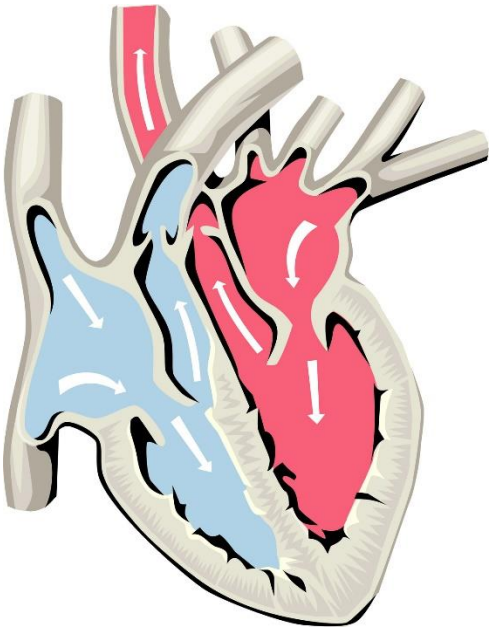
10. Why are valves so important?

11. What is a heart murmur?

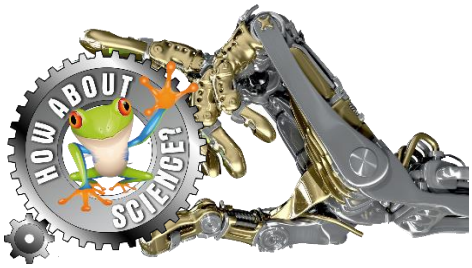
12. Give some examples of valves.

13. Label the diagrams below. Include left ventricle, right ventricle, right atrium, left atrium, aorta, pulmonary artery, valves, septum.





Key



The Heart, Part 1

1. What are hearts mostly made of?

Muscle, but also contain nervous tissue, blood tissue and connective tissue

2. How many chambers are found in a mammal or bird heart? What are their names?

4, left and right ventricles, left and right atria (atrium is singular)

3. What does the left ventricle do? What does the right ventricle do?

The left ventricle pumps oxygen rich blood to the body, the right ventricle pumps oxygen poor blood to the lungs

4. What is an auricle and why is it important?

Auricle means "ear." It expands the capacity of the atria.

5. Why is the coronary artery important?

It carries oxygen rich blood to the heart muscle, without oxygen heart cells will die

6. What are the two large blood vessels at the top of the heart? Which one carries blood to the body? Which one carries blood to the lungs?

Aorta and pulmonary artery. The aorta carries oxygen rich blood to the body. The pulmonary artery carries oxygen poor blood to the lungs.

7. How are veins different from arteries?

Veins carry blood to the heart, they are thin walled and not as muscular as arteries

8. How is the left ventricle different from the right ventricle?

Its walls are thicker and very muscular because of the force needed to pump blood to all of the cells of the body.

9. Why is the right ventricle not as muscular as the left ventricle?

It pumps blood to the lungs which are not very far away.

10. Why are valves so important?

They keep blood from moving backwards in your heart.

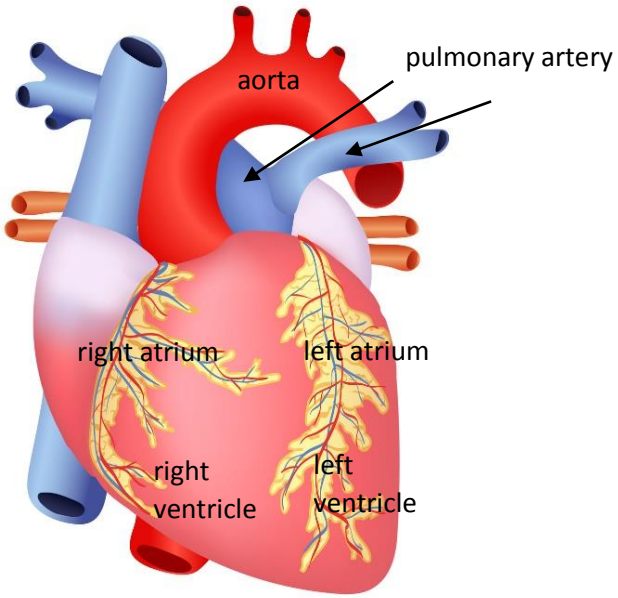
11. What is a heart murmur?

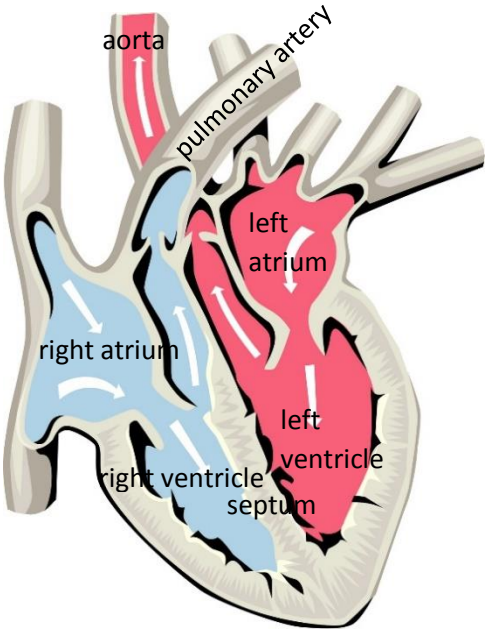
Heart murmurs occur when your valves leak and allow blood to move in the wrong direction.

12. Give some examples of valves.

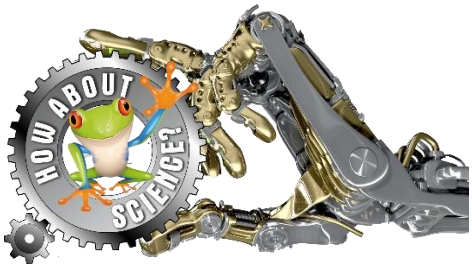
Mitral, tricuspid, semi-lunar

13. Label the diagrams below. Include left ventricle, right ventricle, right atrium, left atrium, aorta, pulmonary artery, valves, septum.





Name _____



The Heart, Part 2

1. What are some of the jobs of the heart?

2. If you insert a probe into the left ventricle where does it come out?

3. Where does blood go after leaving the aorta?

4. Blood that goes to the cells of the body and back to the heart is called the _____ _____.

5. If you insert a probe into the right ventricle where does it come out?

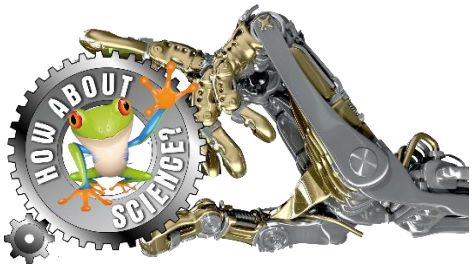
6. Where does blood go after leaving the pulmonary artery?

7. The pathway of blood to the lungs and then back to the heart is called the _____ _____.

8. Why do we call it the semi-lunar valve? Where are they located? What do they do?

9. What happens when you pour water into the aorta? Why?

10. What kind of pump is the heart?



11. If you pour water into the right atrium where does it come out?

12. If you pour water into the left atrium where does it come out?

13. Why is it important that oxygen-rich blood not cross over to the other side of the heart?

14. What structure keeps the two sides of the heart separated?

Key

The Heart, Part 2

1. What are some of the jobs of the heart?

The heart pumps oxygen and nutrients to the body, it helps move blood to carry wastes away from cells

2. If you insert a probe into the left ventricle where does it come out?

Through the aorta

3. Where does blood go after leaving the aorta? **To all parts of the body**

4. Blood that goes to the cells of the body and back to the heart is called the **systemic circulation.**

5. If you insert a probe into the right ventricle where does it come out?

The pulmonary artery

6. Where does blood go after leaving the pulmonary artery?

To the lungs to pick up oxygen

7. The pathway of blood to the lungs and then back to the heart is called the **pulmonary circulation.**

8. Why do we call it the semi-lunar valve? Where are they located? What do they do?

The three flaps are shaped like crescent moons. In the aorta and pulmonary artery. They keep blood from flowing backwards into the heart when the heart relaxes between beats.

9. What happens when you pour water into the aorta? Why?

The water just sits there. It doesn't go down into the aorta because the semilunar valves close.

10. What kind of pump is the heart?

A double pump: one pump pumps blood to the lungs the other pumps blood to the body.

11. If you pour water into the right atrium where does it come out?

It comes out the pulmonary artery. The septum separates the two halves of the heart, so blood can't cross over to the other side and come out the aorta. It also cannot go backward. Valves only allow blood to move one way.

12. If you pour water into the left atrium where does it come out?

It comes out the aorta. The septum separates the two halves of the heart, so blood can't cross over to the other side and come out the pulmonary artery. It also cannot go backward. Valves only allow blood to move one way.

13. Why is it important that oxygen-rich blood not cross over to the other side of the heart?

If it did, oxygen rich blood would mix with oxygen poor blood. Our organs would not get enough oxygen. We'd have hearts like frogs and lizards.

14. What structure keeps the two sides of the heart separated?

The septum.