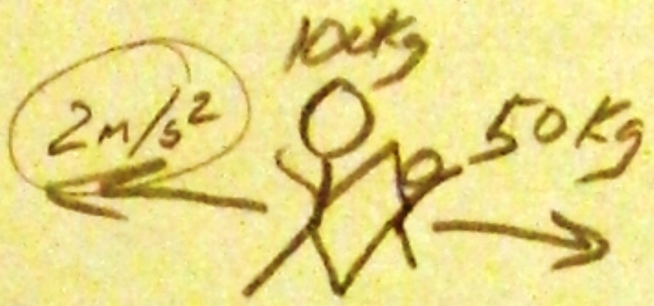
13. Suppose you tried to launch a Newton Car, and you remembered to add the mass, but you forgot to use rubber bands. Why wouldn't the car move very far? Use F=ma to support your answer.

F=ma ← No bands means no acceleration and no force

14. A 100kg person and a 50kg person are floating together in space. One of them pushes the other one.

a. If the push accelerates the 100kg person at a rate of $2m/s^2$, what was the force?

F=ma
F = 100kg (2m/s²) = 200N



b. What force accelerates the 50kg person?

200N

c. What is the 50kg person's acceleration?

4m/s² ← F=ma 200N = 50kg(a)

15. Two people are floating in outer space. One of them has much more mass than the other. One pushes the other one, and they fly apart. The answer to one of the following questions is "you can't tell."

a. By observing the push, how can you tell which person has more mass?

The one who accelerates slowest has more mass.

b. If you didn't see the actual push, but you saw them flying apart, how could you tell which person did the pushing?

You can't

16. Suppose you took an object that had the mass of the entire Earth, and you put it in the rubber band car. If you used a lot of rubber bands, and the object did not have much friction, what would happen?

The car would go FAST. There would be a very strong force.

16. Use Newton's 3rd Law to explain how your rubber band car moves. In the case of *your car*, what are the action and reaction forces? Which objects exert those forces?

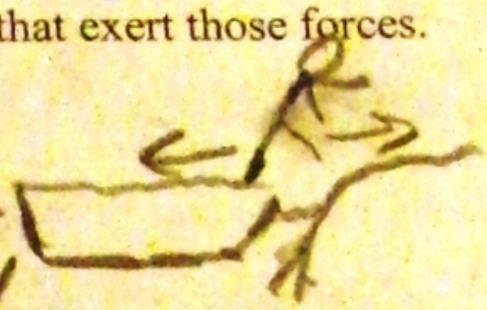
action: Car pushes road backward

reaction: Car is pushed forward by the road.

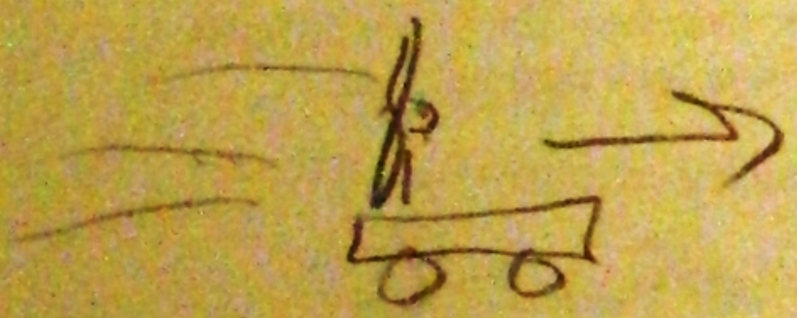
17. Bob runs in a southward direction. Use Newton's 3rd Law to explain how Bob does this. Describe the action/reaction pair of forces and the objects that exert those forces.

Bob pushes ground northward

Ground pushes Bob Southward.



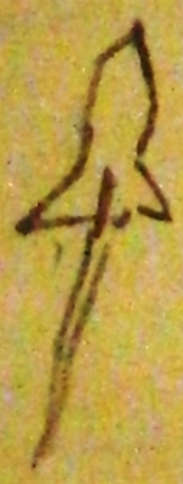
18. A fan cart accelerates across the floor. Use Newton's 3rd Law to explain how the fan cart does this. Describe the action/reaction pair of forces and the objects that exert those forces.



Fan pushes air to left

The air pushes fan to right

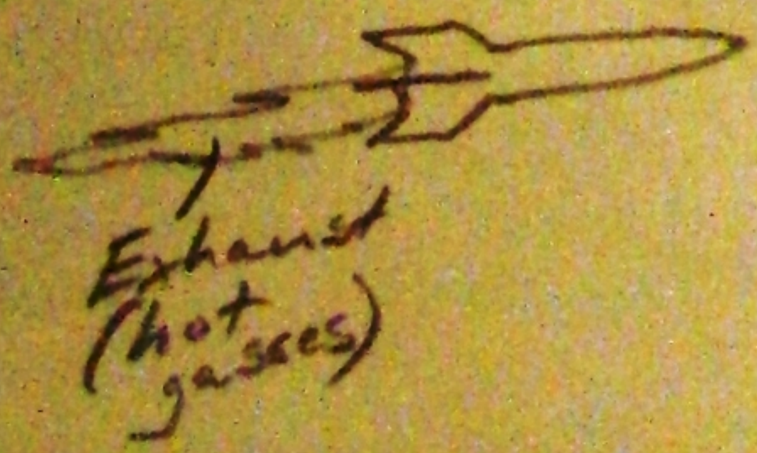
19 A water rocket flies upward. Use Newton's 3rd Law to explain how the water rocket does this. Describe the action/reaction pair of forces and the objects that exert those forces.



Action: Rocket pushes Water downward

Water pushes rocket upward

20. How does a rocket accelerate in space, if there is no air to push against?



Rocket pushes exhaust backward

Exhaust pushes rocket forward