

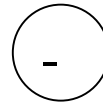
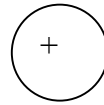
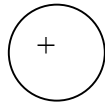
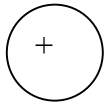
PSII Final Review - Part II

Mr. Menin

NAME _____

AT HOME

1. You get up in the morning and drag yourself out of bed. Your mass might be about
a) 8 kg b) 80 kg c) 800 kg d) 8000 kg
2. You lift up a chair with a mass of 5.8 kg. The weight force on it is _____
3. You brush your hair and it stands up because of the static electricity. Draw an arrow on each charge below showing which way it will move:

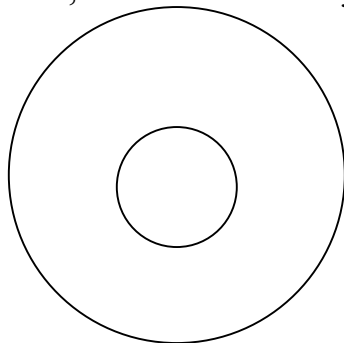


DRIVING TO THE AIRPORT

4. Use Newton's **THIRD** law to explain why the car moves forward.

5. At the Wendy's drive-thru you get water with ice.
The density of ice is _____ water.
a) less than b) the same as c) greater than
6. How do you know?

7. You grab the steering wheel. What type of simple machine is this?
8. Here is a picture of the steering wheel and the steering axle in the middle. Figure out the MA, IMA, and the Efficiency.



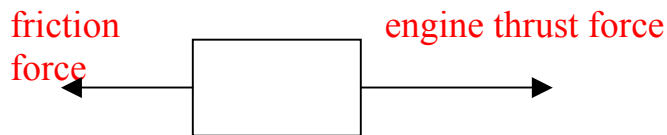
9. (B-question) What input force would be produce an output force of 300 N?
10. The steering wheel is very hot, but the ice is cold. What is different about the atoms in the steering wheel versus those in the ice cube?

11. You are driving the speed limit (35 mph). How long will it take to get to a store, 22 miles away?

12. Your car has an acceleration of 2.5 m/s^2 . You “floor it” and accelerate. How fast are you going after 4.6 seconds?

13. (B-question) Your car has a mass of 1200 kg. Its acceleration is 2.5 m/s^2 . What will the acceleration be if you are towing a 300 kg trailer? (Assume that the force stays the same.)

14.



If the engine thrust force is larger than the friction force, what happens? _____

15. You accelerate to 65 mph. You ease off the engine until the engine force = the friction force. What happens?

- a) the car stops b) the car slows c) the speed stays constant d) you speed up

16. If the engine force = 1500 N and the friction force = 1300 N, what is the “NET FORCE” on the car? _____

17. Your car engine exerts 20000 N of force over a distance of 240 m. This takes 14 seconds. What is the POWER of your engine? _____

18. (B-question) Convert this to horsepower using $1 \text{ hp} = 746 \text{ W}$. _____

19. The car you are driving is only 30% efficient. That means that only 30% of the energy in the gas is actually making the car move. What happens to the other 70%?

20. What energy transformation takes place in each case?

Your car accelerates: _____ → _____

Your car climbs a hill at constant speed: _____ → _____

You brake to a stop: _____ → _____

21. You turn on the car radio. The dB level is 20 dB. This is about as loud as

- a) sound you just barely hear b) whispering c) talking d) rock music

22. You turn up the volume to 50 dB. This means the sound energy is _____ times greater than before.

23. 50 dB is about as loud as

- a) sound you just barely hear b) whispering c) talking d) rock music

24. The sound waves coming out of the radio are _____

- a) transverse b) longitudinal c) mixed d) versificational

25. Draw a sound wave and label compressions and rarefactions.

26. The musical note “C” at 260 Hz is coming out of the radio. What note is each of the following frequencies?

390 Hz: _____

520 Hz: _____

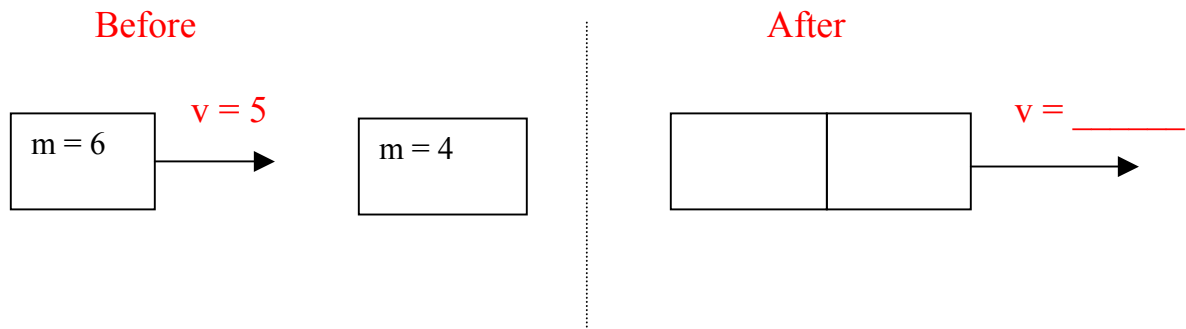
1040 Hz: _____

27. Now the musical note “A” at 440 Hz is coming out of the radio. What note is each of the following frequencies?

660 Hz: _____

880 Hz: _____

28. You see a crash. A moving car hits a parked car and then they move together. (The masses are not in kg, but that doesn't matter.)



29. A puppy runs in front of the car and you slam on the brakes. Sketch the brake system for your car showing the parts, where the area is small and where large, and where the force is small and where it's large.

30. The car breaks down so you pop the hood and look at it. A wire has fallen across the battery, joining the + terminal to the - terminal. What **two** bad things can happen?

31. Why should you not touch the + with your right hand and the - with your left?

32. (B-question) You crank the auto jack handle 25 times (up and down). Each time you crank it, it moves 29 inches. The jack lifts your car 7 inches. Your car weighs 2500 lbs. You have to push with a force of 40 lbs.

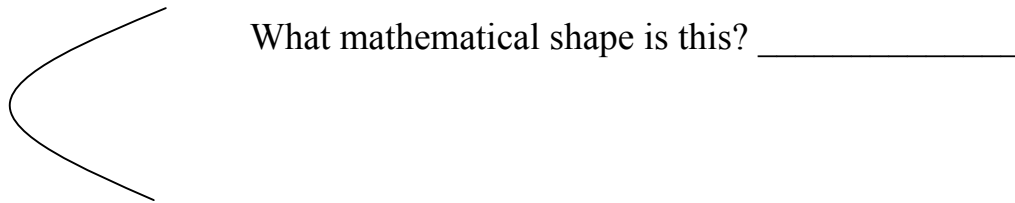
MA = _____

IMA = _____

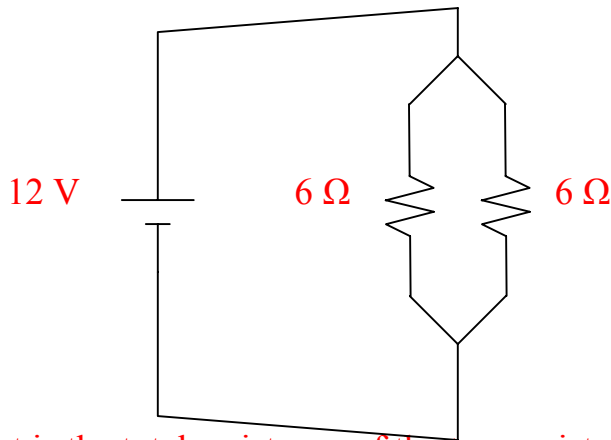
Eff = _____

33. You find out what's wrong with your car. A spring is broken. It stretches 2 cm when the force on it is 12 N. How far will it stretch if the force is 36 N? _____
34. (B-question): How far will it stretch if the force is 30 N? _____
35. The electric circuit in the car is shown below. Find the missing current.

36. A headlight is burned out. It is mounted in a mirror shaped like this:



37. You replace the headlight. The lights each have a resistance of $6\ \Omega$. They are connected in parallel, like this:



What is the total resistance of the two resistors (lights)? _____

What total current do they draw from the battery? _____

38. You have to replace a resistor with the color code Green Blue Red. What resistance is this? _____

ON VACATION

39. At the hotel pool you see a large (240 lb) woman with her small 3-yr old daughter in the hot tub.

Who is in more danger of over heating? _____

Explain why, using the concepts of area, volume, and “scaling”.

40. You decide to go skydiving. You are in the plane.
Sketch the plane and show the 4 forces on it.

41. Sketch the side view of the wing. Indicate where the air flows fast and where slow. Label where the air pressure is high and where it is low. Draw an arrow showing the resulting force.

42. You jump. You let yourself fall almost all the way to the ground before you open your chute.

When you first fall out of the plane, do you speed up? _____

Do you keep speeding up all the way down? _____

Describe what is happening to the force of air resistance as you fall.

If you do reach a constant speed, what must be true about the gravity force and the force of air resistance at that point? _____

What top speed do you reach? _____

43. A plane flies by going “supersonic.” Draw the circular wavefronts coming from this plane that is going faster than sound.

44. You go to the beach. The waves look like they are about 12 feet apart. You count that 10 waves hit the beach in 25 seconds.

What is the wave frequency? _____

What is the wavelength? _____

What is the wave speed? _____

45. At the beach you go SCUBA diving.

How deep do you have to go for the pressure to double? _____

46. Why can't you just walk around on the coral reef breathing through a 10-foot long tube to the surface?

47. You get “the bends.” ☹ What did you do wrong? What is happening in your blood? What are the symptoms? How can you treat it?

48. You go swimming in a river. You normally swim at 5 ft/sec. You head directly north across the river, but the current is flowing 4 ft/sec to the east. How fast do you actually go and in which direction?

49. (B-question) On vacation, you go to the shooting range. You shoot a bullet with a horizontal velocity of 500 m/s. You aim directly at a target 200 m away. How far below the bulls eye does it hit?

A-QUESTION

You are an accident investigator. A 1400 kg car hit a 1600 kg parked car and an inelastic collision resulted. The force of friction on the “wreck” was 40,000 N. The skid marks are 18 m long. How fast was the first car going before it hit the parked car? Convert this to mph using $1 \text{ m/s} = 2.24 \text{ mph}$.