

ST/ STE

Pretest 3.3

1. In the tables below, choose the right characteristic for each link. This is a bicycle bell. (the top part of the bell that the little washers make contact and create sound is not shown)
 - a) **The 1st link is the cylindrical slide-on base of the pinion gear. Since it just slides on, there's no 3rd part, making it direct and removable. The shaft does not move while the clapper can rotate and hit the sides of the bell, which is why the link is partial.**

The 2nd link is the loop part of the spring; it can be removed with the spring and they stretch together.(complete). The spring is flexible, but the link itself(the loop part) is rigid.

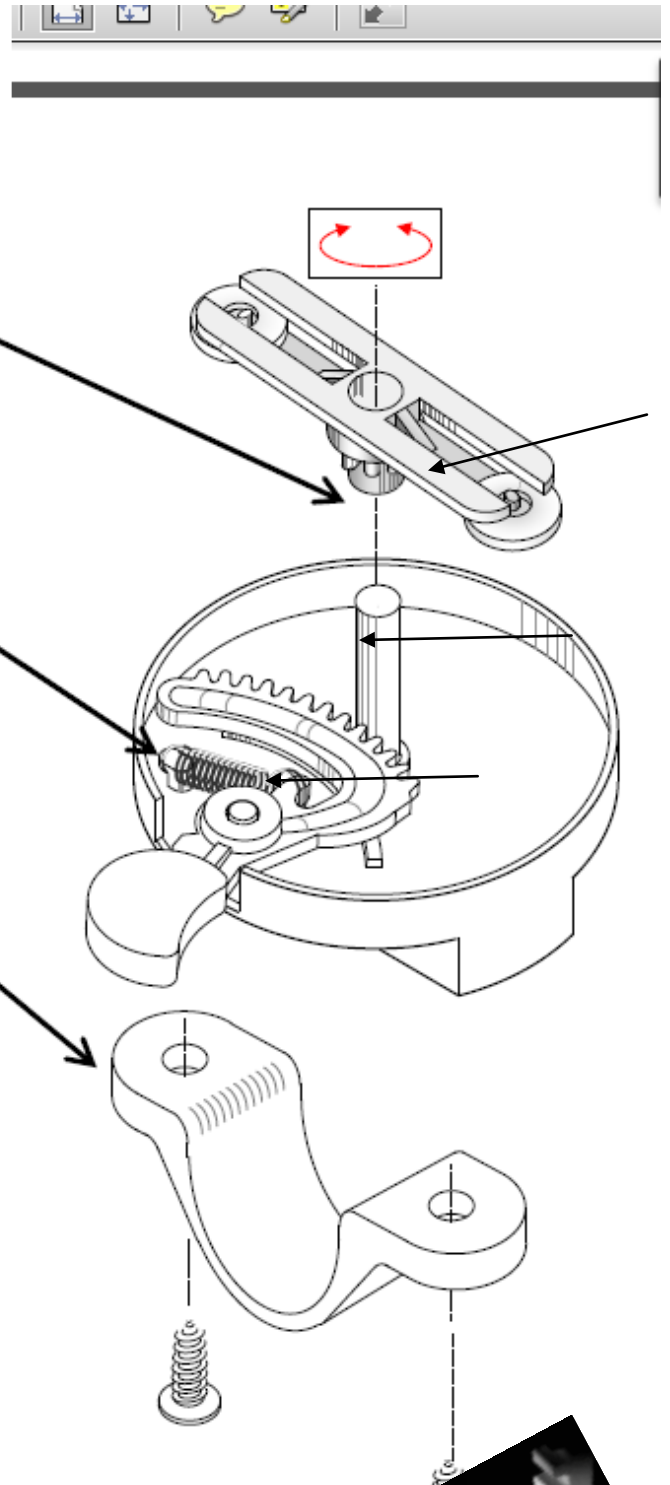
See next page for all answers and diagram.

10.

Link between: the clapper and the pinion shaft	
<i>Direct</i>	or
<i>Rigid</i>	or
<i>Removable</i>	or
	or <i>Partial</i>

Link between: the return spring and the spring retainer	
<i>Direct</i>	or
<i>Rigid</i>	or
<i>Removable</i>	or
<i>Complete</i>	or

Link between: the clamp and the housing	
	or <i>Indirect</i>
<i>Rigid</i>	or
<i>Removable</i>	or
<i>Complete</i>	or



2. a) In the rack and pinion, what transformation of motion is involved?



Circular(pinion) to linear (rack)

- b) Although this system is often used in steering, how could you use this system to lift a weight? Hint: you would need to add a part that would support a weight.

If you fix the pinion(circular gear) to an axle and attach a base to the rack, by turning the pinion the rack will move up and lift the base and whatever weight is placed on it.

- c) Where would you add the lubricant?

The lubricant (oil or grease) should be applied where the rack and pinion's teeth mesh.

3. a) In this screw-gear system, which part is in a fixed position?

The circular nut.

- b) Why is it practical to have the other part moving?

As the long part moves up and down it allows one to unscrew different nut-sizes.

4. a) In the slider-crank system, what part of the engine is moving up and down?

See diagram
the piston

- b) What's powering the up and down motion?

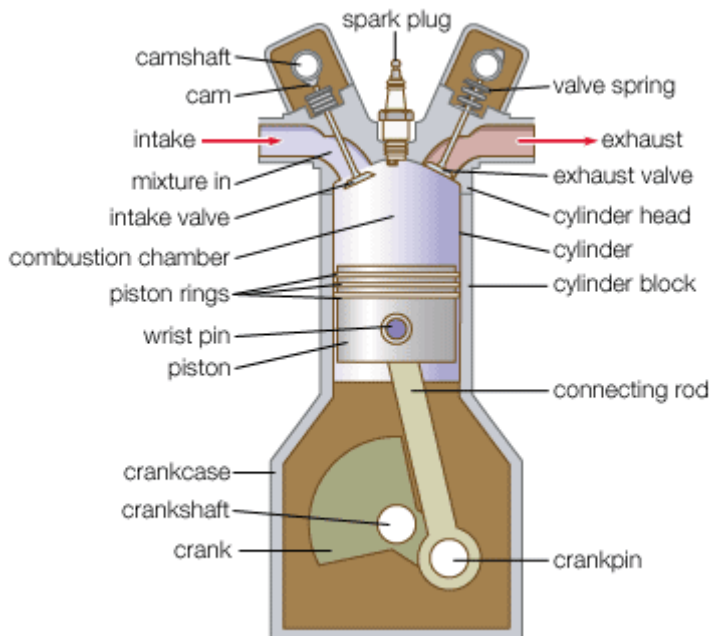
The hot gases produced by the combustion of gasoline.

- c) What kind of motion is experienced by the crank?

circular



- 5.



- d) Is the link between the crank and piston direct? No, there is a connecting rod between them.

- a) If we turn the small gear(11 teeth) so that it

make 34 turns, how many turns will the large gear(17 teeth) complete?

$$V_{out}/V_{in} = n_{in}/n_{out}$$

$$x/34 = 11/17$$

$$x = 22 \text{ turns}$$

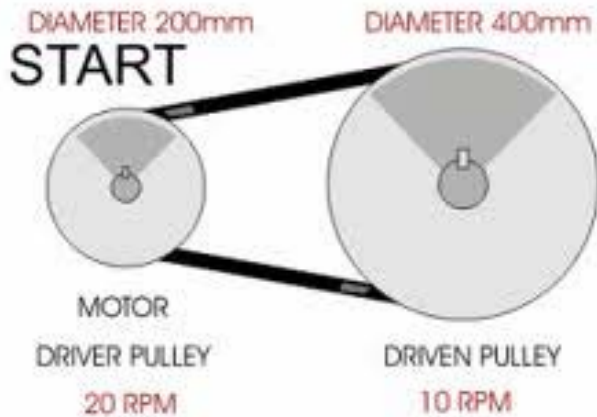
b) How much more turning force (find the mechanical advantage) does the large gear have?
17/11

6. a) What makes this system different from a chain-sprocket system? Give two differences

Belt instead of chain

Groove instead of teeth on gears

b) Calculate the speed(velocity ratio)of this system. $V = I/O = 200/400 = 0.5$

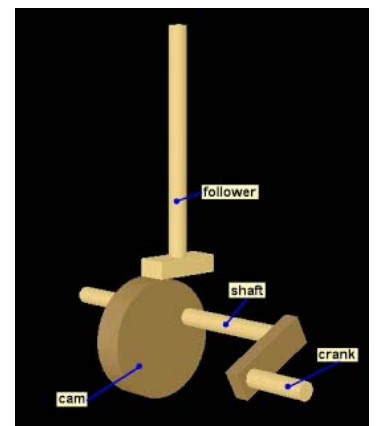
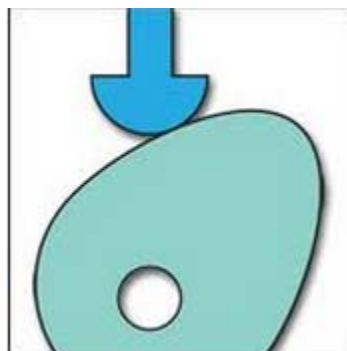


7. You want the motor to spin a certain gear very quickly, but you want the other gear that's attached to the 1st one to move very slowly.

What kind of gear system will work best? Worm-worm-gear

8. A machine requires no toothed gears, and you don't want any belts either. What kind of gear system can be used? Friction gears

9. Show two ways of making the same transformation system operate the up and down motion of a toy dog's head or tongue. Use a cam and follower in each case. But in design one, use a teardrop-shaped cam. In the second design, use an off-centered circular cam.



For flashback, study these topics. This is from the school board and government's checklist to get you ready for the ST exam.

	Yes	Not Yet
Biodiversity		
I understand and can use the definition of biodiversity of a community as ' <i>the relative abundance of species it comprises</i> '		
I would be able to explain and interpret factors that affect the biodiversity of a given community		
Disturbances		
I understand and can use the definition of a disturbance in a community		
I would be able to explain and interpret how certain factors can disturb the ecological balance of a community (e.g. human activity, natural disasters)		
Trophic Relationships		
I understand and can describe the trophic levels (producers (autotrophs), consumers (heterotrophs), decomposers) in an ecosystem		
I would be able to explain and interpret the relationships between the trophic levels of a food web		