

ST/ STE

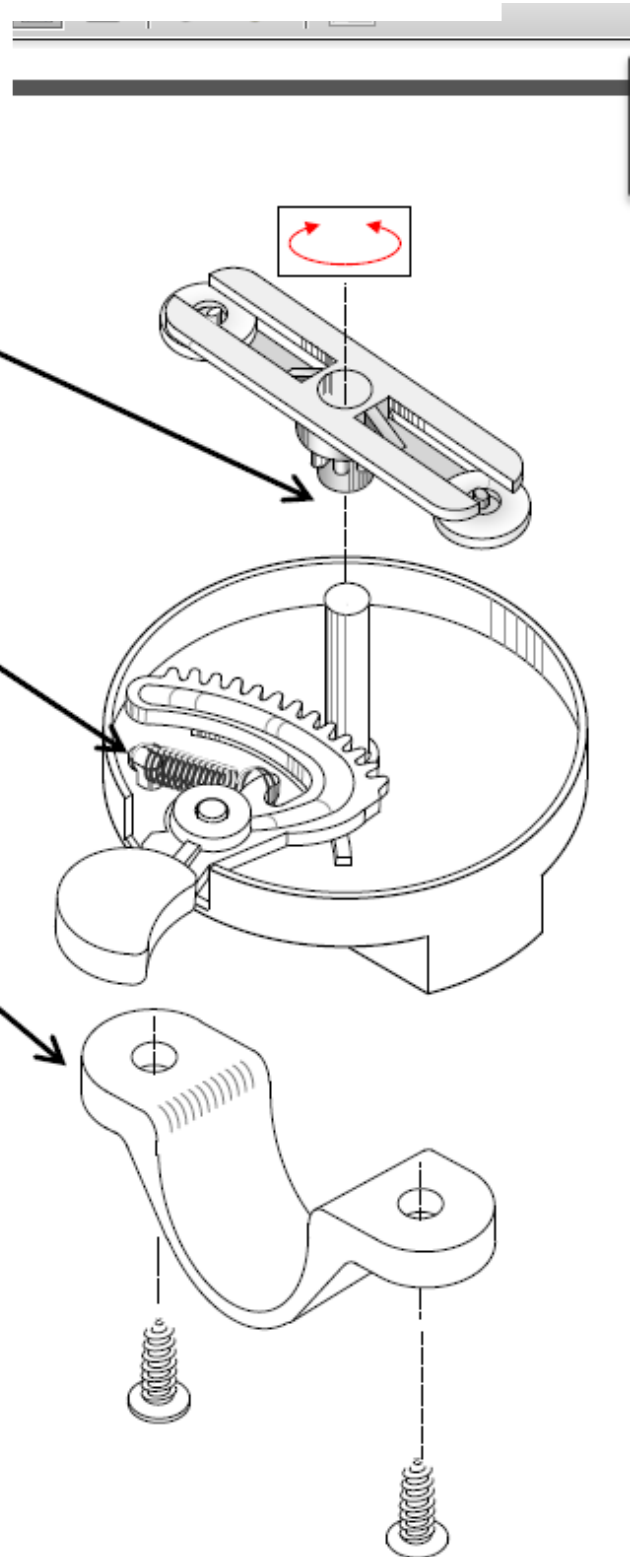
Pretest 4.2 SOLUTIONS

1. In the tables below, choose the right characteristic for each link. This is a bicycle bell. **Top part(actual bell is not shown)**

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?

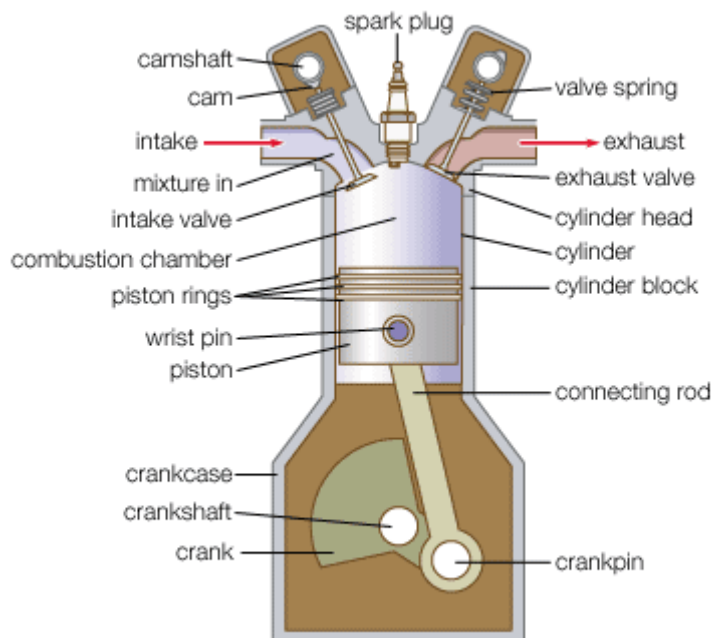
As the long part moves up and down it allows one to unscrew different nut-sizes.

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.

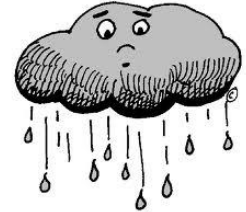


- c) What kind of motion is experienced by the crank?
circular

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



5. a) The second most common gas in the atmosphere is **OXYGEN**
 b) The gas in the air with the most variable composition is **WATER VAPOUR**
 c) Atmospheric pressure is caused by the **WEIGHT** of the air acting on a certain unit of area.
6. Use the following terms to answer the following: troposphere, stratosphere, mesosphere, thermosphere, exosphere



- a) The layer closest to the surface **troposphere**
 b) The layer closest to outer space **exosphere**
 c) The layer that has the important protective gas ozone **stratosphere**
 d) Where Northern lights form **thermosphere**
 e) Found at an altitude of 50 to 80 km, it's where unusual noctilucent clouds form **mesosphere**

7. In which hemisphere do anticyclone winds move **clockwise** away from a high pressure system?

In the northern hemisphere

8. What two forces combine to create the curving effect of the Coriolis effect?

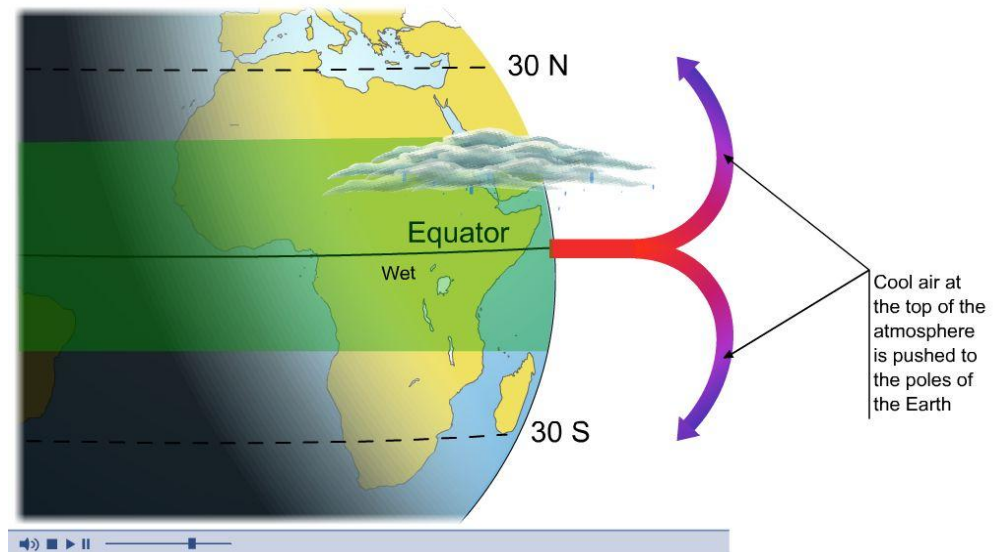
The rotation of the earth and differences in atmospheric pressure.

9. a) Use the diagram to explain why the Hadley cell exists.

Areas closer to the equator receive more direct sunlight. This warms the air. As its density decreases it rises. Cooling causes condensation and then close to the 30° latitude, drier air sinks.

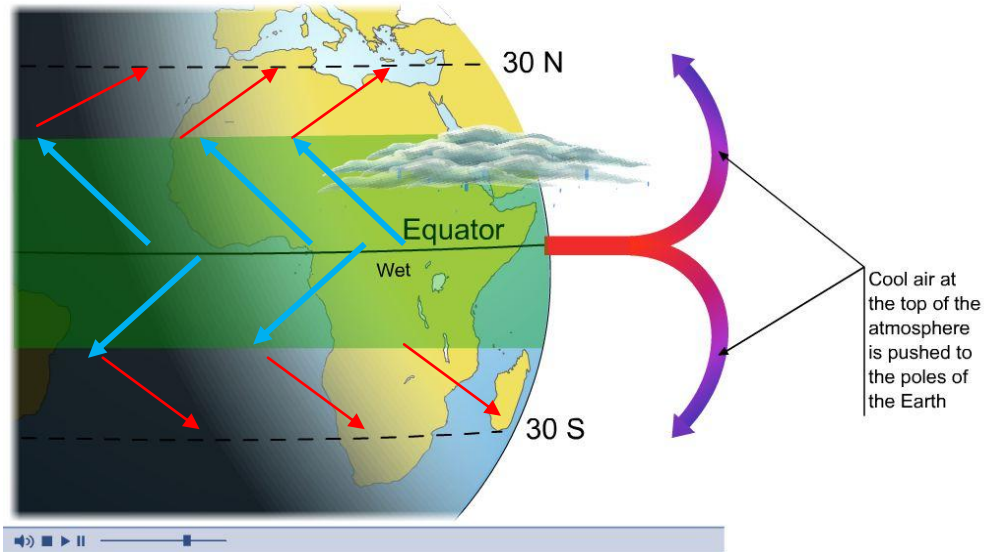
- b) How does it help explain the location of some desert and tropical biomes?

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Below the condensation zones we find tropical forests. Where the drier air sinks at the higher latitudes we get deserts.

10. On the map show the **westerlies** and **trade winds** with the correct direction.



11. What are two important properties of CH_4 , CO_2 and H_2O ?
They let visible light through but absorb heat (infrared)
12. Where does most of the excess CO_2 that we inject into the atmosphere come from?
Most (about half) comes from burning oil, gas and coal to generate electricity. The rest comes from fossil fuel combustion for heating and transportation
13. List three solutions to the global warming problem, including two that do **not** involve a change in lifestyle.
 - 1) Filters for carbon dioxide
 - 2) Use of hydroelectricity for power generation
 - 3) Conservation of energy: cycling, better insulation etc
14. Use chemical equations to show how CFC's lead to O_3 loss.
 $\text{Cl from CFC's} + \text{O}_3 \rightarrow \text{ClO} + \text{O}_2$
 $\text{ClO} + \text{O} \rightarrow \text{O}_2 + \text{Cl}$
15. What are the consequences of a thinner ozone layer?
Higher incidence of skin cancer and cataracts