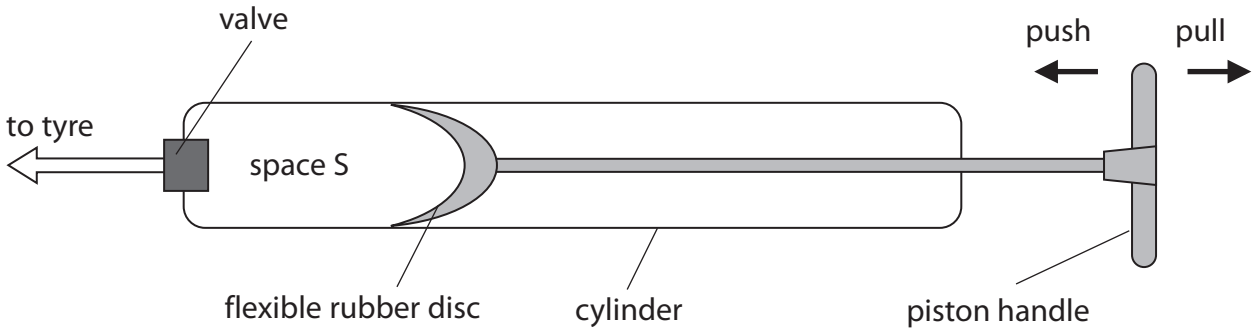
10 (a) The diagram shows the construction of a bicycle pump.



When the piston handle is pulled, air moves past the flexible rubber disc into space S.

When the piston handle is pushed, the flexible rubber disc presses against the sides of the cylinder so no air can pass the disc in either direction.

(i) When the volume of space S is 80 cm^3, the air in space S has a pressure of 1.01×10^5 Pa.

The valve is sealed so no air can escape from the pump.

Calculate the pressure inside space S when the piston handle is pushed in and the volume decreases to 10 cm^3.

(3)

pressure = ... Pa

(ii) State an assumption you have made about the air in space S.

(1)

.....

.....

(iii) When the bicycle pump is used to inflate a tyre, the pump becomes hot.

Suggest why the pump becomes hot.

(2)

.....

.....

.....

.....

(b) The photograph shows a woman using a pump to lift water from a well.

(i) State the relationship between work done, force and distance moved.

(1)

(ii) Calculate the work done in lifting 1.25 kg of water a distance of 8.70 m.

(3)

work done = ... J

(Total for Question 10 = 10 marks)