

PAL Worksheet
Week 9 Problem Set 1

TUBULAR SEGMENTS

- 1) On your white board, draw an unfolded nephron and collecting duct:

- 2) In which segment of the tubule does the majority of reabsorption take place?
 - Is this portion of the nephron permeable to water?
 - Does this portion of the nephron have an unlimited number of transporters for the various substances that are reabsorbed back into blood?
 - What happens to the reabsorption of substance X when all of its transporters are saturated? Where will the remainder of substance X end up?
 - What is the osmolarity of the filtrate in this portion of the nephron? How can this be if most of the solute reabsorption is taking place here?

- 3) Which segment of the LOH is permeable to water, but impermeable to solutes?
 - What happens to the osmolarity of filtrate as it moves through this segment? Please explain:

- 4) Which segment of the LOH is impermeable to water, but permeable to solutes?
 - Why does the solute have to be actively transported out of the tubule in this portion of the LOH?
 - What happens to the osmolarity of filtrate as it moves through this segment? Please explain:
 - How is this segment related to the osmotic gradient of the renal medulla?

- 5) In which segment of the nephron/tubules does fine tuning of water and Na⁺ reabsorption take place?
 - Which cells are responsible for this fine tuning?
 - These cells have receptors for which two hormones?

- 6) Is facultative water reabsorption greater when an individual is hydrated or when an individual is dehydrated?

- 7) Using a drawing, describe in detail the mechanism by which ADH acts as an anti-diuretic hormone, making sure to use the following words (along with others) in your description: collecting duct, receptor, channel, blood, peritubular capillaries, water, filtrate, reabsorption, excretion, urine volume, urine concentration: