**Worksheet suggested answer key**

1. Beads; water

2. Number of milliosmoles or concentration of solute per liter of total volume

3. non-penetrating solutes; water (free)

4. water (free); non-penetrating solutes

5. 10 grams

6. 20 grams

7. The 20% solution has more solutes

8. This will depend on the beads used. For the paper figure, cylinder 10-2 has approximately 90ml while cylinder 20-2 has approximately 80ml.

9. The 10% solution (90% water) has more water compared to the 20% solution (80% water)

10. 10%-1 tube has 10 grams of white beads x 5 mosmol/g = 50 mosmol in a total of 0.1L = 500 mOsM. 20%-1 tube has 20 grams of black beads x 7 mosoml/g = 140 mosmol in a total of 0.1L = 1,400 mOsM.

11. The 20% solution is considered hypertonic while the 10% solution is considered hypotonic.

12. The side which has the 20% solution would increase in volume as water would diffuse (via osmosis) from the side with the 10% solution (hypotonic) to the 20% side (hypertonic). Osmosis, as defined by the diffusion of water across a semi-permeable membrane, will result in a net gain of water on the 20% side which will decrease its solute concentration while at the same time increasing the solute concentration on the side containing the 10% (due to a decrease in volume). If left long enough, the sides should reach a state in which they are in dynamic equilibrium and isotonic relative to each other.