**The Hashemite University Plant physiology 0104351 Faculty of Science First semester, 2008**

**Dept. of Biological Sciences First Exam**

**Instructor: Dr. Emad Bsoul**

**FORM A**

**Name: …………………………………. Number…………………**

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Please, choose the **most correct** answer for the **30 questions** and fill it near its number in the following table.

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| --- | --- | --- | --- |
| **1** |  | **16** |  |
| **2** |  | **17** |  |
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| **13** |  | **28** |  |
| **14** |  | **29** |  |
| **15** |  | **30** |  |

Please, answer by choosing the **most correct** answer of the following questions, **and then fill it at the answer sheet**. **(1/2 point each)**

5) Which structure is the site of the synthesis of proteins that may be exported from the cell?

A) rough ER

B) lysosomes

C) plasmodesmata

D) Golgi vesicles

E) tight junctions

8) Which of the following takes place as an ice cube cools a drink?

A) Molecular collisions in the drink increase.

B) Kinetic energy in the drink decreases.

C) A calorie of heat energy is transferred from the ice to the water of the drink.

D) The specific heat of the water in the drink decreases.

E) Evaporation of the water in the drink increases.

9) When a potassium ion (K+) moves from the soil into the vacuole of a cell on the surface of a root, it must pass through several cellular structures. Which of the following correctly describes the order in which these structures will be encountered by the ion?

A) plasma membrane → primary cell wall → cytoplasm → tonoplast

B) secondary cell wall → plasma membrane → primary cell wall → cytoplasm → tonoplast

C) primary cell wall → plasma membrane → cytoplasm → tonoplast

D) primary cell wall → plasma membrane → tonoplast → cytoplasm → vacuole

E) tonoplast → primary cell wall → plasma membrane → cytoplasm

1) The value for Ψ in root tissue was found to be -0.10 MPa. If you take the root tissue and place it in a 0.1 *M* solution of sucrose (Ψ = -0.23), net water flow would

A) Be from the tissue into the sucrose solution.

B) Be from the sucrose solution into the tissue.

C) Be in both directions and the concentrations would remain equal.

D) Occur only as ATP was hydrolyzed in the tissue.

E) Be impossible to determine from the values given here.

2) What gives rise to the cohesiveness of water molecules?

A) hydrophobic interactions

B) nonpolar covalent bonds

C) ionic bonds

D) hydrogen bonds

E) both A and C



Figure 1

 3) The best conclusion from the data in (Figure 1) is that the plant

A) grows best without air in the soil.

B) grows fastest in 5 to 10% air.

C) grows best at soil air levels above 15%.

D) does not respond differently to different levels of air in the soil.

E) would grow to 24 grams in 40% soil air.

4) The data in (Figure 1) indicate that that the plant

A) grows best at the lower levels of air in the soil.

B) grows about the same in 15% and 20% soil air percent.

C) grows best in soil air levels above 15%.

D) B and C only

E) A, B and C

10) The anatomy of typical dicotyledonous plant leaf, from upper surface to lower surface is

A) lower epidermis, palisade, spongy and upper epidermis

B) upper epidermis, palisade, spongy and lower epidermis

C) upper epidermis, spongy, palisade and lower epidermis

D) lower epidermis, spongy, palisade and upper epidermis

11) What do cohesion, surface tension, and adhesion have in common with reference to water?

A) All increase when temperature increases.

B) All are produced by ionic bonding.

C) All are properties related to hydrogen bonding.

D) All have to do with nonpolar covalent bonds.

E) C and D only

**12) Which of the following has an effect on water potential (Ψ) in plants?**

**A) Air pressure**

B) water-attracting surrounding substances

C) Dissolved solutes

D) A and C only

E) A, B, and C

13) If ΨP = 0.2 MPa and ΨS = -0.45 MPa, the resulting Ψ is

A) +0.65 MPa.

B) -0.65 MPa.

C) -0.25 MPa.

D) +0.25 MPa.

E) Impossible to calculate with this information.

6) Grana, thylakoids, and stroma are all components found in

A) vacuoles.

B) chloroplasts.

C) mitochondria.

D) lysosomes.

E) nuclei.

7) Which of the following relationships between cell structures and their respective functions is correct?

A) cell wall: support, protection

B) chloroplasts: chief sites of cellular respiration

C) chromosomes: cytoskeleton of the nucleus

D) ribosomes: secretion

E) lysosomes: formation of ATP

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| 23)  | Approximately how much water typically leaves the plant by transpiration?  |

A) 90% or more

B) 25% or less

C) 75%

D) 65%

E) 50%

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| 24)  | The pressure required to prevent osmosis from taking place is referred to as:  |

A) Water potential

B) Osmotic potential

C) Pressure potential

D) Turgor pressure

E) None of these answers are correct

25) For this pair of items, choose the option that best describes their relationship.

(A) The average size of particles that constitute silt

(B) The average size of particles that constitute clay

A) Item (A) is *greater* than item (B).

B) Item (A) is *less* than item (B).

C) Item (A) is exactly or very approximately *equal* to item (B).

D) Item (A) may stand in more than one of the above relations to item (B).

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| 17)  | The stacks of double membrane structures found in chloroplasts are  |

A) Plasma membrane

B) Vacuolar membranes

C) Golgi bodies

D) Grana

E) Smooth endoplasmic reticulum

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| 18)  | Which of the following may be found in plant cell vacuoles?  |

A) Water-soluble pigments

B) Crystals

C) Salts

D) Sugars

E) All of these answers are correct

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| 19)  | Root hairs  |

A) Are specialized epidermal cells

B) Are covered with a waxy cuticle

C) Increase the surface area for absorption of water

D) Live only one day

E) Both [are specialized epidermal cells and increase the surface area for absorption of water] are correct

20) Which of the following do guard cells and palisade mesophyll cells have in common?

A) Cuticle wax

B) Thick walls

C) Chloroplasts

D) Vascular bundles

E) Fibers

16) A plant cell with a solute potential of -0.75 MPa maintains a constant volume when bathed in a solution that has a solute potential of -0.30 MPa and is in an open container. What do we know about the cell?

A) The cell has a pressure potential of +0.75 MPa.

B) The cell has a water potential of -0.75 MPa.

C) The cell has a pressure potential of +0.45 MPa.

D) The cell has a pressure potential of +0.40 MPa.

E) The cell has a water potential of 0 MPa.

**14) The water lost during transpiration is an unfortunate side effect of the plant's exchange of gases. However, the plant derives some benefit from this water loss in the form of**

A) Evaporative cooling.

B) Mineral transport.

C) Increased turgor.

D) A and B only

E) A, B, and C

15) Water potential is generally most negative in which of the following parts of a plant?

A) Mesophyll cells of the leaf

B) Xylem vessels in leaves

C) Xylem vessels in roots

D) Cells of the root cortex

E) Root hairs

21) Which of the following statements is *false* about bulk flow?

A) It is driven primarily by pressure potential.

B) It is more effective than diffusion over distances greater than 100 μm.

C) It depends on a difference in pressure potential at the source and sink.

D) It depends on the force of gravity on a column of water.

E) It may be the result of either positive or negative pressure potential.

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| 22)  | Pressure sufficient to prevent the rise of fluid in an osmometer tube, when applied to the top of the tube, is called  |

A) Pressure diffusion.

B) Turgor pressure.

C) Osmotic pressure.

D) Pressure potential.

E) Water potential.

26) **Use van’t Hoff’s to** Calculate the osmotic potential of a 1.0 molal (1 mol per kg) sugar solution at 25oC.

**Equation to calculateOsmotic potential**: ψs**= -*CiRT***

Where:*C*= Concentration of solution as molality(molesof solute per kg of water)

i = Ionisation constant e.g. 1.0 for sugar, 1.8 for NaClR = Gas constant (0.00831 kg MPa mol-1K-1)

*T* = Temperature (K)

A) **ψs= -0.476 MPa**

B) **ψs= -2.476 MPa**

C) **ψs= -0.400 MPa**

D) **ψs= -0.2078 MPa**

**T or F**

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| 27)  | Grasses generally produce a fibrous root system.  |
| 28) | Stomata open when the water content of the guard cells increases.  |
| 29 |  The amount and direction of movement of water in plants can *always* be predicted by measuring water potential (Ψ)  |
| 30  |  A leaf-like structure at the base of a leaf called stipule |

Good Luck

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| **9** | C | **24** | D |
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| **11** | C | **26** | B |
| **12** | B | **27** | T |
| **13** | B | **28** | T |
| **14** | A | **29** | T |
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