NAME:_____ Quiz 14

1. Draw alpha-D-glucose

2. Draw pyruvate. Indicate where C1 of glucose ends up on pyruvate.

3. Draw lactate. Indicate where C1 of glucose ends up on lactate.

4. Draw ribose-5-phosphate. Indicate where C1 of glucose ends up on ribose-5-phosphosphate.

Pentose Phosphate Pathway

1. Draw glucose.
2. React glucose with hexokinase.
3. Convert C1 to a carbonyl (i.e. ester). This is named 6-phosphoglucolactone.
    a. Suggest a name for this enzyme.
    b. Suggest any other reactants/products.
4. Linearize 6-phosphoglucolactone and convert C1 to a carboxylate. The enzyme that catalyzes this reaction is 6-phosphoglucolactonase, while the product is 6-phosphogluconate.
    a. Suggest any other reactants/products.
5. C1 is released as CO_2. This enzyme is named 6-phosphogluconate dehydrogenase. The final product is named ribulose-5 phosphate.
    a. A base abstracts the proton from the C3 hydroxyl group.
    b. One lone pair from the resulting oxyanion move to form double bond with C3, while the hydride attached to C3 is transferred to $NADP^+$. C3 should be a keto group.
    c. A lone pair from one of the C1 carboxylate oxyanions moves to form a double bond with C1. The electrons forming the C1 to C2 bond are withdrawn towards the ketone. These electrons form a double bond between C2 and C3. The carbonyl oxygen on C3 accepts an additional lone pair to form an oxyanion. C1 leaves as CO_2. How would you describe this intermediate?
    d. One lone pair of the oxyanion of C2 (note number change after CO_2 release) moves to reform the carbonyl, moving the pi-electrons towards C1, which picks up a proton.
    e. Suggest any other reactants/products.

Ribulose-5 phosphate undergoes a keto-enol tautomerization to the aldopentose to ribose-5-phosphate.