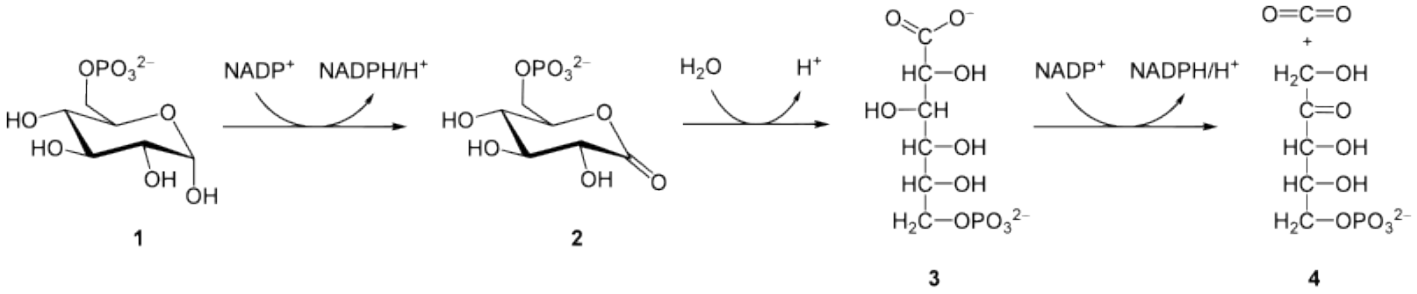
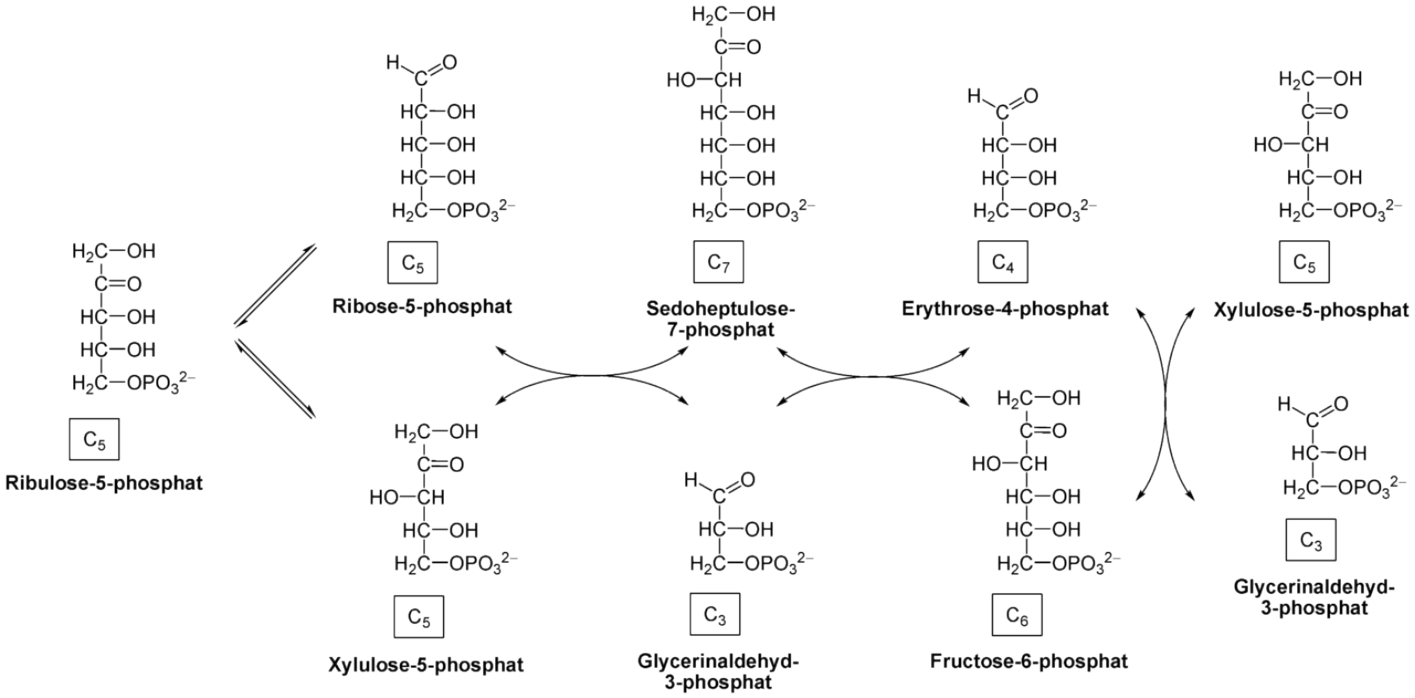
CONCEPT: PENTOSE PHOSPHATE PATHWAY

- Pentose phosphate pathway – glucose 6-phosphate enters, makes 2 NADPH and ribulose 5-phosphate
    - □ Produce ribose 5-phosphate for nucleotide synthesis and H synthesis
    - □ Produce erythrose 4-phosphate for FWY synthesis
    - □ Can completely oxidize glucose
    - □ Source of NADPH, uses $NADP^+$ instead of NAD^+

1. Glucose 6-phosphate dehydrogenase – glucose 6-phosphate + NADP+ → 6-phosphoglucono-δ-lactone + NADPH
2. Lactonase – 6-phosphoglucono-δ-lactone → 6-phosphogluconate
3. 6-phosphogluconate dehydrogenase – 6-phosphogluconate + NADP+ → ribulose 5-phosphate + NADPH
4. Phosphopentose isomerase – ribulose 5-phosphate → ribose 5-phosphate



- Transketolases transfer 2 carbon units
    - □ Use thymine pyrophosphate (TPP) as their transfer agent
    - □ Xyulose 5-phosphate + ribose 5-phosphate → G3P + sedoheptulose 7-phosphate (7C)
- Transaldolases transfers 3 carbon units
    - □ G3P + sedoheptulose 7-phosphate → fructose 6-phosphate + erythrose 4-phosphate (4C)



- NADPH helps prevent oxygen toxicity from super oxide radicals with glutathione reductase
    - □ Superoxide dismutase converts O_2^- to H_2O_2, and glutathione reductase peroxidase uses glutathione to form H_2O
    - □ Glutathione reductase uses NADPH to convert glutathione back into active (reduced) form
    - □ NADPH inhibits glucose entry into the pentose phosphate pathway via feedback inhibition