

Solutions

2.1

- Two lactate molecules (3 C each): pyruvate reduced by NADH.

2.2

- Phosphoglycerate kinase and pyruvate kinase (both substrate-level).

2.3

- Other sugars (fructose, galactose) also enter via hexokinase-type phosphorylation – the step is not unique to glycolysis; PFK-1 is.

3.1

- $6\text{ C} \rightarrow 2 \times \text{pyruvate (3 C each)} \rightarrow 2 \times \text{lactate}$.
- Net 2 ATP (invest 2, return 4); 2 NADH made in payoff, consumed by lactate dehydrogenase.
- Without NAD^+ regeneration, G3P dehydrogenase halts and the payoff phase stops.
- Regeneration: lactate dehydrogenase.

3.2

- Block: after F-6-P, before F-1,6-BP – the committed gate.
- Lactate absent because glycolytic flux never reaches pyruvate.
- Accumulate: glucose-6-P, fructose-6-P (and glucose uptake slows by feedback).
- Downstream intermediates cannot cross the membrane efficiently nor restore the full pathway's regulation in intact muscle.