

### Key – Metabolic Pathways EP – S14

1.
  - a. Step 2 and 4.  $\text{FADH}_2$  and  $\text{NADH}$  are produced.
  - b. Step 1, an ATP is used to start the reaction
  - c. 1 -  $\text{FADH}_2$  and 1 -  $\text{NADH}$  therefore  $2 + 3 = 5 \text{ ATP/cycle}$
  - d. 18 carbons would require 8 chops producing  $(5 \times 8) = 40 \text{ ATP}$ , - 1 ATP to start the process = 39 ATP
2.
  - a. 18 carbons would require 8 chops producing 9 acetyl-CoA
  - b. 8 chops, each produces 1  $\text{NADH} = 8 \text{ NADH}$
  - c. 8 chops, each produces 1  $\text{FADH}_2 = 8 \text{ FADH}_2$
  - d.  $\text{FADH}_2 = 2 \text{ ATP}$  each,  $\text{NADH} = 3 \text{ ATP}$  each, therefore  $8 \times 5 = 40 \text{ ATP}$
3.
  - a. The molecule is reduced (Ketone  $\rightarrow$  Alcohol) by addition of  $\text{H}_2$  across the  $\text{C}=\text{C}$ .
  - b. Removing,  $\text{NADPH}$  is used
  - c. Molecule is reduced,  $\text{NADPH}$  is oxidized
  - d. Anabolism as the molecule is reduced
4.
  - a. Molecule is oxidized (loses  $\text{H}_2$ ) via dehydrogenation
  - b. Adding  $\text{FAD}$  is reduced to  $\text{FADH}_2$
  - c. Molecule is oxidized,  $\text{FAD}$  is reduced
  - d. Catabolism as the molecule loses energy
5.
  - a. The molecule is reduced (Ketone  $\rightarrow$  Alcohol) by addition of  $\text{H}_2$  across the  $\text{C}=\text{C}$ .
  - b. Removing,  $\text{NADPH}$  is used
  - c.  $\text{NADPH}$  is oxidized (loses energy)
  - d. Molecule (gains bonds to  $\text{H}_2$ )
  - e. Anabolism as the molecule is reduced
  - f. Lipogenesis - the coenzyme is  $\text{SACP}$
6.
  - a. Molecule is oxidized (loses  $\text{H}_2$ ) via dehydrogenation
  - b. Adding  $\text{FAD}$  is reduced to  $\text{FADH}_2$
  - c. Molecule is oxidized - loses bonds to  $\text{H}_2$
  - d.  $\text{FAD}$  is reduced - gains bonds to  $\text{H}_2$
  - e. Catabolism as the molecule loses energy
7.
  - a. Hydration reaction (adding  $\text{H}_2\text{O}$  across the  $\text{C}=\text{C}$ ).
  - b. Neither, it is energy neutral
  - c. Nothing
  - d. Nothing
  - e. Anabolic, the molecule is made larger
8.
  - a. Gain,  $\text{NADH}$  is a product
  - b. Catabolism, energy is lost by the molecule
  - c. Lose, ATP is used
  - d. Anabolism, energy is gained by the molecule
9.
  - a. Substrate level phosphorylation - phosphate is transferred from the substrate to an ATP
  - b. Adding, ATP is produced
  - c. The molecule oxidized, gained a bond to oxygen (4 to 5)
  - d. ATP, gains energy
  - e. Catabolic, the molecule is broken down, and the cell gains energy
  - f. Pyruvate Kinase
10.
  - a. Hydrogenation,  $\text{H}_2$  is added across the  $\text{C}=\text{C}$
  - b. Removing,  $\text{NADPH}$  is oxidized (used)
  - c.  $\text{NADPH}$ , lost bond to H
  - d. Molecule, gains bonds to H
  - e. Anabolic, the molecule gains energy
  - f. Lipogenesis because the coenzyme is  $\text{SACP}$