

Name \_\_\_\_\_

**Matching**

Choices may be used more than once or not at all.

1-5. Matching

- |                     |   |          |
|---------------------|---|----------|
| A) Small intestines | Produces saliva                                   | 1) _____ |
| B) Stomach          | Crushes and mixes food via chewing                | 2) _____ |
| C) Mouth            | Crushes and mixes food via churning               | 3) _____ |
|                     | Crushes and mixes food via segmentation           | 4) _____ |
|                     | Produces mucus, hydrochloric acid, and pepsinogen | 5) _____ |

6-10. Matching

- |                          |  |           |
|--------------------------|--|-----------|
| A) Fat                   | Is broken down and absorbed as fatty acids, glycerol, glycerides | 6) _____  |
| B) Salt                  | Is broken down and absorbed as glucose, fructose, galactose      | 7) _____  |
| C) Water                 | Is broken down and absorbed as amino acids or peptides           | 8) _____  |
| D) Protein               | Is absorbed as Na <sup>+</sup> and Cl <sup>-</sup>               | 9) _____  |
| E) Complex carbohydrates | Is absorbed as H <sub>2</sub> O                                  | 10) _____ |

11-15. Matching

- |               |  |           |
|---------------|--|-----------|
| A) Peptidase  | Emulsifies fats                                    | 11) _____ |
| B) Bile salts | Breaks down fats in intestine                      | 12) _____ |
| C) Amylase    | Breaks down protein in stomach                     | 13) _____ |
| D) Pepsin     | Breaks down peptides to amino acids                | 14) _____ |
| E) Lipase     | Breaks down complex carbohydrates to disaccharides | 15) _____ |

16-20. Matching

- |   |  |           |
|---|--|-----------|
| A) Gastric pepsin                         | Breaks down complex carbohydrates to disaccharides in intestines | 16) _____ |
| B) Hepatic bile salts                     | Breaks down peptides to amino acids in intestines                | 17) _____ |
| C) Pancreatic lipase                      | Breaks down protein in stomach                                   | 18) _____ |
| D) Pancreatic amylase                     | Breaks down fats in intestines                                   | 19) _____ |
| E) Pancreatic and/or intestinal peptidase | Emulsifies fats in intestines                                    | 20) _____ |

21-25. Matching

- |  |                          |           |
|--|--------------------------|-----------|
| A) Transported through apical membrane by Na <sup>+</sup> linked co-transporters | Glucose                  | 21) _____ |
| B) Transported through apical membrane by H <sup>+</sup> linked co-transporters  | Fructose                 | 22) _____ |
| C) Transported through apical membrane by facilitative transporters              | Amino acids              | 23) _____ |
| D) Transported through apical membrane by diffusion                              | Small proteins           | 24) _____ |
| E) None of the above   | Glycerol and fatty acids | 25) _____ |

26-30. Matching

- |             |  |           |
|-------------|--|-----------|
| A) Fructose | Goes through apical membrane by facilitative transporters                      | 26) _____ |
| B) Glucose  | Goes through the basolateral membrane by Na <sup>+</sup> /K <sup>+</sup> pumps | 27) _____ |
| C) Sodium   | Goes through apical membrane by Na <sup>+</sup> linked co-transporters         | 28) _____ |
| D) Water    | Go(es) through basolateral membrane by facilitative transporters               | 23) _____ |
| E) A & B    | Goes through the apical membrane by diffusion through channels                 | 30) _____ |

31-35. Matching

- |                         |  |           |
|-------------------------|--|-----------|
| A) Parasympathetic N.S. | Increases salivation   | 31) _____ |
| B) Sympathetic N.S.     | Increases secretion of fluids by pancreas                                | 32) _____ |
|                         | Increases motility of stomach and small intestine                        | 33) _____ |
|                         | Increases secretion of HCl and pepsinogen by stomach                     | 34) _____ |
|                         | Decreases blood flow, secretions, and motility of gastrointestinal tract | 35) _____ |

36-400. Matching

- |   |                 |           |
|---|-----------------|-----------|
| A) Increases secretion of exocrine pancreas | Leptin          | 36) _____ |
| B) Increases secretions of stomach          | Ghrelin         | 37) _____ |
| C) Decreases appetite                       | Gastrin         | 38) _____ |
| D) Increases appetite                       | Secretin        | 39) _____ |
| E) A & C                                    | Cholecystokinin | 40) _____ |

41-45. Matching

- |   |                                  |           |
|---|----------------------------------|-----------|
| A) Stimulates pancreatic secretions (exocrine or endocrine) | Motilin                          | 41) _____ |
| B) Stimulates gastric secretions                            | Gastrin                          | 42) _____ |
| C) Inhibits gastric secretions                              | Secretin                         | 43) _____ |
| D) Stimulates GI motility                                   | Cholecystokinin (CCK)            | 44) _____ |
| E) A and C  | Gastric inhibitory peptide (GIP) | 45) _____ |

46-14. Matching

- |                               |   |           |
|-------------------------------|---|-----------|
| A) Post-absorptive metabolism | Involves the use and storage of nutrients   | 46) _____ |
| B) Absorptive metabolism      | Involves the retrieval and use of nutrients | 47) _____ |
| C) None of the above          | Uses insulin as a key metabolic hormone     | 48) _____ |
|                               | Uses glucagon as a key metabolic hormone    | 49) _____ |
|                               | Uses epinephrine as a key metabolic hormone | 50) _____ |

51-55. Matching

- |                    |   |           |
|--------------------|---|-----------|
| A) Lipolysis       | Creation of glucose from pyruvate, amino acids or fatty acids | 51) _____ |
| B) Glycolysis      | Breakdown of fat to glycerol and fatty acids                  | 52) _____ |
| C) Glycogenesis    | Breakdown of glycogen to create glucose                       | 53) _____ |
| D) Glycogenolysis  | Breakdown of glucose to pyruvate                              | 54) _____ |
| E) Gluconeogenesis | Creation of glycogen from glucose                             | 55) _____ |

56-120. Place the following in order in response to high blood glucose as seen right after eating.

- |  |        |           |
|--|--------|-----------|
| A) Pancreatic beta cells are stimulated                                  | first  | 56) _____ |
| B) Glucose is transported into cells and used or stored                  | second | 57) _____ |
| C) Pancreatic beta cells secrete insulin into systemic blood             | third  | 58) _____ |
| D) Glucose transporters are inserted into plasma membrane                | fourth | 59) _____ |
| E) Insulin binds to tyrosine kinase linked receptors in muscle and liver | fifth  | 60) _____ |

61-65. Matching

- |                       |   |           |
|-----------------------|---|-----------|
| A) Gluconeogenesis    | $2 \text{ Pyruvate} \rightarrow \text{Glucose}$   | 61) _____ |
| B) Electron transport | $\text{Glucose} + 2 \text{ NAD}^+ + 2 \text{ ADP} + 2 \text{ P}_i \rightarrow 2 \text{ pyruvate} + 2 \text{ NADH} + 2 \text{ H}^+ + 2 \text{ ATP}$  | 62) _____ |
| C) Decarboxylation    | $2 \text{ Pyruvate} + 2 \text{ CoA} + 2 \text{ NAD}^+ \rightarrow 2 \text{ Acetyl-CoA} + 2 \text{ CO}_2 + 2 \text{ NADH} + 2 \text{ H}^+$   | 63) _____ |
| D) Glycolysis         | $2 \text{ Acetyl-CoA} + 6 \text{ NAD}^+ + 2 \text{ FAD} + 2 \text{ ADP} + 2 \text{ P}_i \rightarrow 4 \text{ CO}_2 + 6 \text{ NADH} + 6 \text{ H}^+ + 2 \text{ FADH}_2 + 2 \text{ ATP}$       | 64) _____ |
| E) TCA cycle          | $10 \text{ NADH} + 10 \text{ H}^+ + 2 \text{ FADH}_2 + 6 \text{ O}_2 + 34 \text{ ADP} + 34 \text{ P}_i \rightarrow 10 \text{ NAD}^+ + 2 \text{ FAD} + 6 \text{ H}_2\text{O} + 34 \text{ ATP}$ | 65) _____ |

66-130. Matching

- |  |             |           |
|--|-------------|-----------|
| A) Increases glucose uptake and glycogenesis                         | Epinephrine | 66) _____ |
| B) Increases glycogenolysis and gluconeogenesis                      | Glucagon    | 67) _____ |
| C) Decreases glucose uptake; increases gluconeogenesis and lipolysis | Cortisol    | 68) _____ |
|  | Insulin     | 69) _____ |
|  | T3, T4      | 70) _____ |

71-75. Matching (prominent effect)

- |             |   |           |
|-------------|---|-----------|
| A) Insulin  | Increases cellular metabolism, energy, and heat production  | 71) _____ |
| B) Cortisol | Decreases glucose uptake and increases use of fats in cells | 72) _____ |
| C) Thyroxin | Increases glucose uptake into cells                         | 73) _____ |
| D) Glucagon | Increases glycogenolysis in cells                           | 74) _____ |
|             | Increases glycogenesis in cells                             | 75) _____ |

76-80. Place the following in order in response to low blood glucose as seen long after eating.

- |  |        |           |
|--|--------|-----------|
| A) Pancreatic alpha cells are stimulated                             | first  | 76) _____ |
| B) Glucose is used or transported out of cells                       | second | 77) _____ |
| C) Pancreatic alpha cells secrete glucagon into systemic blood       | third  | 78) _____ |
| D) Stored glycogen is broken down to glucose (glucose 6-phosphate)   | fourth | 79) _____ |
| E) Glucagon binds to G-protein coupled receptors in muscle and liver | fifth  | 80) _____ |

81-85. Place the following in order that initiates an increase in metabolism.

- |  |        |           |
|--|--------|-----------|
| A) The hypothalamus secretes TRH into the blood                    | first  | 81) _____ |
| B) The thyroid gland secretes thyroxin into the blood              | second | 82) _____ |
| C) The anterior pituitary secretes TSH into the blood              | third  | 83) _____ |
| D) Thyrotrophs in the anterior pituitary are stimulated            | fourth | 84) _____ |
| E) The hypothalamus detects low blood thyroxin (or low metabolism) | fifth  | 85) _____ |

86-90. Matching

- |           |  |           |
|-----------|--|-----------|
| A) Female | The SRY gene is expressed                                  | 86) _____ |
| B) Male   | Interstitial cells secrete testosterone                    | 87) _____ |
|           | Wolffian ducts develop and differentiate                   | 88) _____ |
|           | Mullerian ducts develop and differentiate                  | 89) _____ |
|           | Sertoli cells secrete Mullerian inhibiting substance (MIS) | 90) _____ |

91-95. Matching

- |  |   |           |
|--|---|-----------|
| A) Gonadotropin releasing hormone (GnRH) | Stimulates prolactin (PRL)                    | 91) _____ |
| B) Corticotropin releasing hormone (CRH) | Stimulates thyrotropin (TSH)                  | 92) _____ |
| C) Thyrotropin releasing hormone (TRH)   | Stimulates corticotropin (ACTH)               | 93) _____ |
| D) Prolactin releasing hormone (PRH)     | Stimulates luteinizing hormone (LH)           | 94) _____ |
|  | Stimulates follicle stimulating hormone (FSH) | 95) _____ |

96-100. Matching

- |        |   |            |
|--------|---|------------|
| A) TSH | Stimulates "nurse" cells of testes                      | 96) _____  |
| B) FSH | Stimulates interstitial cells of testes                 | 97) _____  |
| C) LH  | Stimulates follicular cells of thyroid gland            | 98) _____  |
|        | Stimulates luteal cells of corpus luteum of ovary       | 99) _____  |
|        | Stimulates granulosa cells of ovarian follicle of ovary | 100) _____ |

101-105. Matching (ABG = androgen binding globulin)

- |        |  |            |
|--------|--|------------|
| A) LH  | Stimulates conversion of the empty follicle into the corpus luteum | 101) _____ |
| B) FSH | Stimulates interstitial cells of testes to produce testosterone    | 102) _____ |
|        | Stimulates granulosa cells of ovary to produce estrogen            | 103) _____ |
|        | Stimulates Sertoli cells of testes to produce ABG                  | 104) _____ |
|        | Stimulates ovulation   | 105) _____ |

106-110. Matching

- |   |                                   |            |
|---|-----------------------------------|------------|
| A) "Nurse" cells of testes                      | Produce androgen binding globulin | 106) _____ |
| B) Interstitial cells of testes                 | Produce progesterone              | 107) _____ |
| C) Follicular cells of thyroid gland            | Produce testosterone              | 108) _____ |
| D) Luteal cells of corpus luteum of ovary       | Produce estrogen                  | 109) _____ |
| E) Granulosa cells of ovarian follicle of ovary | Produce thyroxin                  | 110) _____ |

111-115. Matching

- |                 |   |            |
|-----------------|---|------------|
| A) Progesterone | Stimulates spermatogenesis                          | 111) _____ |
| B) Testosterone | Stimulates growth of the endometrium                | 112) _____ |
| C) Estrogen     | Powerfully inhibits GnRH neurons in males           | 113) _____ |
|                 | Powerfully inhibits GnRH neurons in females         | 114) _____ |
|                 | Inhibits growth of, and stabilizes, the endometrium | 115) _____ |

116-120. Matching (most dominant effects)

- A) Progesterone Inhibits GnRh neurons in hypothalamus (luteal phase) 116) \_\_\_\_\_  
B) Estrogen Inhibits growth of endometrium of uterus (luteal phase) 117) \_\_\_\_\_  
C) Inhibin Stimulates growth of endometrium of uterus (follicular phase) 112) \_\_\_\_\_  
Stimulates production of LH by gonadotrophs in pituitary (late follicular phase) 119) \_\_\_\_\_  
Inhibits production of FSH by gonadotrophs in pituitary (follicular and luteal phase) 120) \_\_\_\_\_

121-125. Matching (direct effects)

- A) Progesterone Produced by the chorion of the embryo (pregnant) 121) \_\_\_\_\_  
B) hCG Stimulates growth of ovarian follicle (follicular phase) 122) \_\_\_\_\_  
C) FSH Absence causes sloughing of the endometrium (luteal phase) 123) \_\_\_\_\_  
D) LH Absence causes the death of the corpus luteum (luteal phase) 124) \_\_\_\_\_  
E) B & D Stimulates the corpus luteum to produce progesterone (luteal phase / pregnant) 125) \_\_\_\_\_

**Fill in** – Note: Alternate answers may at times be correct.

1. Most foods are broken down chemically in the GI tract by the process of \_\_\_\_\_.
2. In the stomach \_\_\_\_\_ plays a major role in disrupting phospholipids.
3. Water is reabsorbed through the apical (luminal) membrane using \_\_\_\_\_ and through the basolateral membrane using \_\_\_\_\_.
4. Sodium is reabsorbed through the apical (luminal) membrane usually using \_\_\_\_\_ and through the basolateral membrane using \_\_\_\_\_.
5. Glucose is reabsorbed through the apical (luminal) membrane using \_\_\_\_\_ and through the basolateral membrane using \_\_\_\_\_.
6. Amino acids are reabsorbed through the apical (luminal) membrane using \_\_\_\_\_ and through the basolateral membrane using \_\_\_\_\_.
7. Small peptides are broken down in the cytoplasm of the digestive epithelium by \_\_\_\_\_.
8. Monosaccharides and amino acids are absorbed from the GI tract into \_\_\_\_\_ capillaries.
9. Fatty acids are absorbed through the apical (luminal) membrane of intestinal epithelial cells by way of \_\_\_\_\_ (process).
10. Fatty acids and glycerol are recombined in the cytoplasm of digestive epithelial cells to form \_\_\_\_\_ coated in \_\_\_\_\_.
11. Chylomicrons are absorbed from the GI tract into the \_\_\_\_\_ capillaries rather than into the blood capillaries.
12. \_\_\_\_\_ (a hormone) acts on the hypothalamus to stimulate hunger and on the pituitary to stimulate growth hormone.
13. \_\_\_\_\_ (a hormone) acts on the hypothalamus to suppress (inhibit) hunger.
14. \_\_\_\_\_ (a hormone) increases glucose uptake by most cells (except neurons).
15. \_\_\_\_\_ (a hormone) increases breakdown of glycogen.
16. \_\_\_\_\_ (a hormone) inhibits glucose uptake, and increases use of fat and protein.
17. Loss of the pituitary eliminates \_\_\_\_\_ (hormone) and prevents stimulation of the thyroid gland.
18. Low levels of \_\_\_\_\_ (a hormone) can cause low production of thyroxin by the thyroid, and thus to \_\_\_\_\_ metabolism.
19. Spermatogenesis depends upon a high concentration of \_\_\_\_\_ (a hormone) in the testes.
20. In males, \_\_\_\_\_ (a hormone) inhibits neurons of the hypothalamus that secrete GnRH.
21. \_\_\_\_\_ (a hormone) inhibits growth of the endometrium.
22. During pregnancy the corpus luteum is maintained by \_\_\_\_\_, a hormone produced by the outermost membrane around the embryo.

Name \_\_\_\_\_

Choices may be used more than once or not at all.

**Matching**

1-5. Matching

- |                     |   |                 |
|---------------------|---|-----------------|
| A) Small intestines | Produces saliva                                   | 1) <u>  C  </u> |
| B) Stomach          | Crushes and mixes food via chewing                | 2) <u>  C  </u> |
| C) Mouth            | Crushes and mixes food via churning               | 3) <u>  B  </u> |
|                     | Crushes and mixes food via segmentation           | 4) <u>  A  </u> |
|                     | Produces mucus, hydrochloric acid, and pepsinogen | 5) <u>  B  </u> |

6-10. Matching

- |                          |  |                  |
|--------------------------|--|------------------|
| A) Fat                   | Is broken down and absorbed as fatty acids, glycerol, glycerides | 6) <u>  A  </u>  |
| B) Salt                  | Is broken down and absorbed as glucose, fructose, galactose      | 7) <u>  E  </u>  |
| C) Water                 | Is broken down and absorbed as amino acids or peptides           | 8) <u>  D  </u>  |
| D) Protein               | Is absorbed as Na <sup>+</sup> and Cl <sup>-</sup>               | 9) <u>  B  </u>  |
| E) Complex carbohydrates | Is absorbed as H <sub>2</sub> O                                  | 10) <u>  C  </u> |

11-15. Matching

- |               |  |                  |
|---------------|--|------------------|
| A) Peptidase  | Emulsifies fats                                    | 11) <u>  B  </u> |
| B) Bile salts | Breaks down fats in intestine                      | 12) <u>  E  </u> |
| C) Amylase    | Breaks down protein in stomach                     | 13) <u>  D  </u> |
| D) Pepsin     | Breaks down peptides to amino acids                | 14) <u>  A  </u> |
| E) Lipase     | Breaks down complex carbohydrates to disaccharides | 15) <u>  C  </u> |

16-20. Matching

- |   |  |                  |
|---|--|------------------|
| A) Gastric pepsin                         | Breaks down complex carbohydrates to disaccharides in intestines | 16) <u>  D  </u> |
| B) Hepatic bile salts                     | Breaks down peptides to amino acids in intestines                | 17) <u>  E  </u> |
| C) Pancreatic lipase                      | Breaks down protein in stomach                                   | 18) <u>  A  </u> |
| D) Pancreatic amylase                     | Breaks down fats in intestines                                   | 19) <u>  C  </u> |
| E) Pancreatic and/or intestinal peptidase | Emulsifies fats in intestines                                    | 20) <u>  B  </u> |

21-25. Matching

- |  |                          |                  |
|--|--------------------------|------------------|
| A) Transported through apical membrane by Na <sup>+</sup> linked co-transporters | Glucose                  | 21) <u>  A  </u> |
| B) Transported through apical membrane by H <sup>+</sup> linked co-transporters  | Fructose                 | 22) <u>  C  </u> |
| C) Transported through apical membrane by facilitative transporters              | Amino acids              | 23) <u>  A  </u> |
| D) Transported through apical membrane by diffusion                              | Small proteins           | 24) <u>  B  </u> |
| E) None of the above   | Glycerol and fatty acids | 25) <u>  D  </u> |

26-30. Matching

- |             |  |                  |
|-------------|--|------------------|
| A) Fructose | Goes through apical membrane by facilitative transporters                      | 26) <u>  A  </u> |
| B) Glucose  | Goes through the basolateral membrane by Na <sup>+</sup> /K <sup>+</sup> pumps | 27) <u>  C  </u> |
| C) Sodium   | Goes through apical membrane by Na <sup>+</sup> linked co-transporters         | 28) <u>  B  </u> |
| D) Water    | Go(es) through basolateral membrane by facilitative transporters               | 29) <u>  E  </u> |
| E) A & B    | Goes through the apical membrane by diffusion through channels                 | 30) <u>  D  </u> |

31-35. Matching

- |                         |  |                  |
|-------------------------|--|------------------|
| A) Parasympathetic N.S. | Increases salivation   | 31) <u>  A  </u> |
| B) Sympathetic N.S.     | Increases secretion of fluids by pancreas                                | 32) <u>  A  </u> |
|                         | Increases motility of stomach and small intestine                        | 33) <u>  A  </u> |
|                         | Increases secretion of HCl and pepsinogen by stomach                     | 34) <u>  A  </u> |
|                         | Decreases blood flow, secretions, and motility of gastrointestinal tract | 35) <u>  B  </u> |

36-40. Matching

- |   |                 |              |
|---|-----------------|--------------|
| A) Increases secretion of exocrine pancreas | Leptin          | 36) <u>C</u> |
| B) Increases secretions of stomach          | Ghrelin         | 37) <u>D</u> |
| C) Decreases appetite                       | Gastrin         | 38) <u>B</u> |
| D) Increases appetite                       | Secretin        | 39) <u>A</u> |
| E) A & C                                    | Cholecystokinin | 40) <u>E</u> |

41-45. Matching

- |   |                                  |              |
|---|----------------------------------|--------------|
| A) Stimulates pancreatic secretions (exocrine or endocrine) | Motilin                          | 41) <u>D</u> |
| B) Stimulates gastric secretions                            | Gastrin                          | 42) <u>B</u> |
| C) Inhibits gastric secretions                              | Secretin                         | 43) <u>E</u> |
| D) Stimulates GI motility                                   | Cholecystokinin (CCK)            | 44) <u>E</u> |
| E) A and C  | Gastric inhibitory peptide (GIP) | 45) <u>E</u> |

46-50. Matching

- |                               |   |              |
|-------------------------------|---|--------------|
| A) Post-absorptive metabolism | Involves the use and storage of nutrients   | 46) <u>B</u> |
| B) Absorptive metabolism      | Involves the retrieval and use of nutrients | 47) <u>A</u> |
| C) None of the above          | Uses insulin as a key metabolic hormone     | 48) <u>B</u> |
|                               | Uses glucagon as a key metabolic hormone    | 49) <u>A</u> |
|                               | Uses epinephrine as a key metabolic hormone | 50) <u>A</u> |

51-55. Matching

- |                    |   |              |
|--------------------|---|--------------|
| A) Lipolysis       | Creation of glucose from pyruvate, amino acids or fatty acids | 51) <u>E</u> |
| B) Glycolysis      | Breakdown of fat to glycerol and fatty acids                  | 52) <u>A</u> |
| C) Glycogenesis    | Breakdown of glycogen to create glucose                       | 53) <u>D</u> |
| D) Glycogenolysis  | Breakdown of glucose to pyruvate                              | 54) <u>B</u> |
| E) Gluconeogenesis | Creation of glycogen from glucose                             | 55) <u>C</u> |

56-60. Place the following in order in response to high blood glucose as seen right after eating.

- |  |        |              |
|--|--------|--------------|
| A) Pancreatic beta cells are stimulated                                  | first  | 56) <u>A</u> |
| B) Glucose is transported into cells and used or stored                  | second | 57) <u>C</u> |
| C) Pancreatic beta cells secrete insulin into systemic blood             | third  | 58) <u>E</u> |
| D) Glucose transporters are inserted into plasma membrane                | fourth | 59) <u>D</u> |
| E) Insulin binds to tyrosine kinase linked receptors in muscle and liver | fifth  | 60) <u>B</u> |

61-65. Matching

- |                       |   |              |
|-----------------------|---|--------------|
| A) Gluconeogenesis    | $2 \text{ Pyruvate} \rightarrow \text{Glucose}$   | 61) <u>A</u> |
| B) Electron transport | $\text{Glucose} + 2 \text{ NAD}^+ + 2 \text{ ADP} + 2 \text{ P}_i \rightarrow 2 \text{ pyruvate} + 2 \text{ NADH} + 2 \text{ H}^+ + 2 \text{ ATP}$  | 62) <u>D</u> |
| C) Decarboxylation    | $2 \text{ Pyruvate} + 2 \text{ CoA} + 2 \text{ NAD}^+ \rightarrow 2 \text{ Acetyl-CoA} + 2 \text{ CO}_2 + 2 \text{ NADH} + 2 \text{ H}^+$   | 63) <u>C</u> |
| D) Glycolysis         | $2 \text{ Acetyl-CoA} + 6 \text{ NAD}^+ + 2 \text{ FAD} + 2 \text{ ADP} + 2 \text{ P}_i \rightarrow 4 \text{ CO}_2 + 6 \text{ NADH} + 6 \text{ H}^+ + 2 \text{ FADH}_2 + 2 \text{ ATP}$       | 64) <u>E</u> |
| E) TCA cycle          | $10 \text{ NADH} + 10 \text{ H}^+ + 2 \text{ FADH}_2 + 6 \text{ O}_2 + 34 \text{ ADP} + 34 \text{ P}_i \rightarrow 10 \text{ NAD}^+ + 2 \text{ FAD} + 6 \text{ H}_2\text{O} + 34 \text{ ATP}$ | 65) <u>B</u> |

66-70. Matching

- |  |             |              |
|--|-------------|--------------|
| A) Increases glucose uptake and glycogenesis                         | Epinephrine | 66) <u>B</u> |
| B) Increases glycogenolysis and gluconeogenesis                      | Glucagon    | 67) <u>B</u> |
| C) Decreases glucose uptake; increases gluconeogenesis and lipolysis | Cortisol    | 68) <u>C</u> |
|  | Insulin     | 69) <u>A</u> |
|  | T3, T4      | 70) <u>B</u> |

71-75. Matching (prominent effect)

- |             |   |              |
|-------------|---|--------------|
| A) Insulin  | Increases cellular metabolism, energy, and heat production  | 71) <u>C</u> |
| B) Cortisol | Decreases glucose uptake and increases use of fats in cells | 72) <u>B</u> |
| C) Thyroxin | Increases glucose uptake into cells                         | 73) <u>A</u> |
| D) Glucagon | Increases glycogenolysis in cells                           | 74) <u>D</u> |
|             | Increases glycogenesis in cells                             | 75) <u>A</u> |

76-80. Place the following in order in response to low blood glucose as seen long after eating.

- |  |        |                  |
|--|--------|------------------|
| A) Pancreatic alpha cells are stimulated                             | first  | 76) <u>  A  </u> |
| B) Glucose is used or transported out of cells                       | second | 77) <u>  C  </u> |
| C) Pancreatic alpha cells secrete glucagon into systemic blood       | third  | 78) <u>  E  </u> |
| D) Stored glycogen is broken down to glucose (glucose 6-phosphate)   | fourth | 79) <u>  D  </u> |
| E) Glucagon binds to G-protein coupled receptors in muscle and liver | fifth  | 80) <u>  B  </u> |

81-85. Place the following in order that initiates an increase in metabolism.

- |  |        |                  |
|--|--------|------------------|
| A) The hypothalamus secretes TRH into the blood                    | first  | 81) <u>  E  </u> |
| B) The thyroid gland secretes thyroxin into the blood              | second | 82) <u>  A  </u> |
| C) The anterior pituitary secretes TSH into the blood              | third  | 83) <u>  D  </u> |
| D) Thyrotrophs in the anterior pituitary are stimulated            | fourth | 84) <u>  C  </u> |
| E) The hypothalamus detects low blood thyroxin (or low metabolism) | fifth  | 85) <u>  B  </u> |

86-90. Matching

- |           |  |                  |
|-----------|--|------------------|
| A) Female | The SRY gene is expressed                                  | 86) <u>  B  </u> |
| B) Male   | Interstitial cells secrete testosterone                    | 87) <u>  B  </u> |
|           | Wolffian ducts develop and differentiate                   | 88) <u>  B  </u> |
|           | Mullerian ducts develop and differentiate                  | 89) <u>  A  </u> |
|           | Sertoli cells secrete Mullerian inhibiting substance (MIS) | 90) <u>  B  </u> |

91-95. Matching

- |  |   |                  |
|--|---|------------------|
| A) Gonadotropin releasing hormone (GnRH) | Stimulates prolactin (PRL)                    | 91) <u>  D  </u> |
| B) Corticotropin releasing hormone (CRH) | Stimulates thyrotropin (TSH)                  | 92) <u>  C  </u> |
| C) Thyrotropin releasing hormone (TRH)   | Stimulates corticotropin (ACTH)               | 93) <u>  B  </u> |
| D) Prolactin releasing hormone (PRH)     | Stimulates luteinizing hormone (LH)           | 94) <u>  A  </u> |
|  | Stimulates follicle stimulating hormone (FSH) | 95) <u>  A  </u> |

96-100. Matching

- |        |   |                   |
|--------|---|-------------------|
| A) TSH | Stimulates "nurse" cells of testes                      | 96) <u>  B  </u>  |
| B) FSH | Stimulates interstitial cells of testes                 | 97) <u>  C  </u>  |
| C) LH  | Stimulates follicular cells of thyroid gland            | 98) <u>  A  </u>  |
|        | Stimulates luteal cells of corpus luteum of ovary       | 99) <u>  C  </u>  |
|        | Stimulates granulosa cells of ovarian follicle of ovary | 100) <u>  B  </u> |

101-105. Matching (ABG = androgen binding globulin)

- |        |  |                   |
|--------|--|-------------------|
| A) LH  | Stimulates conversion of the empty follicle into the corpus luteum | 101) <u>  A  </u> |
| B) FSH | Stimulates interstitial cells of testes to produce testosterone    | 102) <u>  A  </u> |
|        | Stimulates granulosa cells of ovary to produce estrogen            | 103) <u>  B  </u> |
|        | Stimulates Sertoli cells of testes to produce ABG                  | 104) <u>  B  </u> |
|        | Stimulates ovulation   | 105) <u>  A  </u> |

106-110. Matching

- |   |                                   |                   |
|---|-----------------------------------|-------------------|
| A) "Nurse" cells of testes                      | Produce androgen binding globulin | 106) <u>  A  </u> |
| B) Interstitial cells of testes                 | Produce progesterone              | 107) <u>  D  </u> |
| C) Follicular cells of thyroid gland            | Produce testosterone              | 108) <u>  B  </u> |
| D) Luteal cells of corpus luteum of ovary       | Produce estrogen                  | 109) <u>  E  </u> |
| E) Granulosa cells of ovarian follicle of ovary | Produce thyroxin                  | 110) <u>  C  </u> |

111-115. Matching

- |                 |   |                   |
|-----------------|---|-------------------|
| A) Progesterone | Stimulates spermatogenesis                          | 111) <u>  B  </u> |
| B) Testosterone | Stimulates growth of the endometrium                | 112) <u>  C  </u> |
| C) Estrogen     | Powerfully inhibits GnRH neurons in males           | 113) <u>  B  </u> |
|                 | Powerfully inhibits GnRH neurons in females         | 114) <u>  A  </u> |
|                 | Inhibits growth of, and stabilizes, the endometrium | 115) <u>  A  </u> |



116-120. Matching (most dominant effects)

- A) Progesterone Inhibits GnRh neurons in hypothalamus (luteal phase) 116) A  
B) Estrogen Inhibits growth of endometrium of uterus (luteal phase) 117) A  
C) Inhibin Stimulates growth of endometrium of uterus (follicular phase) 118) B  
Stimulates production of LH by gonadotrophs in pituitary (late follicular phase) 119) B  
Inhibits production of FSH by gonadotrophs in pituitary (follicular and luteal phase) 120) C

121-125. Matching (direct effects)

- A) Progesterone Produced by the chorion of the embryo (pregnant) 121) B  
B) hCG Stimulates growth of ovarian follicle (follicular phase) 122) C  
C) FSH Absence causes sloughing of the endometrium (luteal phase) 123) A  
D) LH Absence causes the death of the corpus luteum (luteal phase) 124) D  
E) B & D Stimulates the corpus luteum to produce progesterone (luteal phase / pregnant) 125) E

**Fill in** – Note: Alternate answers may at times be correct.

1. Most foods are broken down chemically in the GI tract by the process of hydrolysis.
2. In the stomach HCl plays a major role in disrupting phospholipids.
3. Water is reabsorbed through the apical (luminal) membrane using water channels and through the basolateral membrane using water channels.
4. Sodium is reabsorbed through the apical (luminal) membrane usually using Na<sup>+</sup>/linked transporters and through the basolateral membrane using Na<sup>+</sup>/K<sup>+</sup> pumps.
5. Glucose is reabsorbed through the apical (luminal) membrane using Na<sup>+</sup>/Glu cotransporters and through the basolateral membrane using facilitative transporters.
6. Amino acids are reabsorbed through the apical (luminal) membrane using Na<sup>+</sup>/AA cotransporters and through the basolateral membrane using facilitative transporters.
7. Small peptides are broken down in the cytoplasm of the digestive epithelium by peptidase.
8. Monosaccharides and amino acids are absorbed from the GI tract into blood capillaries.
9. Fatty acids are absorbed through the apical (luminal) membrane of intestinal epithelial cells by way of diffusion (process).
10. Fatty acids and glycerol are recombined in the cytoplasm of digestive epithelial cells to form triglycerides coated in protein.
11. Chylomicrons are absorbed from the GI tract into the lymphatic capillaries rather than into the blood capillaries.
12. Ghrelin (a hormone) acts on the hypothalamus to stimulate hunger and on the pituitary to stimulate growth hormone.
13. Leptin (a hormone) acts on the hypothalamus to suppress (inhibit) hunger.
14. Insulin (a hormone) increases glucose uptake by most cells (except neurons).
15. Glucagon (a hormone) increases breakdown of glycogen.
16. Cortisol (a hormone) inhibits glucose uptake, and increases use of fat and protein.
17. Loss of the pituitary eliminates thyrotropin (TSH) (hormone) and prevents stimulation of the thyroid gland.
18. Low levels of thyrotropin (TSH) (a hormone) can cause low production of thyroxin by the thyroid, and thus to low metabolism.
19. Spermatogenesis depends upon a high concentration of testosterone (a hormone) in the testes.
20. In males, testosterone (a hormone) inhibits neurons of the hypothalamus that secrete GnRH.
21. Progesterone (a hormone) inhibits growth of the endometrium.
22. During pregnancy the corpus luteum is maintained by hCG, a hormone produced by the outermost membrane around the embryo.