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Multiple Choice Questions

- Decide which of the choices best completes the statement or answers the question.
 - Locate that question number on the separate answer sheet provided.
 - Use the procedure described by your teacher to answer each question. For example, “fill in the circle that corresponds to your choice” or “make an X over the letter corresponding to your choice.”
1. Which of the following statements is true?
 - a. Exocrine glands secrete chemical messengers called hormones directly into the bloodstream, which transports the hormones throughout the body.
 - b. Compared to the actions of the nervous system, the hormones of the endocrine system have faster and longer-acting effects on a broader range of cell types.
 - c. The concentration of hormones in the blood remains constant to maintain homeostasis.
 - d. When a hormone binds to its receptor, it triggers other reactions in the target cell.
 2. Which of the following rows CORRECTLY matches the endocrine gland to the hormone it secretes AND to the target tissues affected by the hormone?

Row	Endocrine gland	Hormone secreted	Target cell/organ
a.	posterior pituitary	antidiuretic hormone (ADH)	tubules (nephron) in the kidney
b.	adrenal cortex	epinephrine	fight-or-flight response
c.	pancreas	insulin	raises blood glucose levels
d.	anterior pituitary	oxytocin	lowers blood glucose levels

3. Which of the following is an example of a tropic hormone?
 - a. cortisol
 - b. insulin
 - c. thyroid-stimulating hormone (TSH)
 - d. antidiuretic hormone (ADH)
4. Which hormone is NOT correctly matched to the disorder/disease associated with it?
 - a. insulin—Type 1 diabetes
 - b. human growth hormone—diabetes insipidus
 - c. thyroxine—goitre
 - d. aldosterone—Addison’s disease
5. A high blood cortisol level controls the secretion of
 - a. adrenocorticotrophic hormone (ACTH) from the hypothalamus.
 - b. adrenocorticotrophic hormone (ACTH) from the anterior pituitary.
 - c. thyroid-stimulating hormone (TSH) from the hypothalamus.
 - d. thyroid-stimulating hormone (TSH) from the anterior pituitary.

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6. Which of the following hormones does NOT affect the metabolism of fat?
 - a. insulin
 - b. glucagon
 - c. thyroxine
 - d. prolactin
7. Which of the following endocrine glands does NOT produce a hormone that directly affects blood glucose levels?
 - a. salivary glands
 - b. pancreas
 - c. adrenal glands
 - d. thyroid gland

Use the following information to answer the next question.

Cushing's Disease

In 1932, a physician by the name of Harvey Cushing described eight patients with central body obesity, glucose intolerance, hypertension (high blood pressure), excess hair growth, osteoporosis, kidney stones, menstrual irregularity, and emotional lability. It is now known that these symptoms are the result of excess production of cortisol by the adrenal glands. Cortisol is a powerful steroid hormone and excess cortisol has detrimental effects on many cells throughout the body.

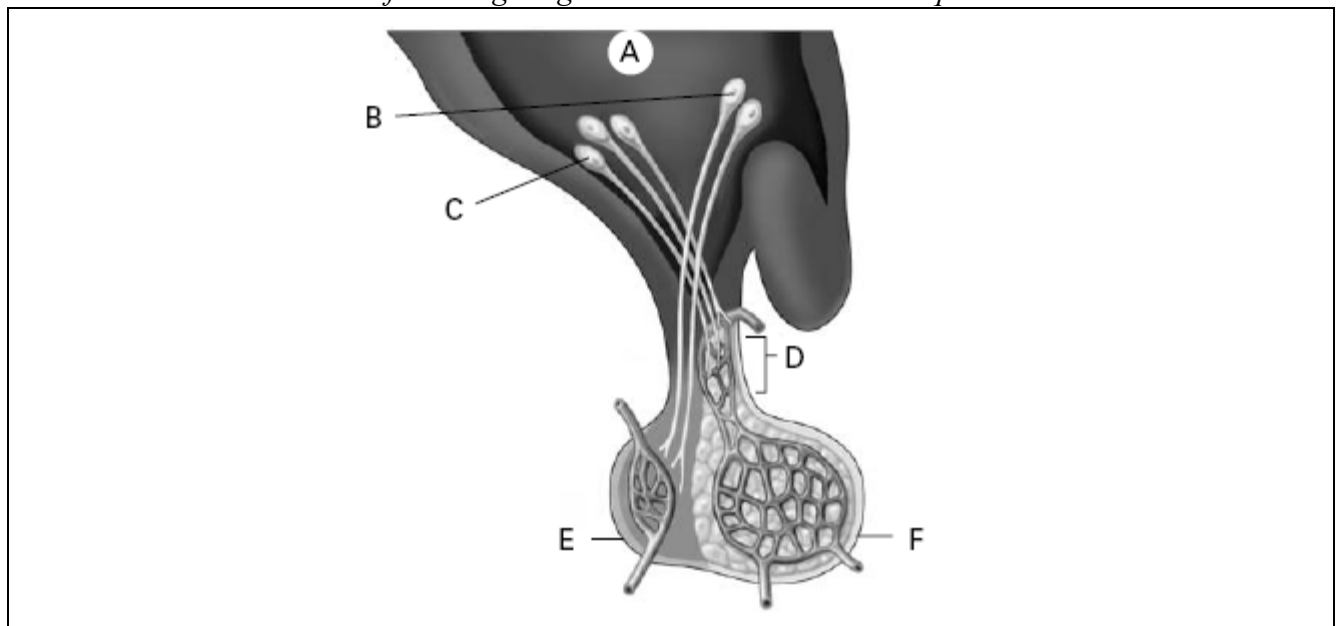
Source: Endocrine Web at www.endocrineweb.com/obesity.html

8. Which of the following may be one cause of Cushing's disease?
 - a. a tumour in the posterior pituitary results in the overproduction of adrenocorticotrophic hormone (ACTH)
 - b. a tumour in the anterior pituitary results in the overproduction of adrenocorticotrophic hormone (ACTH)
 - c. a tumour in the posterior pituitary results in an underproduction of adrenocorticotrophic hormone (ACTH)
 - d. a tumour in the anterior pituitary results in an underproduction of adrenocorticotrophic hormone (ACTH)
9. Which of the following explains one of the differences between Type 1 and Type 2 diabetes?
 - a. People with Type 2 diabetes can produce insulin, but this insulin cannot be used; Type 1 diabetes results from lack of insulin production.
 - b. The treatment for Type 2 diabetes involves insulin injections, while Type 1 can usually be controlled by diet.
 - c. Only Type 1 can result in complications such as kidney disease, reduced circulation, or stroke.
 - d. Type 1 can be a result of lifestyle, and Type 2 is thought to be caused by a virus or other agent.

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10. Which pair consists of antagonistic hormones?
- thyroid-stimulating hormone—thyroxine
 - cortisol—epinephrine
 - insulin—glucagon
 - calcitonin—Vitamin D
11. Which of the following hormones is NOT produced by the anterior pituitary?
- oxytocin
 - human growth hormone (hGH)
 - prolactin
 - thyroid-stimulating hormone (TSH)

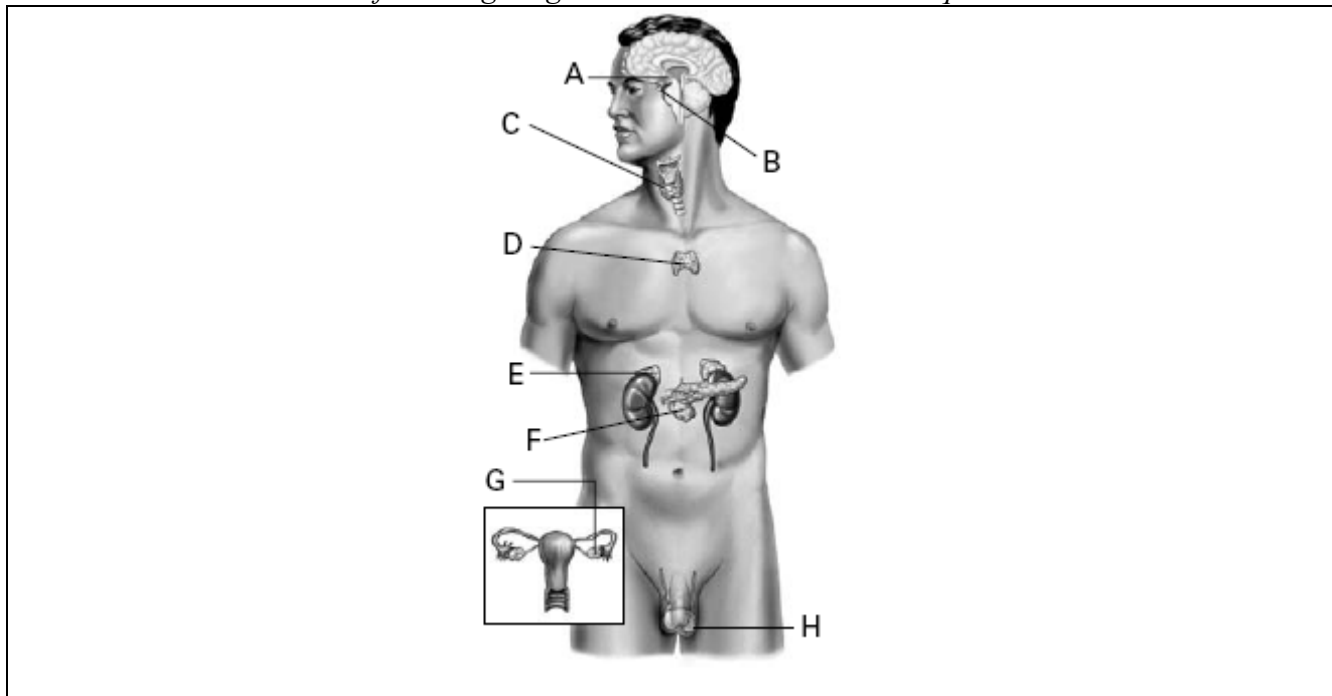
Use the following diagram to answer the next two questions.



12. The structures labelled A and F on this diagram respectively are the
- hypothalamus—posterior pituitary.
 - hypothalamus—anterior pituitary.
 - anterior pituitary—posterior pituitary.
 - posterior pituitary—anterior pituitary.
13. The function of the structure labelled C on the diagram is to
- produce antidiuretic hormone (ADH) and oxytocin.
 - produce ADH and oxytocin.
 - produce releasing and release-inhibiting hormones.
 - regulate the levels of glucagon released into the blood.

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Use the following diagram to answer the next three questions.



14. Which of the following rows CORRECTLY matches the endocrine gland labelled in the diagram to the hormone it produces?

Row	Label on Diagram	Endocrine gland	Hormone
a.	E	adrenal gland	insulin and glucagon
b.	A	pituitary gland	cortisol
c.	F	hypothalamus	aldosterone
d.	C	thyroid gland	thyroxine

15. Which endocrine gland shown on this illustration would be directly responsible for the development of dwarfism or gigantism in humans?

- a. G
- b. F
- c. B
- d. D

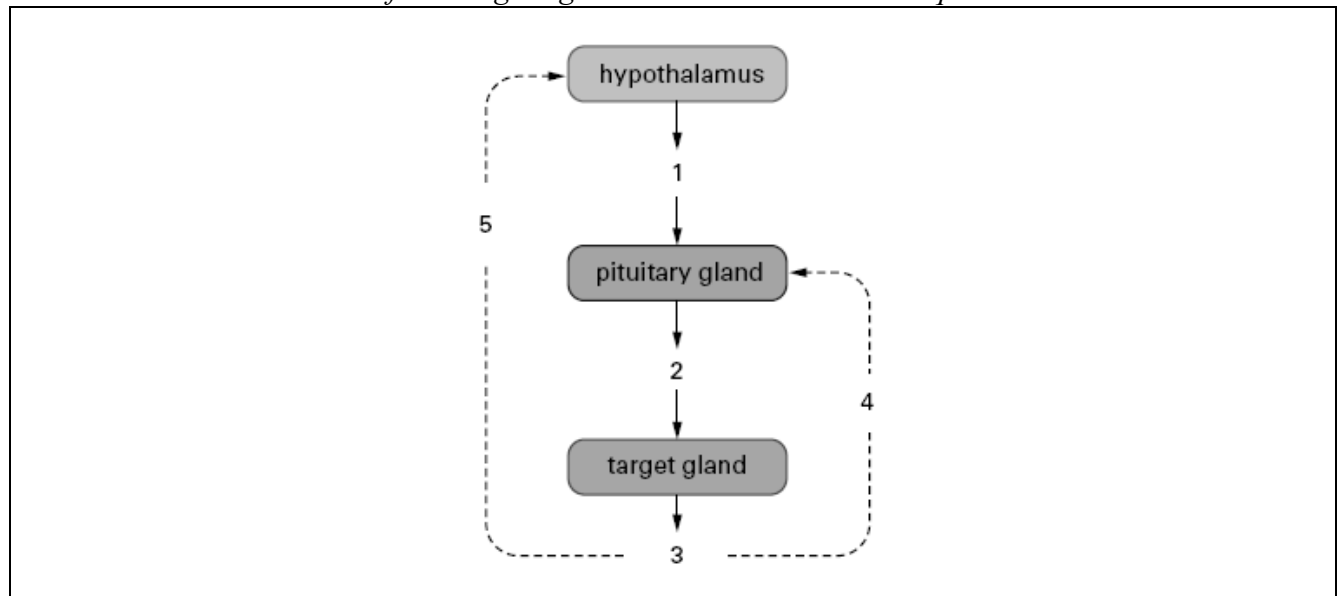
16. Cretinism can develop if low secretions of the hormone are produced by the gland labelled

- a. C.
- b. B.
- c. A.
- d. D.

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17. Which of the following best explains the development of acromegaly in adults?
- increased production of TSH
 - increased production of ACTH
 - increased production of ADH
 - increased production of hGH
18. Which of the following is normally NOT part of the fight-or-flight response to short-term stress situations?
- increased blood glucose levels
 - increased heart rate
 - increased blood pressure
 - increased levels of insulin in the blood
19. The two Canadian scientists that were the first to isolate the islets of Langerhans cells from a dog's pancreas were
- Frederick Banting and Charles Best.
 - Robert Crick and James Watson.
 - David Suzuki and James Shapiro.
 - Harvey Cushing and Thomas Addison.
20. Hypothyroidism that developed in childhood would be characterized by
- increased blood pressure and increased heart rate.
 - impaired physical and mental development.
 - thirst and consumption of large volumes of water.
 - suppression of the immune system and the development of a goiter.

Use the following diagram to answer the next two questions.



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For this question only, assume that this diagram represents the negative feedback mechanism for a hormone primarily responsible for regulating the metabolic rate. This hormone does not have a specific target organ. Instead, it stimulates all cells of the body to metabolize at a faster rate.

21. Which row correctly identifies the hormones indicated by the numbers 1, 2, and 3 on the diagram?

Row	Hormone 1	Hormone 2	Hormone 3
a.	releasing hormone from hypothalamus	thyroid-stimulating hormone (TSH)	thyroxine
b.	releasing hormone from hypothalamus	adrenocorticotrophic hormone (ACTH)	cortisol
c.	inhibiting hormone from hypothalamus	human growth hormone (hGH)	growth factors
D.	inhibiting hormone from hypothalamus	pancreas-stimulating hormone	glucagon

22. The number 5 on the diagram would cause the release of the following hormone:

- releasing hormone
- inhibiting hormone
- adrenocorticotrophic hormone (ACTH)
- thyroid-stimulating hormone (TSH)

Numerical Response Questions

- Record your answer on the answer sheet provided.
- If an answer is a value between 0 and 1 (e.g., 0.25), record the 0 before the decimal place.

Use the following information to answer the next question.

Endocrine Glands

- pancreas
- anterior pituitary
- posterior pituitary
- thyroid
- adrenal medulla
- adrenal cortex

1. Using the numbers above, match the hormone below to the endocrine gland that produces it. Record your **5-digit answer** in the numerical response section of the answer sheet.

Hormone:

insulin

cortisol

antidiuretic
hormone

human growth
hormone

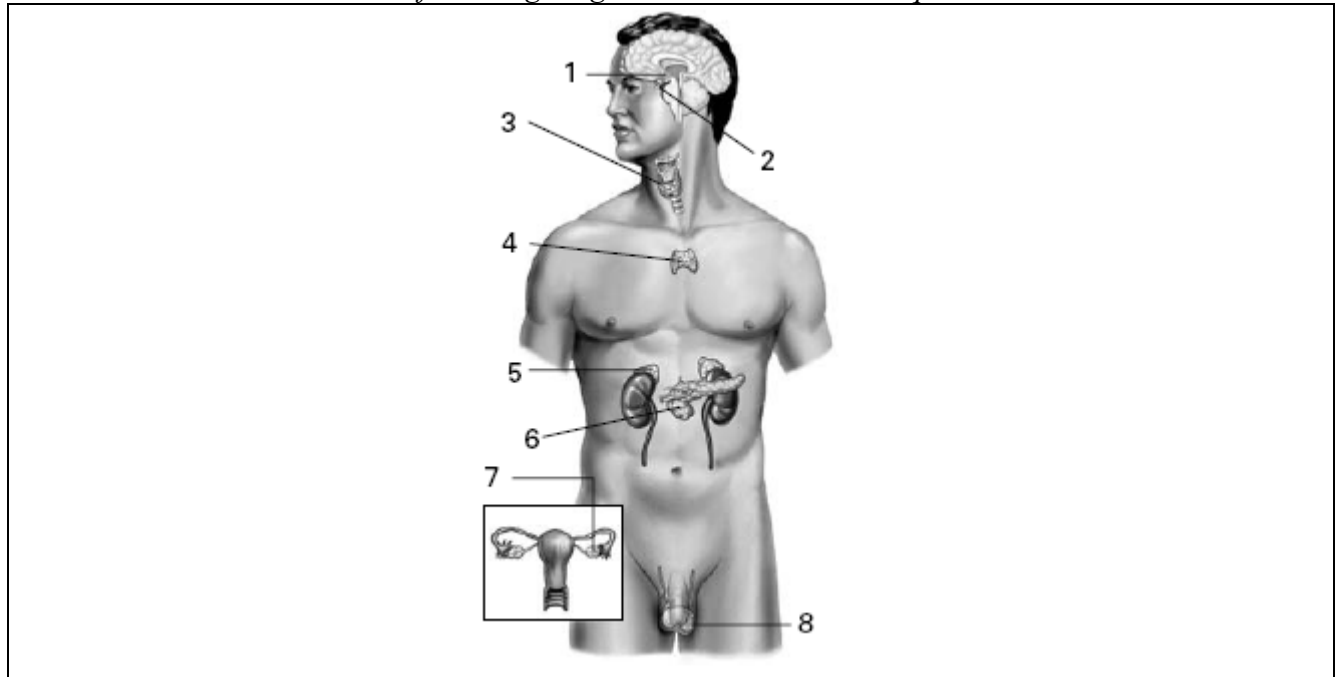
glucagon

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Use the following diagram to answer the next question.



2. Sustained high levels of cortisol are associated with exposure to long-term stressful situations. High levels of cortisol can impair thinking, damage the heart, cause high blood pressure, lead to diabetes, increase susceptibility to infection, and even cause early death.

Using the numbers on the diagram, identify the endocrine glands that are responsible for dealing with the long-term stress response. Record the numbers of the **4 endocrine glands** in the order that they would appear in a negative feedback loop in the numerical response section of the answer sheet.

Use the following information to answer the next question.

Some Endocrine Glands and Hormones

1. adrenal cortex
2. insulin
3. epinephrine
4. pancreas
5. glucagon
6. human growth hormone
7. anterior pituitary

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3. To complete this statement, select the number of the gland or hormone in the text box on the previous page that best fills each blank.

The hormones of the _____ act antagonistically to regulate blood glucose levels. The beta cells of the islets of Langerhans secrete _____, which lowers blood glucose levels. The alpha cells secrete _____, which raises blood glucose levels. Type 1 diabetes causes hyperglycemia because the _____ secreting cells have degenerated. Type 2 diabetes tends to develop gradually, often because the _____ receptors on the body's cells stop responding to this hormone. Record your **5-digit answer** in the numerical response section on the answer sheet.

Written Response Question

Answer each question in the space provided. Use complete sentences, and include diagrams (with labels) when required.

Use the following information to answer the next question.

Health Canada warns consumers not to use human growth hormone drug called GHR-15

OTTAWA - Health Canada is warning consumers not to use GHR-15, which is sometimes labelled as GHR, due to risks associated with unsubstantiated health claims, hyperthyroidism, and possible interactions and allergic reactions. This product is not authorized for sale in Canada. GHR-15, which is available through the Internet in capsule and powder form, is promoted by BIE Health Products (Canada) as a human growth hormone (HGH) supplement. The company suggests it can cure or help prevent a variety of diseases, including cancer, diabetes, arthritis, heart disease, and multiple sclerosis. Human growth hormone therapy has not been proven to be effective via oral treatments; therefore people taking GHR-15 are not likely to experience any therapeutic benefits. Health Canada cautions against the self-diagnosis or self-treatment of serious diseases and advises Canadians that GHR-15 is not approved as a treatment for any of these diseases. The product contains, among other ingredients, several amino acids as well as anterior pituitary and hypothalamic extracts. Based on these ingredients, users of this product could also experience drug or hormone interactions and/or allergic reactions.

To date, there have been no adverse reactions reported to Health Canada regarding this drug; however Health Canada has received numerous complaints about the claims made for this product. Consumers who have concerns about using GHR-15 should consult with a physician to determine an appropriate alternate therapy for their medical conditions.

In order not to contaminate ground water or municipal water systems, consumers are advised not to dispose of unused GHR-15 by flushing it down a toilet or pouring it down a sink. Any unused product should be returned to the supplier. Health Canada has issued a Customs Alert to the Canada Border Services Agency preventing further importation of this product.

Source: www.hc-sc.gc.ca/ahc-asc/media/advisories-avis/2005/2005_55_e.html

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- 1 a) Using your knowledge of the digestive system, **explain** why taking GHR-15 orally would not provide any therapeutic benefit. (1 mark)

- b) **Identify** one disorder of the endocrine system that adults taking human growth hormone supplements could experience. List 4 symptoms of this disorder. (5 marks)

- c) In terms of the endocrine system, **explain** why you think Health Canada would ask Canadians not to dispose of GHR-15 tablets into the water system (3 marks)

- d) Give 2 **reasons why** Health Canada would issue this warning even though no adverse reactions have been reported to Health Canada. (2 marks)

Use the following information to answer the next parts of this question.

Physiologic Effects of Human Growth Hormone

Growth is a very complex process, and requires the coordinated action of several hormones. The direct effects of human growth hormone are the result of its binding to receptors on target cells. hGH is a water-soluble, protein-based hormone that stimulates specific cells.

- e) **Describe** the effects of human growth hormone in children. (4 marks)

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- f) Use a flowchart or other graphic organizer to **summarize** how this hormone elicits a response in a target cell. (3 marks)

Use the following information to answer the next question.

Blood glucose concentrations of one individual were monitored over several hours. The following data were collected. The blood glucose level of a healthy person is approximately 90 mg/100 mL.

Time	Blood Glucose Levels (mg/100 mL)
7:00 A.M.	80
8:00 A.M.	120
9:00 A.M.	90
10:00 A.M.	75
11:00 A.M.	100
12:00 (noon)	80
1:00 P.M.	125
2:00 P.M.	100
3:00 P.M.	90

2. a) **Plot this data** on the grid provided below. Draw a curved line through the points and label your graph appropriately. Draw a horizontal dotted line showing the approximate blood glucose level of a healthy individual. (6 marks)

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- b) Indicate, on the graph, two times when a blood test would reveal high levels of insulin. **Explain** why insulin would be at high levels at these times. (4 marks)

- c) **Predict** what would happen to this person's blood glucose levels if he/she worked out at the gym from 9:00 am to 10:00 am. With respect to blood glucose levels, how would his/her body respond?

- d) The graph shows that this person's insulin levels fluctuate throughout the day. Do you think this person has Type 1 diabetes, has Type 2 diabetes, or is healthy? **Explain** your answer. (3 marks)
