- **1.** Which of the following correctly identifies the level or organisation of these components of the human body?
 - 1) blood 2) brain and spinal cord 3) eye 4) ovum

	cell	tissue	organ	organ system
Α	1	4	2	3
В	1	4	3	2
С	4	1	2	3
D	4	1	3	2

2. The diagram shows parts of an animal cell.



What is the order in which the various organelles are involved when the cell secretes a peptide hormone?

- $A \quad 6 \rightarrow 2 \rightarrow 4 \rightarrow 1$
- **B** $6 \rightarrow 3 \rightarrow 2 \rightarrow 1$
- **C** $5 \rightarrow 3 \rightarrow 4 \rightarrow 1$
- **D** $5 \rightarrow 6 \rightarrow 2 \rightarrow 1$

3. The diagram shows 4 cells with different solute concentrations.



Which of the following correctly states what would happen in the cells immediately after they were placed next to each other?

- 1) Solutes would move from cell 1 to cell 4 via diffusion
- 2) Solutes would move from cell 4 to cell 1 via diffusion
- 3) Water would move from cell 2 to cell 3 via osmosis
- 4) Water would move from cell 3 to cell 2 via osmosis
- A 1 and 2
- **B** 1 and 4

- C 2 and 3D 3 and 4
- 4. The diagram shows the appearance of a plant cell in an isotonic solution.



Which of the following best illustrates the cell after it was immersed in a hypertonic solution for 15 minutes?



- **5.** Which of the following statements are true about the importance of water in the human body?
 - 1) Acts as reactant in hydrolysis
 - 2) Aids in transport of carbon dioxide
 - 3) Enables survival in extreme cold
 - 4) Protects growing foetus
 - **A** 1 and 2
 - **B** 2 and 3

- **C** 1, 2 and 4 **D** 2, 3 and 4
- **6.** Two different patients with different medical conditions are shown below:

Patient X: gall bladder removal surgery due to gallstones Patient Y: kidney failure due to long-term diabetes

Which of the following correctly shows the results of food tests performed on the urine and faecal sample of these two patients?

	Benedi	ct's test	Biure	et test	Ethanol em	ulsion test
	Х	Y	X	Y	Х	Y
Α	+	+	+	+	+	+
В	+	-	+	-	-	-
С	-	+	-	+	+	-
D	-	-	-	-	+	-

+ : positive result

- : negative result
- 7. The diagram shows changes made to a nutrient present in the human body.



Which of the following substances may play a role in causing this change?



8. Which of the following graphs represents the effect on temperature, enzyme concentration and pH respectively on enzyme activity?



9. Which function of the liver is correctly paired with the chemical involved?

	function	chemical
Α	deamination	glycogen
В	detoxification	alcohol
С	excretion	urea
D	storage	starch

10. The diagram shows an investigation about the action of digestive enzymes.



Which of the following substances when added inside the beaker will cause the greatest reduction in the length of the egg white strip?

- A pepsin + distilled water
- **B** pepsin + hydrochloric acid
- **C** boiled pepsin + distilled water
- **D** boiled pepsin + hydrochloric acid
- **11.** The graph shows stomatal opening and closing in the leaves of a species of *Perlargonium*, over a 24-hour period.



time of day

Which conclusions can be made from the graph?

- 1) Stomata open as light intensity increases.
- 2) Stomata open as temperature increases.
- 3) Transpiration is faster when light intensity increases.
- 4) Photosynthesis occurs only when there is light.
- 5) Respiration occurs all the time.



12. The graph shows some of the effects of light intensity, carbon dioxide, and temperature on the rate of photosynthesis.



Which factor is limiting the rate of photosynthesis at points X, Y and Z?

	X	Y	Z
Α	light intensity	carbon dioxide concentration	temperature
В	carbon dioxide concentration	light intensity	temperature
С	temperature	carbon dioxide concentration	light intensity
D	light intensity	temperature	carbon dioxide concentration

13. The Venn diagram shows the relationship between a phloem sieve tube, xylem vessel, and companion cell.



Which row is correct?

	1	2	3	4	5
Α	companion cell	cytoplasm	phloem sieve	nucleus absent	xylem vessel
		present	tube		
В	companion cell	nucleus	phloem sieve	cytoplasm	xylem vessel
		present	tube	present	
С	phloem vessel	mitochondria	companion	nucleus	xylem vessel
		present	cells	present	
D	xylem vessel	cytoplasm	phloem sieve	vacuole	companion cell
		absent	tube	present	

14. The diagram shows a longitudinal section of the vascular bundle of a plant. Some soilborne fungi affect crop growth by growing as shown.



Which process will be directly affected by these fungi?

- A cohesion between water molecules
- B development of root pressure
- C flow of dissolved substances during translocation
- D uptake of water by root hair cells

15. Each set of graphs represents data for blood vessels in the sequence:



16. One type of congenital heart defect is called an atrial septal defect (ASD) where the left and right atria are not completely separated.



Which row describes the effects of ASD on blood pressure and oxygenation?

	blood pressure in pulmonary artery	blood pressure in aorta	percentage oxygenation of blood in pulmonary artery
Α	decreased	increased	decreased
В	decreased	increased	increased
С	increased	decreased	decreased
D	increased	decreased	increased

- **17.** The following changes take place in an athlete's body during a 100-meter race.
 - 1) Increased availability of oxygen to muscles
 - 2) Increased breathing rate
 - 3) Increased production of carbon dioxide by muscles
 - 4) Increased lactic acid concentration in the blood

Which of the following shows the correct order of sequence?



18. The graph shows changes in the air pressure within the lungs during one breathing cycle.



What causes the change in air pressure during stage X?

- A Contraction of diaphragm muscles
- **B** Outflow of air from lungs
- **C** Increase in volume of lungs
- D Relaxation of internal intercostal muscles
- **19.** The bar charts show the relative amounts of four substances in the blood entering and leaving a certain organ in the body of a mammal:



This organ is probably...

- A kidney
- B liver
- **C** lung
- **D** small intestine



20. During osmoregulation, which of the following correctly describes the body's homeostatic response to a large intake of salt solution?

	organ / region stimulated	hormone secreted	kidney tubule action	urine composition
Α	hypothalamus	more anti-diuretic	reabsorb more	smaller volume of
		hormone	water	concentrated urine
В	hypothalamus	less anti-diuretic	reabsorb less	larger volume of
		hormone	water	dilute urine
С	pituitary gland	more anti-diuretic	reabsorb more	smaller volume of
		hormone	water	concentrated urine
D	pituitary gland	less anti-diuretic	reabsorb less	larger volume of
		hormone	water	dilute urine

21. Four different animals were maintained in a laboratory in habitats similar to that of their natural environment. The body core temperature of the animals was measured in response to changes in the temperature of the laboratory environment.



Which statement is best supported by the data?

- A Animal I changes the body core temperature by shivering when the environmental temperature rises above 37°C.
- **B** Animal I and II are most likely mammals.
- **C** Animal III is able to sweat profusely when exposed to an environmental temperature higher than its body core temperature.
- **D** Animal IV will not be able to survive in extremely hot environments.

- 22. Which of the following is/are true of homeostatic control?
 - 1) It is a self-regulatory process.
 - 2) The regulatory centre of all homeostatic processes is the hypothalamus.
 - 3) There must be a stimulus.
 - 4) The receptor detects a stimulus that causes a rise above the normal condition.
 - 5) The corrective mechanism will reverse the effect of the stimulus.
 - A 1 and 2 only
 - **B** 1 and 4 only
 - **C** 1, 2 and 4
 - **D** 1, 3 and 5
- **23.** The diagram shows a section through the brain.



Which of the following correctly identifies the regions of the brain and its function?

	region	function
Α	cerebrum	interprets sensory inputs and controls activity of skeletal
		muscles and conscious behaviour
В	cerebellum	involved in higher mental activities such as memory, learning
		and reasoning
С	medulla oblongata	centre involved in regulating body temperature and water
	-	balance.
D	hypothalamus	control of heart rate, blood pressure and ventilation.

24. During an experiment, a student was blindfolded. The skin on his fingertip, the palm of his hand and his forearm were then touched several times by two pencil points, either one centimetre or two centimetres apart.



1 cm apart 2 cm apart

During the recording of results, there were instances when he inaccurately said he had only been touched by one point. The table below shows the number of times he accurately said that he had been touched by two points.

distance between	% number	number of times he felt two pencil points		
pencil points/cm	fingertip	palm	forearm	
1	100	5	20	
2	100	75	30	

Which statement best concludes the experiment?

- A No touch receptors are present on the skin of the forearm.
- **B** Only a few touch receptors are present in the skin of the palm.
- **C** Touch receptors are densest in number in the skin of the fingertip.
- **D** Touch receptors are least dense in number in the skin of the palm.

The diagram shows a section through the eye. Use it to answer both questions 25 and 26.



25. Which row correctly matches the components of the pupil reflex arc?

	receptor	sensory neurone	effector
Α	1	2	4
В	5	1	3
С	1	6	5
D	5	2	6

26. Colin was reading a book in the garden. He looked up to check on his son swimming in the pool ten metres away.

Which changes occur in his eyes so that his vision is still in focus?

	3	7	5	light rays refracted
Α	contract	slacken	thinner	less
В	contract	tighten	thicker	more
С	relax	slacken	thicker	more
D	relax	tighten	thinner	less

27. The graph shows the changes in blood glucose concentration after a meal. Hormones X and Y are produced in response to the changes in blood glucose concentration.



Which of the following statements about hormones X and Y can be concluded from the graph?

- 1) Hormone X is secreted in response to an increase in blood glucose concentration.
- 2) Hormone X is absent in the blood between 9 10 am.
- 3) Hormone X increases the permeability of liver cells to absorb more glucose.
- 4) Hormone Y is produced by the liver cells.
- 5) Hormone Y converts glycogen into glucose.
- **A** 1 and 2
- **B** 1 and 3
- **C** 2 and 4
- **D** 2 and 5
- 28. Which statement describes the effects of adrenaline?
 - A Causes pupil to constrict.
 - **B** Decreases blood pressure.
 - C Increases blood flow to muscles.
 - D Promotes conversion of glucose to glycogen.

29. May decided to grow two closely-related species of plants in her garden. The table shows the time period at which the reproductive parts of plant X and Y mature.

plant X	plant Y
anther matures in April	anther matures in July
stigma matures in April	stigma matures in April

She made the following conclusions:

- 1) It is possible for plant X to be self pollinated.
- 2) It is possible for plant Y to be self pollinated.
- 3) Plant X can cross pollinate with plant Y.
- 4) Plant Y must be pollinated by insects.
- 5) Pollen grains from plant Y can be germinated on plant X.

Which of the statements can be concluded about plant X and Y?

- **A** 1 and 2
- **B** 1 and 3
- **C** 3 and 4
- **D** 3 and 5
- **30.** Some of the events that occur during sexual reproduction in a flowering plant are listed below:
 - 1) Male gamete fuses with the female gamete.
 - 2) Growth of pollen tube.
 - 3) Pollen grain sticks onto stigma.
 - 4) Seed develops inside ovary.
 - 5) Generative nucleus divides into two male gametes.

What is the correct order of events?

	first						lact
	IIISU						1921
Α		4	2	3	1	5	
В		4	3	2	5	1	
С		3	2	5	1	4	
D		3	1	2	5	4	

31. The diagram shows a section through the female reproductive system.



Which of the following correctly matches the function of X, Y and Z?

	Х	Y	Z	
Α	cells of embryo	haploid gametes can be	supports the development	
	undergoes mitosis	found	of embryo	
В	supports the development	cells of embryo	diploid zygote formed	
	of embryo	undergoes mitosis		
С	diploid zygote formed	produce hormones to	cells of embryo	
		regulate menstrual cycle	undergoes mitosis	
D	haploid gametes can be	cells of embryo	produce hormones to	
	found	undergoes mitosis	regulate menstrual cycle	

32. The diagram represents three properties of male gametes.



Which area describes the male gametes of humans and flowering plants?

33. A cell replicates its DNA and then starts to divide by meiosis. What is the expected arrangement of chromosomes if crossing over has taken place between the two genes A and B shown?



34. A student examined the cells in the growing region of an onion root under the microscope and obtained the data below.

stage	number of cells	
interphase	886	
prophase	73	
metaphase	16	
anaphase	14	
telophase	11	

What is the percentage of cells containing sister chromatids?

- **A** 7.3%
- **B** 8.9%
- **C** 95.9%
- **D** 97.5%
- **35.** If a polypeptide consists of 240 amino acids, what is the minimum number of nucleotides on the gene to code for it?
 - **A** 80
 - **B** 240
 - **C** 720
 - **D** 1440

36. UAG is a stop codon which terminates the synthesis of a polypeptide. The diagram shows a strand of DNA which codes for four amino acids in a polypeptide.



Where would a mutation that introduces a thymine nucleotide in this DNA template strand result in the termination of transcription?

37. In maize, one allele of a particular gene allows chlorophyll production while the other allele prevents this, giving plants with cream coloured leaves. Chlorophyll production in leaves only starts if seedlings are grown in light.

A batch of seeds were obtained by crossing two heterozygous parents. Half the seeds were sown in trays kept in the dark, while the other half were sown in similar conditions except that they received light.

After two weeks, the seedlings were counted and the table gives the results obtained.

number of seedlings							
kept in t	the dark	kept in the light					
green leaves	cream leaves	green leaves	cream leaves				
?	405	320	110				

How many of the seedlings that were kept in the dark had green leaves?

- **A** 0
- **B** 320
- **C** 405
- **D** 1205

38. The diagram shows the blood group phenotypes of some members of a family.



Which member of the F_1 generation must be heterozygous, containing two codominant alleles?

39. The diagram shows food web involving different species of land organisms. Each letter represents a species.



Which is the best prediction about the biomasses of these species measured at a particular point in time?

- **A** The biomass of V + X + Z is equal to the biomass of W.
- **B** The biomass of X is less than the biomass of Y.
- **C** The biomass of X is more than the biomass of W.
- **D** The biomass of Y is less than the biomass of Z.

40. Run-off pollution of a particular river resulted from over-use of chemical fertilisers by a nearby farm. Which of the following graphs correctly shows the resulting changes in levels of oxygen and bacteria in this river?

