

# Placement Self-Assessment Test

## Grade 9 Test — for students applying to enter Grade 10

Mathematics (Q1–45) • Physics (Q46–60) • Chemistry (Q61–75) • Biology (Q76–90) • 90 questions

|                        |                   |                    |
|------------------------|-------------------|--------------------|
| Student name:          | Date:             | Programme code: 12 |
| Grade applying for: 10 | Total score: / 90 | Signature:         |

| Subject          | Mathematics | Physics | Chemistry | Biology | Total |
|------------------|-------------|---------|-----------|---------|-------|
| Score (optional) | / 45        | / 15    | / 15      | / 15    | / 90  |

### Placement Self-Assessment Test

This test is for self-assessment only. It is not included in your official transcript and does not affect your academic record.

- There is no time limit.
- You may use any learning resources, including books, notes, and a calculator, provided that you solve each question yourself and use the resources to improve your own understanding.
- Do not ask another person for answers and do not use artificial intelligence to answer the questions. The purpose of this test is to discover your real level of understanding, not simply to obtain a high score.
- Each correct answer receives **1 point**.
- Each incorrect answer receives a penalty of **–1/3 point**.
- An unanswered question receives **0 points**.
- The suggested passing score is **50 points**.
- You may decide for yourself whether you are ready to move to the next grade or whether it would be better to continue strengthening the current grade first.
- There is no required minimum score in each individual subject. Your subject-by-subject results should help you identify your strengths and the subjects that need more work.
- For example, if you are strong in Mathematics but weak in Chemistry, this test helps us identify the learning materials and support needed to balance your studies.
- Other school subjects are also important. They are not included in this test because Mathematics and Science usually require more teacher guidance and additional practice.

### Instructions for Using the Question Booklet and Answer Sheet

Do not write your answers in the question booklet. Each student has an individual answer sheet and must mark all answers only on that answer sheet.

At the top of the answer sheet, enter or mark **12** as the programme code. This code is for the educational programme for Grades 7 to 12.

For placement purposes, each student must take the test for one grade below the grade they wish to enter:

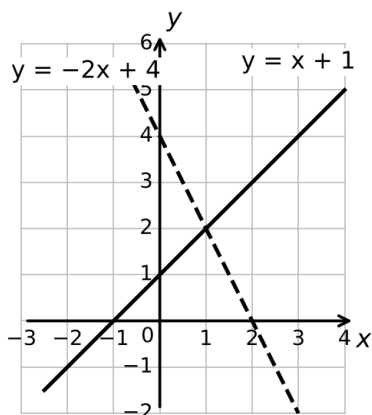
- Students applying for Grade 7 take the Grade 6 test.
- Students applying for Grade 8 take the Grade 7 test.
- Students applying for Grade 9 take the Grade 8 test.
- Students applying for Grade 10 take the Grade 9 test.
- Students applying for Grade 11 take the Grade 10 test.
- Students applying for Grade 12 take the Grade 11 test.

Before starting the test, make sure that your name, personal information, and programme code **12** are correctly entered on your individual answer sheet.

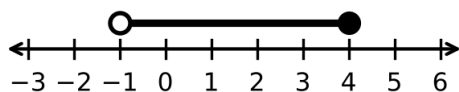
*Each question has four options (A, B, C, D) and exactly one correct answer. Use  $g = 10 \text{ m/s}^2$  unless a question states otherwise.*

| Mathematics (Questions 1–45)                                                                                                                                                                                                                               |                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 1. What is the value of $(-12) \div (+3) - (-5) \times 2$ ?<br>A) 2      B) –14      C) –6      D) 6                                                                                                                                                       | 5. Factorise completely: $2x^2 - 8$<br>A) $2(x - 4)(x + 4)$ B) $(2x - 4)(x + 2)$<br>C) $2(x - 2)^2$ D) $2(x - 2)(x + 2)$             |
| 2. On a winter morning the temperature at the Salang Pass was $-14^\circ\text{C}$ , and Kabul was $22^\circ\text{C}$ warmer. What was the temperature in Kabul?<br>A) $-36^\circ\text{C}$ B) $36^\circ\text{C}$ C) $8^\circ\text{C}$ D) $-8^\circ\text{C}$ | 6. Factorise: $x^2 - 5x - 14$<br>A) $(x - 14)(x + 1)$ B) $(x - 7)(x + 2)$<br>C) $(x + 7)(x - 2)$ D) $(x - 7)(x - 2)$                 |
| 3. What is the value of $(2^3 \times 2^{-5}) \div 2^{-4}$ ?<br>A) $1/64$ B) 16      C) $1/4$ D) 4                                                                                                                                                          | 7. Simplify: $(x^2 - 9) / (x^2 + 3x)$ , for $x \neq 0$ and $x \neq -3$<br>A) $(x - 3)/x$ B) $-3/x$<br>C) $(x + 3)/x$ D) $(x - 3)/3x$ |
| 4. How is 0.00045 written in scientific notation?<br>A) $4.5 \times 10^{-4}$ B) $4.5 \times 10^4$<br>C) $4.5 \times 10^{-5}$ D) $45 \times 10^{-3}$                                                                                                        | 8. Use an algebraic identity to find $103^2 - 97^2$ without a calculator.<br>A) 1,200      B) 12,000      C) 600      D) 36          |

9. Solve:  $2(x - 3) - 3(x + 1) = -4$   
**A)**  $x = -13$     **B)**  $x = -5$     **C)**  $x = 13$     **D)**  $x = 5$
10. If  $f(x) = 3x - 2$ , what is  $f(-2)$ ?  
**A)** 4    **B)** -5    **C)** -8    **D)** -4
11. The graph shows the lines  $y = x + 1$  and  $y = -2x + 4$ . What is the solution of the system of these two equations?

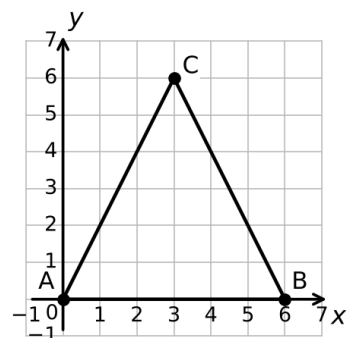


- A)** (0, 1)    **B)** (0, 4)    **C)** (1, 2)    **D)** (2, 1)
12. A farmer in Logar has some chickens and some goats. Together they have 30 heads and 84 legs. How many goats does he have?  
**A)** 12    **B)** 14    **C)** 18    **D)** 21
13. Solve the inequality  $-2x + 7 \geq 1$ .  
**A)**  $x \geq 3$     **B)**  $x \geq -3$     **C)**  $x \leq 3$     **D)**  $x \leq -3$
14. Which inequality is shown on the number line?

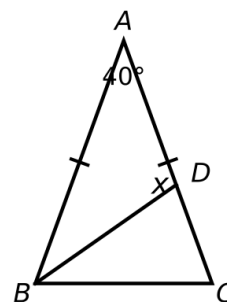


- A)**  $-1 < x \leq 4$     **B)**  $-1 \leq x \leq 4$   
**C)**  $-1 \leq x < 4$     **D)**  $-1 < x < 4$
15. What are the solutions of  $x^2 - 7x + 12 = 0$ ?  
**A)**  $x = 1$  or  $x = 12$     **B)**  $x = 2$  or  $x = 6$   
**C)**  $x = 3$  or  $x = 4$     **D)**  $x = -3$  or  $x = -4$
16. If  $x + 1/x = 3$ , what is the value of  $x^2 + 1/x^2$ ?  
**A)** 3    **B)** 7    **C)** 9    **D)** 11
17. The angles of a triangle are in the ratio 2 : 3 : 4. What is the largest angle?  
**A)**  $80^\circ$     **B)**  $60^\circ$     **C)**  $40^\circ$     **D)**  $100^\circ$
18. In a triangle, the two interior angles that are not next to an exterior angle measure  $(x + 20)^\circ$  and  $2x^\circ$ . The exterior angle measures  $110^\circ$ . What is  $x$ ?  
**A)** 20    **B)** 30    **C)** 40    **D)** 45
19. Two sides of a triangle are 5 cm and 9 cm. Which could be the length of the third side?  
**A)** 11 cm    **B)** 15 cm    **C)** 14 cm    **D)** 3 cm
20. Every point on the bisector of an angle is:  
**A)** the same distance from the two sides of the angle  
**B)** the same distance from the vertex and one side  
**C)** on the perpendicular bisector of each side  
**D)** twice as far from one side as from the other

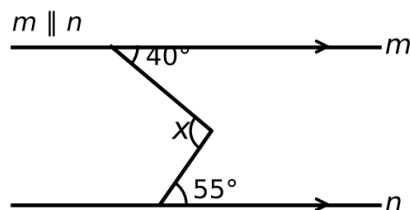
21. Three villages are not on one straight line. A well must be dug at the same distance from all three villages. Where should it be?  
**A)** where the medians of the triangle meet  
**B)** where the perpendicular bisectors of the triangle's sides meet  
**C)** at the midpoint of the longest side  
**D)** where the angle bisectors of the triangle meet
22. In a right-angled triangle, where is the orthocentre (the point where the altitudes meet)?  
**A)** outside the triangle  
**B)** at the midpoint of the hypotenuse  
**C)** at the vertex of the right angle  
**D)** at the centroid
23. Which information does NOT always prove that two triangles are congruent?  
**A)** Two sides and the included angle are equal (SAS).  
**B)** All three pairs of angles are equal (AAA).  
**C)** All three pairs of sides are equal (SSS).  
**D)** Two angles and the included side are equal (ASA).
24. What are the coordinates of the centroid of triangle ABC?



- A)** (3, 4)    **B)** (3, 2)    **C)** (3, 3)    **D)** (2, 3)
25. In triangle ABC,  $AB = AC$  and  $\angle A = 40^\circ$ . BD bisects  $\angle B$ . What is the size of angle  $x = \angle ADB$ ?

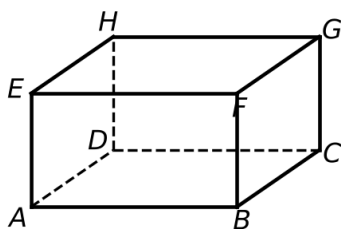


- A)**  $75^\circ$     **B)**  $70^\circ$     **C)**  $110^\circ$     **D)**  $105^\circ$
26. In the figure, lines  $m$  and  $n$  are parallel. What is the size of angle  $x$ ?



- A)**  $85^\circ$     **B)**  $15^\circ$     **C)**  $95^\circ$     **D)**  $105^\circ$
27. What is the size of each interior angle of a regular octagon?  
**A)**  $120^\circ$     **B)**  $45^\circ$     **C)**  $135^\circ$     **D)**  $1080^\circ$

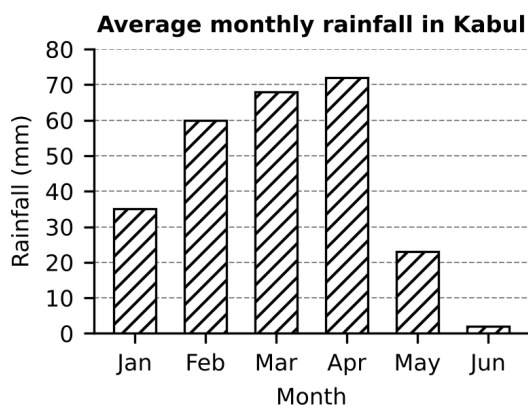
28. How many diagonals does a decagon (10 sides) have?  
**A) 10      B) 35      C) 45      D) 70**
29. How many different straight lines pass through two distinct points?  
**A) exactly two      B) infinitely many**  
**C) exactly one      D) none**
30. Two different planes intersect. What is their intersection?  
**A) a plane      B) a single point**  
**C) two parallel lines      D) a straight line**
31. Two different planes are both perpendicular to the same straight line. How are the planes related?  
**A) They are parallel.**  
**B) They are perpendicular to each other.**  
**C) They meet at one point only.**  
**D) They intersect in that line.**
32. In the cuboid ABCDEFGH shown, which edge is skew to edge AB (neither parallel to AB nor meeting it)?



- A) BF      B) CG      C) DC      D) EF**
33. A line is perpendicular to a plane at point O. Which statement is true?  
**A) It is perpendicular to every line in the plane that passes through O.**  
**B) It is perpendicular to only one line in the plane.**  
**C) It lies inside the plane.**  
**D) It is parallel to the plane.**
34. The table shows the shoe sizes of 20 students. What is the median shoe size?

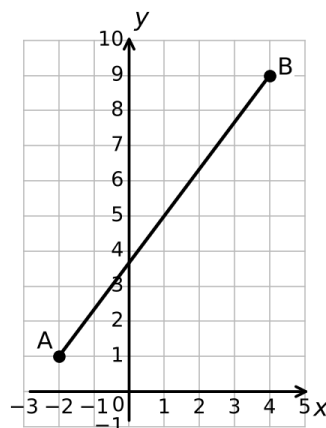
| Shoe size          | 36 | 37 | 38 | 39 | 40 |
|--------------------|----|----|----|----|----|
| Number of students | 2  | 5  | 7  | 4  | 2  |

- A) 37.5      B) 7      C) 39      D) 38**
35. The bar chart shows the average monthly rainfall in Kabul. What is the range of the monthly rainfall for these six months?



- A) 37 mm      B) 260 mm      C) 70 mm      D) 72 mm**

36. The mean of six numbers is 15. When one number is removed, the mean of the remaining five numbers is 14. Which number was removed?  
**A) 14.5      B) 1      C) 15      D) 20**
37. Two fair coins are tossed. What is the probability of getting at least one head?  
**A) 2/3      B) 1/2      C) 1/4      D) 3/4**
38. Two fair dice are rolled. What is the probability that the sum is 7?  
**A) 1/12      B) 1/6      C) 7/36      D) 1/2**
39. What is the distance between points A and B on the grid?

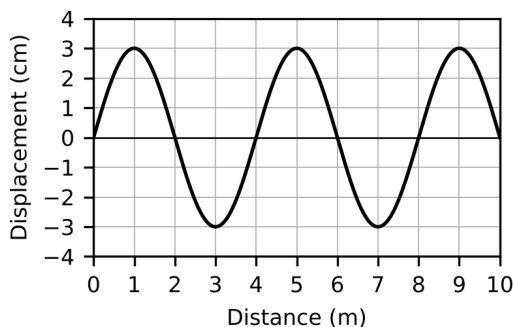


- A) 8 units      B)  $\sqrt{28}$  units**  
**C) 14 units      D) 10 units**
40. A circular garden has a diameter of 14 m. What is its area? ( $\pi = 22/7$ )  
**A) 44 m<sup>2</sup>      B) 616 m<sup>2</sup>      C) 154 m<sup>2</sup>      D) 88 m<sup>2</sup>**
41. After a 15% discount, a phone costs 3,400 AFN. What was the original price?  
**A) 3,385 AFN      B) 2,890 AFN**  
**C) 4,000 AFN      D) 3,910 AFN**
42. One tap fills a water tank in 6 hours, and a second tap fills it in 3 hours. How long does it take to fill the empty tank if both taps are open?  
**A) 3 hours      B) 2 hours**  
**C) 9 hours      D) 4.5 hours**
43. A rectangular garden is 12 m by 8 m. A path 1 m wide is built all around the OUTSIDE of the garden. What is the area of the path?  
**A) 44 m<sup>2</sup>      B) 36 m<sup>2</sup>      C) 40 m<sup>2</sup>      D) 140 m<sup>2</sup>**
44. A kite string is 50 m long and fully straight. The kite is directly above a point 30 m away (horizontally) from Bilal's hand. How high is the kite above his hand?  
**A) 58.3 m      B) 80 m      C) 20 m      D) 40 m**
45. The perimeter of a rectangle is 34 cm and its diagonal is 13 cm. What is its area?  
**A) 30 cm<sup>2</sup>      B) 72 cm<sup>2</sup>      C) 120 cm<sup>2</sup>      D) 60 cm<sup>2</sup>**

#### Physics (Questions 46–60)

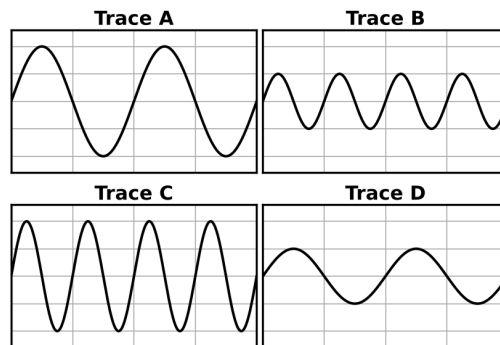
46. What is the SI unit of frequency?  
**A) metre (m)      B) second (s)**  
**C) hertz (Hz)      D) newton (N)**
47. An oscillation has a frequency of 2 Hz. What is its period?  
**A) 2 s      B) 0.5 s      C) 4 s      D) 0.2 s**

48. A point on a fan blade turns 3,000 times in one minute. What is its frequency?  
**A)** 50 Hz **B)** 180,000 Hz  
**C)** 5 Hz **D)** 3,000 Hz
49. Which change will INCREASE the period of a simple pendulum?  
**A)** making the swings smaller  
**B)** using a lighter bob  
**C)** using a heavier bob  
**D)** using a longer string
50. A simple pendulum is 2.5 m long. What is its period? ( $T = 2\pi\sqrt{L/g}$ ,  $g = 10 \text{ m/s}^2$ ,  $\pi = 3.14$ )  
**A)** 6.28 s **B)** 1.57 s **C)** 0.5 s **D)** 3.14 s
51. In a transverse wave, the particles of the medium vibrate:  
**A)** parallel to the direction the wave travels  
**B)** not at all  
**C)** perpendicular to the direction the wave travels  
**D)** only in a circle
52. Two astronauts on the Moon cannot hear each other speak without radios. Why?  
**A)** Sound needs a medium, and there is no air on the Moon.  
**B)** Their voices are too high in pitch.  
**C)** Light waves block sound waves on the Moon.  
**D)** Sound travels too fast on the Moon.
53. The graph shows a wave at one instant. What are its amplitude and wavelength?



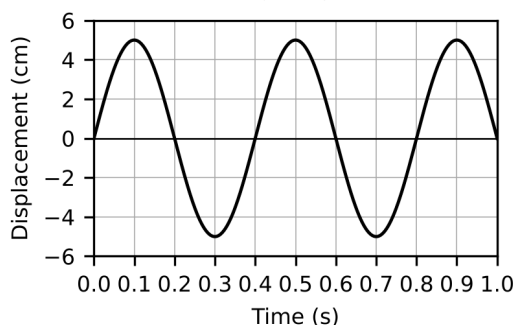
- A)** amplitude 6 cm, wavelength 8 m  
**B)** amplitude 6 cm, wavelength 4 m  
**C)** amplitude 3 cm, wavelength 2 m  
**D)** amplitude 3 cm, wavelength 4 m
54. A guitar string makes 1,320 complete vibrations in 3 seconds. What is its frequency?  
**A)** 0.0023 Hz **B)** 1,320 Hz  
**C)** 3,960 Hz **D)** 440 Hz
55. A sound wave travels at 340 m/s and has a frequency of 680 Hz. What is its wavelength?  
**A)** 231,200 m **B)** 0.5 m  
**C)** 1,020 m **D)** 2 m
56. Karim shouts in front of a high cliff in the Panjshir valley and hears the echo 3 seconds later. The speed of sound is 340 m/s. How far away is the cliff?  
**A)** 510 m **B)** 113 m **C)** 1,020 m **D)** 340 m

57. A dog whistle produces a sound of 25,000 Hz. Why can people not hear it?  
**A)** Its amplitude is zero.  
**B)** Its frequency is above the human hearing range (20 Hz–20,000 Hz).  
**C)** Its frequency is below the human hearing range.  
**D)** Sound cannot travel through air.
58. In which material does sound travel the fastest?  
**A)** water **B)** steel **C)** a vacuum **D)** air
59. The four traces show sounds on an oscilloscope, all drawn to the same scales. Which trace shows the sound that is the LOUDEST and has the HIGHEST pitch?



All traces use the same scales.

- A)** Trace A **B)** Trace B **C)** Trace C **D)** Trace D
60. The graph shows the displacement of a vibrating object over time. What is the frequency of the vibration?



- A)** 5 Hz **B)** 0.4 Hz **C)** 2.5 Hz **D)** 1.25 Hz

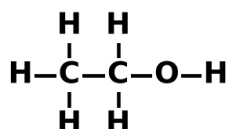
### Chemistry (Questions 61–75)

61. Which of these substances is an organic compound?  
**A)**  $\text{C}_2\text{H}_5\text{OH}$  (ethanol) **B)**  $\text{H}_2\text{O}$   
**C)**  $\text{KNO}_3$  **D)**  $\text{NaCl}$
62. Why can carbon form millions of different compounds?  
**A)** Carbon has the largest atoms of all elements.  
**B)** Carbon atoms form only one bond each.  
**C)** Carbon atoms form ionic bonds with metals only.  
**D)** Each carbon atom forms four covalent bonds and can join to other carbon atoms in chains and rings.
63. Alkanes have the general formula  $\text{C}_n\text{H}_{2n+2}$ . How many hydrogen atoms are in an alkane molecule with 5 carbon atoms?  
**A)** 7 **B)** 10 **C)** 11 **D)** 12
64. What is the name of the alkane  $\text{C}_3\text{H}_8$ ?  
**A)** propene **B)** propane **C)** butane **D)** ethane
65. Which formula represents an alkene?  
**A)**  $\text{C}_3\text{H}_8$  **B)**  $\text{C}_3\text{H}_4$  **C)**  $\text{C}_3\text{H}_6$  **D)**  $\text{C}_6\text{H}_{14}$

66. Ethyne ( $C_2H_2$ ) is used in welding. What type of bond joins its two carbon atoms?
- A) a double bond                      B) a triple bond  
C) an ionic bond                      D) a single bond

67. Bromine water is orange-brown. Which substance quickly makes it colourless?
- A) ethane                                  B) ethene  
C) pure water                              D) methane

68. The diagram shows the displayed formula of a compound. To which family (homologous series) does it belong?

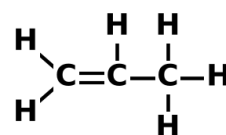


- A) alkanes                                  B) alkenes  
C) alcohols                                  D) carboxylic acids
69. Butane and 2-methylpropane have the same molecular formula,  $C_4H_{10}$ , but different structures. Such compounds are called:
- A) polymers                                  B) isotopes  
C) allotropes                                  D) isomers
70. Which alcohol is very poisonous and can cause blindness even in small amounts?
- A) propanol used in hand sanitiser  
B) glycerol  
C) methanol  
D) ethanol
71. The sour taste of vinegar is caused by:
- A) methanol  
B) ethene  
C) glucose  
D) ethanoic (acetic) acid
72. Liquid vegetable oil is changed into solid fat (such as vegetable ghee) by reacting it with hydrogen. This process is called:
- A) hydrogenation                              B) halogenation  
C) hydration                                  D) oxidation
73. In complete combustion,  $CH_4 + \underline{\hspace{1cm}} O_2 \rightarrow CO_2 + 2H_2O$ . How many molecules of oxygen are needed for one molecule of methane?
- A) 1                      B) 2                      C) 3                      D) 4
74. Using the table, which statement is correct?

| Alkane  | Formula     | Boiling point ( $^{\circ}C$ ) |
|---------|-------------|-------------------------------|
| methane | $CH_4$      | -162                          |
| ethane  | $C_2H_6$    | -89                           |
| propane | $C_3H_8$    | -42                           |
| butane  | $C_4H_{10}$ | -1                            |
| pentane | $C_5H_{12}$ | 36                            |

- A) Boiling point increases with chain length; butane is a liquid at  $25^{\circ}C$ .  
B) Boiling point does not depend on chain length.  
C) Boiling point increases with chain length; pentane is a liquid at  $25^{\circ}C$ .  
D) Boiling point decreases with chain length; methane is a liquid at  $25^{\circ}C$ .

75. What is the name of the compound shown?

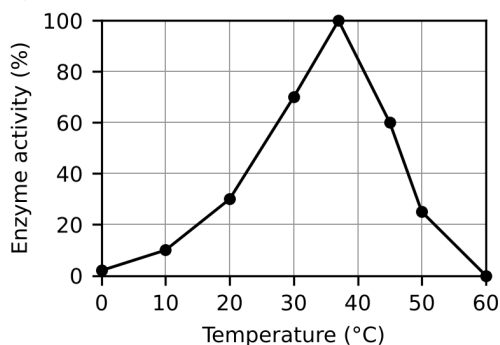


- A) propene    B) propane    C) propyne    D) butene

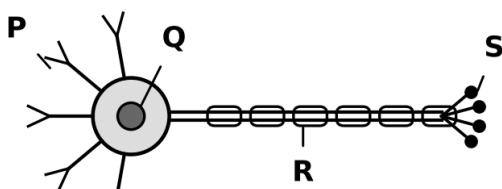
### Biology (Questions 76–90)

76. Chewing food into smaller pieces in the mouth is an example of:
- A) egestion                                  B) chemical digestion  
C) absorption                                  D) mechanical digestion
77. If you chew a piece of naan for a long time, it begins to taste sweet. Why?
- A) Amylase in saliva breaks starch down into sugar.  
B) The teeth turn protein into sugar.  
C) Stomach acid reaches the mouth.  
D) Saliva adds sugar to the bread.
78. What moves food along the oesophagus and intestines?
- A) the beating of the heart  
B) waves of muscle contraction (peristalsis)  
C) gravity only  
D) air pressure from the lungs
79. The stomach produces hydrochloric acid. What is one of its functions?
- A) It digests starch into glucose.  
B) It absorbs water into the blood.  
C) It emulsifies fats.  
D) It kills bacteria and provides the acidic conditions for pepsin to digest protein.
80. Bile is made in the liver and stored in the gall bladder. What does bile do?
- A) It digests protein into amino acids.  
B) It kills all bacteria in the intestine.  
C) It turns starch into maltose.  
D) It breaks large fat drops into small droplets (emulsification).
81. The inner wall of the small intestine has millions of villi. How do villi help?
- A) They store fat for the body.  
B) They produce bile.  
C) They increase the surface area for absorbing digested food.  
D) They push food back to the stomach.

82. The graph shows how the activity of a digestive enzyme changes with temperature. Which statement is correct?



- A) It works best at 60 °C.  
 B) It works best at 0 °C, when molecules move slowly.  
 C) It works best at about 37 °C; at 60 °C it is denatured and stops working.  
 D) Its activity is the same at all temperatures.
83. Which function of the skeleton is shown by the skull?  
 A) protecting the brain      B) producing hormones  
 C) storing bile                D) digesting food
84. Which type of joint at the shoulder allows the arm to move in almost every direction?  
 A) hinge joint  
 B) pivot joint at the elbow  
 C) ball-and-socket joint  
 D) fixed (immovable) joint
85. Osteoporosis makes bones weak and easy to break. Which habit helps to prevent it?  
 A) eating calcium-rich food, getting vitamin D and exercising  
 B) avoiding all physical activity  
 C) drinking less water  
 D) eating only sugary foods
86. When you bend your arm at the elbow to lift a bag, which statement is correct?  
 A) The triceps contracts and the biceps relaxes.  
 B) The biceps contracts and the triceps relaxes.  
 C) The bones contract.  
 D) Both muscles relax.
87. The diagram shows a nerve cell (neuron). In which labelled part is the nucleus found?



- A) P      B) Q      C) R      D) S
88. How does a nerve impulse pass from one neuron to the next?  
 A) The two neurons are joined as one cell.  
 B) Blood carries it from cell to cell.  
 C) Chemicals carry it across a small gap called a synapse.  
 D) It travels through the bones.

89. Which is the correct path of a reflex action, such as pulling your hand from a hot stove?  
 A) brain → receptor → muscle → spinal cord → sensory neuron  
 B) receptor → sensory neuron → spinal cord → motor neuron → muscle  
 C) receptor → motor neuron → spinal cord → sensory neuron → muscle  
 D) muscle → motor neuron → brain → sensory neuron → receptor
90. Which part of the eye controls how much light enters it?  
 A) iris                                B) sclera  
 C) retina                            D) optic nerve

**End of test.** Check that every answer is marked on your answer sheet.