

Placement Self-Assessment Test

Grade 11 Test — for students applying to enter Grade 12

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

Student name:	Date:	Programme code: 12
Grade applying for: 12	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:

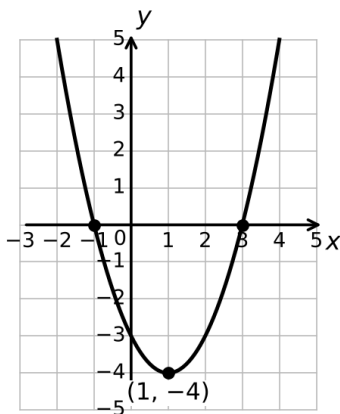
- Students applying for Grade 7 take the Grade 6 test.
- Students applying for Grade 8 take the Grade 7 test.
- Students applying for Grade 9 take the Grade 8 test.
- Students applying for Grade 10 take the Grade 9 test.
- Students applying for Grade 11 take the Grade 10 test.
- Students applying for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

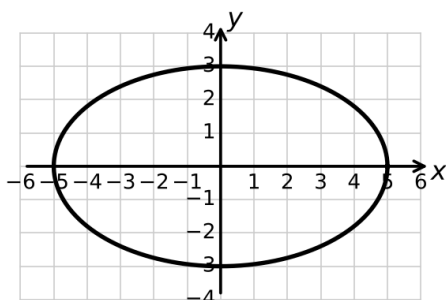
Each question has four options (A, B, C, D) and exactly one correct answer. Use $g = 10 \text{ m/s}^2$ unless a question states otherwise.

Mathematics (Questions 1–45)	
1. The set of all points in a plane that are the same distance from a fixed point and a fixed straight line is a: A) circle B) parabola C) hyperbola D) ellipse	3. What are the centre and radius of the circle $x^2 + y^2 - 6x + 4y - 12 = 0$? A) centre (3, –2), radius 5 B) centre (–3, 2), radius 5 C) centre (3, –2), radius 25 D) centre (–3, 2), radius $\sqrt{12}$
2. Which curve has the equation $x^2/25 + y^2/9 = 1$? A) an ellipse B) a circle C) a hyperbola D) a parabola	4. What is the focus of the parabola $y^2 = 12x$? A) (6, 0) B) (0, 3) C) (12, 0) D) (3, 0)
	5. What is the equation of the directrix of the parabola $x^2 = -8y$? A) $y = 2$ B) $y = -2$ C) $x = 2$ D) $y = 8$

6. What is the vertex of the parabola $y = x^2 - 6x + 5$?
A) $(-3, 32)$ **B)** $(6, 5)$ **C)** $(3, 5)$ **D)** $(3, -4)$
7. In which direction does the parabola $y^2 = -4x$ open?
A) to the right **B)** downward
C) to the left **D)** upward
8. What is the axis of symmetry of the parabola $y = 2x^2 + 8x - 1$?
A) $x = -2$ **B)** $x = 2$ **C)** $y = -2$ **D)** $x = -4$
9. How are the line $y = 2x + 1$ and the parabola $y = x^2 + 2$ related?
A) The line is tangent to the parabola (one common point).
B) The line cuts the parabola at two points.
C) They have no common point.
D) The line is the axis of the parabola.
10. Which equation matches the parabola shown?

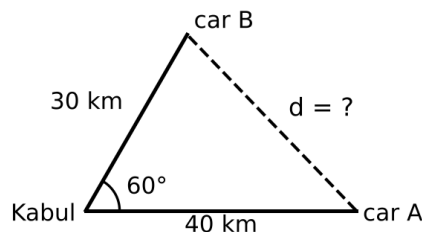


- A)** $y = -x^2 + 2x + 3$ **B)** $y = x^2 - 2x + 3$
C) $y = x^2 + 2x - 3$ **D)** $y = x^2 - 2x - 3$
11. What are the foci of the ellipse $x^2/25 + y^2/16 = 1$?
A) $(\pm 5, 0)$ **B)** $(0, \pm 3)$ **C)** $(\pm 3, 0)$ **D)** $(\pm 4, 0)$
12. What is the eccentricity of the hyperbola $x^2/16 - y^2/9 = 1$?
A) $4/5$ **B)** $5/3$ **C)** $5/4$ **D)** $3/4$
13. What is the centre of the hyperbola $(x - 2)^2/9 - (y + 1)^2/4 = 1$?
A) $(2, -1)$ **B)** $(3, 2)$ **C)** $(9, 4)$ **D)** $(-2, 1)$
14. Which equation matches the ellipse shown?



- A)** $x^2/9 + y^2/25 = 1$ **B)** $x^2/25 - y^2/9 = 1$
C) $x^2/5 + y^2/3 = 1$ **D)** $x^2/25 + y^2/9 = 1$
15. What are the asymptotes of the hyperbola $x^2/9 - y^2/4 = 1$?
A) $y = \pm(3/2)x$ **B)** $y = \pm(2/3)x$
C) $y = \pm(9/4)x$ **D)** $y = \pm(4/9)x$
16. In triangle ABC, $b = 5$, $c = 8$ and angle $A = 60^\circ$. What is the length of side a ?
A) $\sqrt{129}$ **B)** 13 **C)** 7 **D)** 3

17. In triangle ABC, angle $A = 30^\circ$, angle $B = 45^\circ$ and $a = 10$. What is the length of b ?
A) $10\sqrt{2}$ **B)** $5\sqrt{2}$ **C)** 20 **D)** $10\sqrt{3}$
18. Two cars leave Kabul at the same time on two straight roads that make an angle of 60° . After one hour, car A has travelled 40 km and car B 30 km. What is the distance d between them? ($\sqrt{1300} \approx 36.1$)



- A)** 60.8 km **B)** 50 km **C)** 10 km **D)** 36.1 km
19. What is the area of a triangle with two sides of 8 cm and 10 cm and an included angle of 30° ?
A) 80 cm^2 **B)** 34.6 cm^2 **C)** 20 cm^2 **D)** 40 cm^2
20. What is the exact value of $\sin 75^\circ$?
A) $(\sqrt{6} - \sqrt{2})/4$ **B)** $(\sqrt{6} + \sqrt{2})/4$
C) $(\sqrt{3} + 1)/2$ **D)** $\sqrt{3}/2 + 1/2$
21. What is the value of $\cos^2 15^\circ - \sin^2 15^\circ$?
A) $\sqrt{3}/2$ **B)** $1/2$ **C)** $\sqrt{2}/2$ **D)** 1
22. What is the 12th term of the arithmetic sequence $-5, -9, -13, \dots$?
A) -49 **B)** 39 **C)** -53 **D)** -45
23. What is the common difference of the arithmetic sequence $1.2, 1.5, 1.8, 2.1, \dots$?
A) 1.25 **B)** 0.3 **C)** 0.1 **D)** -0.3
24. What is the sum of the first 20 terms of the arithmetic sequence $3, 7, 11, \dots$?
A) 1,640 **B)** 820 **C)** 79 **D)** 860
25. In a geometric sequence, the first term is 3 and the common ratio is 2. What is the 6th term?
A) 13 **B)** 192 **C)** 36 **D)** 96
26. What is the sum of the infinite geometric series $1 + 1/2 + 1/4 + 1/8 + \dots$?
A) $3/2$ **B)** the sum is infinite
C) 2 **D)** 1
27. Laila saves 100 AFN in the first week. Each week after that, she saves 50 AFN more than the week before. How much has she saved in total after 10 weeks?
A) 550 AFN **B)** 2,750 AFN
C) 1,450 AFN **D)** 3,250 AFN
28. A town of 5,000 people grows by 4% each year. What is the population after 2 years?
A) 5,400 **B)** 5,408 **C)** 5,200 **D)** 5,416
29. What are the elements on the main diagonal of matrix A?

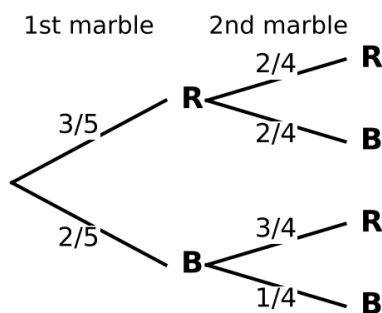
$$A = \begin{bmatrix} 2 & 5 & 1 \\ 0 & -3 & 4 \\ 7 & 8 & 6 \end{bmatrix}$$

- A)** 2, 5, 1 **B)** 1, -3, 7 **C)** 2, -3, 6 **D)** 7, 8, 6

30. For the matrices A and B shown, what is the element in row 2, column 1 of the product AB?

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 0 \\ 1 & 1 \end{bmatrix}$$

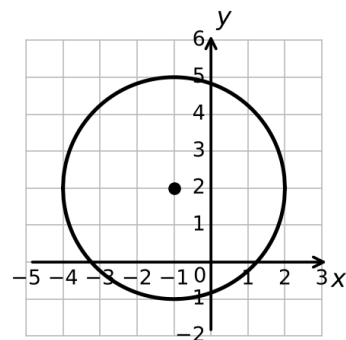
- A) 4 B) 6 C) 7 D) 10
31. What is the determinant of the 2×2 matrix with rows (3, 5) and (2, 4)?
A) 2 B) 22 C) -2 D) 14
32. Matrix A has size 2×3 and matrix B has size 3×4 . What is the size of the product AB?
A) 4×2
B) 2×4
C) 3×3
D) AB cannot be calculated
33. In how many ways can a committee of 3 people be chosen from 7 people?
A) 343 B) 210 C) 21 D) 35
34. In how many ways can 3 books, chosen from 5 different books, be arranged in a row on a shelf?
A) 15 B) 60 C) 125 D) 10
35. A school council of 12 students must choose a president, a vice-president and a secretary. In how many ways can this be done?
A) 1,728 B) 36 C) 1,320 D) 220
36. There are 2 roads from Kabul to Ghazni, 3 roads from Ghazni to Kandahar, and 4 roads from Kandahar to Herat. In how many ways can a traveller go from Kabul to Herat through Ghazni and Kandahar?
A) 9 B) 12 C) 20 D) 24
37. How many different arrangements can be made from all the letters of the word BAMYAN?
A) 720 B) 360 C) 120 D) 180
38. Two-digit numbers are formed from the digits 2, 5 and 9 without repeating a digit. How many of these numbers are even?
A) 2 B) 3 C) 4 D) 6
39. The numbers 1, 2, 3, 4 and 5 are written on five cards. Two cards are chosen at random. What is the probability that the sum of the two numbers is even?
A) 0.6 B) 0.5 C) 0.4 D) 0.3
40. A bag contains 3 red and 2 blue marbles. Two marbles are taken out one after the other without replacement, as shown in the tree diagram. What is the probability that both marbles are the SAME colour?



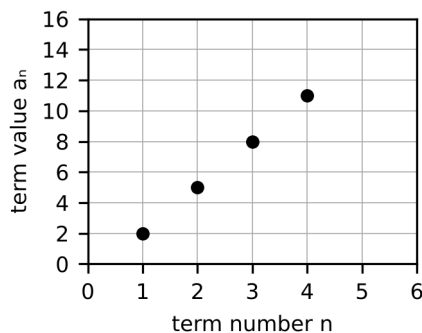
- A) 13/25 B) 3/10 C) 2/5 D) 1/2
41. A fair die is rolled twice. What is the probability of getting at least one six?
A) 25/36 B) 1/3 C) 1/36 D) 11/36

42. What is the coefficient of x^2 in the expansion of $(1 + x)^5$?
A) 5 B) 10 C) 20 D) 25

43. Which equation describes the circle shown on the grid?



- A) $(x - 1)^2 + (y - 2)^2 = 9$
B) $(x - 1)^2 + (y + 2)^2 = 9$
C) $(x + 1)^2 + (y - 2)^2 = 9$
D) $(x + 1)^2 + (y - 2)^2 = 3$
44. The graph shows the first four terms of an arithmetic sequence. What is the 10th term?

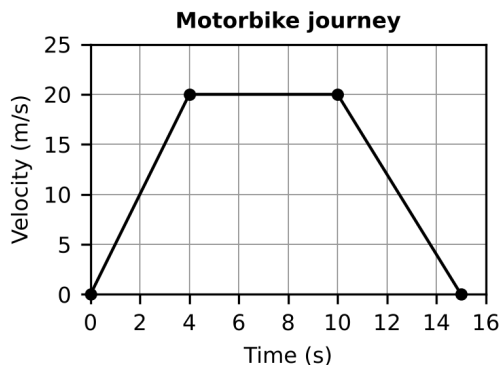


- A) 26 B) 29 C) 30 D) 32
45. What is the sum of all two-digit multiples of 7?
A) 665 B) 784 C) 735 D) 728

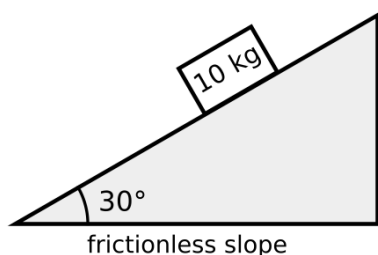
Physics (Questions 46–60)

46. When a bus stops suddenly, the standing passengers move forward. Which law best explains this?
A) the law of conservation of mass
B) Newton's second law
C) Newton's third law
D) Newton's first law (inertia)
47. A car of mass 1,200 kg accelerates at 2.5 m/s^2 . What is the resultant force on the car?
A) 3,000 N B) 480 N
C) 1,202.5 N D) 300 N
48. A horse pulls a cart forward. According to Newton's third law, which statement is correct?
A) The horse's force on the cart is larger than the cart's force on the horse.
B) The cart pulls the horse backward with a force of equal size.
C) The cart pulls the horse with a smaller force, so they move.
D) The cart exerts no force on the horse.
49. A student has a mass of 60 kg. What would be her weight on the Moon, where $g = 1.6 \text{ N/kg}$?
A) 60 N B) 96 N C) 37.5 N D) 600 N

50. A 20 kg box is pulled along the floor with a force of 100 N. The friction force is 40 N. What is the acceleration of the box?
A) 5 m/s² **B)** 7 m/s² **C)** 3 m/s² **D)** 2 m/s²
51. A car's velocity increases from 10 m/s to 30 m/s in 5 s. What is its average acceleration?
A) 8 m/s² **B)** 4 m/s² **C)** 6 m/s² **D)** 2 m/s²
52. The velocity–time graph shows a motorbike's journey. What total distance does it travel?

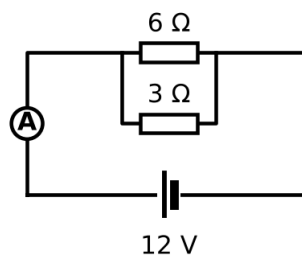


- A)** 300 m **B)** 250 m **C)** 210 m **D)** 150 m
53. A stone is dropped from rest from a height of 45 m. Ignoring air resistance, how long does it take to reach the ground? ($g = 10 \text{ m/s}^2$)
A) 9 s **B)** 4.5 s **C)** 2 s **D)** 3 s
54. A 50 kg student climbs stairs 12 m high in 30 s. What is the average power she uses to gain potential energy? ($g = 10 \text{ m/s}^2$)
A) 200 W **B)** 2,000 W **C)** 20 W **D)** 6,000 W
55. A ball is dropped from a height of 5 m. Ignoring air resistance, what is its speed just before it hits the ground? ($g = 10 \text{ m/s}^2$)
A) 100 m/s **B)** 50 m/s **C)** 10 m/s **D)** 5 m/s
56. A 2 kg ball moves at 6 m/s. What is its kinetic energy?
A) 6 J **B)** 72 J **C)** 36 J **D)** 12 J
57. The distance between the centres of two masses is doubled. What happens to the gravitational force between them?
A) It does not change.
B) It becomes half as large.
C) It doubles.
D) It becomes one quarter as large.
58. A 10 kg block rests on a smooth slope of 30°, as shown. What is the component of its weight that acts down the slope? ($g = 10 \text{ m/s}^2$)



- A)** 50 N **B)** 86.6 N **C)** 100 N **D)** 10 N

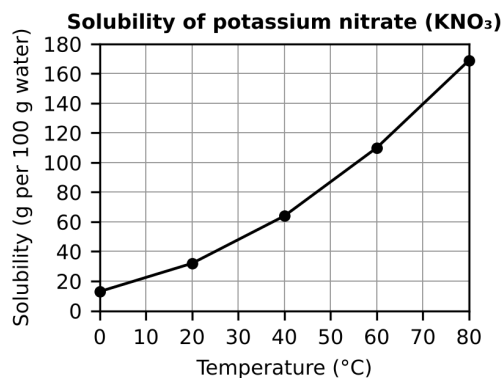
59. What is the reading on the ammeter in the circuit shown?



- A)** 4 A **B)** 1.33 A **C)** 2 A **D)** 6 A
60. An electric kettle is rated 2,000 W and works on 220 V mains. Which fuse is the most suitable for it?
A) 3 A **B)** 13 A **C)** 30 A **D)** 5 A

Chemistry (Questions 61–75)

61. In a salt solution, the water is the:
A) catalyst **B)** solvent
C) solute **D)** precipitate
62. A solution contains 46 g of ethanol ($\text{C}_2\text{H}_5\text{OH}$, $M = 46 \text{ g/mol}$) and 72 g of water ($M = 18 \text{ g/mol}$). What is the mole fraction of ethanol?
A) 0.39 **B)** 0.8 **C)** 0.2 **D)** 0.25
63. A closed container holds ice, liquid water and water vapour together. How many phases are present?
A) 1 **B)** 2 **C)** 3 **D)** 6
64. Which substance mixes completely with water in all proportions?
A) ethanol **B)** vegetable oil
C) sand **D)** petrol
65. Table salt dissolves well in water but hardly at all in petrol. What is the best explanation?
A) Salt reacts with water to form a new element.
B) Petrol is too cold to dissolve salt.
C) Petrol is heavier than water.
D) Water molecules are polar and attract the ions; petrol is non-polar.
66. A solution that can still dissolve more solute at the same temperature is called:
A) supersaturated **B)** unsaturated
C) a suspension **D)** saturated
67. A saturated solution of KNO_3 in 100 g of water at 60 °C is cooled to 20 °C. Using the graph, what mass of KNO_3 crystallises out?



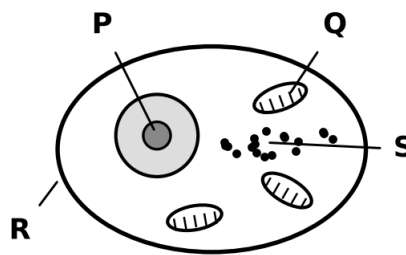
- A)** 46 g **B)** 78 g **C)** 32 g **D)** 110 g
68. 4 g of NaOH ($M = 40 \text{ g/mol}$) is dissolved in water to make 250 mL of solution. What is the molar concentration?
A) 0.016 mol/L **B)** 1.6 mol/L
C) 0.1 mol/L **D)** 0.4 mol/L

69. 50 mL of 2 mol/L hydrochloric acid is diluted with water to a total volume of 500 mL. What is the new concentration?
 A) 0.2 mol/L B) 20 mol/L
 C) 1 mol/L D) 0.5 mol/L
70. 10 g of sugar is dissolved in 40 g of water. What is the mass percentage of sugar in the solution?
 A) 20% B) 25% C) 40% D) 10%
71. CaCl_2 dissociates completely in water. What is its van 't Hoff factor (i)?
 A) 1 B) 2 C) 3 D) 4
72. The table lists four solutions with the same molality. Which solution has the LOWEST freezing point?
- | Solution (in water) | Concentration |
|--|---------------|
| glucose, $\text{C}_6\text{H}_{12}\text{O}_6$ | 0.1 mol/kg |
| sucrose, $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ | 0.1 mol/kg |
| sodium chloride, NaCl | 0.1 mol/kg |
| calcium chloride, CaCl_2 | 0.1 mol/kg |
- A) glucose B) sucrose
 C) sodium chloride D) calcium chloride
73. The vapour pressure of a pure solvent is 3.2 kPa. In a solution, the mole fraction of the solvent is 0.9 and the solute is non-volatile. What is the vapour pressure of the solution?
 A) 3.2 kPa B) 2.88 kPa C) 3.52 kPa D) 0.32 kPa
74. A 1 mol/kg solution of glucose in water is heated. At what temperature does it boil at standard pressure? (K_b of water = $0.52^\circ\text{C}\cdot\text{kg/mol}$)
 A) 99.48°C B) 101.04°C
 C) 100°C D) 100.52°C
75. A solution has a hydrogen ion concentration of 1×10^{-3} mol/L. What is its pH?
 A) 3 B) 11 C) -3 D) 7

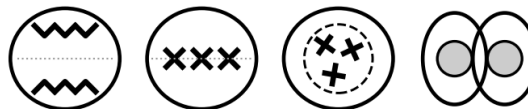
Biology (Questions 76–90)

76. Which organelle releases most of the energy from glucose in aerobic respiration?
 A) nucleus B) cell membrane
 C) mitochondrion D) ribosome
77. What is the function of ribosomes?
 A) photosynthesis
 B) controlling which substances enter the cell
 C) storing water
 D) making proteins
78. The cell wall of a plant cell is made mainly of:
 A) starch B) fat
 C) cellulose D) protein
79. Which structure is found in BOTH prokaryotic and eukaryotic cells?
 A) chloroplasts B) a nucleus
 C) mitochondria D) ribosomes

80. The diagram shows an animal cell. Which labelled structure is a mitochondrion?



- A) P B) Q C) R D) S
81. Root hair cells take in mineral ions from soil where the concentration of these ions is lower than inside the cells. Which process is used?
 A) osmosis
 B) simple filtration
 C) active transport, which needs energy
 D) diffusion
82. A red blood cell placed in pure water swells and bursts. Why?
 A) The water dissolves the cell membrane.
 B) Salt enters the cell from the water.
 C) The cell actively pumps water out.
 D) Water enters the cell by osmosis because the cell contents have a higher solute concentration.
83. A human body cell with 46 chromosomes divides by mitosis. What do the two daughter cells contain?
 A) 23 chromosomes each, genetically different
 B) 46 chromosomes each, genetically identical to the parent cell
 C) 46 chromosomes each, genetically different from the parent cell
 D) 92 chromosomes each
84. Which statement correctly describes meiosis?
 A) It produces gametes with half the number of chromosomes.
 B) It produces two identical body cells.
 C) It happens only in plant roots.
 D) It doubles the number of chromosomes.
85. The diagram shows four cells at different stages of mitosis. In which cell are the chromosomes lined up at the equator (metaphase)?



Cell P Cell Q Cell R Cell S

- A) Cell P B) Cell Q C) Cell R D) Cell S
86. Which gas is produced inside cells during aerobic respiration?
 A) carbon dioxide B) nitrogen
 C) oxygen D) hydrogen
87. During a hard race, an athlete's muscles start to respire anaerobically. Which substance builds up in the muscles?
 A) oxygen B) starch
 C) ethanol and oxygen D) lactic acid

- 88.** Aphids are small insects that feed on the sugary sap in plant stems. Which tissue do they pierce to get this sugar?
- A)** cortex of the root **B)** xylem
C) phloem **D)** epidermis
- 89.** Why is the wall of the left ventricle thicker than the wall of the right ventricle?
- A)** It stores more blood than the right ventricle.
B) It pumps blood to the whole body, which needs a higher pressure.
C) It pumps blood only to the lungs.
D) It receives blood from the lungs.
- 90.** After an injury to the cerebellum, which ability is most likely to be affected?
- A)** balance and coordination of movement
B) vision
C) memory of words only
D) breathing rate

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