**APPENDIX A**

**Algebraic Concepts Performance Test (ACPT)**

**Section A: Biodata**

School: ­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sex: Male [ ] Female [ ]

**Section B: Items on Algebraic Concepts**

Instruction: Answer all questions by ticking [√ ] the correct answers

Time Allowed: 1 hour.

**Simplification of algebraic expressions**

1. Identify the number of terms in the simplification of – x2 – x + 2(2x2 – 4x).

A.6 B**.** 5 C.4 D**.** 3 E.2

1. The highest power of the variable in the expression 5x2 – x + 1 is?

A.5 B**.** 2 C.1 D**.** – 1 E.0

1. The result of expanding (3x – 5) (5 – 3x) is a \_\_\_\_\_\_\_ expression.

A.linear B**.** quadratic C.non-algebraic D**.** polynomial E.two-termed

1. Find the coefficient of x in the expansion of (6x + 5) (x – 2)

A.– 7 B**.** – 3 C.4 D**.** 7 E.11

1. The constant term in the simplification of ½(p2 + 4) – 2(p – 1) is.

A.4 B**.** 2 C.0 D**.** – 2 E.– 4

1. Find the sum of 8 a2 – 6a – 1, 7a3 – 5a2 – 5 and 5a3 + 6a – 4 A.12a3 + 3a2 – 10

B**.** 12a3 – 8a2 – 10 C.7a3 – 8a2 – 10 D**.** 7a3 + 3a2 – 10 E.7a3 – 3a2 – 10

1. Subtract the expression –5x3 – 12x2 + 8 from 4x3 – 7x2 – 2 A.9x3 – 5x2 + 10 B**.** 9x3 – 5x2 – 10 C.9x3 + 5x2 – 10 D**.** 9x3 – 5x2 – 6 E.9x3 – 5x2 + 6
2. Simplify (x + 2)(x – 1) + 2(1 – x)

A.x(x + 3) B**.** x(x – 3) C.x(x + 1) D**.** x(x – 1) E.x2 – x – 4

1. Expand and simplify 2(a – 3b)2 – (a – b)2. A.3a2 + 10ab + 10b2 B**.** 3a2 – 10ab + 10b2 C.3a2 – 10ab + 8b2 D**.** 3a2 – 14ab + 8b2 E.3a2 – 14ab – 8b2
2. The length of a rectangle is (3x2 – 4x + 7) cm and its width is (x2 – 2x – 1) cm. Find its perimeter.

A.6x2 – 4x + 12 B**.** 8x2 – 4x + 12 C.6x2 +12x + 12

D**.** 8x2 +12x + 12 E.8x2 – 12x + 12

**Quadratic expressions**

1. To factorize x2− 7x + 6 means to write it as a product of two

A.identical factors B**.** different factors C.identical variables

D**.** different variables E.algebraic terms

1. 4x2 +12x + 9 is an expression in \_\_\_\_\_\_\_\_\_ variable(s).

A.one B**.** two C.three D**.** four E.five

1. Write an expression for the sum of the factors of the expression x2 – 5x + 6.

A.(x – 3) B**.** (x – 2) C.(x – 1) D**.** (2x – 1) E.(2x – 5)

1. If (x − 4) is one of the factors of 3x2 – 11x – 4, what is the other factor?

A.(3x – 1) B**.** (3x + 1) C.(3x – 4) D**.** (3x + 7) E.(3x – 7)

1. Complete the following 10 – 7x – 12x2 = (5 ?)(? 3x)

A.(5 – 4x) (2 – 3x) B**.** (5 + 4x) (2 + 3x) C.(5 + 4x) (2 – 3x)

D**.** (5 – 4x) (2 + 3x) E.(4x + 5) (3x – 2)

1. Find the factors of x (2a – b) – 2a + b. A.(2a + b) (x – 1) B**.** (2a + b) (x – 1)  C. (2a – b) (x – 1) D**.** (2a – b) (x + 1) E.(x –2a) (2a – b)
2. What are the factors of ax – ay + 6y– 6x?

A.(x – y) (a – 6) B**.** (x – y) (a + 6) C.(x – y) (6 – a)

D**.** (x – y) (6 – y) E.(x – y) (6 – x)

1. Factorize x2 – 2xy – 24y2

A.(x + 8y) (x – 3y) B**.** (x – 8y) (x + 3y) C.(x – 6y) (x + 4y)

D**.** (x + 6y) (x – 4y) E.(x + 12y) (x – 2y)

1. The width of a classroom is 1 metre less than the length. Its area is 20 m2. Find the new expressions for the area of the classroom.

A.(x + 4) and (x – 5) B**.** (x – 4) and (x –5) C.(x + 4) and (x + 5)

D**.** (x – 4) and (x + 5) E.(x – 4) and (x + 5).

1. In a quadratic expression x2 + bx + c, what are the possible factors of c if c is negative and b is positive?
2. Each factor is negative.
3. Each factor is positive.
4. One factor is negative and the other positive. The positive factor has a larger absolute value.
5. One factor is negative and the other is positive. The negative factor has a larger absolute value.
6. None of the above

**Algebraic fractions, special trinomials, and word problems**

1. Factorize the expression 1 – 4x2.

A.(1 – 2x) (1 – 2x) B**.** (1 + 2x) (1 + 2x) C.(1 + 2x) (1 – 2x)

D**.** (2x – 1) (2x – 1) E.(2x + 1) (2x – 1)

1. The factors of a2 – b2 are:

A.(a – b) (a + b) B**.** (a – b) (a – b) C.(a + b) (a + b)

D**.** ab(a – b) E.ab(a +b)

1. What must be added to x2 – 18x to make it a perfect square?

A.3 B**.** 6 C.9 D**.** 18 E.81

1. Which of the following expressions is not a perfect square?

A.4x2 + 4x + 1 B**.** y2 + 2y + 1 C.2x2 – 3x – 9

D**.** y2 – 4y + 4 E.9x2 − 12x + 4

1. Express to its lowest terms

A. B**.**  C. D**.**  E.

1. Simplify completely , where x ≠ 0

A. B**.**  C. D**.**  E.

1. Find two numbers whose product is – 30 and whose sum is – 7.

A.– 6, 5 B**.** –10, 3 C.15, 2 D**.** 6, –5 E.–3, 10

1. The length of a rectangular floor is 3m longer than its width. Write an expression that represents the area of the rectangle.

A.w2 + 3w B**.** w2 + 6w C.4w + 6 D**.** 4w2 + 6 E.w2 + 2w + 3

1. A square has sides of length 2x – 3. What is the area of the square in terms of x?

A.4x2 –12x – 9 B**.** 4x2 –12x + 9 C.4x2 +12x + 9

D**.** 4x2 – 12x + 6 E.4x2 – 12x + 6

1. If x2 + bx + c is a perfect square, then c =
2. The square of half of the coefficient of x
3. Half of the square of the coefficient of x
4. Half multiplied by the square of the first and last terms
5. Two multiplied by the square of the first and last terms
6. None of the above

**Solutions of quadratic equations**

1. Solve the equation y2 – 4y = 0

A.y = 0 or 4 B**.** y = 0 or – 4 C.y = 0 D**.** y = 4 E.y = ± 2

1. Find the roots of the equation (x + 2)(x – 7) = 0

A.2 or –7 B**.** – 2 or 7 C.– 2 or – 7 D**.** ±7 or – 2 E.2 or 7

1. The quadratic equation x2 + x + 16 = 0 has:

A.two equal roots B**.** two unequal roots C.one root D**.** no real roots E.irrational roots

1. The greater of the two roots of the equation 2x2 − 8 = 0 is

A.8 B**.** 4 C.2 D**.** 0 E.– 4

1. What are the values of x for which the equation x2 + 6x + 5 = 0?

A.5, 1 B**.** – 5, – 1 C.– 3, 2 D**. –**3, –2 E.3, 2

1. If x2 + 3x + 1 = 0, then x = – 2.62 or

A.2.62 B**.** 2.38 C.1.62 D**.** – 0.38 E.– 2.62

1. Solve the equation (x + 3)2 = 25

A.2, 10 B**.** – 8, 2 C.3, –5 D**.** 0, E.0,–

1. Solve the equation x2 = 1− 4x by completing the square.

A.2, – 5 B**.** – 2, 5 C.− 2 ± D**.** 2 ± E.1, − 4

1. The roots of the quadratic equation bx2+ cx + a = 0 is given by

A. x = B**.** x = C.x =

D**.** x = E.x =

1. The procedures of solving a quadratic equation by completing the square are as follows except
2. Arrange the equation in such a way that only the constant term is on the RHS
3. Write down the values of *a*, band cas *a* = …, b= …., c= ….
4. Make the expression on the LHS of the equation a perfect square
5. Factorize the LHS and also simplify the RHS
6. Find the square root of both sides, remembering the positive and negative values

**Marking scheme for Algebraic Concepts Performance Test (ACPT)**

|  |  |  |  |
| --- | --- | --- | --- |
| 1. E |  | 21. C |  |
| 2. B |  | 22. B |  |
| 3. C |  | 23. E |  |
| 4. A |  | 24. C |  |
| 5. D |  | 25. A |  |
| 6. C |  | 26. B |  |
| 7. B |  | 27. B |  |
| 8. D |  | 28. A |  |
| 9. C |  | 29. B |  |
| 10. E |  | 30. A |  |
| 11. B |  | 31. A |  |
| 12. A |  | 32. B |  |
| 13. E |  | 33. D |  |
| 14. B |  | 34. B |  |
| 15. C |  | 35. A |  |
| 16. C |  | 36. D |  |
| 17. A |  | 37. B |  |
| 18. B |  | 38. C |  |
| 19. A |  | 39. A |  |
| 20. C |  | 40. B |  |

**Total = 100 marks (i.e. 40 × 2 marks)**

**APPENDIX B**

**Algebra Concepts Attitude Questionnaire (ACAQ)**

**Section A: Biodata**

School

Sex

**Section B: Algebra Concepts Attitude Questionnaire Items.**

Dear student,

In this section, you are to respond to whether you Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), or Strongly Disagree (SA) by ticking (√) in the appropriate column that most closely corresponds to how the items below best describe your feeling.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S/No** | **Feeling** | **SA** | **A** | **U** | **D** | **SD** |
| 1. | I am not afraid of algebra at all |  |  |  |  |  |
| 2. | I always feel all right in algebra lessons |  |  |  |  |  |
| 3. | Algebra concepts are exciting to me |  |  |  |  |  |
| 4. | I like to solve challenging questions in algebra |  |  |  |  |  |
| 5. | I am happier in algebra class than in any other area of mathematics |  |  |  |  |  |
| 6. | I am afraid of algebra |  |  |  |  |  |
| 7. | I always get confused in algebra lessons |  |  |  |  |  |
| 8. | I have never been very excited about algebra concepts |  |  |  |  |  |
| 9. | I am not comfortable with attempting any challenging algebra questions |  |  |  |  |  |
| 10. | I hate mathematics because of algebra topics |  |  |  |  |  |
|  | **Confidence** |  |  |  |  |  |
| 11. | I am very good at algebra aspects of mathematics |  |  |  |  |  |
| 12. | I always do my algebra assignments |  |  |  |  |  |
| 13. | I have less trouble learning algebraic terms |  |  |  |  |  |
| 14. | I can get good marks in algebra |  |  |  |  |  |
| 15. | I am sure of myself whenever I do algebra |  |  |  |  |  |
| 16. | I am not good at algebra |  |  |  |  |  |
| 17. | I always have a hard time doing my algebra assignments |  |  |  |  |  |
| 18. | It takes me a long time to understand algebraic terms than an average student |  |  |  |  |  |
| 19. | I have not recorded any good marks in algebra |  |  |  |  |  |
| 20. | I do not have self-confidence when it comes to algebra |  |  |  |  |  |
|  | **Beliefs** |  |  |  |  |  |
| 21. | To me, the knowledge of algebraic concepts will facilitate the understanding of other aspects of mathematics |  |  |  |  |  |
| 22. | I believe algebraic concepts are the most important aspects of senior school mathematics that one needs to learn |  |  |  |  |  |
| 23. | To me, I believe that the knowledge of algebra will increase my problem-solving skills |  |  |  |  |  |
| 24. | Algebra is one of the easiest aspects of mathematics that I can teach my younger ones |  |  |  |  |  |
| 25. | To me, algebra is important in everyday activities |  |  |  |  |  |
| 26. | Learning algebraic concepts to me is a waste of time as it has nothing to do with other aspects of mathematics |  |  |  |  |  |
| 27. | To me, algebraic concepts are the least important aspect of senior school mathematics as they carry little or no weight |  |  |  |  |  |
| 28. | I do not believe that the study of algebra will improve my problem-solving skills |  |  |  |  |  |
| 29. | To me, algebra seems to be the most difficult aspect of mathematics |  |  |  |  |  |
| 30. | Algebra to me is of no relevance to our everyday activities |  |  |  |  |  |
|  | **Behaviors** |  |  |  |  |  |
| 31. | I use to connect some algebraic concepts to daily life |  |  |  |  |  |
| 32. | I often find different ways to solve any difficult algebra questions |  |  |  |  |  |
| 33. | I like to share my solutions in algebra with others |  |  |  |  |  |
| 34. | I do persist with the solving of algebra question until it is solved |  |  |  |  |  |
| 35. | I always try to think about the algebraic concept which has not been understood |  |  |  |  |  |
| 36. | I have never related any algebraic concept to daily life |  |  |  |  |  |
| 37. | Whenever I try my usual of solving any algebra question and I find it difficult, I use to take it to my teacher or friends for assistance |  |  |  |  |  |
| 38. | I do not share my solutions in algebra with others |  |  |  |  |  |
| 39. | I do not enjoy spending much time-solving algebra question |  |  |  |  |  |
| 40. | Whenever any aspect of algebra is not clear, I use to keep it aside |  |  |  |  |  |

Source: (Adapted from Deopkan, Lawsky and Padwa, 2013)