CLASS IX – MATHEMATICS

Chapter Test: Exploring Algebraic Identities

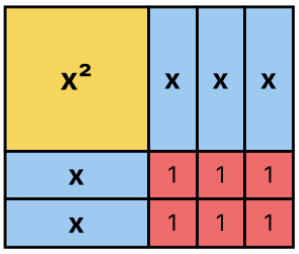
(Ganita Manjari, Grade 9, Part I – Chapter 4)

Time: 1½ Hours **M. M.: 40**

General Instructions:

1. This paper contains 21 questions. All questions are compulsory.
2. This paper is divided into 5 sections: **A, B, C, D** and **E**.
3. In **Section A**, Questions no. **1** to **10** are MCQs and questions no. **11** and **12** are Assertion-Reason based questions of 1 mark each.
4. In **Section B**, Questions no. **13** to **16** are Very Short Answer type questions carrying 2 marks each.
5. In **Section C**, Questions no. **17** and **18** are Short Answer type questions carrying 3 marks each.
6. In **Section D**, Questions no. **19** and **20** are Long Answer type questions carrying 5 marks each.
7. In **Section E**, Question no. **21** is a case based question carrying 4 marks. Internal choice is provided in the 2 marks part of the case study.
8. There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C, 2 questions in Section D and 1 part of Section E.
9. Show all the steps of your working and name the identity you use. In rational expressions, assume that denominators are not equal to zero.
10. Use of calculator is **not** allowed.

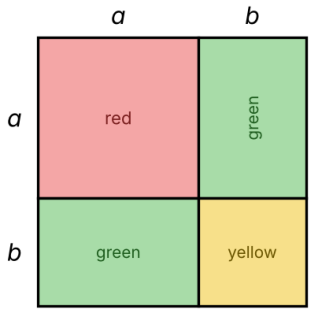
Q. No.	Section – A	Marks
1.	The expansion of $(3x + 2y)^2$ is (A) $9x^2 + 6xy + 4y^2$ (B) $9x^2 + 12xy + 4y^2$ (C) $3x^2 + 12xy + 2y^2$ (D) $9x^2 + 4y^2$	**[1]**
2.	If $a + b = 7$ and $ab = 12$, then $a^2 + b^2$ is equal to (A) 19 (B) 37 (C) 25 (D) 49	**[1]**
3.	The value of $(98)^2$ using a suitable identity is (A) 9404 (B) 9504 (C) 9704 (D) 9604	**[1]**
4.	The product $(x + 3)(x - 7)$ is equal to (A) $x^2 - 4x - 21$ (B) $x^2 + 4x - 21$ (C) $x^2 - 4x + 21$ (D) $x^2 + 10x - 21$	**[1]**
5.	The factorised form of $x^2 - 10x + 25$ is (A) $(x + 5)^2$ (B) $(x - 5)^2$ (C) $(x - 5)(x + 5)$ (D) $(x - 25)(x + 1)$	**[1]**
6.	If $x + 1/x = 5$, then $x^2 + 1/x^2$ is equal to (A) 25 (B) 27 (C) 23 (D) 21	**[1]**
7.	The value of 101×99, found using the identity $(a + b)(a - b) = a^2 - b^2$, is (A) 9999 (B) 10001 (C) 9899 (D) 10099	**[1]**
8.	In the expansion of $(a + 2b + 3c)^2$, the coefficient of bc is (A) 6 (B) 5 (C) 36 (D) 12	**[1]**

Q. No.	Section – A	Marks
9.	A rectangle is made using algebra tiles: one x^2 tile, five x-tiles and six unit tiles, as shown. Its length and breadth are  (A) $(x + 1)$ and $(x + 6)$ (B) $(x + 2)$ and $(x + 3)$ (C) $(x + 5)$ and $(x + 1)$ (D) $(x + 4)$ and $(x + 2)$	**[1]**
10.	The factorisation of $x^3 + 8$ is (A) $(x - 2)(x^2 + 2x + 4)$ (B) $(x + 2)(x^2 + 2x + 4)$ (C) $(x + 2)(x^2 - 2x + 4)$ (D) $(x + 2)(x^2 - 4x + 4)$	**[1]**
	Questions number 11 and 12 are Assertion and Reason based questions. Two statements are given, one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer from the options (A), (B), (C) and (D) as given below. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A). (C) Assertion (A) is true but Reason (R) is false. (D) Assertion (A) is false but Reason (R) is true.	
11.	**Assertion (A):** $(a + b)^2$ is always greater than $a^2 + b^2$ for all real numbers a and b. **Reason (R):** $(a + b)^2 = a^2 + 2ab + b^2$.	**[1]**
12.	**Assertion (A):** The expression $4x^2 + 12x + 9$ can be written as $(2x + 3)^2$. **Reason (R):** $4x^2 + 12x + 9 = (2x)^2 + 2(2x)(3) + 3^2$, which has the form $a^2 + 2ab + b^2$ with $a = 2x$ and $b = 3$.	**[1]**

Q. No.	Section – B	Marks
13.	Expand $(3x - 5y)^2$ using a suitable identity.	**[2]**
14.	(A) Factorise: $49p^2 + 42pq + 9q^2$. **OR** (B) Factorise: $81a^2 - 4b^2$.	**[2]**
15.	Using a suitable identity, find the value of $(1004)^2$ without direct multiplication.	**[2]**
16.	(A) If $a + b = 9$ and $ab = 20$, find the values of $a^2 + b^2$ and $(a - b)^2$. **OR** (B) If $x - 1/x = 4$, find the values of $x^2 + 1/x^2$ and $(x + 1/x)^2$.	**[2]**

Q. No.	Section – C	Marks
17.	(A) Expand $(2x + 3y - z)^2$ using a suitable identity. **OR** (B) Expand $(3a - 2b)^3$.	**[3]**
18.	(A) Factorise $2x^2 + 11x + 12$ by splitting the middle term. **OR** (B) Factorise $64m^3 + 27n^3$.	**[3]**

Q. No.	Section – D	Marks
19.	(A) Simplify the rational expression $(x^3 - 8) / (x^2 + x - 6)$ by factorising the numerator and the denominator. **OR** (B) Simplify the rational expression $(4x^2 - 12xy + 9y^2) / (8x^3 - 27y^3)$.	**[5]**
20.	(A) The length of a rectangular park is 7 m more than its breadth and its area is 330 m^2. Find the length and the breadth of the park. **OR** (B) If $x + y + z = 9$ and $xy + yz + zx = 26$, find (i) $x^2 + y^2 + z^2$, (ii) the value of $x^3 + y^3 + z^3 - 3xyz$.	**[5]**

Q. No.	Section – E	Marks
21.	**Case Study:** For Diwali, a school draws a square rangoli of side $(a + b)$ metres on its ground. It is divided into a red square of side a metres, a yellow square of side b metres and two green rectangles of sides a metres and b metres, as shown.  (i) Write the area of each of the four parts and hence show that $(a + b)^2 = a^2 + 2ab + b^2$. **[1]** (ii) If $a = 7$ and $b = 3$, find the area of the whole rangoli using the identity. **[1]** (iii) (A) If $a + b = 12$ and $ab = 35$, find the total area of the red and the yellow squares. **[2]** **OR** (iii) (B) If $a - b = 3$ and the total area of the red and yellow squares is 29 m^2, find the area of one green rectangle and the side of the whole rangoli. **[2]**	**[4]**