

Algebraic Expressions, Identities and Factorisation

Mathematics · Class 8 · Topic-wise Practice Worksheet

TIME 45 minutes	QUESTIONS 18	TOTAL MARKS 24	MAX. SCORE ____ / 24
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Name: _____ Class/Sec: _____ Date: _____

INSTRUCTIONS

- There are **18 questions** in this worksheet. All questions are compulsory.
- Each question has four options (A), (B), (C) and (D). Exactly **one** option is correct.
- Questions 1–15 carry **1 mark** each. Questions 16–18 (Achievers Section) carry **3 marks** each.
- There is no negative marking. Use of a calculator is **not** allowed.
- Rough work may be done on the blank space at the side of each page.

Section A — Mathematical Reasoning

Q1–Q8 · 1 mark each

- How many terms are there in the expression $4x^2y - 3xy + 7$?
 (A) 1 (B) 2
 (C) 3 (D) 4
- The coefficient of x in $5x^2 - 3x + 2$ is _____.
 (A) 5 (B) 3
 (C) 2 (D) -3
- $(a + b)^2 =$ _____.
 (A) $a^2 + b^2$ (B) $a^2 - 2ab + b^2$
 (C) $a^2 + 2ab + b^2$ (D) $a^2 - b^2$
- The product $(x + 3)(x - 3)$ is _____.
 (A) $x^2 + 9$ (B) $x^2 - 6x + 9$
 (C) $x^2 + 6x + 9$ (D) $x^2 - 9$
- The factorised form of $6x + 12$ is _____.
 (A) $6(x + 12)$ (B) $6(x + 2)$
 (C) $6x(1 + 2)$ (D) $2(3x + 12)$
- The degree of the polynomial $3x^2y + 5xy^2 - 7$ is _____.
 (A) 2 (B) 3
 (C) 4 (D) 7
- $(2x)^3 =$ _____.
 (A) $2x^3$ (B) $6x^3$
 (C) $8x^3$ (D) $8x$

8. Using a suitable identity, the value of 98×102 is _____.

(A) 9996

(B) 9998

(C) 10004

(D) 10000

Section B — Everyday Mathematics and Reasoning

Q9–Q15 · 1 mark each

9. A square of side $(a + b)$ is divided as shown. The two **shaded** rectangles together have a total area of _____.

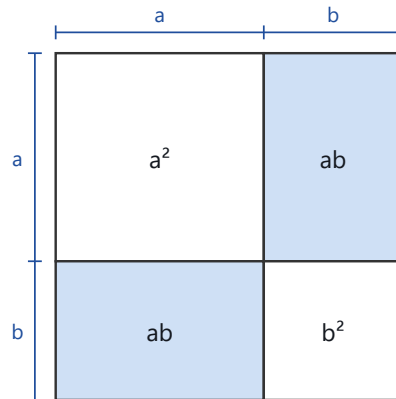


Fig. 9.1 — Area model of $(a + b)^2$

(A) ab

(B) $(a + b)^2$

(C) $a^2 + b^2$

(D) $2ab$

10. The factors of $x^2 - 7x + 12$ are _____.

(A) $(x - 3)(x - 4)$

(B) $(x + 3)(x + 4)$

(C) $(x - 2)(x - 6)$

(D) $(x - 1)(x - 12)$

11. $(3a - 2b)^2 =$ _____.

(A) $9a^2 - 4b^2$

(B) $9a^2 + 4b^2$

(C) $9a^2 - 12ab + 4b^2$

(D) $9a^2 - 6ab + 4b^2$

12. A rectangular plot has length $(x + 5)$ m and breadth $(x - 2)$ m. Its area, in square metres, is _____.

(A) $x^2 - 10$

(B) $2x + 3$

(C) $x^2 + 7x - 10$

(D) $x^2 + 3x - 10$

13. The factorised form of $9x^2 - 25y^2$ is _____.

(A) $(3x - 5y)(3x + 5y)$

(B) $(3x - 5y)^2$

(C) $(9x - 25y)(x + y)$

(D) $(3x + 5y)^2$

14. If $x + \frac{1}{x} = 5$, then $x^2 + \frac{1}{x^2}$ equals _____.

(A) 23

(B) 25

(C) 27

(D) 10

15. $12x^3y^2 \div 4xy =$ _____.

(A) $3x^3y$

(B) $3x^2y$

(C) $8x^2y$

(D) $3xy$

16. Consider the following statements.

- (i) $(a + b)^2 = a^2 + b^2$ for all values of a and b .
- (ii) Every polynomial of degree 2 can be written as the product of two linear factors with integer coefficients.
- (iii) $3x$ and $3x^2$ are unlike terms.

Which of the statements is/are correct?

- (A) (iii) only
- (B) (i) and (iii) only
- (C) (ii) and (iii) only
- (D) All three

17. Factorise $x^4 - 16$ completely.

- (A) $(x^2 - 4)(x^2 + 4)$
- (B) $(x - 2)(x + 2)(x^2 + 4)$
- (C) $(x - 2)^2(x + 2)^2$
- (D) $(x - 4)(x + 4)$

18. If $a + b = 7$ and $ab = 12$, then $a^2 + b^2 = \underline{\hspace{2cm}}$.

- (A) 13
- (B) 25
- (C) 37
- (D) 49

Answer Key

1	C	2	D	3	C	4	D	5	B
6	B	7	C	8	A	9	D	10	A
11	C	12	D	13	A	14	A	15	B
16	A	17	B	18	B				

Solutions

1. Answer: (C) 3

Terms are the parts separated by + and – signs. Here they are $4x^2y$, $-3xy$ and 7, so there are **3** terms. Such an expression is called a trinomial.

2. Answer: (D) -3

The coefficient of x is the number multiplying x , taken together with its sign. The term is $-3x$, so the coefficient is **-3** .

3. Answer: (C) $a^2 + 2ab + b^2$

$(a + b)^2 = (a + b)(a + b) = a^2 + ab + ba + b^2 = \mathbf{a^2 + 2ab + b^2}$. The middle term $2ab$ must not be forgotten.

4. Answer: (D) $x^2 - 9$

This is the identity $(a + b)(a - b) = a^2 - b^2$, with $a = x$ and $b = 3$.

So the product is **$x^2 - 9$** .

5. Answer: (B) $6(x + 2)$

The highest common factor of $6x$ and 12 is 6 .

$6x + 12 = \mathbf{6(x + 2)}$. Option (D) is a correct but incomplete factorisation, since $3x + 12$ still has a common factor of 3 .

6. Answer: (B) 3

The degree of a term is the sum of the exponents of its variables: $3x^2y$ has degree $2 + 1 = 3$, and $5xy^2$ has degree $1 + 2 = 3$. The highest of these is **3**.

7. Answer: (C) $8x^3$

The cube applies to the whole of $2x$:

$$(2x)^3 = 2^3 \times x^3 = \mathbf{8x^3}.$$

8. Answer: (A) 9996

Write $98 = 100 - 2$ and $102 = 100 + 2$, then use $(a - b)(a + b) = a^2 - b^2$:

$$98 \times 102 = 100^2 - 2^2 = 10000 - 4 = \mathbf{9996}.$$

9. Answer: (D) $2ab$

Each shaded rectangle measures a by b , so each has area ab . Together they give **$2ab$** .

The whole square has area $(a + b)^2$, and adding the four pieces gives $a^2 + ab + ab + b^2 = a^2 + 2ab + b^2$ — a picture proof of the identity.

10. Answer: (A) $(x - 3)(x - 4)$

We need two numbers whose product is $+12$ and whose sum is -7 . These are -3 and -4 .

$$x^2 - 7x + 12 = x^2 - 3x - 4x + 12 = x(x - 3) - 4(x - 3) = \mathbf{(x - 3)(x - 4)}.$$

11. Answer: (C) $9a^2 - 12ab + 4b^2$

Use $(x - y)^2 = x^2 - 2xy + y^2$ with $x = 3a$ and $y = 2b$:

$$(3a)^2 - 2(3a)(2b) + (2b)^2 = \mathbf{9a^2 - 12ab + 4b^2}.$$

12. Answer: (D) $x^2 + 3x - 10$

Area = length $\times$ breadth = $(x + 5)(x - 2)$

$$= x^2 - 2x + 5x - 10 = \mathbf{x^2 + 3x - 10}.$$

13. Answer: (A) $(3x - 5y)(3x + 5y)$

Both terms are perfect squares: $9x^2 = (3x)^2$ and $25y^2 = (5y)^2$. Using $a^2 - b^2 = (a - b)(a + b)$,

$$9x^2 - 25y^2 = \mathbf{(3x - 5y)(3x + 5y)}.$$

14. Answer: (A) 23

Square both sides:

$$\left(x + \frac{1}{x}\right)^2 = 5^2$$

$$x^2 + 2 \cdot x \cdot \frac{1}{x} + \frac{1}{x^2} = 25$$

$$x^2 + 2 + \frac{1}{x^2} = 25$$

$$\text{So } x^2 + \frac{1}{x^2} = 25 - 2 = \mathbf{23}.$$

15. Answer: (B) $3x^2y$

Divide the numbers and subtract the exponents of like variables:

$$12 \div 4 = 3, x^3 \div x = x^2, y^2 \div y = y.$$

So the quotient is **$3x^2y$** .

16. Answer: (A) (iii) only

Statement (i) is false — the middle term $2ab$ is missing; it is true only when $ab = 0$. Statement (ii) is false; for example $x^2 + 1$ cannot be factorised into linear factors with integer coefficients. Statement (iii) is true; like terms must have exactly the same variables raised to the same powers, and $x \neq x^2$. Hence **(iii) only**.

17. Answer: (B) $(x - 2)(x + 2)(x^2 + 4)$

Apply $a^2 - b^2 = (a - b)(a + b)$ twice.

$$x^4 - 16 = (x^2)^2 - 4^2 = (x^2 - 4)(x^2 + 4)$$

$$\text{and } x^2 - 4 = (x - 2)(x + 2).$$

So $x^4 - 16 = \mathbf{(x - 2)(x + 2)(x^2 + 4)}$. Option (A) is correct but not *complete*, since $x^2 - 4$ factorises further. The factor $x^2 + 4$ cannot be broken down any further.

18. Answer: (B) 25

Use the identity $(a + b)^2 = a^2 + 2ab + b^2$, rearranged as

$$a^2 + b^2 = (a + b)^2 - 2ab$$

$$= 7^2 - 2 \times 12 = 49 - 24 = \mathbf{25}.$$

(Here a and b are 3 and 4, and indeed $9 + 16 = 25$. $\checkmark$)