ExamPath

CLASS 9 MATHEMATICS · FBISE · UNIT 4

Unit 4: Factorization and Algebraic Manipulation — Advanced Practice

20 multiple-choice questions Suggested time: **20 minutes** 1 mark each

Name: _____ Date: _____ Score: / 20

Circle one answer for each question. The answer key with explanations is on the last pages, so try every question before you check. These are practice questions, not official FBISE papers.

1. Why is $(x - y)^3$ different from $x^3 - y^3$?

(A) $(x - y)^3$ has extra middle terms $-3x^2y + 3xy^2$

(B) They are the same expression

(C) $x^3 - y^3$ has more terms

(D) $(x - y)^3$ has no variables

2. If the HCF of two polynomials P and Q is 1, what is their LCM?

(A) $P \div Q$

(B) $P \times Q$

(C) $P + Q$

(D) 1

3. Why can a non-zero constant multiplier be used during the division method for HCF?

(A) A constant does not change the HCF

(B) It changes the degree

(C) It makes the remainder zero

(D) It doubles the HCF

4. Factorize $x^3 + 27$.

(A) $(x - 3)(x^2 + 3x + 9)$

(B) $(x + 3)(x^2 + 3x + 9)$

(C) $(x + 3)^3$

(D) $(x + 3)(x^2 - 3x + 9)$

5. If $P = (\pm Q)^2$, the square roots of P are:

(A) $-Q$ only

(B) $+Q$ and $-Q$

(C) Q only

(D) Q^2

6. Which rule finds the HCF of monomials?

(A) LCM of the coefficients with the highest powers

(B) Multiply all the terms together

(C) HCF of the coefficients with the lowest power of each common variable

(D) Add the coefficients

7. Why do we factorize the numerators and denominators before multiplying algebraic fractions?

(A) So that the fractions become equal
(B) So that we can add the numerators
(C) So that all variables disappear
(D) So that common factors can be cancelled

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8. Factorize $2x^2 - 5x - 3$.

(A) $(2x + 1)(x - 3)$
(B) $(2x - 1)(x + 3)$
(C) $(2x + 3)(x - 1)$
(D) $(x + 1)(2x - 3)$

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9. Why is it useful to put $x^2 + 5x = a$ in $(x^2 + 5x + 4)(x^2 + 5x + 6) - 3$?

(A) It removes the constant term
(B) It cancels the brackets
(C) Both brackets then have the same first two terms, giving a simple quadratic in a
(D) It makes the expression linear

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10. What is the key idea for factorizing $a^4 + 4b^4$?

(A) Add and subtract $4a^2b^2$ to form a perfect square minus a square
(B) Use the sum of cubes formula
(C) Take a^2 out as a common factor
(D) Divide both terms by 4

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11. Simplify $(x^2 - 1)/(x + 2) \div (x - 1)/(x^2 - 4)$, for $x \neq \pm 2$ and $x \neq 1$.

(A) $(x + 1)(x + 2)$
(B) $(x + 1)(x - 2)$
(C) $x^2 - 1$
(D) $(x - 1)(x + 2)$

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12. Why is the LCM of $x^2 - 1$ and $x^2 - 2x + 1$ equal to $(x - 1)^2(x + 1)$?

(A) The factors are added together
(B) The lowest powers are taken
(C) Every factor is taken with its highest power
(D) Only the common factors are taken

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13. Why can we NOT multiply the dividend by a variable during the division method for HCF?

(A) It would make the remainder negative
(B) Variables cannot be multiplied
(C) It would reduce the degree
(D) It could add a factor that was not in the original polynomials

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14. Find the LCM of $x^2 - x - 6$ and $x^2 + x - 2$.

(A) $(x - 3)(x + 2)^2(x - 1)$
(B) $(x - 3)(x - 1)$
(C) $(x + 2)$
(D) $(x - 3)(x + 2)(x - 1)$

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15. To factorize $a^4 + a^2b^2 + b^4$, we add and subtract:

(A) b^4
(B) $2ab$
(C) a^2b^2
(D) a^4

16. For a product like $(x + a)(x + b)(x + c)(x + d) + k$, the pairs are chosen so that:

(A) $a = b$ and $c = d$
(B) $a + b = c + d$
(C) $a \times b = c \times d$
(D) $a - b = c - d$

17. The difference of two cubes $a^3 - b^3$ equals:

(A) $(a - b)(a^2 + ab + b^2)$
(B) $(a - b)(a^2 - ab + b^2)$
(C) $(a - b)^3$
(D) $(a + b)(a^2 - ab + b^2)$

18. The relation between the HCF and LCM of two polynomials P and Q is:

(A) HCF ÷ LCM = P × Q
(B) HCF − LCM = P − Q
(C) HCF + LCM = P + Q
(D) HCF × LCM = P × Q

19. Why must we remember that $x \neq 3$ when simplifying $(x^2 - 9)/(x - 3)$?

(A) The numerator is always positive
(B) The original expression is undefined when $x = 3$
(C) The expression is always zero
(D) x must be negative

20. A student cancels x from $(x + 2)/x$ and gets 2. What is wrong?

(A) x must equal 2
(B) There is no mistake
(C) x is only a term of the numerator, not a factor of all of it
(D) The answer should be x

Answer key

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1 A	**2** B	**3** A	**4** D	**5** B
6 C	**7** D	**8** A	**9** C	**10** A
11 B	**12** C	**13** D	**14** D	**15** C
16 B	**17** A	**18** D	**19** B	**20** C

Explanations

1. A. $(x - y)^3$ has extra middle terms $-3x^2y + 3xy^2$
$(x - y)^3 = x^3 - 3x^2y + 3xy^2 - y^3$. It is not the same as $x^3 - y^3$.

2. B. P × Q
Since HCF × LCM = P × Q, an HCF of 1 gives LCM = P × Q.

3. A. A constant does not change the HCF
Multiplying by a non-zero number adds no new polynomial factor, so the HCF stays the same.

4. D. $(x + 3)(x^2 - 3x + 9)$
$x^3 + 27 = x^3 + 3^3 = (x + 3)(x^2 - 3x + 9)$.

5. B. +Q and −Q
Both +Q and −Q give P when squared, so both are square roots.

6. C. HCF of the coefficients with the lowest power of each common variable
For monomials, take the HCF of the numbers and the lowest power of every common variable.

7. D. So that common factors can be cancelled
Cancelling common factors gives the most reduced form of the product.

8. A. $(2x + 1)(x - 3)$
Split $-5x$ as $-6x + x$. Then $2x(x - 3) + 1(x - 3) = (2x + 1)(x - 3)$.

9. C. Both brackets then have the same first two terms, giving a simple quadratic in a
The expression becomes $(a + 4)(a + 6) - 3$, a quadratic in a that can be factorized, and then x is put back.

10. A. Add and subtract $4a^2b^2$ to form a perfect square minus a square
$a^4 + 4b^4 = (a^2 + 2b^2)^2 - (2ab)^2$, which then factorizes as a difference of squares.

11. B. $(x + 1)(x - 2)$
Multiply by the reciprocal and factorize: $(x + 1)(x - 1)(x + 2)(x - 2) \div ((x + 2)(x - 1)) = (x + 1)(x - 2)$.

12. C. Every factor is taken with its highest power
$x^2 - 1 = (x - 1)(x + 1)$ and $x^2 - 2x + 1 = (x - 1)^2$. The LCM takes $x - 1$ squared and $x + 1$ once.

13. D. It could add a factor that was not in the original polynomials
A variable may bring in a new common factor, and the HCF would then be wrong.

14. D. $(x - 3)(x + 2)(x - 1)$
$x^2 - x - 6 = (x - 3)(x + 2)$ and $x^2 + x - 2 = (x + 2)(x - 1)$. Take every factor once at its highest power.

15. C. a^2b^2
Adding and subtracting a^2b^2 gives $(a^2 + b^2)^2 - (ab)^2$, a difference of squares.

16. **B. a + b = c + d**

When the sums are equal, the two pair-products share the same x-part. That lets us substitute one variable.

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17. **A. $(a - b)(a^2 + ab + b^2)$**

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$.

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18. **D. HCF × LCM = P × Q**

The product of the HCF and the LCM equals the product of the two polynomials.

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19. **B. The original expression is undefined when x = 3**

At x = 3 the denominator is 0, so the original fraction is undefined, even though x + 3 is defined.

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20. **C. x is only a term of the numerator, not a factor of all of it**

Only common factors can be cancelled. (x + 2)/x = 1 + 2/x, which is not 2.

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