CHAPTER P6

Factoring

Multiple-Choice Old Exam Questions

39 questions • 4 topics • options A–E • two questions per page

Topic 1 | Sums and Differences of Cubes

Factoring expressions that are a sum or difference of two cubes • Questions 1–8

Q **1**

One of the factors of $(2x-1)^3-1$ is

A) $4x^2-2x+1$

B) $2x$

C) $2x-1$

D) $x-2$

E) $4x^2+2x+1$

Q **2**

If $(2x-1)^3+8=(2x+1)(mx^2+nx+p)$, then $m+n+p=$

A) 3

B) 7

C) 4

D) 1

E) 6

Q
3

If the polynomial $27y^3 + 1$ factors into $(3y + 1)(My^2 + Ny + 1)$, then $M + N =$

A) 6

B) 12

C) 15

D) 3

E) 9

Q
4

One factor of $24 + 3(x - 1)^3$ is

A) $x^2 - 4x + 7$

B) $x^2 - 4x - 7$

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

D) $x^2 - 6x + 7$

E) $x^2 + x + 9$

Q
5

If the expression $64 + (x - 3)^3$ factors into $(x + 1)(x^2 + Ax + B)$, then $A + B =$

A) 27

B) -27

C) 47

D) -47

E) -37

Q
6

One factor of $27z^9 + 64y^{12}$ is

A) $9z^6 - 12z^3y^4 + 16y^8$

B) $9z^6 + 12z^3y^2 + 16y^4$

C) $9z^6 - 12z^3y^4 + 4y^8$

D) $9z^6 + 12z^3y^4 + 8y^4$

E) $9z^6 - 12z^3y^4 + 2y^8$

Q
7

The sum of the factors of $(2a+1)^3 - 8$ is equal to

A) $4a^2 + 10a + 6$

B) $4a^2 - 6a + 10$

C) $4a^2 + 10a + 8$

D) $4a^2 + 6a - 10$

E) $4a^2 + 10a - 6$

Q
8

One factor of $54 + 2(2x+1)^3$ is

A) $(x+2)$

B) $(x-2)$

C) $(x+4)$

D) $(x-1)$

E) $(2x-1)$

Topic 2 | Grouping and Common Factors

Factoring by taking out a common factor or by grouping terms • Questions 9–16

Q **9**

One of the factors of $3y^3 + 15y^2 - 12y - 60$ is

A) $y + 2$

B) $y^2 - 2$

C) $y^2 + 4$

D) $y - 5$

E) $y - 4$

Q **10**

One of the factors of $4x^3 + 4x^2y - 9xy^2 - 9y^3$ is equal to

A) $2x - 3y$

B) $x - y$

C) $x - 3y$

D) $2x + y$

E) $2x - y$

Q
11

One factor of $18x^5 + 15x^4z - 75x^3z^2$ is

A) $3x - 5z$

B) $2x - 5z$

C) $3x + 25z$

D) $6x - 5z$

E) $3x - 25z$

Q
12

One of the factors of $9 + x^3y^2 - 9x^3 - y^2$ is

A) $x^2 + x + 1$

B) $x^2 - x + 1$

C) $y - 9$

D) $y + 9$

E) $y^2 + y + 3$

Q
13

One of the factors of $3x^3 - 2x^2 - 12x + 8$ is:

A) $x + 2$

B) $3x + 2$

C) $x - 4$

D) $x + 4$

E) $x - 1$

Q
14

One factor of the polynomial $8x^4 - 8x^3 + x - 1$ is

A) $4x^2 + 2x - 1$

B) $4x^2 - x - 2$

C) $4x^2 - 2x + 1$

D) $4x^2 + 2x + 1$

E) $4x^2 - 4x + 1$

Q
15

One factor of $y^3 - x^2y + x^2 - y^2$ is

A) $y + x$

B) $x^2 + y$

C) $y^2 + x$

D) $y + 1$

E) $x + 1$

Q
16

One of the factors of $4y^5 - y^3 + 4y^2 - 1$ is

A) $y^2 - y + 1$

B) $y + 2$

C) $y - 1$

D) $y^2 + y + 1$

E) $y - 2$

Topic 3 | Perfect Squares, Quadratic Type and Special Factoring

Perfect square trinomials, substitution, differences of squares and fourth powers • Questions 17–28

Q **17**

If $4x^2 + 36x + C = (ax + b)^2$, then $a + b =$

A) 11

B) 7

C) 9

D) -7

E) -9

Q **18**

One factor of the polynomial $q^2 - p^2 + 4p - 4$ is

A) $(q - p + 2)$

B) $(q - p - 2)$

C) $(q + p + 1)$

D) $(q - p)$

E) $(q + p)$

Q
19

One factor of the polynomial $(x^2-1)^2+(x^2-1)-12$ is

A) $x+2$

B) $x-1$

C) $x+1$

D) $x+3$

E) $x-3$

Q
20

One factor of $a^2+4b^2+4b-4ab-2a$ is

A) $a-2b-2$

B) $a+2b+2$

C) $a+2b-2$

D) $a-2b+2$

E) $a-b-1$

Q
21

If the expression $x^{4n} - 1$ factors into $x^{4n} - 1 = (x^n - 1)A$, then A is equal to

A) $(x^n + 1)(x^{2n} + 1)$

B) $(x^n - 1)(x^{2n} + 1)$

C) $(x^n + 1)(x^n - 1)$

D) $x^{3n} + 1$

E) $x^{2n} + 1$

Q
22

One factor of $6(4x^2 - 12xy + 9y^2) + 7(2x - 3y) - 3$ is

A) $6x - 9y - 1$

B) $4x + 6y - 1$

C) $6x - 9y + 3$

D) $4x - 6y - 1$

E) $6x - 9y - 3$

Q
23

One factor of $y^4 + 64$ is:

A) $y^2 + 4y + 8$

B) $y^2 + 4y - 8$

C) $y^2 - 4y - 8$

D) $y^2 + 8$

E) $y^2 - 8$

Q
24

The sum of the two factors of the polynomial $p^2q^2 - 10 - 2q^2 + 5p^2$ is

A) $p^2 + q^2 + 3$

B) $p^2 + q^2 - 7$

C) $p^2 - q^2 + 3$

D) $p^2 - q^2 - 7$

E) $p^2 + q^2 - 3$

Q
25

One factor of $(3a+5)^2+6(3a+5)-16$ is

A) $(3a+13)$

B) $(3a-2)$

C) $(3a-3)$

D) $(3a-16)$

E) $(3a+16)$

Q
26

One factor of $x^2y^2-10xy+25-a^4$ is

A) $(xy+a^2-5)$

B) $(xy-a^2+5)$

C) $(xy+a^2+5)$

D) $(xy+a+5)$

E) $(xy-a-5)$

Q
27

The expression $\left(x+\frac{1}{x}\right)^2-\left(x-\frac{1}{x}\right)^2$ simplifies to:

A) 4

B) $\frac{4}{x}$

C) $-\frac{4}{x}$

D) 0

E) 8

Q
28

If $4x^2y^2-36xy+k+1$ is a perfect square trinomial, then $k=$

A) 82

B) 48

C) 8

D) 80

E) 24

Topic 4 | Rational Exponents and Algebraic Fractions

Factoring and simplifying expressions with rational exponents and fractions • Questions 29–39

Q **29**

$$\frac{3(x^2+3)^{-1/3} - 2x^2(x^2+3)^{-4/3}}{(x^2+3)^{-4/3}} =$$

A) $x^2 + 9$

B) $x^2 + 3$

C) $x^2 - 3$

D) $3x^2 + 9$

E) $5x^2 + 9$

Q **30**

One factor of $2t^{3/2} - 7t^{1/2} - 4t^{-1/2}$ is

A) $2t + 1$

B) $2t - 1$

C) $t - 2$

D) $t + 2$

E) $t + 4$

Q
31

One of the factors of $3x^{5/2} - 9x^{3/2} + 6x^{1/2}$ is

A) $x - 1$

B) $x + 1$

C) $x + 2$

D) $3x - 1$

E) $3x - 2$

Q
32

Factor $(x^2 + 1)^{1/2} + 2(x^2 + 1)^{-1/2}$

A) $\frac{x^2+3}{\sqrt{x^2+1}}$

B) $\frac{x^2+1}{\sqrt{x^2+3}}$

C) $\frac{x^2+2}{\sqrt{x^2+1}}$

D) $(x^2 + 3)\sqrt{x^2 + 1}$

E) $\frac{x^2-1}{\sqrt{x^2+1}}$

Q
33

Factor $2x^{1/3}(x-2)^{2/3} - 5x^{4/3}(x-2)^{-1/3}$

A) $\frac{(-3x-4)\sqrt[3]{x}}{\sqrt[3]{x-2}}$

B) $\frac{(-3x+4)\sqrt[3]{x}}{\sqrt[3]{x-2}}$

C) $\frac{(-7x-4)\sqrt[3]{x}}{\sqrt[3]{x-2}}$

D) $\frac{(-3x-4)\sqrt[3]{x-2}}{\sqrt[3]{x}}$

E) $\frac{(-3x-4)\sqrt[3]{x}}{x-2}$

Q
34

One of the factors of $(2x+3)^{\frac{3}{2}} - (2x+3)^{\frac{1}{2}} - 2(2x+3)^{-\frac{1}{2}}$ is

A) $2x+1$

B) $x-1$

C) $x-2$

D) $x+1$

E) $2x+5$

Q
35

$$\frac{(1+2x^2)^{\frac{1}{3}} - (x^2-1)(1+2x^2)^{-\frac{2}{3}}}{(1+2x^2)^{-\frac{2}{3}}} =$$

A) $x^2 - 1$

B) 1

C) x^2

D) $x^2 + 1$

E) $x^2 + 2$

Q
36

$$\frac{(1+x^2)^{\frac{1}{2}} - x^2(1+x^2)^{-\frac{1}{2}}}{(1+x^2)^{-\frac{3}{2}}} =$$

A) $1 + x^2$

B) $1 - x^2$

C) x^2

D) $\sqrt{1+x^2}$

E) $(1+x^2)^2$

Q
37

One factor of $y^{\frac{1}{4}} + y^{-\frac{3}{4}} - 2y^{-\frac{7}{4}}$ is

A) $(y-2)$

B) $(y-3)$

C) $(y+3)$

D) $(y-1)$

E) $(y+1)$

Q
38

If $18(x+1)^{-1/2} + 2(x+1)^{1/2} = \frac{A(x+B)}{(x+1)^{1/2}}$, then $A+B=$

A) 10

B) -2

C) 2

D) 8

E) 12

Q
39

$$[2x + (y - 1)][2x - (y - 1)] + [2x - (y - 1)]^2 =$$

A) $8x^2 + 2xy - 4x$

B) $8x^2 - 4xy - 4x$

C) $8x^2 - 4xy + 4x$

D) $8x^2 - 2xy + 4x$

E) $8x^2 + 4xy - 4x$

Answer Key

"Original" shows the question number in the source worksheet.

Q	Original	Ans.	Value
1	3	**A**	$4x^2 - 2x + 1$
2	5	**A**	3
3	6	**A**	6
4	11	**A**	$x^2 - 4x + 7$
5	12	**A**	27
6	19	**A**	$9z^6 - 12z^3y^4 + 16y^8$
7	22	**A**	$4a^2 + 10a + 6$
8	34	**A**	$(x + 2)$
9	1	**A**	$y + 2$
10	13	**A**	$2x - 3y$
11	18	**A**	$3x - 5z$
12	27	**A**	$x^2 + x + 1$
13	28	**A**	$x + 2$
14	30	**C**	$4x^2 - 2x + 1$
15	32	**A**	$y + x$
16	37	**A**	$y^2 - y + 1$
17	2	**A**	11
18	8	**A**	$(q - p + 2)$
19	9	**A**	$x + 2$
20	10	**A**	$a - 2b - 2$
21	14	**A**	$(x^n + 1)(x^{2n} + 1)$
22	15	**A**	$6x - 9y - 1$
23	17	**A**	$y^2 + 4y + 8$
24	20	**A**	$p^2 + q^2 + 3$
25	21	**A**	$(3a + 13)$
26	23	**A**	$(xy + a^2 - 5)$
27	29	**A**	4
28	36	**D**	80
29	4	**A**	$x^2 + 9$
30	7	**A**	$2t + 1$
31	16	**A**	$x - 1$
32	24	**A**	$\frac{x^2 + 3}{\sqrt{x^2 + 1}}$
33	25	**A**	$\frac{(-3x - 4)\sqrt[3]{x}}{\sqrt[3]{x - 2}}$
34	26	**A**	$2x + 1$
35	31	**E**	$x^2 + 2$
36	33	**A**	$1 + x^2$
37	35	**D**	$(y - 1)$

Q	Original	Ans.	Value
38	38	**E**	12
39	39	**C**	$8x^2 - 4xy + 4x$