Practice Exercises on Factoring the Sum and Difference of Two Cubes

A. Finding the Cube Root

Express the following in exponential form with a power of 3. One point each.

1. 125
2. $\frac{1}{8}$
3. -8
4. $216y^3$
5. $-64x^6y^12$

B. Factoring the Sum and Difference of Two Cubes

Factor each polynomial completely. Write the final answers only. One point each.

1. $x^3 + 125$
2. $m^3 - 64$
3. $8x^3 - 27$
4. $1 - a^3$
5. $n^3 + 27$
6. $27x^3 - 8$
7. $64n^3 + 1$
8. $343m^3 + 64n^3$
9. $a^3 - 343b^3$
10. $16x^4 + 54xy^3$

C. Fill in the Blank

Factor each polynomial completely then supply the missing terms. One point each.

1. $a^3 + 64 = (\_\_\_\_ + 4)(a^2 - 4a + 16)$
2. $u^3 + 8 = (u + 2)(\_\_\_\_ - 2u + 4)$
3. $125 - x^3 = (5 - x)(25 + \_\_\_\_ + x^2)$
4. $a^3 + 125 = (\_\_\_\_ + 5)(a^2 - 5a + 25)$
5. $x^3 + 1 = (x + 1)(\_\_\_\_ - x + 1)$
6. $-27u^3 + 125 = (-3u + \_\_\_\_)(9u^2 + 15u + 25)$
7. $250x^4 + 128x = 2x(\_\_\_\_ + 4)(25x^2 - 20x + 16)$
8. $8a^3 + 125 = (2a + 5)(\_\_\_\_ - 10a + 25)$
9. $8x^4 + x = x(2x + 1)(\_\_\_\_ - 2x + 1)$
10. $m^3 + 8n^3 = (m + \_\_\_\_)(m^2 - 2mn + 4n^2)$

Answer Key

A. Finding the Cube Root

1. $125 = 5^3$
2. $\frac{1}{8} = (\frac{1}{2})^3$
3. $-8 = (-2)^3$
4. $216y^3 = (6y)^3$
5. $-64x^6y^{12} = (-4x^2y^4)^3$

B. Factoring the Sum and Difference of Two Cubes

1. $x^3 + 125 = (x+5)(x^2 - 5x + 25)$
2. $m^3 - 64 = (m-4)(m^2 + 4m + 16)$
3. $8x^3 - 27 = (2x-3)(4x^2 + 6x + 9)$
4. $1 - a^3 = (1-a)(1 + a + a^2)$
5. $n^3 + 27 = (n+3)(n^2 - 3n + 9)$
6. $27x^3 - 8 = (3x-2)(9x^2 + 6x + 4)$
7. $64n^3 + 1 = (4n+1)(16n^2 - 4n + 1)$
8. $343m^3 + 64n^3 = (7m+4n)(49m^2 - 28mn + 16n^2)$
9. $a^3 - 343b^3 = (a-7b)(a^2 + 7ab + 49b^2)$
10. $16x^4 + 54xy^3 = 2x(2x+3y)(4x^2 - 6xy + 9y^2)$

C. Fill in the Blank

1. a
2. u^2
3. $5x$
4. a
5. x^2
6. 5
7. $5x$
8. $4a^2$
9. $4x^2$
10. $2n$