

Practice Problems

1. Completely factor each of the following.

a) $x^3 - y^3$

c) $x^{12} - 125$

e) $-1 + 1000k^6$

b) $a^3 - 8b^3$

d) $27 - 8m^6$

f) $8p^3 - 125q^9$

2. Completely factor each of the following.

a) $5x^4 - 5x$

d) $a^3x^2 - a^3y^2 - b^3x^2 + b^3y^2$

b) $5b - 3a + 3ax^3 - 5bx^3$

e) $2abp^3x^2 - 16abq^3x^2 - 2abp^3y^4 + 16abq^3y^4$

c) $2a^2b^3 - 54a^2c^6$

3. Simplify each of the following.

a) $\frac{6x^3 - 6}{x^2 + x + 1}$

b) $\frac{a^2 - b^2}{a^3 - b^3}$

c) $\frac{a^2x - a^2y - 4b^2x + 4b^2y}{ax^3 - ay^3 - 2bx^3 + 2by^3}$

Answers

1. a) $(x - y)(x^2 + xy + y^2)$ b) $(a - 2b)(a^2 + 2ab + 4b^2)$ c) $(x^4 - 5)(x^8 + 5x^4 + 25)$
d) $(3 - 2m^2)(4m^4 + 6m^2 + 9)$ e) $(10k^2 - 1)(100k^4 + 10k^2 + 1)$ f) $(2p - 5q^3)(4p^2 + 10pq^3 + 25q^6)$
2. a) $5x(x - 1)(x^2 + x + 1)$ b) $(3a - 5b)(x - 1)(x^2 + x + 1)$ c) $2a^2(b - 3c^2)(b^2 + 3bc^2 + 9c^4)$
d) $(x + y)(x - y)(a - b)(a^2 + ab + b^2)$ e) $2ab(p - 2q)(p^2 + 2pq + 4q^2)(x - y^2)(x + y^2)$
3. a) $6x - 6$ b) $\frac{a + b}{a^2 + ab + b^2}$ c) $\frac{a + 2b}{x^2 + xy + y^2}$