

4.4 Factoring Polynomial Functions CYU

Use when you get it right all by yourself

S Use when you did it all by yourself, but made a silly mistake

H Use when you could do it alone with a little help from teacher or peer

G Use when you completed the problem in a group

X Use when a question was attempted but wrong (get help)

N Use when a question was not even attempted

CONCEPTS	BASIC	INTERMEDIATE	ADVANCED
GCF: Greatest Common Factor	1, 2, 3, 9		
Difference of Squares	2	8	
Sum/Difference of Cubes		4, 5	
Factoring by Grouping	6, 7		
Factors of Polynomials	10, 11	12, 13	
Real-World Application	14	15	

Factor the polynomial completely. Show all work to earn full credit.

1. $x^3 - 2x^2 - 24x$

$x(x-6)(x+4)$

2. $4k^5 - 100k^3$

$4k^3(k-5)(k+5)$

3. $3r^6 - 11r^5 - 20r^4$

$r^4(3r+4)(r-5)$

4. $y^3 + 512$

$(y+8)(y^2-8y+64)$

5. $c^3 - 27$

$(c-3)(c^2+3c+9)$

6. $m^3 - m^2 + 7m - 7$

$(m^2+7)(m-1)$

7. $4q^3 - 16q^2 - 9q + 36$

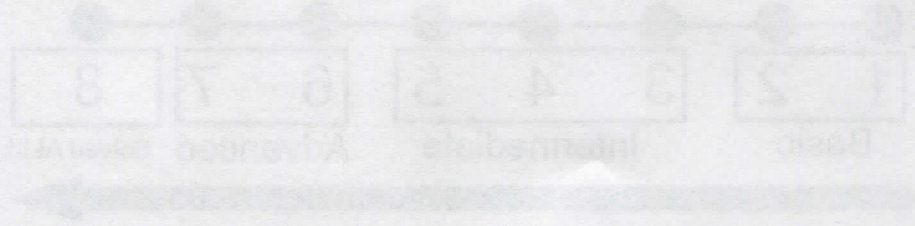
$(2q+3)(2q-3)(q-4)$

8. $49k^4 - 9$

$(7k^2+3)(7k^2-3)$

9. $3r^8 + 3r^5 - 60r^2$

$3r^2(r^3+5)(r^3-4)$



Determine whether the binomial is a factor of the polynomial. Show all work to earn full credit.

10. $f(x) = 2x^3 + 5x^2 - 37x - 60; x - 4$

11. $h(x) = 6x^5 - 15x^4 - 9x^3; (x + 3)$

factor
 $f(4) = 0$

not a factor
 $h(-3) \neq 0$

Show that the binomial is a factor of the polynomial. Then factor the polynomial completely. Show all work.

12. $s(x) = x^4 + 4x^3 - 64x - 256; x + 4$

13. $h(x) = x^3 - x^2 - 24x - 36; x - 2$

$s(-4) = 0; \text{synthetic } \div$

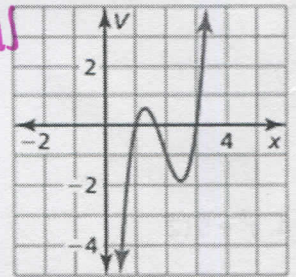
$h(-2) = 0; \text{synthetic } \div$

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

$h(x) = (x+2)(x-6)(x+3)$

14. **MODELING WITH MATHEMATICS** The volume (in cubic inches) of a rectangular birdcage can be modeled by $V = 3x^3 - 17x^2 + 29x - 15$, where x is the length (in inches). Determine the values of x for which the model makes sense. Explain your reasoning.

$x > 3 \checkmark$ all positive lengths
 $V = (x-1)(x-3)(3x-5)$



15. **PROBLEM SOLVING** The profit P (in millions of dollars) for a shoe manufacturer can be modeled by $P = -21x^3 + 46x$, where x is the number (in millions) of shoes produced. The company now produces 1 million shoes and makes a profit of \$25 million, but it would like to cut back production. What lesser number of shoes could the company produce and still make the same profit?

$x = 1, 0.7, -1.7$

So, the company needs to sell ≈ 0.7 million shoes to have a \$25 million profit.

CYU Reflection: How far can you go: basic, intermediate, or advanced?

Rate your mastery level!

How confident are you with the skills this CYU covered? Circle the score you would give yourself.

