Algebra II - Chapter 6 Exam Review

In case you get stuck *(and can't find a math teacher nearby)*, each problem has a *(page # and example #)* to refer to in your textbook. Please do all work <u>on separate paper</u>. NO LATE REVIEWS ACCEPTED.

1. Write $4x^2(-2x^2 + 5x^3)$ in standard form. Then classify it by degree and number of terms. *(Pg. 313, example 1)*
2. Use a graphing calculator to find a quartic (4th degree) function to model the data. *(Pg. 314, example 3)*

x	1	2	3	4	5	6	7	8	9	10
$f(x)$	12	4	5	13	9	16	19	16	24	43

3. The table shows the number of hybrid cottonwood trees planted in Oregon since 1995. Find a **<u>cubic</u>** function to model the data and use it to estimate the number of cottonwoods planted in 2006. *(Pg. 314, example 3)*

Years since 1995	1	3	5	7	9
Trees planted (in thousands)	1.3	18.3	70.5	177.1	357.3

4. Write the expression $(x + 6)(x - 4)$ as a polynomial in standard form. *(Pg. 319, example 1)*
5. Write $6x^3 - 24x^2 - 72x$ in factored form. *(Pg. 320, example 2)*
6. Write $3x^3 + 27x^2 + 60x$ in factored form. *(Pg. 320, example 2)*
7. Write a polynomial function in standard form with zeros at –4, 5, and 2. *(Pg. 322, example 5)*
8. Write a polynomial function in standard form with zeros at –1, 3, and –5. *(Pg. 322, example 5)*
9. Find the zeros of $f(x) = (x + 5)^2(x - 4)^5$ and state the multiplicity. *(Pg. 322, example 6)*
10. Divide $3x^3 - 3x^2 - 4x + 3$ by $x + 3$ by using **<u>both</u>** long division and synthetic division *(you should get the same answer using both methods)*. *(Pg. 327-8, examples 1 and 3)*
11. Divide $2x^3 - 3x^2 + 3x - 3$ by $x - 2$ by using **<u>both</u>** long division and synthetic division *(you should get the same answer using both methods)*. *(Pg. 327-8, examples 1 and 3)*
12. Determine which of the following binomials are factors of $-2x^3 + 14x^2 - 24x + 20$. *(Pg. 327, example 2)*
    a. $x + 5$ b. $x + 20$ c. $x - 24$ d. $x - 5$
13. Use synthetic division to find $P(4)$ for $P(x) = x^4 + 10x^3 - 5x^2 + 4x + 6$. *(Pg. 329, example 5)*
14. Use synthetic division to find $P(-2)$ for $P(x) = x^4 + 6x^3 + 10x^2 + 5x + 7$. *(Pg. 329, example 5)*
15. *(Refer to Pg. 328, example 4, for this word problem)*
    The volume in cubic feet of a bedroom closet can be expressed as the product of its three dimensions: $V(x) = x^3 - 7x^2 + 7x + 15$. The width is $x + 1$.
    a. Find linear expressions with integer coefficients for the other dimensions.
    b. If the width of the closet is 8 feet, what are the other dimensions?
16. Factor the expression: $x^3 + 216$ *(Pg. 334, example 3)*
17. Factor **<u>and solve</u>** $x^3 - 64 = 0$. Find all complex roots. *(Pg. 335, example 4)*
18. Factor **<u>and solve</u>** $27x^3 + 125 = 0$. Find all complex roots. *(Pg. 335, example 4)*
19. Solve $x^4 - 20x^2 = -64$. *(Pg. 335, example 5)*

20. Solve $x^4 - 29x^2 = -100$. *(Pg. 335, example 5)*

21. Use the Rational Root Theorem to list all possible rational roots of the polynomial equation $x^3 + x^2 - 7x - 4 = 0$. Do **not** find the actual roots. *(Pg. 342, example 1)*

22. Use the Rational Root Theorem to list all possible rational roots of the polynomial equation $x^3 + 9x^2 + 5x - 9 = 0$. Do **not** find the actual roots. *(Pg. 342, example 1)*

23. Find the rational roots of $x^4 - 3x^3 - 5x^2 + 9x - 2 = 0$. *(Pg. 342, example 2)*

Find all roots/zeros of each polynomial equation. *(Pg. 342, example 2)*
For these problems, use your graphing calculator to find the rational roots on the graph. Then use synthetic division to factor the polynomial. You may need to use the quadratic formula (or solve by using square roots) to finish these off.

24. $x^3 - 2x^2 + 10x + 136 = 0$

25. $x^4 - 5x^3 + 11x^2 - 25x + 30 = 0$

26. $2x^4 - x^3 + 26x^2 - 16x - 96 = 0.$

A polynomial equation with rational coefficients has the given roots. Find two additional roots. *(Pg. 343-344, examples 3 and 4)*

27. $1 + \sqrt{5}, 3 - \sqrt{3}$

28. $1 + \sqrt{6}, 6 - \sqrt{5}$

29. $5 + i, -6i$

30. Find a third-degree polynomial equation with rational coefficients that has roots –5 and $4 + i$.

For the equation, find the number of complex (i.e., total) roots, the possible number of real roots, and then list the possible rational roots. Do NOT find the actual roots. *(Pg. 348, example 1)*

31. $x^7 - 12x^6 + 4x^2 - 5x + 7 = 0$

32. $4x^6 - 4x^3 + 8 = 0$

Use Pascal's Triangle to expand the binomial. *(Pg. 360, examples 1 and 2)*

33. $(a - 6)^3$

34. $(b + 5)^4$

35. **Find the third term of the binomial expansion for:**
$(s - 2)^4$

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Answer Section

1. $20x^5 - 8x^4$; quintic binomial
2. $f(x) = 0.08x^4 - 1.73x^3 + 12.67x^2 - 34.68x + 35.58$
3. $T(x) = 0.4x^3 + 0.8x^2 + 0.1x$; 630.3 thousand trees
4. $x^2 + 2x - 24$
5. $6x(x - 6)(x + 2)$
6. $3x(x + 5)(x + 4)$
7. $f(x) = x^3 - 3x^2 - 18x + 40$
8. $f(x) = x^3 + 3x^2 - 13x - 15$
9. –5, multiplicity 2; 4, multiplicity 5
10. $3x^2 - 12x + 32$, R –93
11. $2x^2 + x + 5$, R 7
12. only (d), $x - 5$, is a factor
13. 838
14. 5
15. **a.** height, $x - 5$; depth, $x - 3$
    b. height, 2 ft; depth, 4 ft
16. $(x + 6)(x^2 - 6x + 36)$
17. $x = 4,\ x = -2 \pm 2i\sqrt{3}$
18. $x = \frac{5}{3},\ x = -\frac{5}{6} \pm \frac{5i\sqrt{3}}{6}$
19. 4, –4, 2, –2
20. 5, –5, 2, –2
21. –4, –2, –1, 1, 2, 4
22. –9, –3, –1, 1, 3, 9
23. $x = 1, x = -2$ *(the last 2 roots are irrational:* $x = 2 \pm \sqrt{3}$ *)*
24. –4, $3 \pm 5i$
25. $2, 3, \pm i\sqrt{5}$
26. $2, -\frac{3}{2}, \pm 4i$
27. $1 - \sqrt{5}, 3 + \sqrt{3}$
28. $1 - \sqrt{6}, 6 + \sqrt{5}$
29. $5 - i,\ 6i$
30. $x^3 - 3x^2 - 23x + 85 = 0$
31. 7 complex roots; 1, 3, 5, or 7 real roots; possible rational roots: ±1, ±7
32. 6 complex roots; 0, 2, 4, or 6 real roots; possible rational roots: $\pm\frac{1}{4}, \pm\frac{1}{2}, \pm 1, \pm 2, \pm 4, \pm 8$
33. $a^3 - 18a^2 + 108a - 216$
34. $b^4 + 20b^3 + 150b^2 + 500b + 625$
35. $24x^2$