

**Secondary Math III Honors
Module 3 Study Guide
Polynomials**

Directions: Show all work.

Identify the following functions as linear, exponential, quadratic, cubic, or logarithmic.

<p>1.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>x</td><td>y</td></tr> <tr><td>0</td><td>1</td></tr> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>8</td></tr> </table>	x	y	0	1	1	2	2	4	3	8	<p>2.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>x</td><td>y</td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>8</td></tr> <tr><td>3</td><td>27</td></tr> </table>	x	y	0	0	1	1	2	8	3	27	<p>3.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>x</td><td>y</td></tr> <tr><td>1</td><td>0</td></tr> <tr><td>2</td><td>1</td></tr> <tr><td>4</td><td>2</td></tr> <tr><td>8</td><td>3</td></tr> </table>	x	y	1	0	2	1	4	2	8	3	<p>4.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>x</td><td>y</td></tr> <tr><td>0</td><td>1</td></tr> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>7</td></tr> </table>	x	y	0	1	1	2	2	4	3	7	<p>5.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>x</td><td>y</td></tr> <tr><td>0</td><td>1</td></tr> <tr><td>1</td><td>2</td></tr> <tr><td>2</td><td>3</td></tr> <tr><td>3</td><td>4</td></tr> </table>	x	y	0	1	1	2	2	3	3	4
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Use the equations below to answer questions 6-9.

$$f(x) = x + 1$$

$$g(x) = x^2 + 2$$

$$h(x) = x^3 + 3$$

6. Find $f(x) + g(x)$

7. Find $f(x) - g(x)$

8. Find $f(x) \cdot g(x)$

9. Find $f(x)[h(x) + g(x)]$

Solve for x for questions 10-12.

10. $9x^2 - 25 = 0$

11. $x^2 + 4x = -3$

12. $(x + 4)(x - 3)(x + 1) = 0$

13. Write a polynomial in **factored form** that has a leading coefficient of 2, and the following roots: -1, 2, -3.

14. Write a polynomial in **standard form** that has a leading coefficient of 2, and the following roots: -1, 2, -3.

Use the binomial expansion and Pascal's triangle to solve questions 15-16.		17. Write a polynomial in factored form <u>and</u> standard form with a leading coefficient of -3, and the following roots: 4, 2i, and _____.
15. What is the third term in the expansion of $(x + 7)^4$?	16. What is the second term in the expansion of $(2 + y)^3$?	
For 18-19: Use the Remainder Theorem to determine if the following are roots of the given polynomial or not; state the remainder.		
18. $(x^3 + 3x^2 - 59x + 30) \div (x - 6)$		
19. $(n^3 + n^2 - 28n + 28); f(-4)$		
For 20-21: Divide the following polynomials.		
20. $(3n^3 - 16n^2 + 20n - 4) \div (3n - 1)$	21. $(p^3 + 3p^2 + 2) \div (p + 3)$	
Using the rational root theorem, factor the following polynomials completely and state both the real and complex roots.		
22. $x^3 + 9x^2 + 15x + 7 = 0$	23. $x^4 + 3x^2 - 40 = 0$	

Graph the following functions, make sure to label all points clearly.

24. $f(x) = (x + 2)^2(x - 3)^2$

Degree of function: _____

Even or odd degree: _____

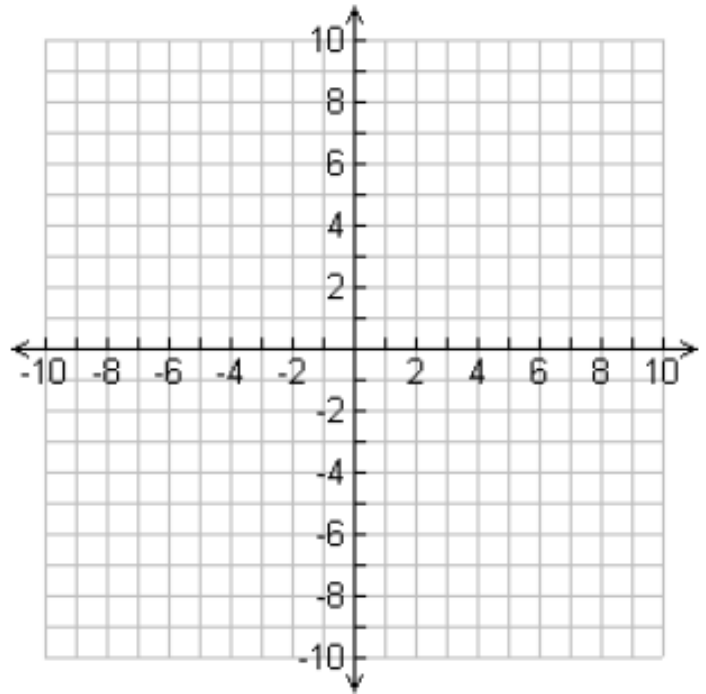
Positive or negative leading coefficient:

End Behavior:

As $x \rightarrow -\infty, f(x) \rightarrow$ _____.

As $x \rightarrow \infty, f(x) \rightarrow$ _____.

Roots, including multiplicity:



25. $f(x) = -(x - 4)^4(x - 1)^2$

Degree of function: _____

Even or odd degree: _____

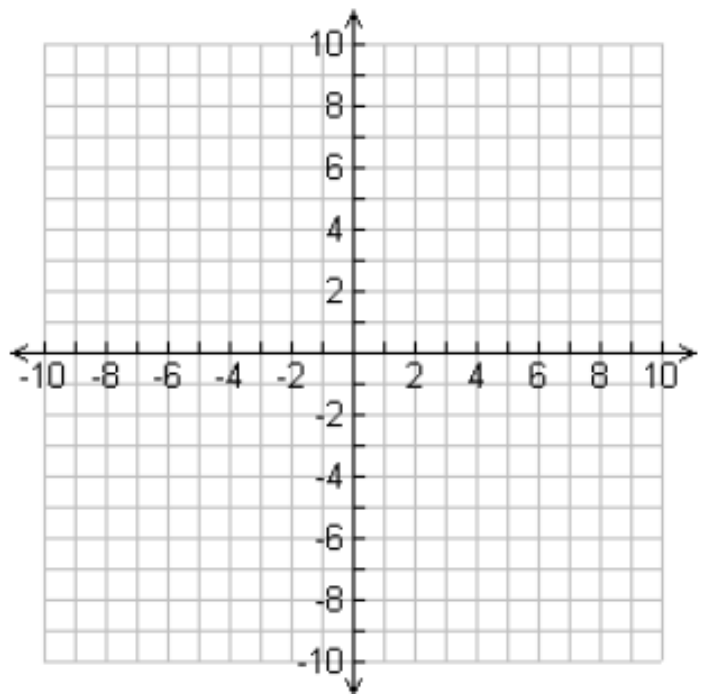
Positive or negative leading coefficient:

End Behavior:

As $x \rightarrow -\infty, f(x) \rightarrow$ _____.

As $x \rightarrow \infty, f(x) \rightarrow$ _____.

Roots, including multiplicity:



26. $f(x) = x(x^2 + 4)$

Degree of function: _____

Even or odd degree: _____

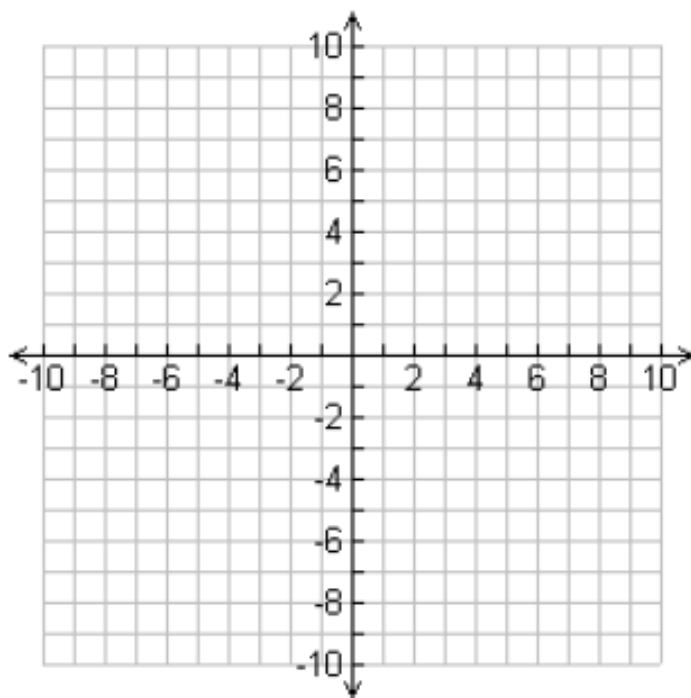
Positive or negative leading coefficient:

End Behavior:

As $x \rightarrow -\infty, f(x) \rightarrow$ _____.

As $x \rightarrow \infty, f(x) \rightarrow$ _____.

Roots, including multiplicity:



NO CALCULATOR ALLOWED.

27. $f(x) = -x^2(x - 3)^3$

Degree of function: _____

Even or odd degree: _____

Positive or negative leading coefficient:

End Behavior:

As $x \rightarrow -\infty, f(x) \rightarrow$ _____.

As $x \rightarrow \infty, f(x) \rightarrow$ _____.

Roots, including multiplicity:

