

Quiz today, but first...questions  
on 3.6 HW?

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3.  $a^3 - x^3 - b^3$

4.  $64x^3 - 125$

5.  $27x^3 + 8$

6.  $1000x^3 - y^3$

Sum/Difference of Cubes

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a^3 + b^3)$

$a = 3x$

$b = 2$

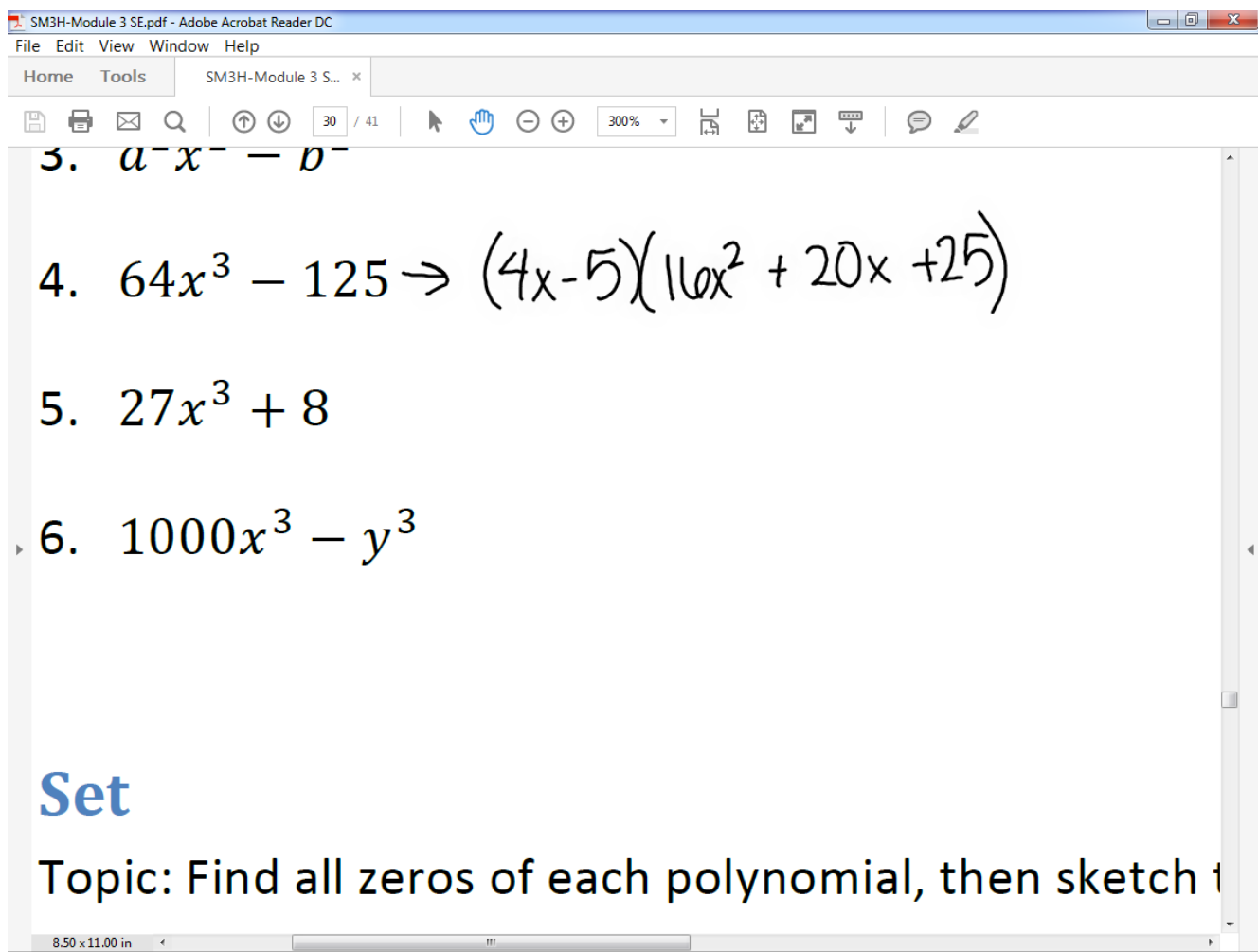
$(3x+2)((3x)^2 - (3x)(2) + (2)^2)$

$(3x+2)(9x^2 - 6x + 4)$

## Set

Topic: Find all zeros of each polynomial, then sketch t

8.50 x 11.00 in



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3.  $a^3 - x^3 - b^3$

4.  $64x^3 - 125 \rightarrow (4x-5)(16x^2 + 20x + 25)$

5.  $27x^3 + 8$

6.  $1000x^3 - y^3$

**Set**

Topic: Find all zeros of each polynomial, then sketch t

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1.  $4x^2 - 25$
2.  $9x^2 - 16y^2$
3.  $a^2x^2 - b^2 = (ax+b)(ax-b)$   
 $(ax)^2 - b^2$
4.  $64x^3 - 125$
5.  $27x^3 + 8$
6.  $1000x^3 - y^3$

8.50 x 11.00 in

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14. Factor  $(x^6 - y^6)$  as the difference of 2 squares. Then factor your answer as the difference of 2 cubes and the sum of 2 cubes.  $(x^3)^2 - (y^3)^2$

$((x^3)^3 - (y^3)^3)$

$((x^2)^3 + (-y^2)^3)$

15. Factor  $(x^6 - y^6)$  as the difference of 2 cubes. Then factor your answer.

16. Should you ultimately get the same answers? Did you? Explain.

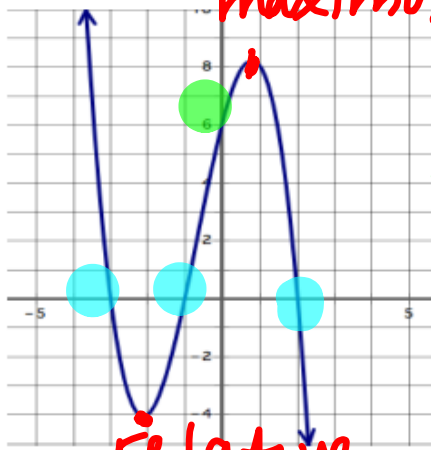
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# 3.7 Graphing all Poly's

## A Solidify Understanding Task

Part I: Connecting the number system to polynomials.

1. Write everything you know about the following polynomial:



relative maximum

relative minimum

degree: 3

x-intercepts: -3, -1, 2  
 (-3, 0), (-1, 0), (2, 0)

y-intercept: 6  
 (0, 6)

E. Ben: As  $x \rightarrow -\infty, f(x) \rightarrow -\infty$

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

domain:  $(-\infty, \infty)$

range:  $(-\infty, \infty)$

negative lead coeff.



<http://www.flickr.com/photos/cu2nite/34778>

2. In case this was not part of what you wrote in question 1, use function notation to highlight values of importance for this function. (For example:  $f(0) = 6$ )

$f(-3) = 0$        $f(2) = 0$   
 $f(-1) = 0$        $f(0) = 6$

3. The graph above gives us quite a bit of information to assist in writing the equation. What if instead you have a polynomial function written out in standard form and are given one factor, how could you determine the graph of the function?

last term is all 3 mult together

For each, one factor of a cubic function is given. Do your best to find the remaining factors and then use this information to determine all roots of the function and sketch a graph.

4. Function:  $f(x) = x^3 + 3x^2 - 4x - 12$  Factor:  $(x + 3)(x)(x)$  Roots of function:

$-12 \div 3 = -4$   
 options: -2, 2;  
               -1, 4; 1, -4

$x = -3,$   
 $-2,$   
 $2$

5. Function:  $f(x) = x^3 + 6x^2 + 11x + 6$  Factor:  $(x + 1)$  Roots of function:

$6 \div 1 = 6$

$x = -1,$

6. Function:  $f(x) = x^3 + 3x^2 - 12x - 12$       Factor:  $(x - 3)$       Roots of function:

7. Function:  $f(x) = x^3 - x^2 + 4x - 4$       Factor:  $(x - 2i)(x + 2i)$       Roots of function:  
 $x = 2i,$   
 $-2i,$

8. Function:  $f(x) = x^3 - 3x^2 - 3x - 9$       Factor:  $(x - 3)$       Roots of function:

9. Find all linear factors and graph:  $f(x) = x^4 - 16$       Roots of function:

Part II: Given the roots, find the factors and write the polynomial equation in standard form.

10. Roots: 3, -4, and 0

11. Roots: 5,  $2i$ ,  $-2i$

12. Roots:  $\sqrt{3}$ ,  $-\sqrt{3}$ , -2

13. Find the factored form of the cubic function with roots 2,  $3i$  and \_\_\_

14. Conclusion: What have you learned about polynomial functions as a result of this task?

# Homework

## 3.7 "Ready, Set, Go"