7.3 – Factor and Solving Polynomials

"Smartphone, take me to the lesson!"

Write your questions and thoughts here!

Two-Step Factoring

Always look for a GCF to factor out first!

a. $3x^4 - 39x^3 + 108x^2$ b. $4x^3 - 36x$

Factoring by Grouping

Sometimes if you have a polynomial with no common factor in EVERY term, factor by grouping can work….

Examples: a. $12x^3 - 10x^2 - 18x + 15$ b. $24x^3 - 16x^2 - 3x + 2$

c. $10r^3 + 6r^2 - 5r - 3$ d. $28x^3 + 49x^2 - 16x - 28$

Factoring Polynomials in Quadratic Form

Examples: a. $25x^4 - 49$ b. $2x^8 + 10x^5 + 12x^2$

c. $x^3 + 7x^2 - 9x - 63$ d. $16g^4 - 625$

Factoring with Cube Patterns

Sum of Two Cubes	$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ Rewrite differences with as a negative b term.

Examples: a. $64x^3 + 27 =$ b. $8x^3 - 125 =$

c. $3y^5 - 75y^3$

d. $16b^5 + 686b^2$

CHOOSE THE APPROPRIATE METHOD!!!!

a. $16x^3 - 44x^2 - 42x$

b. $n^4 - 4n^2 - 60$

c. $z^5 - 3z^4 - 16z + 48$

d. $32w^5 - 108w^2$

Solving Polynomial Equations

Now we can use the zero product property to ***solve*** polynomial equations as well!

a. $y^3 - 5y^2 = 0$

b. $-21x^3 + 15x^2 = -6x^4$

c. $18x^3 = 3x^5 + 15x$

d. $d^6 - 4d^4 - 9d^2 + 36 = 0$

Now summarize what you have learned!

Practice 7.3

Factor each expression completely.

1. $x^3 + x^2 - 6x$

2. $2x^4 - 12x^3 + 18x^2$

3. $10x^4 - 90x^2$

4. $x^3 - 7x^2 + 12x$

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Factor each expression using the sum of cubes formula. $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

5. $27x^3 + 125$

6. $8x^3 + 27$

7. $8x^3 - 1$

8. $64 - x^3$

Factor each expression by grouping.

9. $x^3 + 5x^2 - 6x - 30$

10. $7r^3 - 42r^2 - 3r + 18$

11. $5n^3 + 40n^2 - n - 8$

12. $6x^3 - x^2 + 42x - 7$

Factor each quadratic form.

13. $x^4 + 6x^2 - 16$

14. $m^4 - 1$

15. $5a^5 + 55a^3 + 150a$

16. $4x^5 - 16x^3 + 12x$

7.3 – Factor and Solving Polynomials

Solve each quadratic equation.

17. $x^3 - 2x^2 - 5x = -10$

18. $x^4 - 7x^2 - 18 = 0$

19. $x(3x - 5)(x - 4) = 0$

20. $9x^4 + 25 = 30x^2$

21. $8x^4 + 81 = 54x^2$

22. $x^3 = 2x^2 - x$

23. $x^9 = 25x^5 - 144x$

OPTIONAL: ONLY FOR JEDIS OF FACTORING!!!

SAT Review

MUTIPLE CHOICE

For what value of x is the statement below false?

$$5x^2 < (5x)^2$$

(A) -5
(B) 0
(C) $\frac{1}{5}$
(D) 1
(E) For no value of x

FREE RESPONSE

Let $\boxed{x}$ be defined as $\boxed{x} = x^2 - x$ for all values of x. If $\boxed{a} = \boxed{a - 2}$, what s the value of a?

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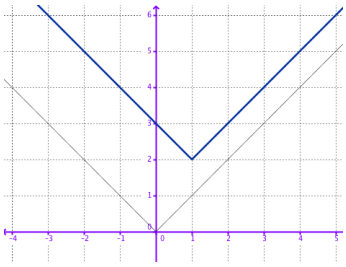
Algebra Skillz

GRAPH

Below, the graph of $f(x) = |x - 1| + 2$ is sketched in bold. Its parent function $f(x) = |x|$ is represented by the thin curve

1. Describe the translation of the parent graph.

2. How does the translation relate to the equation?



SIMPLIFY

3. $\sqrt{25} + \sqrt{40} + \sqrt{90}$

4. $(x^2 - 25x) + (x^2 + 25x)$

SOLVE

5. Solve: $x^2(x + 14) = 0$

6. Factor and solve.
$x^2 - 25x + 24 = 0$

Application 7.3

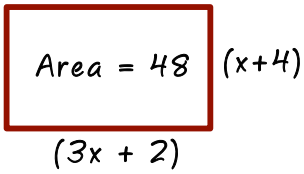
1. Factor: $z^5 - 3z^4 - 16z + 48$

2. Solve: $48y^5 = 27y^3$

3. Ramstein HS decides that the foyer needs a giant bust of Mr. Brust's head: a "Bust-o-Brust," you could say. The Bust-o-Brust is to be made from 250 cubic inches of clay in the shape of a rectangular prism (see # 4b on the next page). The height and the width of the prism each have to be 5 inches less than the length. Draw a picture and solve a polynomial equation to find the dimensions of the prism.

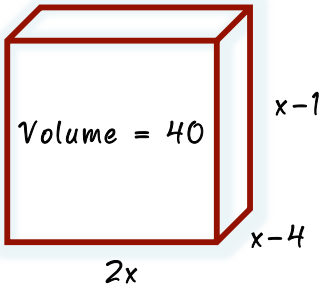
4. Find the possible value(s) of x.

a.



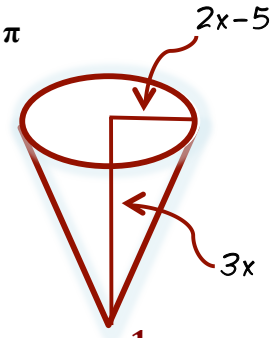
Rectangle

b.



c.

Volume = 125π



$$V_{cone} = \frac{1}{3}\pi r^2 h$$

5. The longer leg of a right triangle is one unit shorter than twice the length of the shorter leg. The hypotenuse is one unit longer than twice the length of the shorter leg. Use the Pythagorean Theorem to find the lengths of each side of the right triangle.