Your Name

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Radicals and Solving Binomial Equations

11 / 5 / 2020

Notes

Name______________________________________Polynomial Introduction Homework

Odd and Even Polynomials and Polynomials in general

Use the given polynomials to answer the following questions, if false explain why

1. F $f(x)=8x^5-12x^4+10x+128$ is called an even binomial
   If false explain why?________________________

2. F $f(x)=11x^6-9x^4+7x$ is called an odd polynomial
   If false explain why?________________________

3. F Any polynomial is considered ODD if it has an odd number of terms
   If false explain why?________________________

4. F Any polynomial is considered EVEN if it only has an even number as a coefficient or constant
   If false explain why?________________________

5. F ______ $f(x)=8x^4-128x^5$ has a positive lead coefficient
   If false explain why?________________________

6. F $f(x)=8x^4-6x^3+4x^2+8x$ $+0x^0$ has all of its terms
   If false explain why? constant term miss

7. F $f(x)=8x^4-128x^3+x^5-2x^2-12$ has all of its terms
   If false explain why? Linear term missing

8. F $f(x)=8x^4-128x^3+x^5-2x^2-12$ has lead coefficient of 0
   If false explain why?________________________

9. F $f(x)=8x^4-128x^3+x^5-2x^2-12$ is in standard form
   If false explain why?________________________

10. F $f(x)=8x^4-128x^3+x^5-2x^2-12$ has lead coefficient of 8
    If false explain why? 1

11. T $f(x)=8x^4-128x^3+x^5-2x^2-12$ $+0x$ has linear term with a coefficient of 0
    If false explain why?________________________

12. F The maximum number of terms of a polynomial should be equal to the degree of a polynomial
    If false explain why? $x^2+x^1+x^0$

13. F The number of possible roots of a polynomial should be equal to the one more than degree of a polynomial
    If false explain why?________________________

Name____ Radical Introduction and Solving Homework

In algebra 1, hopefully you learned how to use a radical to solve an equation with an exponent

1. When solving the previous equation, which is the more correct response?
   a. The solution(s) of this equation are the x coordinates of the x intercepts of $f(x)=8x^4-128$
   b. The solution(s) of this equation are the x coordinates of the some ordinary points on the function $f(x)=8x^4-128$

Index - # of repeated factors

2. State the index and radicand of the following expression $\sqrt[5]{18}$ radicand - # under the root
   a. Index of radical 5
   b. Radicand of the radical 18

$x^3 = x \cdot x \cdot x$

$x^2 = x \cdot x$

3. State the following expression $\sqrt[5]{18}$ using a fractional exponent $\sqrt[5]{18}=$ $18^{1/5}$

Index is denominator $18^{2/5} = \sqrt[5]{18^2}$ numerator

$x^1 = x$

4. Approximate the following expression $\sqrt[5]{18}$ round to the three decimal places 1.783

$\sqrt[5]{18} = 18^{1/5} = 18 \wedge (1/5) = 1.7826$

$x^0 = 1$

5. Use $\sqrt[5]{32}$ to explain what a fifth root is or what it specifically tells us numerically

$\sqrt[5]{32} = \sqrt[5]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = \sqrt[5]{2^5} = 2^{5/5} = 2$

$x^{-1} = \frac{1}{x}$

$x^{-2} = \frac{1}{x^2}$

6. Why was $\sqrt[5]{32}$ a great example to explain what a fifth root is or what it specifically tells us numerically?

7. $5x^3-625$ is called a cubic binomial 2 terms

8. $5x^3-625$ has 5 as its lead coefficient and -625 as its constant

9. $5x^3-625$ is missing its Quadratic term and its Linear term

$5x^3 + 0x^2 + 0x^1 - 625x^0$

- EVEN indexed radicals must have a POSITIVE radicand to be REAL $\sqrt[4]{-16}$ imaginary
- ODD indexed radicals are ALWAYS REAL $\sqrt[3]{-8} = -2$
- IF the radicand is a power equal to the index of the radical then it can be expressed without radical

10. Simplify each of the following IF possible

$\sqrt[3]{\frac{8}{125}} = \frac{\sqrt[3]{8}}{\sqrt[3]{125}} = \frac{\sqrt[3]{2^3}}{\sqrt[3]{5^3}} = \frac{2}{5}$	$\sqrt[3]{10} = \sqrt[3]{2 \cdot 5}$ already simplified	$\sqrt[3]{-88} = \sqrt[3]{-8 \cdot 11} = \sqrt[3]{-8} \cdot \sqrt[3]{11} = \boxed{-2\sqrt[3]{11}}$

$\sqrt[3]{\frac{216}{343}} = \frac{6}{7}$	$\sqrt[3]{512} = 8$ $\sqrt[3]{-512} = \sqrt[3]{-8\cdot-8\cdot-8}$ $= \sqrt[3]{(-8)^3}$ $= -8$	$\sqrt[3]{36} = \sqrt[3]{2\cdot2\cdot3\cdot3}$ cant simplify $\sqrt[3]{108} = \sqrt[3]{2\cdot2\cdot3\cdot3\cdot3}$ $= 3\sqrt[3]{4}$

11. APPROXIMATE each of the following round to three decimal places

$\sqrt[3]{\frac{8}{125}} = \frac{2}{5} = 0.4$	$\sqrt[3]{10} = 2.154$	$\sqrt[3]{88^1} = 88^{\frac{1}{3}}$ $= 4.448$
$\sqrt[3]{\frac{216}{343}} = \frac{6}{7}$ $= 0.857$	$\sqrt[3]{512} = 8$	$\sqrt[3]{36} = 3.302$ $\sqrt[3]{108} = 4.762$

- EVEN indexed radicals must have a POSITIVE radicand to be REAL
- ODD indexed radicals are ALWAYS REAL
- IF the radicand is a power equal to the index of the radical then it can be expressed without radical

12. Simplify each of the following IF possible

$\sqrt[4]{\frac{81}{625}} = \frac{\sqrt[4]{81}}{\sqrt[4]{625}}$ $\boxed{\frac{3}{5}} = \frac{\sqrt[4]{3^4}}{\sqrt[4]{5^4}}$	$\sqrt[4]{10000}$ $\sqrt[4]{10\cdot10\cdot10\cdot10}$ $\sqrt[4]{10^4} = 10$	$\sqrt[4]{44} = \sqrt[4]{4\cdot11}$ $\sqrt[4]{2\cdot2\cdot11}$ Cannot be simplified more	$\sqrt[4]{\frac{1}{16}} = \frac{\sqrt[4]{1}}{\sqrt[4]{2^4}} = \frac{1}{2}$ $\sqrt[4]{-\frac{1}{16}}$ Imaginary

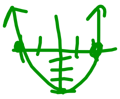
13. APPROXIMATE each of the following round to three decimal places

Solving Binomial Equations

1. move the constant term to the other side
2. undo the multiplication the variable term has
3. undo the exponent with the root

When you take an even root $\sqrt{\ }$ $\sqrt[4]{\ }$ $\pm$ answers

ex. $x^2 - 4 = 0$



$+4 \quad +4$

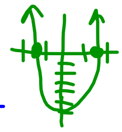
$\sqrt[2]{x^2} = \sqrt{4} = \sqrt{2\cdot 2}$

$x = \pm 2 \qquad = \sqrt{-2\cdot -2}$

$\boxed{x = 2 \text{ and } x = -2}$

need 2 solutions

ex. $3x^2 - 6 = 0$



$+6 \quad +6$

$\frac{3x^2}{3} = \frac{6}{3}$

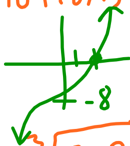
$\sqrt{x^2} = \sqrt{2}$

$x = \pm\sqrt{2}$

$x = 1.414$ & $x = -1.414$

odd roots have one answer

ex. $x^3 - 8 = 0$



$+8 \quad +8$

$\sqrt[3]{x^3} = \sqrt[3]{8} = \sqrt[3]{2\cdot 2\cdot 2}$

$\boxed{x = 2}$ $\quad \sqrt[3]{-8} = \sqrt[3]{-2\cdot -2\cdot -2}$

$\boxed{2 \text{ imaginary solutions}}$

need 3 solutions

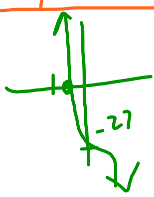
ex. $-125x^3 - 27 = 0$

$+27 \quad +27$

$\frac{-125x^3}{-125} = \frac{27}{-125}$

$\sqrt[3]{x^3} = \sqrt[3]{-\frac{27}{125}}$

$x = \frac{\sqrt[3]{-27}}{\sqrt[3]{125}} = \frac{-3}{5}$



$\boxed{x = -\frac{3}{5} \text{ \& 2 imaginary solutions}}$

ex. $x^4 - 16 = 0$

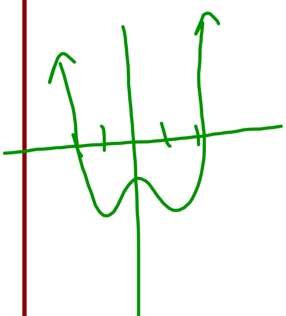
$+16 \quad +16$

$\sqrt[4]{x^4} = \sqrt[4]{16} = \sqrt[4]{2\cdot 2\cdot 2\cdot 2}$

$x = \pm 2 \qquad \sqrt[4]{-2\cdot -2\cdot -2\cdot -2}$

need 4 total

$\boxed{x = 2, x = -2, 2 \text{ imaginary}}$



ex. $-4x^4 + 81 = 0$

$-81 \quad -81$

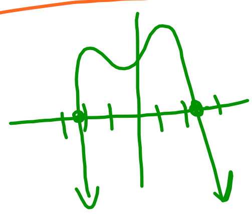
$\frac{-4x^4}{-4} = \frac{-81}{-4}$

$\sqrt[4]{x^4} = \sqrt[4]{\frac{81}{4}}$

$x = \frac{\sqrt[4]{81}}{\sqrt[4]{4}} = \pm\frac{3}{4^{1/4}} \cdot \frac{4^{3/4}}{4^{3/4}}$

$x = \pm\frac{3\sqrt[4]{4^3}}{4}$

$\boxed{x = \pm 2.121 \text{ \& 2 imaginary solutions}}$



$\sqrt[4]{\frac{81}{625}}$ $=0.6$	$\sqrt[4]{10000}$ $=10$	$\sqrt[4]{44}$ $44^{1/4}=2.576$	$\sqrt[4]{\frac{1}{16}}$ $=\frac{\sqrt[4]{1}}{\sqrt[4]{16}}=\frac{1}{\sqrt[4]{2^4}}=\frac{1}{2}$

In algebra 1, hopefully you learned how to use a radical to solve an equation with an exponent, lets try

14. Solve $0=4x^3-6$ $x=\sqrt[3]{\frac{3}{2}}$

$4x^3=6$

$x^3=\frac{3}{2}$

https://www.desmos.com/calculator/bi1aoqxfds
https://www.desmos.com/calculator/jvaynuwcfg
https://www.desmos.com/calculator/nq7rkho5vw
https://www.desmos.com/calculator/vh3imvrouo
https://www.desmos.com/calculator/u4zbei6yzh

STATE ANSWER WITH FRACTION UNDER RADICAL X = $\frac{\sqrt[3]{3}}{\sqrt[3]{2}}$ ≈ 1.145

STATE ANSWER WITH DECIMAL UNDER RADICAL X = $\sqrt[3]{1.5}$ ≈ 1.145

15. Algebraically, we are supposed to be offended by a fraction under the radical symbol. A radical is NOT simplified completely if there is a fraction under the radical. Your answer to question 40 in its simplest form is actually $x=\frac{\sqrt[3]{12}}{2}$ use a calculator to show that it is the same as the answers you got on #40.

Yes

Solve each of the equations (All of these equations have a solution just some of them have solutions are NOT REAL solution)

16. Solve $0=5x^3-20$ $x^3=4$

$20=5x^3$

X = $\sqrt[3]{4}$ ≈ 1.587 (round to three decimal places when necessary)

and 2 Imaginary solutions

17. Solve $0=5x^4-160$ $x^4=32$

$5x^4=160$ $x=\pm\sqrt[4]{32}$

X = ± 2 ≈ ± 2 (round to three decimal places when necessary)

and 2 Imaginary

18. Solve $0=7x^4-102$

$7x^4=102$

$x^4=\frac{102}{7}$

$\boxed{x=\pm\sqrt[4]{\frac{102}{7}}}$

$x=\pm 1.954$
and 2 Imaginary solutions

X = ______________________ ≈ ______________________ (round to three decimal places when necessary)

19. Solve $0 = 10x^4 + 50$

$x^4 = -5$

$10x^4 = -50$

X = 4 imaginary Solutions ≈ ______________________ (round to three decimal places when necessary)

20. Solve $0 = 6x^5 + 192$

$x^5 = 32$

$6x^5 = -192$

$x = \sqrt[5]{32}$

X = 2 ≈ ______________________ (round to three decimal places when necessary)

and 4 imaginary Solutions

21. Solve $0 = 2x^5 + 301$

$2x^5 = -301$

$x^5 = -\frac{301}{2}$

$x = \sqrt[5]{-\frac{301}{2}} = \sqrt[5]{-150.5}$

X = $\sqrt[5]{-150.5}$ ≈ -2.726 (round to three decimal places when necessary)

and 4 imaginary solutions