## Warm-up

1) Factor: $x^4 - 8x = x(x^3 - 8) = x(x-2)(x^2+2x+4)$

2) Solve: $2 < \frac{k^2+1}{k^2}$ $\longrightarrow$ $2k^2 < k^2+1$

$k^2 < 1$

$k = 1, -1$


3) Solve: $(x+4)(x+2) = -3x$

$x^2+6x+8 = -3x$

$x^2+9x+8 = 0$

$(x+8)(x+1) = 0$

$x+8=0 \quad x+1=0$

$x = -8, -1$

$-2: (-2)^2 = 4 < 1$

$0: 0^2 = 0 < 1$ ✓

$2: 2^2 = 4 < 1$

$(-1, 0) \cup (0, 1)$

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# Calc 4 Life

Section R.6

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If $n$ is a natural number, then

$a^n = (a)(a)(a)...(a)$

where $a$ appears $n$ times

$5^4$

$5 \cdot 5 \cdot 5 \cdot 5$

If $a$ is any nonzero real number, and if $n$ is a positive integer, then:

$a^0 = 1$ and $a^{-n} = \frac{1}{a^n}$

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Review Examples:

a) $6^0 = 1$

b) $(-9)^2 = 81$

c) ~~$-(3^{-2})$~~ $= \frac{1}{-9} = -\frac{1}{9} = \frac{-1}{9}$

d) $9^{-1} = \frac{1}{9}$

e) $(3/4)^{-1} = 4/3$

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## Properties of Exponents

1) $(a^m)(a^n) = a^{m+n}$

2) $a^m/a^n = a^{m-n}$

3) $(a^m)^n = a^{mn}$

4) $(ab)^m = a^m b^m$

5) $(a/b)^m = a^m/b^m$

$(a+b)^m \neq a^m + b^m$

$(a+b)^2 \neq a^2 + b^2$

$(a+b)(a+b)$

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## Simplifying Exponential Expressions

a) $k^4 \cdot k^6 = k^{10}$

b) $\frac{b^{14}}{b^6} = b^8$

c) $\frac{r^4}{r^{17}} = r^{-13} = \frac{1}{r^{13}}$

d) $(2m^3)^4 = 16m^{12}$

e) $(3x)^3 = 27x^3$

f) $(\frac{a^{11}}{b^3})^6 = a^{66}/b^{18}$

g) $\frac{a^{-3}b^5}{a^4b^7} \rightarrow \frac{1}{a^7b^2}$

$-3-4=-7$

$5-7=-2$

h) $x^{-2} - y^{-2}$

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

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## Calculations with Rational Exponents

a) $121^{1/2} = 11$

b) $625^{1/4} = \sqrt[4]{625} = 5$

c) $256^{1/4} = 4$

d) $64^{1/6} = 2$

e) $64^{1/3} = 4$

f) $64^{1/2} = 8$

g) $-49^{1/2} = -7$

h) $(-49)^{1/2} \rightarrow$ undefined $7i$ $\quad i = \sqrt{-1}$

i) $(-32)^{1/5} = -2$

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## More Calculations with Rational Exponents

a) $27^{2/3} = (27^{1/3})^2 = 3^2 = 9$

b) $32^{2/5} = 2^2 = 4$

c) $64^{4/3} = 4^4 = 256$

d) $25^{3/2} = 5^3 = 125$

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## Simplifying Exponential Expressions

a) $\frac{(y^{1/3}y^{5/3})}{y} = \frac{y^{1/3+5/3=6/3}}{y^1} = \frac{y^2}{y^1} = y$

b) $m^{2/3}(m^{7/3} + 2m^{1/3}) = m^{2/3+7/3} + 2m^{2/3+1/3} = m^3 + 2m$

c) $\left(\frac{(m^7n^{-2})}{(m^{-5}n^2)}\right)^{1/4} = \left(\frac{m^{12}}{n^4}\right)^{1/4} = \frac{m^3}{n}$

$7-(-5)$

$-2-2=-4$

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## Simplifying Exponential Expressions

a) $4m^{1/2} + 3m^{3/2} = m^{1/2}(4+3m)$

b) $9x^{-2} - 6x^{-3} = 3x^{-3}(3x-2)$

$-2-(-3)=1$

c) $(x^2 + 5)(3x - 1)^{1/2}(2) + (3x - 1)^{1/2}(2x) = 2(3x-1)^{-1/2}(x^2+5 + (3x-1)x)$

$3x^2-1x$

$2(3x-1)^{-1/2}(4x^2-x+5)$

$\frac{1}{2}-(-\frac{1}{2})=1$

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# Homework

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# 5 - 23 odd, 29 - 41 odd, 51 - 55 odd

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