M/Choice

3. $\left(\frac{36x^4y^3}{4x^8y^{-1}}\right)^{\frac{1}{2}}$

$\left(9x^{-4}y^4\right)^{1/2}$

B $3x^{-2}y^2$

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

5. $\frac{\left(m^3n^{-3}\right)^{-1}}{\left(m^{-2}n^1\right)^4}$

$\frac{m^{-3}n^3}{m^{-8}m^4}$

B m^5n^{-1}

$= \frac{m^5}{n^1}$

6/ $\frac{12p^3q^{-7}}{15p^1q^6}$

$-7-6=-13$

$\frac{7}{1}$

$\frac{4}{5}\frac{p^2}{1}\frac{q^{-13}}{1}$

D $\frac{4p^2}{5q^{13}}$

7/ $m^{-2}n^{6} \cdot m^{3}n^{-8}$

$= m^{1}n^{-2}$

$= \dfrac{m}{n^{2}}$

10/ $(64a^{12}b^{15})^{2/3}$

$\left(\sqrt[3]{64}\right)^{2}$

$64^{2/3}\left(\dfrac{a^{12}}{1}\right)^{2/3}\left(\dfrac{b^{15}}{1}\right)^{2/3}$

$\to 16a^{8}b^{10}$

A

14/ $(a^{-4}b^{-3})(a^{3}b^{-4})$ $a=-1$ $b=3$

$a^{-1}b^{-7}$

$\dfrac{1}{ab^{7}} = \dfrac{1}{(-1)(3)^{7}} = \dfrac{-1}{2187}$

$\dfrac{1}{2187} = \dfrac{1}{-2187} = -\dfrac{1}{2187}$

FREE RESPONSE:
Show all work for each of the following in the space provided. **[Value = 34]**

1. Joshua simplified $\sqrt[3]{1024}$ as shown: [3]

$\sqrt[3]{1024} = \sqrt[3]{8} \cdot \sqrt[3]{128}$ ✓ LINE 1
$= \sqrt[3]{8} \cdot \sqrt[3]{125} \cdot \sqrt[3]{3}$ ✗ LINE 2
$= 2 \cdot 5 \cdot \sqrt[3]{3}$ LINE 3
$= 10 \cdot \sqrt[3]{3}$ LINE 4

Correct Solution

$\sqrt[3]{8} \cdot \sqrt[3]{128}$

$2\sqrt[3]{128}$

$2(\sqrt[3]{64} \times \sqrt[3]{2})$

$8\sqrt[3]{2}$

(a) Identify the line where Joshua made an error: 2

(b) Provide the steps for a correct solution in the box provided above.

2. Express the following radicals as exponents and use exponent laws to simplify the expression: [3]

$$\left(\sqrt[3]{x}\right)^2\left(\sqrt[8]{x^3}\right)$$

$\left(\sqrt[n]{x}\right)^w = x^{\frac{w}{n}}$

$x^{2/3} \cdot x^{3/8}$ $\quad \frac{2}{3} + \frac{3}{8} = \frac{16+9}{24}$

$x^{25/24}$

3. Arrange the following in order from least to greatest: [3]

$3 \times \sqrt{12}$

$$\sqrt[4]{20}\ ,\ 3\sqrt{12}\ ,\ 27^{\frac{3}{5}}\ ,\ \left(\frac{3}{8}\right)^{-\frac{2}{5}}$$

2.11, 10.4, 7.22, 1.48

4. Express each of the following as radicals in simplest form: [6]

(a) $\sqrt{48}$

$\sqrt{16} \times \sqrt{3}$
$4\sqrt{3}$

(b) $-4\sqrt{300}$

$-4\sqrt{100} \times \sqrt{3}$
$-4(10\sqrt{3})$
$-40\sqrt{3}$

(c) $\sqrt[5]{96}$

$\sqrt[5]{32} \times \sqrt[5]{3}$
$2\sqrt[5]{3}$

5. Simplify each of the following expressions. Express your answers using all **positive** exponents. [7]

(a) $(-3x^4y^{-3})^4$

3

$= (-3)^4(x^4)^4(y^{-3})^4$

$81 \; x^{16} y^{-12}$

$= \frac{81x^{16}}{y^{12}}$

(b) $\frac{24x^{-3}(2y^{-3})^3}{(-2xy^5)^3}$

4

$= \frac{24x^{-3}(8y^{-9})}{-8x^3y^{15}}$

$= \frac{192x^{-3}y^{-9}}{-8x^3y^{15}} \Rightarrow = -24x^{-6}y^{-24}$

$= \frac{-24}{x^6y^{24}}$

6. Simplify the following expression. Express your solution using all **positive** exponents: [6]

$$\frac{(-2x^5y)^3(2x^{-7}y^4)^{-3}}{(-3xy^8)^2(27x^{-6}y^3)^{-\frac{2}{3}}}$$

$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

$$\frac{(-8x^{15}y^3)\left(\frac{1}{8}x^{21}y^{-12}\right)}{(9x^2y^{16})\left(\frac{1}{9}x^4y^{-2}\right)}$$

$27^{-\frac{2}{3}} = \frac{1}{27^{2/3}} = \frac{1}{9}$

$= \frac{-1x^{36}y^{-9}}{1x^6y^{14}} = -1x^{30}y^{-23} = \frac{-x^{30}}{y^{23}}$

7. Use your knowledge of exponents to evaluate the following expression. All work must be clearly shown! [6]

$$\left(\frac{2}{3}\right)^{-2} + 6w^0 - \frac{2}{16^{-\frac{3}{4}}} + \sqrt[3]{125} - \left(\frac{27}{8}\right)^{-\frac{1}{3}} + (25-9)^{\frac{1}{2}}$$

$\left(\frac{3}{2}\right)^2 + 6(1) - 2(16)^{3/4} + 5 - \left(\frac{8}{27}\right)^{\frac{1}{3}} + 16^{\frac{1}{2}}$

$6 - 16 + 5 + 4$

$= \frac{9}{4} + 6 - 2(8) + 5 - \frac{2}{3} + 4$

$= \frac{9}{4} - \frac{2}{3} - \frac{1}{1}$

$= \frac{27 - 8 - 12}{12}$

$= \frac{7}{12}$

Polynomials

By now, you should be familiar with variables and exponents. You may have dealt with expressions like $3x^4$ or $6x$. Polynomials are sums of these expressions. Each piece of the polynomial, each part that is being added, is called a "term". Polynomial terms have variables to whole-number exponents; there are no square roots of exponents, no fractional powers, and no variables in the denominator. Here are some examples:

$6x^{-2}$	NOT a polynomial term	This has a negative exponent.
$1/x^2$	NOT a polynomial term	This has the variable in the denominator.
$\sqrt{x}$	NOT a polynomial term	This has the variable inside a radical.
$4x^2$	a polynomial term	

Here is a typical polynomial:

terms

Coefficient - a number in front of a variable

Constant - a number with no variable

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

- TERMS are separated by addition or subtraction signs.

Monomial → 1 term

ex. $7x^3$

Binomial ⇒ 2 terms

$x - 7y^3$

Trinomial ⇒ 3 terms

Expanding and Simplifying:

- <u>Collecting Like Terms</u>

Probably the most common thing you will be doing with polynomials is "combining like terms". This is the process of adding together whatever terms you can, but not overdoing it by adding together terms that can't actually be combined.

Terms can be combined if they have the exact same variable part. Here is a rundown of what's what:

LIKE TERM - exact same variable(s)

Examples:

1) $3x + 4x$

$= 7x$

2) $2x^2 + 3x - 4 - 1x^2 + x + 9$

$x^2 + 4x + 5$

3) $10x^3 - 14x^2 + 3x - 4x^3 + 4x - 6$

$6x^3 - 14x^2 + 7x - 6$

4) $-4y - [3x + (3y - 2x + \{2y - 7\}\ ) - 4x + 5]$