MATH 1021-02 & -03: Precalculus - Algebra

Sections 1.1 & 1.2 Handout

Warm-up:

Please try the following exercises:

a) Expand: $6(t+4)$

b) Evaluate the expression shown in **Problem 3** below.

Section 1.1 - The Real Numbers:

The Number Line and Absolute Value:

Problem 1. Graph the following intervals on a number line:
a) $(-8,-1)$, **b)** $[-1,10)$, **c)** $[-5,\infty)$

Problem 2. Fill in the blank with one of $<$, $>$, or $=$:
a) $|5|$ ____ $|-6|$, **b)** $|3|\cdot|-5|$ ____ $|3(-5)|$, **b)** $|6-(-4)|$ ____ $|-4-6|$

Order of Operations & Parentheses: Evaluate the following expressions:

Problem 3. $9-3\times 4-(-2)*(3-5)+2*6\div 3$

Problem 4. $3(2+4(6+1))$

Problem 5. $\dfrac{\left[4-(1+2(6-3)^2)\right]^2}{2-3}$

Properties of Fractions: Evaluate the following expressions:

Problem 6. $\dfrac{1}{3}+\dfrac{2}{5}$

Problem 7. $\dfrac{a}{b}-\dfrac{c}{d}$

Problem 8. $24\div\dfrac{2}{3}$

Section 1.2 - Exponents and Radicals:

Definition & Properties of Exponents: Evaluate the following Expressions:

Problem 9. $(-2)^4 =$ ____, $-(2)^4 =$ ____

Problem 10. $3(-2)^5 =$ ____, $(3 \cdot (-2))^5 =$ ____

Write as an expression with a single exponent:

Problem 11. $2^5 \cdot 2^2$

Problem 12. $(3^2)^6$

Problem 13. $(9^{50} \cdot 9^2)^{10}$

Radicals: Evaluate the following Expressions:

Problem 14. $\sqrt{64}$

Problem 15. $\sqrt[3]{-64}$

Problem 16. $\sqrt[5]{-32}$

Problem 17. $\left(-\frac{27}{8}\right)^{2/3}$

Work the Problems on the Laws of Exponents Handout (next page $\rightarrow$)

Laws of Exponents:

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

① $a^m a^n = a^{m+n}$ ← to multiply powers of like bases, add exponents

② $\frac{a^m}{a^n} = a^{m-n}$ ← to divide powers of like bases, subtract

③ $(a^m)^n = a^{mn}$ ← to raise a power to a power, multiply

④ $(ab)^n = a^n b^n$ ← raise each factor to the power

⑤ $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ ← raise top and bottom to power

} distribute the exponent!

⑥ $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$ ← to raise a number to a negative power, invert and change the sign of the power

⑦ $\frac{a^{-n}}{b^{-m}} = \frac{b^m}{a^n}$

Properties of n^{th} roots:

① $\sqrt[n]{ab} = \sqrt[n]{a}\sqrt[n]{b}$

② $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

③ $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$

④ $\sqrt[n]{a^n} = a$ if n is odd

⑤ $\sqrt[n]{a^n} = |a|$ if n is even

Simplify Each Expression

a) $x^8 x^2$

b) $x^2 x^{-6}$

c) $\left(\frac{x^4 z^2}{4y^5}\right)\left(\frac{2x^3 y^2}{z^3}\right)^2$

d) $\left(\frac{y}{5x^{-2}}\right)^{-3}$

e) $\frac{s^{3/2}}{s^{1/2}}$