

Math011 - Practice Test on Chapters 5 & 6

1. Compute and Simplify:

a) $(-2)^3 = (-2)^3$
 $=(-2)(-2)(-2) = -8$

b) $2^{-3} = 2^{-3}$
 $=1/2^3 = 1/8 = 0.125$

c) $2^{1000} \cdot 2^{999}$
 $=2^{1000+999} = 2^{1999}$

**Negative exponents
are reciprocals**

2. Write in normal decimal notation:

a) $2.16 \cdot 10^{14}$
 $=216,000,000,000,000$

b) $6.14 \cdot 10^{-12}$
 $=0.00000000000614$

3. Write in scientific notation:

a) $12,100,000,000,000$
 $=1.21 \cdot 10^{13}$

b) 0.0000000000783
 $7.83 \cdot 10^{-10}$

4. Simplify:

a) $(2x^2)^2 = 2^2(x^2)^2 = 4x^4$

b) $(2x^2y^3)^4 = 2^4(x^2)^4(y^3)^4 = 16x^8y^{12}$

c) $\frac{2x^3}{4x^5} = \frac{1}{2x^2}$

d) $\frac{4x^{-2}y^3}{2x^3y^{-2}} = \frac{2y^5}{x^5}$

5. Simplify and express as a polynomial in standard form:

a) $(4x^2 - 6x - 3) + (2x^2 + 3x + 8) = 6x^2 - 3x + 5$

b) $(4x^2 - 6x - 3) - (2x^2 + 3x + 8) = 2x^2 - 9x - 11$

6. Expand, simplify and express as a polynomial in standard form:

a) $(4x - 3)(3x + 8) = 12x^2 + 32x - 9x - 24 = 12x^2 + 23x - 24$

b) $(2x - 3)(2x^2 + 3x + 8) = 4x^3 + 6x^2 + 16x - 6x^2 - 9x - 24$
 $= 4x^3 + 5x - 24$

c) $(2x - 3)^2 = (2x - 3)(2x - 3) = 4x^2 - 12x + 9$

7. What are the quotient and remainder for: $(2x^2 + 3x + 8) \div (2x - 3)$?

$$\begin{array}{r}
 \underline{x + 3 \quad \text{rem } 17} \\
 2x - 3 \overline{) 2x^2 + 3x + 8} \\
 \underline{2x^2 - 3x} \\
 6x + 8 \\
 \underline{6x - 9} \\
 17
 \end{array}$$

8. Factor completely (or say does not factor):

a) $x^2 - 3x - 10 = (x - 5)(x + 2)$

b) $x^3 - 3x^2 - 2x + 6 = x^2(x - 3) - 2(x - 3) = (x^2 - 2)(x - 3)$

c) $6x^3 - 3x^2 = 3x^2(2x - 1)$

d) $x^4 - 16 = (x^2 - 4)(x^2 + 4) = (x - 2)(x + 2)(x^2 + 4)$

e) $x^4 + 16$ **Does not factor**

9. Solve the equation: $x^2 = 14 - 5x$ (Hint: Factor)

Rewrite as: $x^2 + 5x - 14 = (x + 7)(x - 2) = 0$

$x + 7 = 0$ or $x - 2 = 0$

$x = -7$ or $x = 2$

10. In 1990, the official USA federal debt held by the public was \$2.19 trillion; in 2006, it was \$9.56 trillion. Write each in scientific notation. What is the rate of growth for the nation debt in “dollars per year” over these 16 years? The population of the USA was 249 million people in 1990 and 301 million people in 2006. What was the debt per person in each year?

1990: $\$2.19 \cdot 10^{12}$

2006: $\$9.56 \cdot 10^{12}$

ROG: $(\$9.56 \cdot 10^{12} - \$2.19 \cdot 10^{12}) / 16\text{yrs} = 4.61 \cdot 10^{11} \text{ \$/yr}$

1990: $(\$2.19 \cdot 10^{12}) / 2.49 \cdot 10^8 = 8.80 \cdot 10^3 \text{ \$/person}$

2006: $(\$9.56 \cdot 10^{12}) / 2.49 \cdot 10^8 = 3.18 \cdot 10^4 \text{ \$/person}$