Algebra 2 Name _____ ID: 1

Midterm Review Day #1

Date _____ Period ____

Simplify.

1) $\sqrt{50x^4}$

$5x^2\sqrt{2}$

2) $\sqrt[3]{1000x^3}$

1000

$10x$

3) $-5\sqrt{45n^3}$

$-5 \cdot 3n\sqrt{5n}$

$-15n\sqrt{5n}$

4) $2\sqrt{6} + 2\sqrt{24}$

$6\sqrt{6}$

5) $\sqrt{2k^2} \cdot -4\sqrt{3k^2}$

$-4\sqrt{6k^4}$

$-4k^2\sqrt{6}$

6) $\sqrt{3}(\sqrt{10} - 5\sqrt{3})$

$-15 + \sqrt{30}$

7) $(3\sqrt{2} + \sqrt{3})(\sqrt{4} + \sqrt{3})$

$3\sqrt{8} + 3\sqrt{6} + \sqrt{12} + 3$

$6\sqrt{2} + 3\sqrt{6} + 2\sqrt{3} + 3$

8) $\frac{3}{\sqrt{3} - 3} \cdot \frac{(\sqrt{3} + 3)}{(\sqrt{3} + 3)} = \frac{3\sqrt{3} + 9}{3 + 3\sqrt{3} - 3\sqrt{3} - 9}$

$\frac{3\sqrt{3} + 9}{-6} = \frac{-\sqrt{3} - 3}{2}$

9) $\frac{-2 + 5\sqrt{2}}{5 + \sqrt{3}} \cdot \frac{(5 - \sqrt{3})}{(5 - \sqrt{3})} = \frac{-10 + 2\sqrt{3} + 25\sqrt{2} - 5\sqrt{6}}{25 - 5\sqrt{3} + 5\sqrt{3} - 3}$

$\frac{-10 + 2\sqrt{3} + 25\sqrt{2} - 5\sqrt{6}}{22}$

10) $\frac{3\sqrt{2}}{4\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{6}}{4 \cdot 3} = \frac{3\sqrt{6}}{12} = \frac{\sqrt{6}}{4}$

11) $\frac{4i}{5 + 4i} \cdot \frac{(5 - 4i)}{(5 - 4i)} = \frac{20i - 16i^2}{25 - 20i + 20i - 16i^2}$

$\frac{20i + 16}{25 + 16} = \frac{20i + 16}{41}$

12) $\frac{-5 + 2i}{-4i} \cdot \frac{i}{i} = \frac{-5i + 2i^2}{-4i^2} =$

$\frac{-5i - 2}{4}$

13) $\frac{3-i}{6+3i}$ $\frac{(6-3i)}{(6-3i)} = \frac{18-9i-6i+3i^2}{36-18i+18i-9i^2}$

$\frac{15-15i}{45} = \frac{1-i}{3}$

14) $(8-5i)(2+2i)$

$16+16i-10i-10i^2$

$26+6i$

15) $-i-3-2+7i$

$6i-5$

$-5+6i$

16) $5-4i-(8-2i)-7$

$5-4i-8+2i-7$

$-10-2i$

Solve each equation by taking square roots.

17) $5n^2-4=-35$

$+4 \quad +4$

$\frac{5n^2}{5} = \frac{-31}{5}$

$\sqrt{n^2} = \sqrt{\frac{-31}{5}}$

$n = \frac{\pm i\sqrt{31}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$

$n = \frac{\pm i\sqrt{155}}{5}$

Solve each equation with the quadratic formula.

$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

18) $7x^2+5x+11=0$

$\frac{-5 \pm \sqrt{(5)^2-4(7)(11)}}{2(7)} = \frac{-5 \pm i\sqrt{283}}{14}$

19) $10k^2+10k+7=4$ $\quad 10k^2+10k+3=0$

$-4 \quad -4$

$\frac{-10 \pm \sqrt{(10)^2-4(10)(3)}}{2(10)} = \frac{-10 \pm \sqrt{-20}}{20}$

$\frac{-10 \pm 2i\sqrt{5}}{20} = \frac{-5 \pm i\sqrt{5}}{10}$

20) $11m^2+11=7m$

$11m^2-7m+11=0$

$\frac{7 \pm \sqrt{(-7)^2-4(11)(11)}}{2(11)} = \frac{7 \pm \sqrt{-435}}{22} =$

$\frac{7 \pm i\sqrt{435}}{22}$

Solve each equation by factoring.

21) $x^2=-8+6x$

$x^2-6x+8=0$

$(x-4)(x-2)=0$

$x-4=0 \quad x-2=0$

$\boxed{x=4} \quad \boxed{x=2}$

22) $n^2-1=6n-6$ $\quad n^2-6n+5=0$

$(n-5)(n-1)=0$

$n-5=0 \quad n-1=0$

$\boxed{n=5} \quad \boxed{n=1}$

Solve each equation by completing the square.

23) $v^2 + 4v + 3 = 0$

$v^2 + 4v + 4 = -3 + 4$

$\sqrt{(v+2)^2} = \sqrt{1}$

$v + 2 = \pm 1$

$v+2=1$: $-2\ -2$ → $\boxed{v=-1}$

$v+2=-1$: $-2\ -2$ → $\boxed{v=-3}$

24) $n^2 + 8n + 57 = -10$

$-57\ \ -57$

$n^2 + 8n + 16 = -67 + 16$

$\sqrt{(n+4)^2} = \sqrt{-51}$

$n + 4 = \pm\sqrt{-51}$

$-4\ \ -4$

$n = -4 \pm i\sqrt{51}$

Divide, using long division or synthetic division.

25) $(x^3 + 11x^2 + 16x + 60) \div (x + 10)$

-10 | $1\ \ 11\ \ 16\ \ 60$

$\downarrow\ \ -10\ \ -10\ \ -60$

$1\ \ 1\ \ 6\ \ |\ 0$

$\boxed{x^2 + x + 6}$

26) $(4x^4 - 9x^3 - 33x^2 + 21x - 8) \div (x - 4)$

4 | $4\ \ -9\ \ -33\ \ 21\ \ -8$

$\downarrow\ \ 16\ \ 28\ \ -20\ \ 4$

$4\ \ 7\ \ -5\ \ 1\ \ |\ -4$

$\boxed{4x^3 + 7x^2 - 5x + 1 - \frac{4}{x-4}}$

State if the given binomial is a factor of the given polynomial, using long division or synthetic division to determine your answer.

27) $(x^3 + 8x^2 - 12x - 27) \div (x + 9)$

-9 | $1\ \ 8\ \ -12\ \ -27$

$\downarrow\ \ -9\ \ 9\ \ 27$

$1\ \ -1\ \ -3\ \ |\ 0$

yes

28) $(3x^3 + 21x^2 + 2) \div (x + 7)$

-7 | $3\ \ 21\ \ 0\ \ 2$

$\downarrow\ \ -21\ \ 0\ \ 0$

$3\ \ 0\ \ 0\ \ 2$

NO

Simplify each expression.

29) $(3m^3 - 6m + 3m^2) + (5m^4 - 3m + 8m^2)$

$5m^4 + 3m^3 + 11m^2 - 9m$

Name each polynomial by degree and number of terms.

30) $5n - 3 + 6n^2$

Quadratic Trinomial

Expand completely, using the Binomial Theorem.

31) $(y-2x)^4$

$1y^4 \quad 4y^3 \quad 6y^2 \quad 4y^1 \quad 1y^0$
$(2x)^0 \quad (-2x)^1 \quad (-2x)^2 \quad (-2x)^3 \quad (-2x)^4$

$y^4 - 8y^3x + 24x^2y^2 - 32x^3y + 16x^4$

$\boxed{y^4 - 8xy^3 + 24x^2y^2 - 32x^3y + 16x^4}$

Perform the indicated operation.

32) $g(x) = x + 3$
$h(x) = x^3 - 2$
Find $(g \cdot h)(x)$

$(x+3)(x^3-2)$

$x^4 - 2x + 3x^3 - 6$

$\boxed{x^4 + 3x^3 - 2x - 6}$

33) $g(x) = 2x - 1$
$h(x) = -3x - 1$
Find $(g \circ h)(x)$

$2\square - 1$
$2(-3x-1) - 1$
$-6x - 2 - 1$
$\boxed{-6x - 3}$

34) $g(n) = -2n + 5$
Find $(g \circ g)(-8)$

$-2(-2n) + 5$

$\boxed{+4n + 5}$

$-2\square + 5$
$-2(-2n+5) + 5$
$4n - 10 + 5$
$4n - 5$

$\boxed{-37}$

35) $f(x) = 2x$
$g(x) = 2x - 5$
Find $(f - g)(2)$

$2x - (2x - 5)$
$2x - 2x + 5$

$\boxed{5}$

Find the inverse of each function.

36) $g(x) = (x+2)^3 + 3$

$x = (y+2)^3 + 3$
$-3 \qquad -3$
$\sqrt[3]{x-3} = \sqrt[3]{(y+2)^3}$
$\sqrt[3]{x-3} = y + 2$
$-2 \qquad -2$
$\sqrt[3]{x-3} - 2 = y$

$\boxed{g^{-1}(x) = \sqrt[3]{x-3} - 2}$

State if the given functions are inverses. Use composition.

37) $g(x) = -3x - 9$
$f(x) = \dfrac{-9 - x}{3}$

$x = -3y - 9$
$+9 \qquad +9$
$\dfrac{x+9}{-3} = \dfrac{-3y}{-3}$
$\dfrac{-x-9}{3} = y$

$3 \cdot x = \dfrac{-9-y}{3} \cdot 3$
$3x = -9 - y$
$+9 \qquad +9$
$\dfrac{3x+9}{-1} = \dfrac{-y}{-1}$
$-3x - 9 = y$

$\boxed{\text{yes}}$