CR Algebra 2 Name_____

Fall Review for Midterm (Units 1-3) FR

Date_____ Period____

Name each polynomial by degree and number of terms.

1) $-7 - 7a$

linear binomial

2) -5

constant monomial

Simplify each expression.

3) $(x - 8) - (2 - 5x + 2x^3)$

$x - 8 - 2 + 5x - 2x^3$

$-2x^3 + 6x - 10$

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

$2n^4 + n^3 - 9n^2$

Find each product.

5) $(2n - 2)(5n - 7)$

$10n^2 - 14n - 10n + 14$

$10n^2 - 24n + 14$

6) $(6n - 4)(2n^2 + 6n - 6)$

$2n^2 + 6n - 6$

$6n$	$12n^3$	$36n^2$	$-36n$
-4	$-8n^2$	$-24n$	24

$12n^3 + 28n^2 - 60n + 24$

Simplify.

7) $(-5 + 8i) + (-6 - 4i)$

$-11 + 4i$

$i^2 = -1$

	-5	$-7i$
6	-30	$-42i$
$-6i$	$30i$	$42i^2$

$\cdot 2$ -1

-42

8) $(-5 - 7i)(6 - 6i)$

$-30 + 30i - 42i + 42i^2$

$-72 - 12i$

$-72 - 12i$

9) $\sqrt{108}$

$\sqrt{36}\sqrt{3}$

$6\sqrt{3}$

10) $\sqrt{-112}$

$\sqrt{16}\sqrt{7}$

$\pm 4i\sqrt{7}$

Factor each completely.

11) $2n^3 - 16n^2$

$2n^2(n - 8)$

12) $4k^2 - 37k + 63$

$(4k - 9)(k - 7)$

13) $x^2 + 10x + 21$

21
3 7
10

$(x+3)(x+7)$

14) $4x^2 - 1$

$(2x+1)(2x-1)$

15) $8x^3 + 125$

$a = 2x \quad b = 5$

$(2x+5)(4x^2-10x+25)$

16) $2x^3 + 4x^2 + 3x + 6$

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

Solve each equation by factoring.

17) $n^2 - 9n + 18 = 0$

18
-3 -6
-9

$(n-3)(n-6)=0$

$n = \{3, 6\}$

Solve each equation by taking square roots.

18) $n^2 = 100$

$n = \pm 10$

19) $v^2 - 4 = -18$

$\sqrt{v^2} = \sqrt{-14}$

$v = \pm i\sqrt{14}$

Solve each equation by completing the square.

20) $m^2 - 4m - 96 = 0$

$(m+8)(m-12)=0$

$m=-8 \quad m=12$

Solve each equation with the quadratic formula.

21) $3x^2 - x + 2 = 0$

$$\frac{-(-1) \pm \sqrt{\overset{1}{(-1)^2} \overset{-24}{-4(3)(2)}}}{2(3)}$$

$$\frac{1 \pm \sqrt{-23}}{6} = \frac{1 \pm i\sqrt{23}}{6}$$

State the maximum number of turns the graph of each function could make.

22) $f(x) = x^3 - x^2 + 2$ Degree - 1

2

State the actual number of zeros of each function.

23) $f(x) = x^5 - 3x^3 + x + 1$

5

Describe the end behavior of each function.

24) $f(x) = -x^3 + 2x^2 + 1$

left y up
$x \to -\infty, f(x) \to \infty$

right y down
$x \to \infty, f(x) \to -\infty$

$f(x) \to \infty$ as $x \to -\infty$

$f(x) \to -\infty$ as $x \to \infty$

Perform the indicated operation.

25) $h(n) = 2n - 1$
$g(n) = -4n + 1$
Find $h(n) + g(n)$

$2n - 1 - 4n + 1 = -2n$

26) $g(n) = 3n + 4$
$f(n) = n^3 + 5n$
Find $g(f(n))$

Composition of functions

$g(f(n))$

$3(n^3+5n)+4$

$3(n^3+5n)+4$

$3n^3+15n+4$

$3n^3+15n+4$

27) $g(n) = 2n - 5 = 2(-1) - 5 = -7$
$h(n) = n + 5 = -1 + 5 = 4$
Find $(g - h)(-1)$

$-7 - 4 = -11$

28) $g(n) = 2n - 2 = 2(3) - 2 = 4$
$h(n) = n^3 - 4n^2 + n = (3)^3 - 4(3)^2 + (3) = -6$
Find $(g \cdot h)(3)$

$4(-6) = -24$

Divide.

29) $(x^4 - 25x^2 - 10x + 53) \div (x - 5)$

$x^3 + 5x^2 + 0x - 10 + \frac{3}{x-5}$

$x-5 \overline{)x^4 + 0x^3 - 25x^2 - 10x + 53}$

$-x^4 + 5x^3$

$5x^3 - 25x^2$

$-5x^3 + 25x^2$

$0x^2 - 10x$

$-0x^2 + 0x$

$-10x + 53$

$+10x - 50$

3

30) $(m^4 - 6m^3 - 38m^2 - 16m - 46) \div (m - 10)$

$m^3 + 4m^2 + 2m + 4 - \frac{6}{m-10}$

$m-10 \overline{)m^4 - 6m^3 - 38m^2 - 16m - 46}$

$-m^4 + 10m^3$

$4m^3 - 38m^2$

$-4m^3 + 40m^2$

$2m^2 - 16m$

$-2m^2 + 20m$

$4m - 46$

$-4m + 40$

-6

State if the given binomial is a factor of the given polynomial.

31) $(2n^4 - 27n^3 + 76n^2 + 44n + 9) \div (n - 9)$

9	2	-27	76	44	9
		18	-81	-45	-9
	2	-9	-5	-1	$\boxed{0}$

yes, because the remainder is zero.

State the possible rational roots for each equation.

32) $\overset{q}{25}x^8 - 34x^4 + \overset{p}{9} = 0$

$\frac{1,3,9}{1,5,25}$ $\frac{p}{q}$: $\pm\left(1, \frac{1}{5}, \frac{1}{25}, 3, \frac{3}{5}, \frac{3}{25}, 9, \frac{9}{5}, \frac{9}{25}\right)$

Factor each. One factor has been given.

33) $2x^3 - 3x^2 - 17x + 30 = 0;\ x - 2$

2	2	-3	-17	30	
		4	2	-30	
	2	1	-15	$\boxed{0}$	

-30, 6, -5, 1

$2x^2 + x - 15 = 0$

	$2x$	-5
x	$2x^2$	$-5x$
3	$-6x$	-15

$(2x-5)(x+3)(x-2)$

Find all roots. One root has been given.

x	y
⋮	0
	0
	0

34) $3x^3 - 23x^2 + 54x - 40 = 0;\ 2$

2	3	-23	54	-40	
		6	-34	40	
	3	-17	20	$\boxed{0}$	

60, -5, -12, -17

$3x^2 - 17x + 20 = 0$

	x	-4
$3x$	$3x^2$	$-12x$
-5	$-5x$	20

$3x - 5 = 0$ $x - 4 = 0$

$x = \frac{5}{3}$ $x = 4$

$X = \{2, \frac{5}{3}, 4\}$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

35) $-4,\ 1,\ -3$

$(x+4)(x-1)(x+3)$

$(x^2 + 3x - 4)(x+3)$

$x^3 + 6x^2 + 5x - 12$

36) $4,\ -3i$

$(x-4)(x+3i)(x-3i)$

$(x-4)(x^2+9)$

$x^3 - 4x^2 + 9x - 36$

36) $4, -3i, 3i$