Multiple Choice
Select the item that best answers each question.

1) What is the lead coefficient of $9x^5 + 7x^4 + 2x^6 + 6x^2$? $2x^6 + 9x^5 + 7x^4 + 6x^2$

   a. 1   b. 9   **c. 2**   d. 6

2) Which polynomial is a quadratic trinomial (2nd degree, 3 terms) ?

   a. $x^3 + 4x^4 + 3$ b. $3m - 13m^3$ c. $12x^5 - 4$ **d. $x^2 - 3x + 4$**

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

   a. $-n^3 + 5n + 6$ b. $-n^3 + 5n - 1$ c. $3n^3 + 5n - 1$ **d. $-6n^3 + 5n + 6$**

4) Simplify $(2n - 2)(3n - 4)$ $6n^2 - 8n - 6n + 8$
                                    $6n^2 - 14n + 8$

   a. $6n^2 - 14n + 8$ b. $32n^2 - 64n + 32$ c. $6n^2 - 2n - 8$ d. $25n^2 + 35n + 12$

5) Simplify $(7m + 2)^2 = (7m + 2)(7m + 2) = 49m^2 + 14m + 14m + 4$
                                                           $49m^2 + 28m + 4$

   a. $49m^2 - 4$ b. $49 + 28m + 4m^2$ **c. $49m^2 + 28m + 4$**   d. $49m^2 + 4$

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

   a. $4x^2 - 20x - 25$ b. $4x^2 - 3x - 25$ **c. $4x^2 - 25$**   d. $4x^2 + 25$

7) Factor completely: $10x^3 - 2x^2 = 2x^2(5x - 1)$
              common factor

   a. $2x^2(5x)$ b. $10x^2(x - 1)$ c. $2(x^3 - x^2)$ **d. $2x^2(5x - 1)$**

8) Factor completely: $40n^3 + 64n^2 - 15n - 24$
   By grouping $8n^2(5n + 8) - 3(5n + 8) = (5n + 8)(8n^2 - 3)$

   a. $(8n^2 + 3)(5n - 8)$ **b. $(8n^2 - 3)(5n + 8)$**   c. $(8n^2 - 3)(5n + 3)$ d. $(8n^2 + 3)(5n - 3)$

9) Factor completely: $x^2 - 3x - 10$
AC Method

$\boxed{ac}$
-10
$\boxed{2, -5}$
$1, -10$

$\underline{x^2 + 2x} \ \underline{-5x - 10}$
$x(x+2) - 5(x+2)$
$(x+2)(x-5)$

a. $(x+5)(x+2)$ b. $(x-3)(x-9)$ c. $\boxed{(x-5)(x+2)}$ d. $(x-5)(x-2)$

10) Factor completely: $x^2 + 15x + 56$
AC Method

$\boxed{ac}$
56
$\boxed{7, 8}$
$2, 28$

$\underline{x^2 + 7x} + \underline{8x + 56}$
$x(x+7) + 8(x+7)$ $(x+7)(x+8)$

a. $\boxed{(x+7)(x+8)}$ b. $(x-6)(x+5)$ c. $(x+1)(x-7)$ d. $Not\ factorable$

11) Factor completely: $3r^2 + 30r + 27 = 3(r^2 + 10r + 9)$
common factor
AC Method

$= 3(r^2 + 1r + 9r + 9)$
$3(r(r+1) + 9(r+1))$

$\boxed{ac}$
9
$\boxed{1, 9}$
$3, 3$

$\rightarrow 3(r+1)(r+9)$

a. $(r+9)(r+1)$ b. $(3r+27)(r+1)$ c. $3(r-9)(r-1)$ d. $\boxed{3(r+9)(r+1)}$

12) Factor completely: $2x^2 + 3x - 9$
AC Method

$\boxed{ac}$
-18
$2, -9$
$\boxed{-3, 6}$

$\underline{2x^2 - 3x} + \underline{6x - 9}$
$x(2x-3) + 3(2x-3)$
$(2x-3)(x+3)$

a. $(2x+3)(x-3)$ b. $(2x+1)(x-8)$ c. $\boxed{(2x-3)(x+3)}$ d. $(3x-4)(x-3)$

13) Factor completely: $3k^2 + 31k + 36$
AC Method

$\boxed{ac}$
108
$3, 36$
$9, 12$
$\boxed{4, 27}$

$\underline{3k^2 + 4k} + \underline{27k + 36}$
$k(3k+4) + 9(3k+4)$
$(3k+4)(k+9)$

a. $\boxed{(3k+4)(k+9)}$ b. $3(k+4)(k+3)$ c. $(3k-4)(k-9)$ d. $Not\ factorable$

14) Factor completely: $5x^2 - 49x - 10$
AC Method

$\boxed{ac}$
-50
$-50, 1$
$\boxed{-10, 5}$

$\underline{5x^2 - 50x} + \underline{1x - 10}$
$5x(x-10) + 1(x-10)$
$(x-10)(5x+1)$

a. $(5x+1)(x+10)$ b. $\boxed{(5x+1)(x-10)}$ c. $-(3x+5)(x+10)$ d. $5(x+1)(x+2)$

15) Factor completely: $32n^3 + 80n^2 + 50n = 2n(16n^2 + 40n + 25)$
common factor
perfect square trinomial

$= 2n((4n)^2 + 2(4n)(5) + (5)^2) = 2n(4n+5)^2$

a. $(-8n^2 + 10n)(8n+10)$ b. $\boxed{2n(4n+5)^2}$ c. $2n(4n-5)^2$ d. Can't be factored

16) Factor completely: $m^2 + 10m + 25 = (m)^2 + 2(m)(5) + (5)^2$
perfect square trinomial

$= (m+5)^2$

a. $(m-5)(m+5)$ b. $(m-5)^2$ c. $\boxed{(m+5)^2}$ d. Can't be factored

17) Factor completely: $x^2 - 9$

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

difference of squares

$(x-3)(x+3)$

a. $(x+3)(x-3)$ b. $(x+9)^2$ c. $(x-3)^2$ d. Can't be factored

18) Factor completely: $9b^2 + 4$

↑ not factorable

a. $(3b+2)(3b-2)$ b. $(-3b+2)(3b-2)$ c. $(9b+2)^2$ d. Can't be factored

Free Response: Respond to each question thoroughly. Show your work!

21) Simplify: $(-3x^2 + 7x^3) - (-3x^3 - 6x^2 - 2x^4)$

$-3x^2 + 7x^3 + 3x^3 + 6x^2 + 2x^4$

combine like terms
write in standard form.

$2x^4 + 10x^3 + 3x^2$

22) Simplify: $(7a + 2b)^2$

$(7a + 2b)(7a + 2b)$

$49a^2 + 14ab + 14ab + 4b^2$

perfect square
trinomial.

$49a^2 + 28ab + 4b^2$

23) Factor completely: $84mn + 56km - 98m^2 - 48kn$

$84mn - 98m^2 + 56km - 48kn$

$-14m(-6n + 7m) + 8k(7m - 6n)$

$-14m(7m - 6n) + 8k(7m - 6n)$

$(7m - 6n)(-14m + 8k) = 2(7m-6n)(-7m+4k)$

24) Factor completely: $9m^2 + 36m + 20$

ac method

ac
180
6,30
9,20
3,60

$9m^2 + 6m + 30m + 20$

$3m(3m+2) + 10(3m+2)$

$(3m+2)(3m+10)$

25) Factor completely: $x^4 - 81$

difference of squares
gives us
conjugate pairs.

$x^4 - 81$

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

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

difference
of squares

$(x-3)(x+3)(x^2+9)$

Factoring Trade

Name: _____

Period: _____

Directions: Trade papers with 12 different people to factor the following expressions.
You should NOT be factoring the same problem each time.

1 Name: _____

$$7x^3 - 63x$$

$= 7x(x^2 - 9)$ Difference of squares

$= 7x((x)^2 - (3)^2)$

$= \boxed{7x(x-3)(x+3)}$

2 Name: common factor, ac Method

$$2m^2 + 12m - 32$$

$= 2(m^2 + 6m - 16)$

$= \boxed{2(m-2)(m+8)}$

$\begin{array}{c} -16 \\ \overline{-1, 16} \\ \boxed{-2, 8} \\ -4, 4 \end{array}$

3 Name: ac Method

$$6k^2 - 5k - 4 \qquad \boxed{ac}$$

$\underline{6k^2 - 8k} + \underline{3k - 4}$

$2k(3k-4) + 1(3k-4)$

$\boxed{(2k+1)(3k-4)}$

$\begin{array}{c} -24 \\ \overline{6, -4} \\ \boxed{-8, 3} \\ -2, 12 \\ -1, 24 \end{array}$

4 Name: Grouping

$$\underbrace{3y^3 + 7y^2} \underbrace{-12y - 28}$$

$y^2(3y+7) - 4(3y+7)$

$(y^2 - 4)(3y+7)$

$\underbrace{}$
difference of squares

$\boxed{(y-2)(y+2)(3y+7)}$

5 Name: common factor

$$18a^2b - 30ab^2$$

$$\boxed{6ab(3a - 5b)}$$

6 Name: common factor, ac Method

$$x^3 - 13x^2 + 42x$$

$$= x(x^2 - 13x + 42)$$

$$= \boxed{x(x-6)(x-7)}$$

$$\boxed{ac}$$
$$42$$
$$\boxed{-6, 7}$$
$$2, 26$$

7 Name: common factor, difference of squares

$$5x^4 - 5$$

$$= 5(x^4 - 1)$$

$$= 5\left((x^2)^2 - (1)^2\right)$$

$$= 5(x^2 - 1)(x^2 + 1)$$

difference of squares

$$= \boxed{5(x-1)(x+1)(x^2+1)}$$

8 Name: Grouping

$$4x^3 + 3x^2 - 20x - 15$$

$$x^2(4x+3) - 5(4x+3)$$

$$\boxed{(x^2-5)(4x+3)}$$

9 Name: ac Method/PST

$$4a^2 + 20a + 25$$

OR $(2a)^2 + 2(2a)(5) + (5)^2$

$4a^2 + 10a + 10a + 25$

$2a(2a+5) + 5(2a+5)$

$(2a+5)(2a+5)$

$(2a+5)^2$

ac
100
+10,10
4,25
2,50

10 Name: ac method

$$n^2 - 18n - 40$$

$n^2 + 2n - 20n - 40$

$n(n+2) - 20(n+2)$

$(n-20)(n+2)$

-40
4,10
2,-20
1,40
5,8

11 Name: common factor, ac Method

$$3x^3 + 21x^2 - 180x$$

$= 3x(x^2 + 7x - 60)$

$= 3x(x-5)(x+12)$

-60
6,10
2,30
3,20
12,-5

12 Name: common factor difference of squares

$$m^3n - mn^3$$

$= mn(m^2 - n^2)$

$= mn(m-n)(m+n)$