

Please show all work for full credit. (4 points each numbered problem)

<p>1. Write the prime factorization of</p> <p>(a) $36 = 2^2 \cdot 3^2$</p> $\begin{array}{r} 2 \overline{)36} \\ 2 \overline{)18} \\ 3 \overline{)9} \\ 3 \end{array}$ <p>(b) $200 = 2^3 \cdot 5^2$</p> $\begin{array}{r} 2 \overline{)200} \\ 2 \overline{)100} \\ 2 \overline{)50} \\ 5 \overline{)25} \\ 5 \end{array}$	<p>2. Find the GCF.</p> <p>(a) $\text{GCF}(60, 150) = 2 \cdot 3 \cdot 5 = 30$</p> $\begin{array}{r} 2 \overline{)60} \\ 2 \overline{)30} \\ 3 \overline{)15} \\ 5 \end{array} \qquad \begin{array}{r} 2 \overline{)150} \\ 3 \overline{)75} \\ 5 \overline{)25} \\ 5 \end{array}$ $60 = 2^2 \cdot 3 \cdot 5 \qquad 150 = 2 \cdot 3 \cdot 5^2$ <p>(b) $\text{GCF}(8a^5b^2, 6ab^4) = 2ab^2$</p>
<p>3. Factor out the GCF.</p> <p>(a) $24x + 18 = 6(4x + 3)$</p> <p>(b) $5a^2b^2 + 5ab^2 + 25b^2$ $= 5b^2(a^2 + a + 5)$</p>	<p>4. Factor out the GCF.</p> <p>(a) $2x(y + 8) - 5(y + 8)$ $= (2x - 5)(y + 8)$</p> <p>(b) $7x(x - 5) + (x - 5)$ $= (7x + 1)(x - 5)$</p>

5. Factor

(a) $ab + cb + 5ad + 5dc$
 $= (a + c)(b + 5d)$

	<i>a</i>	<i>c</i>
<i>b</i>	<i>ab</i>	<i>cb</i>
<i>5d</i>	<i>5ad</i>	<i>5dc</i>

(b) $4x^2 - 4x - 3yx + 3y$
 $= (4x - 3y)(x - 1)$

	<i>x</i>	<i>-1</i>
<i>4x</i>	<i>4x²</i>	<i>-4x</i>
<i>-3y</i>	<i>-3xy</i>	<i>3y</i>

6. Factor

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

	<i>x</i>	<i>-3</i>
<i>x</i>	<i>x²</i>	<i>-3x</i>
<i>4</i>	<i>4x</i>	<i>-12</i>

(b) $2w^2 + 3w - 4w - 6$
 $= (w - 2)(2w + 3)$

	<i>2w</i>	<i>3</i>
<i>w</i>	<i>2w²</i>	<i>3w</i>
<i>-2</i>	<i>-4w</i>	<i>-6</i>

7. Factor

(a) $x^2 + 11x + 18$
 $= (x + 9)(x + 2)$

	<i>18</i>
<i>1</i>	<i>18</i>
<i>2</i>	<i>9</i>
	<i>11</i>

(b) $w^2 - 14w + 24$
 $= (w - 2)(w - 12)$

	<i>24</i>
<i>1</i>	<i>24</i>
<i>2</i>	<i>12</i>
<i>-2</i>	<i>-12</i>
	<i>-14</i>

8. Factor

(a) $w^2 + 7w - 30$
 $= (w - 3)(w + 10)$

	<i>-30</i>
<i>-1</i>	<i>30</i>
<i>-2</i>	<i>15</i>
<i>-3</i>	<i>10</i>
	<i>7</i>

(b) $x^2 - 3x - 40$
 $= (x + 5)(x - 8)$

	<i>-40</i>
<i>-1</i>	<i>40</i>
<i>-2</i>	<i>20</i>
<i>-4</i>	<i>10</i>
<i>-5</i>	<i>8</i>
<i>5</i>	<i>-8</i>
	<i>-3</i>

9. Factor completely

(a) $4x^2 + 4x - 48$
 $= 4(x^2 + 1x - 12)$
 $= 4(x + 4)(x - 3)$

-12	
-1	12
-2	6
-3	4
1	

(b) $5y^3 + 60y^2 + 100y$
 $= 5y(y^2 + 12y + 20)$
 $= 5y(y + 2)(y + 10)$

20	
1	20
2	10
12	

10. Factor

(a) $x^2 - 10xy + 25y^2$
 $= (x - 5y)(x - 5y)$

25	
1	25
5	5
-5	-5
-10	

(b) $a^2 - 2ab - 15b^2$
 $= (a + 3b)(a - 5b)$

-15	
-1	15
-3	5
3	-5
-2	

11. Factor

$2x^2 + 13x + 15$
 $= 2x^2 + 3x + 10x + 15$
 $= (2x + 3)(x + 5)$

30	
1	30
2	15
3	10
13	

	2x	3
x	2x ²	3x
5	10x	15

12. Factor

$2x^2 - 1xy - 21y^2$
 $= 2x^2 + 6xy - 7xy - 21y^2$
 $= (2x - 7y)(x + 3y)$

-42	
-1	42
-2	21
-3	14
-6	7
6	-7
-1	

	x	3y
2x	2x ²	6xy
-7y	-7xy	-21y ²

13. Factor

a) $x^2 - 25$
 $= (x + 5)(x - 5)$

(b) $64 - y^2$
 $= (8 + y)(8 - y)$

14. Factor

a) $x^3 - 64$
 $= (x - 4)(x^2 + 4x + 16)$

(b) $8 + y^3$
 $= (2 + y)(4 - 2y + y^2)$

15. Factor completely

$$x^4 - 81y^4$$
$$= (x^2 + 9y^2)(x^2 - 9y^2)$$
$$= (x^2 + 9y^2)(x + 3y)(x - 3y)$$

16. Factor completely

$$4x^3 - 32$$
$$= 4(x^3 - 8)$$
$$= 4(x - 2)(x^2 + 2x + 4)$$

17. Solve

$$x^2 + 12x + 27 = 0$$

$$(x + 3)(x + 9) = 0$$

$$x + 3 = 0 \quad \text{or} \quad x + 9 = 0$$

$$\begin{array}{r} -3 \quad -3 \\ x = -3 \end{array} \qquad \begin{array}{r} -9 \quad -9 \\ x = -9 \end{array}$$

Solution set: $\{-3, -9\}$ **18. Solve**

$$2x^2 - 12x = 0$$

$$2x(x - 6) = 0$$

$$2x = 0 \quad \text{or} \quad x - 6 = 0$$

$$x = 0 \qquad \begin{array}{r} +6 \quad +6 \\ x = 6 \end{array}$$

Solution set: $\{0, 6\}$ **19. Solve**

$$2x^2 - 11x = -5$$

$$\begin{array}{r} +5 \quad +5 \\ 2x^2 - 11x + 5 = 0 \end{array}$$

$$2x^2 - 11x + 5 = 0$$

$$2x^2 - x - 10x + 5 = 0$$

	10
1	10
-1	-10
	-11

	2x	-1
x	2x ²	-x
-5	-10x	5

$$(2x - 1)(x - 5) = 0$$

$$2x - 1 = 0 \quad \text{or} \quad x - 5 = 0$$

$$\begin{array}{r} +1 \quad +1 \\ 2x = 1 \end{array} \qquad \begin{array}{r} +5 \quad +5 \\ x = 5 \end{array}$$

$$x = \frac{1}{2}$$

Solution set: $\{\frac{1}{2}, 5\}$ **20. Solve**

$$(x - 3)(x - 8) = -6$$

$$x^2 - 8x - 3x + 24 = -6$$

$$x^2 - 11x + 24 = -6$$

$$\begin{array}{r} +6 \quad +6 \\ x^2 - 11x + 30 = 0 \end{array}$$

$$x^2 - 11x + 30 = 0$$

$$(x - 6)(x - 5) = 0$$

$$x - 6 = 0 \quad \text{or} \quad x - 5 = 0$$

$$\begin{array}{r} +6 \quad +6 \\ x = 6 \end{array} \qquad \begin{array}{r} +5 \quad +5 \\ x = 5 \end{array}$$

Solution set: $\{6, 5\}$