

I. Simplify the radicals.

$$1) \sqrt{12x^5y^2} = \sqrt{4 \cdot 3 \cdot x \cdot x \cdot x \cdot y^2}$$

$$= 2x^2y\sqrt{3x}$$

$$2) \sqrt{200} = \sqrt{2 \cdot 100}$$

$$= 10\sqrt{2}$$

$$3) \sqrt{-50} = \sqrt{-1} \cdot \sqrt{25 \cdot 2}$$

$$\sqrt{-1} = i$$

$$= 5i\sqrt{2}$$

$$4) \sqrt{243} = \sqrt{81 \cdot 3}$$

$$= 9\sqrt{3}$$

II. Complex Numbers: Put all answers in standard form.

5) $-6i(11+2i)$ $i^2 = -1$

$$= -66i - 12i^2$$

$$= -66i - 12(-1)$$

$$= -66i + 12 = 12 - 66i$$

6) $(2i+8) + (3i-4)$

$$2i + 3i = 5i$$

$$8 - 4 = 4$$

$$= 4 + 5i$$

7) $(3-2i)(-9+2i)$

$$3(-9+2i) - 2i(-9+2i)$$

$$-27 + 6i + 18i - 4i^2$$

$$-27 + 24i - 4(-1)$$

$$= -27 + 24i + 4 = -23 + 24i$$

or
box
method

8) $(7-3i)(7+3i)$

7	-3i	
7	49	-21i
+3i	21i	-9i^2

$$= 49 - 9i^2$$

$$= 49 - 9(-1)$$

$$= 49 + 9 = 58$$

9) $(2i-4)(-i+7)$

$$2i(-i+7) - 4(-i+7)$$

$$-2i^2 + 14i + 4i - 28$$

$$-2(-1) + 18i - 28$$

$$= 2 + 18i - 28 = -26 + 18i$$

10) $\frac{2-3i}{3+5i}$

Conjugate $3-5i$
of denominator

$$\frac{2-3i}{3+5i} \cdot \frac{3-5i}{3-5i} = \frac{6-10i-9i+15i^2}{9-25i^2}$$

$$= \frac{6-19i+15(-1)}{9-25(-1)} = \frac{6-15-19i}{9+25} = \frac{-9-19i}{34}$$

$$2i^2 - 4 - i - 7$$

$$2i^2 - i = i$$

$$-4 - 7 = -11$$

$$\Rightarrow -11 + i$$

III. Factor completely.

11) $x^2 + 5x - 14$

m	a
-14	5
7(-2)	7+(-2)

$(x^2 + 7x) - 2x - 14$

$x(x+7) - 2(x+7)$

$(x+7)(x-2)$

13) $\frac{5p^2q + 10pq}{5pq \quad 5pq}$

GCF = $5pq$

$5pq(p+2)$

15) $(x^2 - 16x)(x - 16)$ Group

$x(x-16) + 1(x-16)$

$(x+1)(x-16)$

17) $10x^2 + 13x - 3$

m	a
-30	+13
15(-2)	15+(-2)

$(10x^2 + 15x)(-2x - 3)$

$5x(2x+3) - 1(2x+3)$

$(5x-1)(2x+3)$

19) $36x^2 - 49$

D.O.T.S.

$(6x-7)(6x+7)$

12) $x^2 - 100$

D.O.T.S.

$(x-10)(x+10)$

14) $3x^3 - 27x^2 + 54x$

GCF: $3x$

$3x(x^2 - 9x + 18)$

m	a
+18	-9
-6(-3)	-6+(-3)

$(x^2 - 6x) - 3x + 18$

$x(x-6) - 3(x-6)$

$3x(x-6)(x-3)$

16) $9x^2 - 49$

D.O.T.S.

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

18) $3x^2 + 26x + 16$

m	a
+48	+26
2(24)	24+2

$(3x^2 + 24x)(x+8)$

$3x(x+8) + 2(x+8)$

$(3x+2)(x+8)$

20) $8x^3 - 125$

Cubes

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