53.) $5i(3+2i)(8+3i)$ $\qquad i^2=-1$

$5i(24+9i+16i+6i^2)$

$5i(24+25i-6)$

$5i(18+25i)$

$90i+125i^2$

$90i-125 = -125+90i$

$$y = 7(x-2)^2 - 28$$

$$0 = 7(x-2)^2 - 28$$

$$28 = 7(x-2)^2$$

$$\sqrt{4} = \sqrt{(x-2)^2}$$

$$\pm 2 = x - 2$$

$$x = 2 \pm 2$$

$$2 + 2 \qquad 2 - 2$$

$$\boxed{4, 0}$$

51.) $-8-(3+2i)-(9-4i)$

$-\underline{\underline{8}}-\underline{\underline{3}}-2i-\underline{\underline{9}}+4i$

$-20+2i$

1.6: Complex Numbers (continued)

You will need to find conjugates to simplify some expressions.

The product of a number and its conjugate will be a rational number.

$(5+\sqrt{3})(5-\sqrt{3})$ FOIL FL

#55 Skip

$25-3$

22

1) Find the product of 5 - 7i and its conjugate.

$$(5-7i)(5+7i)$$

$$25-49i^2$$

$$25-49(-1)$$

$$25+49$$

$$74$$

Simplify.

2) $\frac{21i}{4+3i} \cdot \frac{(4-3i)}{(4-3i)}$

$\frac{21i(4-3i)}{25}$

$\frac{84i-63i^2}{25}$

$\frac{84i+63}{25}$

$\frac{63+84i}{25}$

$\frac{63}{25}+\frac{84}{25}i$

Simplify.

3)

$$\frac{12-3i}{2i} \cdot \frac{-2i}{-2i}$$

$$\frac{-24i+6i^2}{-4i^2}$$

$$\frac{-24i-6}{4}$$

$$-\frac{3}{2}-6i$$

$$\frac{12-3i}{2i} \cdot \frac{i}{i}$$

$$\frac{12i-3i^2}{-2}$$

$$\frac{12i+3}{-2}$$

$$\frac{-3}{2}-6i$$

Perform the indicated operation. Simplify.

4) $(2 + i)^3$

$(2+i)^3 \neq 2^3 + i^3$

$\underbrace{(2+i)(2+i)}(2+i)$

$4 + 4i + i^2$

$(3+4i)(2+i)$

$6 + 8i + 3i + 4i^2$

$6 + 11i - 4$

$2 + 11i$

$2 + 11i$

Powers of i

$i^1 = i$ rem 1

$i^2 = -1$ rem 2

$i^3 = -i$ rem 3

$i^4 = 1$ rem 0

$i^3 = i^2 \cdot i^1 = (-1) \cdot i = -i$

$i^4 = i^2 \cdot i^2 = (-1)(-1) = 1$

Simplify.

6) $(-2i)^7$

$(-2)^7 i^7$

$-128(-i)$

$128i$

7) $i^{564} = 1$

$$\begin{array}{r} 141 \\ 4\overline{)564} \\ \underline{4} \\ 16 \\ \underline{16} \\ 4 \\ \underline{4} \\ 0 \end{array}$$

remainder is 0

8) $i^{221} = i$

$$\begin{array}{r} 55 \\ 4\overline{)221} \\ \underline{20} \\ 21 \\ \underline{20} \\ 1 \end{array}$$

Solve.

9) $x^2 - 22 = -112$

$\sqrt{x^2} = \sqrt{-90}$

$x = \pm\sqrt{-90}$

$x = \pm i\sqrt{90}$

$x = \pm 3i\sqrt{10}$

10) $-5(p+3)^2 + 11 = 31$

$-5(p+3)^2 = 20$

$\sqrt{(p+3)^2} = \sqrt{-4}$

$p+3 = \pm\sqrt{-4}$

$p+3 = \pm i\sqrt{4}$

$p+3 = \pm 2i$

$p = -3 \pm 2i$

Find the zeros of the function.

11) $g(x) = 3x^2 + 12$

$0 = 3x^2 + 12$

$-12 = 3x^2$

$-4 = x^2$

$\sqrt{x^2} = \sqrt{-4}$

$x = \pm i\sqrt{4}$

$x = \pm 2i$

17.) $(8-5i)-(-11+4i)$

$8-5i+11-4i$

$19-9i$

$(8-5i)(-11+4i)$

$-88+32i+55i-20i^2$

$-88+87i+20 = -68+87i$

Factor completely

Solve using factoring

solve using square roots

Simplify radicals

Find zeros of quadratic equations

Imaginary numbers; standard form

Powers of i