Name: _Key_   Date: _October 12, 2015_

Solve.

                                                     Checks

1) $\sqrt{2x+12} = 6 - x$

$$2x + 12 = 36 - 12x + x^2$$

$$0 = x^2 - 14x + 24$$

$$0 = (x-12)(x-2)$$

    ① $x = 12$

    ② $\boxed{x = 2}$

Check $x = 12$

$$\sqrt{2(12)+12} = 6 - 12$$

$$\sqrt{24+12} = -6$$

$$\sqrt{36} \neq -6$$

$$6 \neq -6$$

$x = 2$

$$\sqrt{2(2)+12} = 6 - 2$$

$$\sqrt{4+12} = 4$$

$$\sqrt{16} = 4$$

$$4 = 4 \checkmark$$

Write in terms of $a + bi$

2) $\sqrt{-400}$

$$i \cdot \sqrt{(20)^2}$$

$$= \boxed{0 + 20i}$$

3) $-\sqrt{-220}$

$$= (-1) \cdot i \cdot \sqrt{4 \cdot 55}$$

$$= -i \cdot 2 \cdot \sqrt{55}$$

$$= 0 - 2i\sqrt{55}$$

Multiply or divide.

4) $\dfrac{\sqrt{49}}{\sqrt{-2}}$ $= \dfrac{7}{i\sqrt{2}} \cdot \dfrac{-i\sqrt{2}}{-i\sqrt{2}} = \dfrac{-7i\sqrt{2}}{-i^2 \cdot 2} = \dfrac{-7i\sqrt{2}}{2}$

$$= \boxed{-\dfrac{7i\sqrt{2}}{2}}$$

Perform the indicated operation. Write the result in the form a + bi.

5) $(7 - 8i) + (3 + 6i)$

$$\boxed{10 - 2i}$$

6) $(\sqrt{11} + 3i)(\sqrt{11} - 3i)$

$$11 - 3i\sqrt{11} + 3i\sqrt{11} - 9i^2$$

$$11 - 9(-1)$$

$$11 + 9 = 20 \qquad \boxed{20 + 0i}$$

7) $\dfrac{2}{5i} \cdot \dfrac{-5i}{-5i} = -\dfrac{10i}{25i^2}$

$$= -\dfrac{10i}{-25} = \dfrac{2i}{5}$$

$$\boxed{0 + \frac{2}{5}i}$$

Find the power of a +bi

8) i^{27}

$$\frac{27}{4} = 6 \, r \, 3 \qquad (i^4)^6 \cdot i^3$$

$$1^6 \cdot i^2 \cdot i$$

$$1 \cdot (-1) \cdot i$$

$$-i \qquad \boxed{0 - i}$$

Rationalize the denominator and simplify. Assume that all variables represent positive real numbers.

9) $\sqrt[3]{\dfrac{7}{9}}$

$$\dfrac{\sqrt[3]{7}}{\sqrt[3]{9}} \cdot \dfrac{\sqrt[3]{3}}{\sqrt[3]{3}} = \dfrac{\sqrt[3]{21}}{\sqrt[3]{27}} = \boxed{\dfrac{\sqrt[3]{21}}{3}}$$

Use rational exponents to simplify the following.

10) $\sqrt[9]{y^{15}z^9}$

$$y^{15/9} \cdot z^{9/9}$$

$$y^{5/3} \cdot z$$

$$\boxed{y^{5/3}z} \quad \text{or} \quad \boxed{z\sqrt[3]{y^5}}$$

Simplify the radical expression. Assume that all variables represent positive real numbers.

11) $\dfrac{\sqrt{120}}{\sqrt{6}}$

$$\sqrt{\dfrac{120}{6}} = \sqrt{20} = \boxed{2\sqrt{5}}$$

Solve the equation.

12) $\dfrac{5(y-4)}{3} = 2y - 2$

$5y - 20 = 6y - 6$

$\boxed{-14 = y}$

Perform the indicated operation.

13) $(3x^8 + 3x^7 - 3x^3 + 9) - (13x^8 - 4x^5 + 9x^3 - 10)$

$3x^8 + 3x^7 - 3x^3 + 9 - 13x^8 + 4x^5 - 9x^3 + 10$

$\boxed{-10x^8 + 3x^7 + 4x^5 - 12x^3 + 19}$

Multiply.

14) $(2x+5)^3$

$\left[(2x+5)(2x+5)\right](2x+5)$

$(4x^2 + 20x + 25)(2x+5)$

$8x^3 + 20x^2 + 40x^2 + 100x + 50x + 125$

$\boxed{8x^3 + 60x^2 + 150x + 125}$

BONUS! Solve.

15) $\sqrt{x+150} - \sqrt{x+55} = 5$

$\sqrt{x+150} = \left(\sqrt{x+55} + 5\right)^2$

$x + 150 = x + 55 + 10\sqrt{x+55} + 25$

$x + 150 = x + 80 + 10\sqrt{x+55}$

$70 = 10\sqrt{x+55}$

$7 = \sqrt{x+55}$

$49 = x + 55$

$\boxed{-6 = x}$

$\underline{\text{Ck}}$

$\sqrt{-6+150} - \sqrt{-6+55} = 5$

$\sqrt{144} - \sqrt{49} = 5$

$12 - 7 = 5$

$5 = 5 \checkmark$

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