Chapter 1 Review WKST

1. Simplify completely.

a) $\sqrt{6}\left(\sqrt{2}-\sqrt{12}\right)$ b) i^{1123} c) i^{2014}

2. Use the given information below to simplify each expression completely. Write your answer in standard form; then identify the real and imaginary parts.

A=1-3i B=1+3i C=3i D=1+4i

a) AB-CD b) $\frac{A}{C}$ c) $\frac{C}{D^2}$

3. Can a quadratic equation have one real answer? Only one imaginary answer? Explain.

4. Tell whether the statement is *always, sometimes, or never true.* Explain your reasoning.

a) A real number is an imaginary number.

b) A complex number is an imaginary number.

c) Quadratic equations have real solutions.

d) Roots of quadratic equations are conjugate pairs.

5. Alex throws a ball straight up toward the roof of an indoor baseball stadium. The height *h* in feet of the ball after *t* seconds can be modeled by the function $h(t)=-16t^2+112t$. If the height of the roof is 208 feet will the ball hit the roof? Show the work that leads to your conclusion.

6. The perimeter of a right triangle is 40 cm, and its hypotenuse measures 17cm. Find the length of each leg. Show the work that leads to your conclusion.

7. A square and rectangle have the same area. The length of the rectangle is five inches more than twice the length of the side of the square. The width of the rectangle is 6 inches less than the side of the square. Find the length of the side of the square. Show the work that leads to your conclusion.

8. Determine the domain and the range *without* graphing. State your answer in interval notation.

a) $f(x)=2x^2+8x-1$ b) $f(x)=9-x^2$

9. List the number sets to which each number belongs.

a) 5 b) $\frac{\sqrt{3}}{2}$ c) π d) $3-2i$

10. Determine the most efficient method for solving each quadratic equation below. Explain your reasoning. You cannot use a method more than once.

a) $3x^2-6x+1=-x$ b) $15x^2-37x=8$

c) $4+3(x-7)^2=-80$ d) $6x^2-20x=x^2-13$

11. Write each quadratic function in vertex form.

a) $f(x)=4x^2-12x+1$ b) $y=-x^2+8x-16$

12. ***Graphing Calculator*** - For each function find: the vertex, the zeros, the domain, the range, the domain of where the function is increasing, the domain of where the function is decreasing, the domain of where the function is positive and the domain of where the function is negative. State all answers in ***set*** notation when necessary.

a) $f(x)=2x^2-3x+4$ b) $y=-(x+5.1)^2+5.2$

ANSWERS

1.

a) $2\sqrt{3}-6\sqrt{2}$ b) $-i$ c) -1

2.

a) $22-3i$, Real Part: 22, Imaginary Part: -3

b) $-1-\frac{1}{3}i$, Real Part: -1, Imaginary Part: $-\frac{1}{3}$

c) $\frac{24}{289}-\frac{45}{289}i$, Real Part: $\frac{24}{289}$, Imaginary Part: $-\frac{45}{289}$

3. A quadratic can have one repeated real root. A quadratic cannot have only one imaginary root; if the roots are imaginary there must be two imaginary roots that are conjugate pairs.

4.

a) Never; Nonreal numbers are imaginary.
b) Sometimes; Complex numbers that have an imaginary part are imaginary, complex numbers that do not have an imaginary part are real.
c) Sometimes; Quadratic equations sometimes yield two imaginary solutions.
d) Sometimes; Only imaginary or irrational roots of a quadratic equation come in conjugate pairs. Rational roots of quadratics sometimes come in conjugate pairs, but not always.

5. The maximum height that Alex's ball will reach is 196 ft. Since 196<208, the ball will not hit the ceiling.

6. 8 cm, 15 cm

7. 10 inches

8.

a) D: $(-\infty,\infty)$; R: $[-9,\infty)$

b) D: $(-\infty,\infty)$; R: $(-\infty,9]$

9.

a) R, Q, Z, W, N, D
b) R, I
c) R, I, T
d) This number is imaginary.

10.

a. Quadratic formula. This equation is not a candidate for factoring or square roots and $\frac{b}{2a}$ is not even.

b. Factoring. In standard form, the equation can be factored.
c. Square Roots. This equation can be easily written in vertex form.

d. CTS. This equation is not a candidate for factoring or square roots and $\frac{b}{2a}$ is even.

11.

a. $f(x)=4\left(x-\frac{3}{2}\right)^2-8$

b. $y=-(x-4)^2$

12.

a.
Vertex: (0.750, 2.875)
Zeros: none
Domain: $\{x|x\in R\}$
Range: $\{y|y\geq 2.875\}$
Inc: $\{x|x>0.750\}$
Dec: $\{x|x<0.750\}$
Pos: $\{x|x\in R\}$
Neg: never

b.
Vertex: (-2.1, 5.2)
Zeros: (-4.380, 0) & (0.180, 0)
Domain: $\{x|x\in R\}$
Range: $\{y|y\leq 5.2\}$
Inc: $\{x|x<-2.1\}$
Dec: $\{x|x>-2.1\}$
Pos: $\{x|-4.380<x<0.180\}$
Neg: $\{x|x<-4.380 \text{ or } x>0.180\}$