BECA / Huson / Precalculus: 3. Complex numbers First and last name:
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4.9 Test: Cumulative year-to-date standards

A1-APR.1 Perform operations with polynomials

1. Find the difference $f(x) - g(x)$ as a polynomial in standard form, given:

$$f(x) = x^4 - 3x^3 - 3x^2 - 2x + 5 \quad \text{and} \quad g(x) = 2x^4 - x^3 + 2x + 5.$$

2. Select each correct equation.

(a) $x^2 + 14 = x^2 + 7^2$

(b) $x^2 + 49 = (x - 7)(x + 7)$

(c) $x^2 - 49 = (x - 7)(x + 7)$

(d) $x^2 + 14x + 49 = (x - 7)^2$

(e) $x^2 - 14x + 49 = (x + 7)^2$

(f) $x^2 - 14x + 49 = (x - 7)^2$

(g) $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

(h) $x^3 + y^3 = (x - y)(x^2 - xy + y^2)$

A2-A.APR.3 Identify zeros of polynomials given suitable factorizations

3. Write down the solutions to the equation $(x - 7)(4x + 3)(x - 2) = 0$.

A2-A.REI.2 Solve rational and radical equations, identify extraneous solutions

4. Square both sides of the equation and solve for x.

(a) $\sqrt{x + 9} = 4$

(b) Check your solution.

5. Solve for x and check.

   (a) $\sqrt{5x+16}+5=14$

   (b) Check your solution.

6. Solve for x. $\dfrac{8}{x+3}=\dfrac{x+1}{x}$

A2-F.BF.2 Write arithmetic and geometric sequences with recursive formulas

7. Write a recursive definition of the sequence $a_1 = 0.25$, $a_2 = 0.75$, $a_3 = 1.25$, $a_4 = 1.75, \ldots$

8. Write a recursive definition of the geometric sequence b.

n	b_n
1	-1
2	5
3	-25

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A2.N.CN.2 Apply the properties of complex numbers

9. Write each expression in the form $a + bi$ with a, b real numbers.

   Given $s = 2 - 5i$ and $t = 9 - 3i$.

   (a) $s + t =$

   (b) $s - t =$

   (c) $st =$

10. Simplify each expression, using complex numbers as necessary.

    (a) $\sqrt{-49} =$

    (b) $\frac{1}{2}\sqrt{-12} =$

11. Does the equation $x^2 + 3x + 7 = 0$ have real or imaginary solutions? Justify your answer.

A2.HSN.RN.2 Expressions with radicals and rational exponents

12. Simplify each radical expression, using complex numbers as necessary.

(a) $\sqrt{64} =$

(b) $\sqrt{27} =$

(c) $\sqrt{-9} =$

(d) $\dfrac{\sqrt{-50}}{\sqrt{2}} =$

13. Simplify each expression.

(a) $125^{\frac{2}{3}} =$

(b) $\left(\sqrt[3]{\frac{8}{27}}\right)^2 =$

14. Rewrite each expression as a fractional exponent in simplest terms. $x > 0$

(a) $\sqrt[3]{7} =$

(b) $\dfrac{1}{\sqrt[3]{5}} =$

(c) $\sqrt[2]{x^4} =$

(d) $\dfrac{1}{(\sqrt[3]{x})^2} =$

15. Rewrite each expression with fractional exponent as a radical.

(a) $5^{\frac{1}{4}} =$

(b) $5^{-\frac{1}{3}} =$

(c) $x^{\frac{2}{5}} =$

(d) $x^{-\frac{1}{3}} =$