Honors Algebra One: Second Semester Proficiency Test Review

#1-9, Simplify completely.

1. \( \left( \frac{a^2}{b^3} \right)^5 \)
2. \( \left( \frac{3a^3b}{a^2b^4} \right)^3 \)
3. \( (-4x^4y^3)^2 \left( 5x^4z^{-5} \right)^3 \)
4. \( 5^{-\frac{1}{3}} \cdot 5^{-\frac{5}{3}} \)
5. \( \frac{5^5}{6^6 \cdot 3^3} \)

6. \( (x^2 - 6x + 6) - (5x^2 + x + 1) \)
7. \( -4yz(6y - z)(4y - z) \)
8. \( (a - 8b)^2 \)
9. \( (y^3 - 5)(y^3 + 5) \)

10. Perform the operation. Write the answer in scientific notation and standard notation: \( \frac{0.00000156}{0.0003} \)

11. Express the volume of the fish tank in scientific notation:

   ![Fish Tank Diagram]

#12-20, Factor completely.

12. \( 25x^2y - 20x^2y^2 \)
13. \( x^2 - 16x + 39 \)
14. \( 2x^3 + 6x - 36 \)
15. \( 8a^2 + 37a - 15 \)
16. \( 25x^2 - 10x + 1 \)
17. \( 25 - 64a^2 \)
18. \( 3x^2 + 19xy + 6y^2 \)
19. \( 16x^4 - 81 \)
20. \( 4m^4 + 4m^2 - 3 \)

21. Find the domain of the rational function: \( f(x) = \frac{x^2 + 4x + 3}{x^2 - x - 56} \)

22. Simplify completely: \( \frac{36 - 4x^2}{x^2 - 2x - 3} \)

#23-27, Perform the operations and simplify completely.

23. \( \frac{3x^2 - x - 14}{x^2 - 4} \cdot \frac{x^2 + x - 6}{3x^2 + 2x - 21} \)
24. \( \frac{x^2 - 6x + 9}{1 - x^2} + \frac{x^2 - 9}{x^2 - 5x + 4} \)
25. \( \frac{x + 9}{x + 5} \cdot \frac{x - 10}{x + 7} \)

26. \( \frac{5x}{x^2 + 11x + 18} + \frac{5x}{x^2 - 4} \)
27. \( \frac{4x^6y^6 + 8x^4y - 12xy^6}{-4x^5y^5} \)
#28-31, Solve the equation.

28. \( \frac{x - 3}{x - 5} + \frac{x - 7}{x - 5} = x - 5 \)

29. \( \frac{3}{y + 5} = \frac{1}{3y + 6} - \frac{y + 2}{y^2 + 7y + 10} \)

30. \( \frac{5}{x - 2} + \frac{4}{x + 1} = \frac{1}{x^2 - x - 2} \)

31. \( \frac{1}{x + 3} = \frac{-3x}{x + 8} \)

32. Express the verbal in symbols: \( y \) varies directly as \( z \) squared and inversely as the cube of \( u \).

33. An object in free fall travels a distance \( s \) that is directly proportional to the square of the time \( t \). If an object falls 833 feet in 7 seconds, how far will it fall in 10 seconds?

34. Under constant temperature, the volume occupied by a gas varies inversely to the pressure applied. If the gas occupies a volume of 18 cubic inches under a pressure of 5 pounds per square inch, find the volume when the gas is subjected to a pressure of 10 pounds per square inch.

#35-54, Solve the equation.

35. \( 2y^2 - 11y + 5 = 0 \)

36. \( 2x^2 + 6x = 0 \)

37. \( 3x^2 = -2 + 5z \)

38. \( z^2 - 27 = 0 \)

39. \( 7x^2 - 25 = 0 \)

40. \( (x + 5)^2 - 3 = 0 \)

41. \( x^2 - 6x + 10 = 0 \)

42. \( 9x^2 + 9x + 2 = 0 \)

43. \( 3x^2 + 7x = -1 \)

44. \( q^2 = -4 \)

45. \( x^2 + 10x + 18 = 0 \)

46. \( (a + 1)^2 = 8 \)

47. \( x^2 + 2x = 7 \)

48. \( 3x^2 - 4x + 2 = 0 \)

49. \( x^2 - 2x + 10 = 0 \)

50. \( -x^2 + 6x = 2 \)

51. \( 5x^2 = 2x - 1 \)

52. \( -x^2 - 6x - 4 = 0 \)

53. \( 0.2x^2 - 0.16x - 0.1 = 0 \)

54. \( \frac{x^2}{7} + \frac{9}{7}x = -1 \)

55. Let \( f(x) = x^2 - 4x + 4 \). For what value(s) of \( x \) is \( f(x) = 1 \)?

56. Use the discriminant to find the type of solutions that exist for \( 4x^2 - 4x + 1 = 0 \).

#57-77, Simplify completely.

57. \( -\sqrt{225} \)

58. \( \sqrt{-125} \)

59. \( 16^{\frac{1}{4}} \)

60. \( (-64)^{\frac{1}{3}} \)

61. \( -27^{\frac{2}{3}} \)

62. \( \sqrt{9x^2} \)

63. \( \sqrt[3]{-8a^3} \)

64. \( (25x^6)^{\frac{3}{2}} \)

65. \( \left( \frac{-8}{27} \right)^{\frac{2}{3}} \)

66. \( \sqrt[3]{32} \)

67. \( \sqrt[3]{128a^2b^3} \)

68. \( \sqrt[3]{-32x^6} \)

69. \( \sqrt{6} + \sqrt{54} \)

70. \( \sqrt{54x} + \sqrt{2x} \)
72. \( \sqrt{175m} - \sqrt{18m} + \sqrt{128m} \)  
73. \( \sqrt{-44} \)  
74. \( \sqrt{\frac{49}{25}} \)  
75. \( 3\sqrt{2} \cdot 4\sqrt{14} \)

76. \( \frac{5}{\sqrt{6}} \)  
77. \( 4\sqrt{2}(3\sqrt{5} + \sqrt{6}) \)

78. Change the radical to an exponential expression: \( \sqrt[4]{4abc} \)

79. Solve the equation for \( V \):  
\[ d = \frac{8V}{\pi} \]

80. Given the quadratic equation:  
\[ f(x) = x^2 + 2x + 1 \]  
locate the x-intercept(s), the y-intercept, and vertex. Express locations as ordered pairs.

81. Given the quadratic equation:  
\[ f(x) = -x^2 - 8x - 7 \]  
locate the x-intercept(s), the y-intercept, and vertex. Express locations as ordered pairs.

82. Graph \( f(x) = 2(x+1)^2 - 8 \). Locate the vertex, x-intercept(s), and the y-intercept as ordered pairs and state the axis of symmetry. Units do not need to be to scale.

vertex ______________________

x-intercept(s) ______________________

y-intercept ______________________

axis of symmetry ______________________

83. Complete the square to write the function \( f(x) = -3x^2 + 18x - 5 \) in \( f(x) = a(x - h)^2 + k \) form.
Answers: \(0 \frac{b^5}{a^{10}} \quad 2 \frac{27a^{15}}{b^9} \quad 3 \frac{16y^2z^{21}}{125x^4} \quad 4 \frac{1}{25} \quad 5 \frac{6^3}{8} \) or \(3 \sqrt{36} \)

\(6 - 4x^2 - 7x + 5 \quad 7 \quad 9 \quad 96y^3z + 40y^2z^2 - 4yz^3 \quad 8 \ a^2 - 16ab + 64b^2 \)

\(9 \ y^6 - 25 \quad 10 \ 5.2 \times 10^{-3} ; 0.0052 \quad 11 \ 2.1 \times 10^4 \ mm^3 \quad 12 \ 5x^2y (5 - 4y) \)

\(13 \ (x - 3)(x - 3) \quad 14 \ 2(x + 6)(x - 3) \quad 15 \ (8a - 3)(a + 5) \quad 16 \ (5x - 1)^2 \)

\(17 \ (5 - 8a)(5 + 8a) \quad 18 \ (3x + y)(x + 6y) \quad 19 \ (2x - 3)(2x + 3)(4x^2 + 9) \)

\(20 \ (2m^2 - 1)(2m^2 + 3) \quad 21 \ x \neq -7, x \neq 8 \quad 22 \ - \frac{4(x + 3)}{x + 1} \quad 23 \ 1 \)

\(24 \ - \frac{(x - 3)(x - 4)}{(x + 3)(x + 1)} \quad 25 \ 21x + 11 \ \\
\(26 \ 5x(2x + 7) \quad 27 \ - x - \frac{3y}{x^4} + \frac{3y}{x^4} \frac{27}{x} \ \\
\(28 \ x = 7; 5 \) is extraneous \(29 \ - \frac{19}{11} \quad 30 \ - \frac{4}{9} \quad 31 \ - \frac{4}{3} \quad 32 \ - 2 \quad 33 \ Y = \frac{X^2}{3} \)

\(34 \ 1700 \ ft. \quad 35 \ 9 \ in. \quad 36 \ \frac{5}{2} \quad 37 \ \frac{2}{3} \quad 38 \ \frac{3}{3} \quad 39 \ \pm 3 \pm \sqrt{2} \quad 40 \ \pm 5 \pm \sqrt{3} \quad 41 \ \pm 1 \pm 2 \sqrt{2} \)

\(42 \ 1 \pm 2 \sqrt{2} \quad 43 \ 2 \pm \sqrt{2} \quad 44 \ 1 \pm 3i \quad 50 \ 3 \pm \sqrt{7} \quad 51 \ 5 \pm 2i \quad 52 \ -3 \pm \sqrt{5} \)

\(53 \ \frac{4}{16} \quad 54 \ - \frac{9}{\sqrt{3}} \quad 55 \ 1, 3 \quad 56 \ equal \ rational \ answers (one \ repeated \ six) \ \\
\(57 \ -15 \quad 58 \ -5 \quad 59 \ - \frac{2}{6} \quad 60 \ -4(6) - 9 \quad 62 \ 3 \times 6 \quad 63 \ -2a \quad 64 \ 125x^9 \)

\(65 \ 9 \quad 66 \ \frac{3}{4} \quad 67 \ 4ab - \sqrt{7b} \quad 68 \ -2x^3 \quad 69 \ 4 \times 6 \quad 70 \ -7 \times 2 \)

\(71 \ 4 \times 2 \quad 72 \ 5.97m + 5 \sqrt{2}m \quad 73 \ 2i \times \sqrt{7} \quad 74 \ \frac{7}{3} \quad 75 \ 24 \times \sqrt{7} \quad 76 \ \frac{3\sqrt{3}}{6} \quad 77 \ 12 \times 10^8 \pm \sqrt{7} \quad 78 \ (4abc)^{\frac{1}{2}} \quad 79 \ V = \frac{n^3}{8} \)

\(80 \ y - \text{int} : (0,-1) \quad 81 \ y - \text{int} : (1,0) \quad 82 \ \text{vertex} : (-1,8) \quad 83 \ y - \text{int} : (0,-1) \quad 84 \ \text{vertex} : (1,9) \)

\(85 \ \text{axis of symmetry} : x = -1 \)

\(f(x) = -3(x-3)^2 + 22 \)