Test 2 Review

1. Divide.

\[(2x^2 + 21x + 47) \div (x + 7)\]

Your answer should give the quotient and the remainder.

Quotient:

Remainder:

2. Divide.

\[(20x^3 + 16x^2 + 5x + 6) \div (5x - 1)\]

Your answer should give the quotient and the remainder.

Quotient:

Remainder:
3. Divide.

\[ (-9x^3 + 11x^2 + 3x^4 - 4) \div (3x^2 - 1) \]

Write your answer in the following form: Quotient + \( \frac{\text{Remainder}}{3x^2 - 1} \).

\[
\begin{array}{c|cccc}
-3x^2 & -9x^3 & +11x^2 & +3x^4 & -4 \\
-9x^2 & +11x^2 & -9x^2 & +9x^2 & -9x^2 \\
0 & +2x^2 & +4x^2 & +3x^4 & -4 \\
-2x^2 & +4x^2 & +12x^2 & -8 & +8 \\
0 & +2x^2 & +4x^2 & +12x^2 & +4 \\
\hline
0 & +2x^2 & +4x^2 & +3x^4 & -4 \\
\end{array}
\]

\[
\begin{array}{c|cccc}
-3x^2 & -9x^3 & +11x^2 & +3x^4 & -4 \\
-9x^2 & +11x^2 & -9x^2 & +9x^2 & -9x^2 \\
0 & +2x^2 & +4x^2 & +3x^4 & -4 \\
-2x^2 & +4x^2 & +12x^2 & -8 & +8 \\
0 & +2x^2 & +4x^2 & +12x^2 & +4 \\
\hline
0 & +2x^2 & +4x^2 & +3x^4 & -4 \\
\end{array}
\]

4. Use synthetic division to find the quotient and remainder when \(-x^4 + 4x^3 + 12x^2 - 8\) is divided by \(x - 6\). Specifically, complete the synthetic division table below, and write your answer in the following form: Quotient + \( \frac{\text{Remainder}}{x - 6} \).

\[
\begin{array}{c|cccc}
6 & -1 & 4 & 12 & 0 & -8 \\
\hline
& & & & & \\
\end{array}
\]

\[
\begin{array}{c|cccc}
6 & -1 & 4 & 12 & 0 & -8 \\
\hline
& & & & & \\
\end{array}
\]

\[
\begin{array}{c|cccc}
-1 & 4 & 12 & 0 & -8 \\
-6 & +6 & +6 & +6 & -8 \\
0 & +4 & +24 & +48 & -8 \\
\hline
0 & +4 & +24 & +48 & -8 \\
\end{array}
\]

\[
\begin{array}{c|cccc}
-1 & 4 & 12 & 0 & -8 \\
-6 & +6 & +6 & +6 & -8 \\
0 & +4 & +24 & +48 & -8 \\
\hline
0 & +4 & +24 & +48 & -8 \\
\end{array}
\]

5. Solve for \( w \).

\[
\frac{w - 2}{6} = \frac{2}{9}
\]

Simplify your answer as much as possible.
6. Solve for $x$.

$$\frac{-8}{x} = \frac{-14}{x-3}$$

7. Solve for $w$.

$$\frac{-4}{w} = -6$$

Simplify your answer as much as possible.

8. Solve for $y$.

$$-3 = \frac{4}{y+4}$$

Simplify your answer as much as possible.

9. Solve for $x$.

$$3 = \frac{1}{4} - \frac{5}{x}$$

Simplify your answer as much as possible.

10. Solve for $u$.

$$\frac{3}{5u} = \frac{1}{15} - \frac{5}{3u}$$
11. Solve for $v$.
\[
\frac{6}{v-4} - \frac{4}{v-4} = 2
\]

12. Solve for $y$.
\[
-\frac{3}{5y+15} + 1 = -\frac{6}{y+3}
\]

13. Solve for $w$.
\[
\frac{1}{w-3} + \frac{4}{w+3} = \frac{1}{w^2 - 9}
\]

14. Solve for $x$.
\[
\frac{3}{x+5} = \frac{x}{x+8}
\]

15. Solve for $w$.
\[
w = \frac{18}{w} - 3
\]
16. Solve for $y$.

\[9 - \frac{4}{y+2} = \frac{2}{y+1}\]

17. Solve for $y$.

\[\frac{y-2}{y+6} + 1 = \frac{y+6}{y+3}\]

18. Solve for $w$.

\[\frac{w}{w+2} + \frac{4}{w+6} = \frac{w-10}{w^2 + 8w + 12}\]

19. Solve for $y$.

\[-\frac{40}{y^2 - 12y + 27} = \frac{2y}{y-3}\]

20. Solve for $A$.

\[\frac{F}{A} = p\]
21. Solve for $h$.

$$F = \frac{g}{4+h}$$

22. Solve for $z$.

$$\frac{8}{z} = \frac{9}{x} + \frac{5}{y}$$

23. Ravi drove 420 miles using 18 gallons of gas. At this rate, how many gallons of gas would he need to drive 357 miles?

24. There are two machines that produce aluminum cans. The newer machine can produce 4200 cans in 210 minutes. It takes the older machine 280 minutes to produce that many cans. If the two machines work together, how long will it take them to produce 4200 cans?

25. Working together, two pumps can drain a certain pool in 4 hours. If it takes the older pump 12 hours to drain the pool by itself, how long will it take the newer pump to drain the pool on its own?

Do not do any rounding.

26. A plane has a cruising speed of 300 miles per hour when there is no wind. At this speed, the plane flew 600 miles with the wind in the same amount of time it flew 400 miles against the wind. Find the speed of the wind.
27. Simplify.
\[ \frac{\sqrt{81}}{\sqrt{25}} \]
Be sure to write your answer in simplest form.

28. Evaluate the following.
\[ -\sqrt{25} = \]
\[ \sqrt{-81} = \]

29. Simplify.
\[ \sqrt{18y} \]
Assume that the variable represents a positive real number.

30. Simplify.
\[ \sqrt{81w^8} \]
Assume that the variable \( w \) represents a positive real number.

31. Simplify each expression.
Assume that the variables represent any real numbers.
\[ \sqrt{z^{20}} = \]
\[ \sqrt{w^{10}} = \]
32. Find the value of $\sqrt[3]{1000}$.

33. Evaluate the following.
   
   (a) $\sqrt[4]{-16} = ____$
   
   (b) $-\sqrt[3]{125} = ____$

34. Simplify.

   \[ \sqrt[3]{125}u^{19} \]

   Assume that the variable represents a positive real number.

35. Simplify each radical expression as much as possible.

   Assume that the variables represent any real numbers.

   (a) $\frac{\sqrt[6]{(2 - 5w)^9}}{\sqrt[6]{6}} = ____$
   
   (b) $\frac{\sqrt{6}}{\sqrt{y}} = ____$

36. Find the domain of the function.

   \[ u(x) = \sqrt{4 + x} \]

   Write your answer using interval notation.
37. Find the domains of the functions $f$ and $g$.

\[
 f(x) = \sqrt[4]{3x + 6} \\
 g(x) = \sqrt[3]{x - 4}
\]

Write your answers using interval notation.

38. Simplify.

\[\sqrt{50}\]

39. Simplify.

\[\sqrt[12]{28u}\]

Assume that the variable $u$ represents a positive real number.

40. Simplify.

\[\sqrt{13y}\]

Assume that the variable represents a positive real number.

41. Simplify.

\[\sqrt{45y^{21}}\]

Assume that the variable represents a positive real number.
42. Simplify.

\[ \sqrt{24x^{10}z^7} \]

Assume that all variables represent positive real numbers.

43. Write the following in simplified radical form.

\[ \sqrt[3]{\frac{14}{u}} \]

Assume that the variable represents a positive real number.

44. Write the following in simplified radical form.

\[ \sqrt[5]{128w^9} \]

Assume that the variable represents a positive real number.

45. Write the following expression in simplified radical form.

\[ \sqrt[5]{192s^{10}t^{14}} \]

Assume that all of the variables in the expression represent positive real numbers.

46. Write the following as a radical expression.

\[ \frac{z^7}{t^8} \]
47. Evaluate.

\[
\frac{1}{125^3} = \_
\]

\[
\frac{1}{256^4} = \_
\]

48. Evaluate the following.

(a) \(-27^\frac{1}{3} = \_
\)

(b) \((-256)^\frac{1}{4} = \_
\)

49. Simplify.

\[
\frac{2}{32^5}
\]

50. Simplify. Write your answers without exponents.

\[
\left( \frac{1}{16} \right)^{-\frac{3}{4}} = \_
\]

\[
4^{-\frac{5}{2}} = \_
\]
51. Simplify.

$$\frac{6}{\sqrt{7}} \cdot \sqrt{2}$$

Assume that the variable represents a positive real number.

52. Simplify.

$$\frac{2}{u^7} \div \frac{3}{u^5}$$

Write your answer using only a positive exponent.
Assume that the variable represents a positive real number.

53. Simplify the expression.

$$\frac{\frac{3}{z^2}}{\frac{z^{-1/4}}{1}}$$

Write your answer using only positive exponents.
Assume that all variables are positive real numbers.

54. Simplify.

$$\left(\frac{u^4}{\sqrt{3}}\right)^5$$

Write your answer without parentheses.
Assume that the variable represents a positive real number.
55. Simplify the expression.

\[
\left( x^{-5} \cdot y^3 \right)^{\frac{3}{5}}
\]

Write your answer without using negative exponents. Assume that all variables are positive real numbers.

56. Simplify.

\[
\frac{4}{\nu + 6} \cdot \frac{12\nu}{\nu^2 + 12\nu + 36}
\]

57. Simplify.

\[
\frac{3 - \frac{5}{2y}}{7 - \frac{5}{2y}}
\]
58. Simplify.

$$\frac{1 + \frac{5}{x}}{1 - \frac{25}{x^2}}$$

59. Simplify.

$$7\sqrt{5} - 2\sqrt{5}$$

60. Simplify.

$$-5\sqrt{50} - \sqrt{18}$$

61. Simplify.

$$3\sqrt{27} - \sqrt{12} + 2\sqrt{3}$$

62. Simplify.

$$\sqrt{63}z + \sqrt{28}z$$

Assume that the variable represents a positive real number.
63. Simplify.
\[ 4z \sqrt[3]{32z^3} - \sqrt[5]{18z^5} \]
Assume that the variable represents a positive real number.

64. Simplify as much as possible.
\[ w\sqrt[3]{18x^3} - x\sqrt[2]{50}w^2 \]
Assume that all variables represent positive real numbers.

65. Simplify.
\[ -4\sqrt[4]{48} + \frac{4}{\sqrt[4]{243}} \]

66. Simplify.
\[ -5\sqrt[3]{108x^{11}} + 3\sqrt[3]{32x^{11}} \]
Assume that the variable represents a positive real number.

67. Simplify.
\[ \sqrt[5]{5} \cdot \sqrt[2]{2} \]
68. Simplify.

\[ \sqrt{54} \times 4\sqrt{50} \]

69. Simplify.

\[ \sqrt{5x} \cdot \sqrt{2x} \]

Assume that the variable represents a positive real number.

70. Simplify.

\[ \sqrt{15c^5} \cdot \sqrt{3c} \]

Assume that the variable represents a positive real number.

71. Simplify.

\[ \sqrt{8y^6u^2} \cdot \sqrt{2y^5u^4} \]

Assume that all variables represent positive real numbers.

72. Simplify.

\[ \sqrt[4]{4} \cdot \sqrt[4]{12} \]
73. Simplify.

\[ \sqrt[4]{3} w^5 \cdot \sqrt[4]{27} w^6 \]

Assume that the variable represents a positive real number.

74. Multiply.

\[ \sqrt{3} (10 - \sqrt{5}) \]

Simplify your answer as much as possible.

75. Multiply.

\[ \sqrt{3} (9 \sqrt{6} - \sqrt{14}) \]

Simplify your answer as much as possible.

76. Multiply.

\[ (4 \sqrt{10} - 8 \sqrt{3}) (3 \sqrt{3} + 6 \sqrt{10}) \]

Simplify your answer as much as possible.

77. Multiply and simplify.

\[ (\sqrt{x} + \sqrt{3})^2 = \]
\[ (\sqrt{x} - 2 \sqrt{3})(\sqrt{x} + 2 \sqrt{3}) = \]
78. Simplify.
\[
\frac{\sqrt{45}}{\sqrt{15}}
\]

79. Simplify.
\[
\frac{\sqrt{48} - 6}{18}
\]

80. Rationalize the denominator and simplify.
\[
\frac{3}{\sqrt{7}}
\]

81. Rationalize the denominator and simplify.
\[
\frac{\sqrt{5}}{\sqrt{3}}
\]

82. Rationalize the denominator and simplify.
\[
\frac{-5}{7 - 2\sqrt{5}}
\]
83. Rationalize the denominator and simplify.

\[ \frac{\sqrt{5} - \sqrt{11}}{2 \sqrt{5} + \sqrt{11}} \]

84. Rationalize the denominator and simplify.

\[ \frac{4}{\sqrt{8}} \]

85. Write in simplified radical form with at most one radical.

\[ \sqrt[5]{w^2} \cdot \sqrt[5]{w} \]

Assume that the variable represents a positive real number.