1. Classify each number as to its type: real, irrational, rational, integers, whole numbers, natural numbers.

\[-\frac{8}{4}, 1, \sqrt{6}, \frac{\pi - 4}{2e}, 2.56, 0, -7, \sqrt[3]{-99}, 52, \frac{2}{3}, 6 - 5i\]

Real

Irrational

Rational

Integer

Whole

Natural

2. What properties of real numbers are illustrated in the following?

a. \[\frac{6x\sqrt{x^2 + 5}}{\sqrt{x^2 + 5}} = 6x\]

b. \[e^{-2(x-5)} = e^{-2x + 10}\]

c. \[(58 - x) + 8y = 8y + (58 - x)\]

d. \[5(x + 6) - 30 = 5x + 30 - 30 = 5x + (30 - 30) = 5x + 0 = 5x\]

3. \[\left(\frac{-9x^7y^{-2}z^{-5}}{6xy^{-2}z^{-5}}\right)^{-3} \left(\frac{2x^{-1}y^0}{3z^4}\right)^2 = \]
4. \[
\frac{-2 - 4 - \frac{8}{5}}{\frac{5}{4}} =
\]

5. \[
\frac{\left(-\frac{1}{5}\right)^{-4003} + 625^{1000}}{125^{1334} + \left(\frac{1}{25}\right)^{-2000}} =
\]

6. What is the distance between \(\frac{-9}{20}\) and \(\frac{8}{15}\)?

7. What is the domain of \(\sqrt[3]{9x + 4}\)?
8. If \( x > 0 \), rewrite \( \sqrt[4]{x^{9}} \sqrt[6]{x^{-2}} \) as a single power of \( x \).

9. Fully factor \( 8x^3 \sqrt{2x-6} - 2x \sqrt{2x-6} \).

10. \( \left( \frac{625x^{-12}}{y^{-4}z^{16}} \right)^{-3} \left( \frac{4}{4} \right) = \)

11. \( (a^2b^3c - 2ab^2 + c^2)(ac^4 - bc) = \)
12. Rationalize the denominator of \( \frac{4}{5x - 2\sqrt{7}} \).

13. Factor completely: \( 3x^7 - 2187x^{-7} \).

14. What is the degree, leading coefficient, and constant term of the polynomial expression \( 2x(3x - 4)(x + 1)^2 \)?

15. \( \frac{\sqrt[3]{-128}}{\sqrt[3]{(x - 8)^5}} = \)
16. \[ 6\sqrt[5]{15x^{10}} + \frac{3}{5}\sqrt[3]{1875x^7} - 2x^5\sqrt[3]{480x^5} = \]

17. Simplify \(4x^4 - x^2 - 20x\) \(\div (2x - 5)\) by performing polynomial long division.

18. Fully factor \(25x^2 - 60xy + 36y^2\).
19. Rationalize the denominator of \( \frac{2\sqrt{x}}{2\sqrt{x} + h - 2\sqrt{x}} \).

20. Fully simplify \( \sqrt[8]{6561x^{64}y^{24}z^{27}} \).

21. By hand, with no calculator, simplify \(-3^2 + 9 \left| -2^4 + \left( \frac{-27}{125} \right)^{-\frac{2}{3}} \right| + 36 \div 2 \cdot 3 \).