

- The Real Number System (R1)
- Integer Exponents, Sci. Notation & Order of Operations (R2)
- Operations with Polynomials (R3)
- Factoring (R4)
- Rational Expressions (R5)
- Radicals & Rational Exponents (R6)
- Basics of Equation Solving (R7)
- Introduction to Graphing (1.1)
- Functions & Graphs (1.2)

1. Consider the numbers: 0.56 , $\sqrt{36}$, $-\sqrt{6}$, $\frac{0}{4}$, $\frac{-5}{0}$, 14 , $\frac{2}{3}$. Which are rational numbers but not integers?
2. Determine the degree of the polynomial: $P = 5x^2y^5 - 2x^4y^6 - 9x^7y^2$. List the terms of the polynomial.
3. Calculate: $2^6 \times 2^{-3} \div 2^{10} \div 2^{-8}$.
4. Calculate: $-14^0 - (-14)^0 + \sqrt{(-2)^2}$.
5. A radioactive material produces 25 billion disintegrations per second. How many disintegrations are produced in one hour? Write the answer using scientific notation.
6. Calculate: $\frac{2.4 \times 10^5}{4.8 \times 10^{12}}$. Write the answer using scientific notation.
7. Multiply and simplify: $(2m - n)(2m + n) - 2(m - n)^2$
8. Factor completely over the integers: $2x^4 + 54x$.
9. Factor completely over the integers: $x^4 + 5x^2 - 36$.
10. Factor completely over the integers: $x^{\frac{1}{2}}(x^2 + 2)^2 - 3x^{\frac{3}{2}}(x^2 + 2)$.
11. Factor completely over the integers: $12x^2 - 11x + 2$
12. Divide and simplify: $\frac{x^2 - 4}{x^3 + 8} \div \frac{x^2 - 4x + 4}{x^2 - 2x + 4}$.
13. Subtract and simplify: $\frac{5x + 4}{x^2 + 4x} - \frac{2x + 4}{x^2 + 7x + 12}$.
14. Simplify: $\frac{y^{-2} - x^{-2}}{x^{-1} - y^{-1}}$
15. Simplify: $\frac{\frac{x+h}{x+h+1} - \frac{x}{x+1}}{h}$

16. Simplify and express the answer in terms of positive exponents only:

(a). $\frac{(3x^{-2}y^3)^5}{(-3x^{-2}y^3)^3}$

(b). $(-5c^{-1}d^{-2})^{-2}$

17. Assume that variables can represent any real number. Simplify: $\sqrt[4]{16x^{12}(2y-3)^4}$

18. Convert to exponential notation and simplify: $\sqrt[5]{\sqrt[4]{17}}$

19. Express $\frac{x \cdot \sqrt[5]{x^2}}{\sqrt[4]{x^3}}$ in the form x^r , where r is a real number.

20. Assume $(a+b) > 0$. Write $\frac{\sqrt{(a+b)^3} \cdot \sqrt[3]{a+b}}{\sqrt[6]{(a+b)^7}}$ as a single radical.

21. Evaluate: $(-27)^{-\frac{2}{3}}$

22. Rationalize the denominator and simplify: $\sqrt{\frac{3}{8}}$

23. Rationalize the denominator and simplify (Assume all variables are positive numbers): $\frac{6}{\sqrt[5]{8x^2}}$

24. Rationalize the denominator and simplify: $\frac{\sqrt{2}}{8-\sqrt{6}}$

25. (-1,2) and (3,4) are the endpoints of the diameter of a circle. Find the radius, r, and the coordinates of the center, C, of the circle. Find an equation of the circle.

26. The equation of a circle in general form is $4x^2 + 4y^2 - 16x + 4y - 3 = 0$. Express its equation in standard form ("center-radius form"). Determine the coordinates of the center and the radius of the circle.

27. Determine whether the relation $y^2 = 16 - x^2$ is a function. Justify your answer.

28. State the domain of $f(x) = \frac{\sqrt{x-1}}{x^2-25}$ in interval notation.

29. Solve: $9(2x+8) = 20 - (x+5)$

30. Solve: $t^2 + 12t + 27 = 0$

31. Solve: $3y^2 - 15 = 0$

32. Solve: $(3x^2 + 7x - 20)(x^2 - 4x) = 0$

Key:

1. $0.56, \frac{2}{3}$ 2. Degree 10; the terms are: $5x^2y^5, -2x^4y^6$, and $-9x^7y^2$ 3. 2 4. 0

5. 9×10^{13} disinteg/hour 6.5×10^{-8} 7. $2m^2 + 4mn - 3n^2$ 8. $2x(x+3)(x^2 - 3x + 9)$

9. $(x^2 + 9)(x+2)(x-2)$ 10. $x^{\frac{1}{2}}(x^2 + 2)(x - 1(x-2))$ 11. $(3x-2)(4x-1)$ 12. $\frac{1}{x-2}$

13. $\frac{3(x+1)}{x(x+3)}$ 14. $-\frac{x+y}{xy}$ 15. $\frac{1}{(x+1)(x+h+1)}$ 16. (a) $-\frac{9y^6}{x^4}$ (b) $\frac{c^2d^4}{25}$

17. $2x^2|x| \cdot |2y-3|$ 18. $17^{\frac{1}{20}}$ 19. $x^{\frac{13}{20}}$ 20. $\sqrt[3]{(a+b)^2}$ 21. $1/9$ 22. $\frac{\sqrt{6}}{4}$

23. $\frac{3\sqrt[5]{4x^3}}{x}$ 24. $\frac{4\sqrt{2} + \sqrt{3}}{29}$

25. C (1,-1); $r = \sqrt{13}$; $(x-1)^2 + (y+1)^2 = 13$ or $x^2 - 2x + y^2 + 2y = 11$

26. $(x-2)^2 + \left(y + \frac{1}{2}\right)^2 = 5$; C (2, -1/2); $r = \sqrt{5}$

27. No, Equation of a circle. It would not pass the vertical line test.

28. $[1,5) \cup (5,\infty)$ 29. $\{-3\}$ 30. $\{-9,-3\}$ 31. $\{\pm\sqrt{5}\}$ 32. $\left\{-4, 0, \frac{5}{3}, 4\right\}$