

Each solution is worth $3\frac{1}{3}$ points. Show all calculations.

1. $\frac{8}{9} - \frac{3}{5} =$

2. The quotient of two real numbers with different signs is

3. Simplify the following expression:

$$\left(\frac{xy^{-3}}{2x^{-2}y^2} \right)^2$$

4. Graph the following equation:

$$y = \frac{2}{3}x + 2$$

5. What are the equation and slope of the y -axis?

6. Given $f(x) = 2x - 8$, find $f(3)$.

7. Solve the following inequality. Give each result in set notation and graph it.

$$-3 \leq 3x < 12$$

8. Solve the following inequality. Write the solution in interval notation and graph it.

$$|2y + 4| < 10$$

9. Simplify the following product.

$$-2t^3u(t^0u^4 - 4t^2u^3)$$

10. Simplify the following expression fully.

$$\frac{\frac{1}{a} + \frac{1}{b}}{\frac{a}{b} - \frac{b}{a}}$$

11. Solve the equation $7(x + 5) = x - 1$.

12. Completely factor the following expression: $16m^4 - 1$.

13. Write the numeral 0.0072 in scientific notation.

14. Perform the indicated operation and simplify completely.

$$\frac{x^2 + 2x - 35}{y} \cdot \frac{6y^3}{2x - 10}$$

15. Solve the following equation for r : $d = rt$.

16. Solve the system of equations given below.

$$\begin{aligned} 3x + y &= 12 \\ x - y - 2z &= 10 \\ 2x + 3y + 5z &= -7 \end{aligned}$$

17. Do the following two lines intersect? Answer yes or no, together with the point of intersection, if any.

$$\begin{aligned} 5x + 6y &= -5.5 \\ 6x + 1.5y &= -8.5 \end{aligned}$$

18. Compute the determinant.

$$\begin{vmatrix} 3 & 0 & -1 \\ 6 & -1 & 4 \\ 2 & -2 & -2 \end{vmatrix}$$

19. Compute the distance between the two points $(1 - \sqrt{2}, -1)$ and $(2 + \sqrt{2}, 4)$.

20. Rationalize the denominator of $\frac{5 - \sqrt{x}}{5 - \sqrt{y}}$.

21. At what x values does the parabola $y = 2x^2 + 5x + 2$ intersect the x axis?

22. The volume (V) of a cylinder with radius (r) and height (h) is given by $V = \pi r^2 h$. Solve this formula for r .

23. Find the vertex of the parabola $y = 2x^2 + 6x - 1$.

24. Decompose $\frac{8x^3 + 6x^2 + 30x - 25}{x^2(x^2 + 5)}$ using partial fractions.

25. If $f(x) = \frac{16x + 6}{7}$, find $f^{-1}(x)$ or show why it isn't a function.

26. Find the balance after 18 months if \$625 is placed in an account earning 1.9% annual interest compounded continuously.

27. Solve $2^{6-t} = 15^{2t}$ for t .

28. Express $\log a + 2\log b - \log c$ as a single logarithm.

29. List the possible rational roots for $5x^8 - x^7 + 6x^6 - 7x + 8$, as given by the Rational Roots Theorem.

30. If -5 is one root of $x^3 + x^2 - 15x + 25$, what are the others?