

Welcome to Honors Pre-Calculus. These problems are designed to help keep your mind fresh during the summer. Please work on them throughout the course of the summer and use online resources to search for topics you need help on.

Find the midpoint of the line segment joining the points.

$$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

1. $(-4, 10), (4, -5)$

2. $\left(-\frac{1}{3}, -\frac{1}{3}\right), \left(-\frac{1}{6}, -\frac{1}{2}\right)$

Find the distance between the points.

$$\text{Distance formula} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

3. $(-1, 2), (5, 4)$

4. $\left(-\frac{1}{3}, -\frac{1}{3}\right), \left(-\frac{1}{6}, -\frac{1}{2}\right)$

Find the slope of the line passing through each pair of points

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

5. $(3, -2), (-4, -2)$

Find the equation of a line with the given information

Point slope form $y_2 - y_1 = m(x_2 - x_1)$

Slope intercept form $y = mx + b$

$m = -1/3, (5, 4)$

6. $(4, 3), (-4, -4)$

Determine whether the lines are parallel, perpendicular, or neither.

7. $\begin{cases} x - 2y = 2 \\ -x + 2y = -3 \end{cases}$

Factor

8. $2x^2 - 5x - 12$ 9. $6x^2 - 13x - 5$ 10. $x^2 + \frac{1}{2}x - \frac{3}{2}$ 11. $x^3 - 27$

Simplify each expression. (No negative exponents)

12. $\left(\frac{a^5 b^3}{b^{-2} c^2}\right)^{-3}$ 13. $(9x^6)^{3/2}$ 14. $\left(\frac{x^5}{y^3}\right)^3 \cdot \left(\frac{x^4}{y^5}\right)^{-2}$

Simplify each rational expression (remember to rationalize if needed)

15. $\sqrt{\frac{2}{3}}$ 16. $\sqrt{75x^3y^4}$

Solve each equation or inequality.

17. $\frac{3x}{2} + \frac{1}{4}(x - 2) = 10$ 18. $\frac{17+y}{y} + \frac{32+y}{y} = 100$ 19. $\sqrt[4]{x+1} = 2$

20. $|8 - 3x| = 1$ 21. $3^{2x} = 17$ 22. $\log_3(x - 5) = 2$ 23. $e^{2x-3} = 6$

Solve each system using either substitution or elimination

24.
$$\begin{cases} 4x + 2y = 12 \\ 2x + 6y = -4 \end{cases}$$

25.
$$\begin{cases} x + 2y + z = 7 \\ x - 2y - 4z = 0 \\ 2x - y + 4z = -3 \end{cases}$$