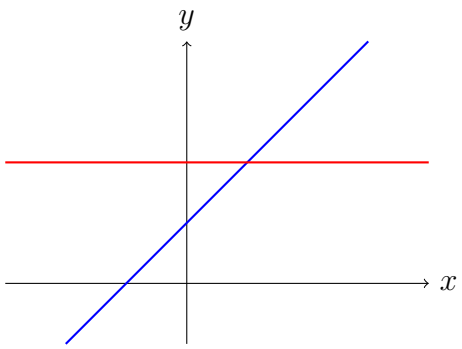
ILLAWARRA TUTORING

This worksheet aims to develop the skills to find the intersection points of graphs both algebraically and visually. You will work on problems of varying difficulty that involve finding where two graphs meet. Read each question carefully and show all your working.

Easy Questions

1. Solve for the intersection point of the lines $y = 2x + 1$ and $y = -x + 4$.
2. Determine the point of intersection for the graphs of $y = 3x - 2$ and $y = 3$.
3. Using the diagram below, label the point where the graphs $y = x + 1$ and $y = 2$ intersect.



4. Find the intersection point of the graphs $y = -x$ and $y = x$.
5. For what value of x do the functions $y = 2x$ and $y = 4x$ have the same value?

Intermediate Questions

6. Solve for the points of intersection between $y = x^2$ and $y = 2x + 1$.
7. Determine the intersection points of $y = -x + 3$ and $y = x^2 - x - 2$.
8. Find all points of intersection between the quadratic $y = x^2$ and the horizontal line $y = 4$.
9. Determine the intersection points of $y = x^2$ and $y = 3 - x$.
10. On a sheet of paper, sketch the graphs of $y = x^2$ and $y = x + 2$. Label the approximate coordinates of their intersection(s).
11. Find the intersection points of $y = x^2$ and $y = -x + 2$.

12. Algebraically determine the intersection points of $y = x^2 - 1$ and $y = x$.

13. Explain how the discriminant of the quadratic equation derived from $x^2 = mx + c$ can be used to determine the number of intersection points between the quadratic $y = x^2$ and the line $y = mx + c$.

14. Find all intersection points between the quadratic $y = x^2 + 2x$ and the line $y = 0$.

15. Solve for the intersection points of $y = x^2 - 4$ and $y = 2x$.

16. On a fresh sheet of paper, sketch the graphs of $y = x^2$ and $y = -2x + 3$. Then, estimate and label their points of intersection.

17. Determine the intersection points of $y = x^2$ and $y = x^2 - 3$. Explain your reasoning.

18. Find the intersection points between $y = x^2$ and $y = 4x - 4$.

19. Graph $y = -x + 1$ and $y = x^2 - x$, then find their point(s) of intersection algebraically.

20. Determine the intersection points of $y = x^2 + x + 1$ and $y = 2x + 3$ by solving the corresponding equation.

Hard Questions

21. Find all intersection points of the graphs $y = x^3$ and $y = 3x$.

22. Determine the intersection points between $y = x^3 - 3x$ and $y = x^2$.

23. Solve for the intersection points of $y = 2x^3 - x$ and $y = x^2 + 1$.

24. Find the point(s) of intersection between $y = x^3 - x$ and $y = 2$. (An exact algebraic solution may not be possible; provide your answer in exact form or indicate if a numerical approximation is required.)

25. Determine the intersection points of the cubic $y = x^3 + x^2 - x - 1$ with the line $y = 0$.

26. Find all intersection points between $y = x^3$ and $y = x^2 + x$.

27. Using pen and paper, sketch the graphs of $y = x^3 - x$ and $y = x + 1$. Label all approximate points of intersection.

28. Determine the intersection points between $y = -x^3$ and $y = 2x^2$.

29. Solve for the intersection points of $y = x^3 - 2x^2 - x + 2$ and $y = x + 1$.

30. Determine all points of intersection between $y = x^3 + 2x^2 - 5$ and $y = x^2 - 1$.