ILLAWARRA TUTORING

This worksheet will help you learn to work with absolute value functions and understand how their graphs are formed. You will practise evaluating, rewriting, transforming and solving equations and inequalities involving absolute value functions.

Easy Questions

1. Evaluate $f(x) = |x - 2|$ at $x = 5$.
2. Solve the equation $|x| = 3$.
3. Sketch the graph of $f(x) = |x|$.
4. Write $f(x) = |x + 1|$ as a piecewise defined function.
5. For $f(x) = |2x - 4|$, calculate $f(3)$ and $f(1)$.

Intermediate Questions

6. Given $f(x) = |x - 3|$, find its x-intercepts.
7. Solve $|2x + 1| = 5$.
8. Solve the inequality $|x - 2| < 4$.
9. Starting with $f(x) = |x|$, write the equation of the function after shifting it right by 3 units and up by 2 units.
10. For $f(x) = |x + 4|$, determine the vertex and the axis of symmetry.
11. Sketch the graph of $f(x) = 2|x| - 1$.
12. Write $f(x) = -|x - 1|$ as a piecewise defined function.
13. Solve the equation $|-x + 2| = 3$.
14. Determine the range of the function $f(x) = -2|x| + 5$.
15. Given $f(x) = |3x + 6|$, solve for x when $f(x) \leq 9$.
16. Let $f(x) = |x|$ and $g(x) = x - 2$. Find $(f \circ g)(x)$ and express it as a piecewise defined function.
17. Explain how changing the parameter a in $f(x) = a|x|$ affects its graph.

18. Consider $f(x) = |x - 2| + |x + 2|$. Simplify the expression for $x \geq 2$.

19. Solve the inequality $|2x - 1| > 3$.

20. The function $f(x) = |x - 1|$ is transformed into $g(x) = |2(x - 1)| + 3$. Describe all the transformations applied to $f(x)$.

Hard Questions

21. For $f(x) = 2|x - 4| + 1$, determine both the x-intercepts and the y-intercept.

22. Solve the equation $|x - 3| = 2|x + 1|$.

23. Let $f(x) = |x+2|+|x-2|$. Write $f(x)$ as a piecewise defined function and determine its minimum value.

24. Prove that for all real numbers x and y, $|x + y| \leq |x| + |y|$.

25. Sketch the graph of $f(x) = 3|x + 1| - 2$.

26. Let $f(x) = |x|$ and $g(x) = 2x+5$. Find $(g \circ f)(x)$ and write it as a piecewise defined function.

27. Solve the inequality $|3x + 2| > 5$.

28. Solve the equation $||x - 1| - 2| = 1$.

29. If $f(x) = |x - 3|$ and $h(x) = f(x - 2) + 4$, determine the coordinates of the vertex of $h(x)$.

30. Describe a real-world scenario that could be modelled by an absolute value function. Explain the meaning of the vertex, the slope (or steepness), and any translations present in your model.