ILLAWARRA TUTORING

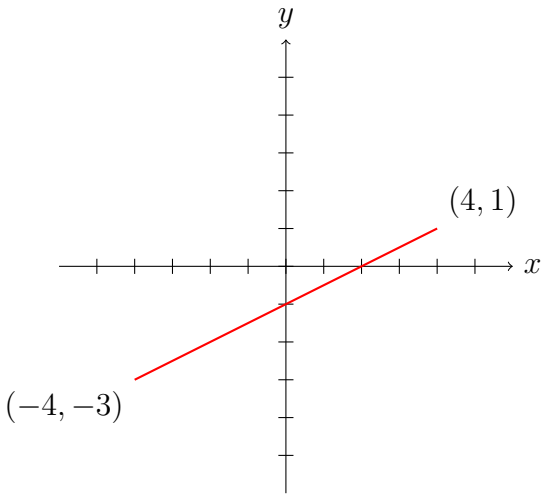
In this worksheet you will examine linear functions and their graphs, and learn how to interpret slope–intercept form in practical terms.

Easy Questions

1. Identify the slope and y–intercept of the linear function $y = 2x + 3$.
2. Write down two points that lie on the line $y = -x + 1$.
3. Convert the equation $y - 4 = 2(x - 2)$ to slope–intercept form.
4. For the line $y = -3x + 5$, state its y–intercept as a coordinate.
5. Complete the linear function: $y = \_\, x + \_$, given that the slope is 3 and the y–intercept is -2.

Intermediate Questions

6. Graph the linear function $y = \frac{1}{2}x - 1$ by calculating two points and then drawing the line. Use the tikz diagram below.



7. Calculate the slope of the line passing through the points $(1, 2)$ and $(3, 6)$. Then, express the equation of the line in slope–intercept form.
8. A taxi service charges a fixed booking fee of 4 dollars plus 1.50 dollars per kilometre. Write an equation for the fare, and state what the slope and y–intercept represent in this context.

9. Find the values of m and b in $y = mx + b$ if the line passes through $(0, 1)$ and $(2, 5)$.

10. A line crosses the y–axis at $(0, -2)$ and the x–axis at $(4, 0)$. Write its equation in slope–intercept form.

11. Write the equation of the line with slope -3 that passes through the point $(2, 5)$.

12. Determine the x–intercept of the line $y = 4x - 8$.

13. Rewrite the equation $2y - 4x = 6$ in slope–intercept form.

14. A mobile plan charges a monthly fee of 25 dollars plus 0.10 dollars per minute used. Express the monthly cost C as a function of minutes m, and identify the slope and y–intercept.

15. Complete the following table for $y = -x + 2$. Calculate y when $x = -1, 0, 1, 2, 3$, and comment on the constant rate of change.

16. For the function $y = 3x + 1$, find the coordinate of the point on the line when $x = 4$.

17. A table shows values for a linear function as follows: when $x = 0$, $y = 2$; when $x = 1$, $y = 5$; and when $x = 3$, $y = 11$. Calculate the slope and explain why the function is linear.

18. Determine whether the equations $y = 2x + 3$ and $2y = 4x + 6$ represent the same line. Justify your answer by rewriting the second equation in slope–intercept form.

19. For the line $y = -2x + 7$, calculate the value of y when $x = -3$.

20. A function f is defined by two points: $f(0) = 5$ and $f(2) = 9$. Write the function in the form $y = mx + b$.

Hard Questions

21. A bridge has its height (in metres) modelled by a linear function of the horizontal distance x (in metres) from one end. When $x = 0$, the height is 3 m and when $x = 20$, the height is 8 m. Determine the linear function and explain the practical meaning of the slope.

22. Find the value of m such that the line $y = mx + 2$ passes through the intersection point of the lines $y = 2x + 1$ and $y = -x + 4$.

23. Convert the equation $3x + 4y = 12$ to slope–intercept form. Then explain the significance of the slope and y–intercept in a real–world context.

24. A school uniform policy has a weekly laundry cost given by a linear function of the number of students. The cost is 50 dollars when there are no students and increases by 1.20 dollars for each additional student. Write the function and interpret the meaning of each term.

25. For the line $y = \frac{5}{3}x - 7$, calculate the coordinates of the point where the line crosses the x–axis. Then verify your result.

26. Given the functions $f(x) = 2x + 3$ and $g(x) = -x + 8$, find the value of x for which $f(x) = g(x)$, and explain what this intersection point represents graphically.

27. A production cost is modelled as a linear function. If the cost is 200 dollars when no units are produced and 350 dollars when 50 units are produced, determine the cost function in the form $C(x) = mx + b$, and interpret the slope.

28. Sketch the graph of $y = -0.5x + 4$ by plotting at least three points. Then describe in your own words how the slope affects the direction of the line.

29. An experiment shows a linear relationship between time t (in minutes) and distance travelled s (in metres), given by $s = 1.2t + 0$. Explain what the slope indicates in this relationship.

30. A car's fuel consumption is approximated by the linear model $y = -0.05x + 12$, where y is the fuel remaining (in litres) and x is the distance travelled in kilometres. Calculate the distance the car can travel before the fuel decreases to 6 litres.