ILLAWARRA TUTORING

In this worksheet you will calculate and interpret the gradient (slope) of a line. You will use the formula $m = \dfrac{\Delta y}{\Delta x}$ to understand rates of change in various contexts.

Easy Questions

1. Calculate the gradient of the line joining $(1, 2)$ and $(3, 8)$.
2. Determine the gradient of the line passing through $(0, 5)$ and $(10, 5)$.
3. Find the gradient of the line given by $y = 4x - 7$.
4. Calculate the gradient between the points $(-2, -6)$ and $(3, 4)$.
5. State True or False: A line with a gradient of 0 is horizontal.

Intermediate Questions

6. Calculate the gradient of the line passing through $(-3, 4)$ and $(2, -6)$.
7. A movement is represented by the vector $(7, 14)$. Calculate the gradient of this movement.
8. If moving from an arbitrary point (x, y) to the point $(x + 8, y + k)$ gives a gradient of $\dfrac{1}{2}$, what is k?
9. Determine the gradient of the line joining $(0, 0)$ and $(6, -3)$.
10. Find the gradient of the line joining $(5, 12)$ and $(10, 2)$.
11. A line rises by 6 units when x increases by 2. What is its gradient?
12. Compare the gradients of the segments joining $A(1, 2)$ to $B(4, 8)$ and $C(2, 3)$ to $D(6, 15)$. Are they equal?
13. Express the gradient of a horizontal line as a fraction.
14. For the points $(2, 9)$ and $(5, y)$ on a line with gradient -3, find the value of y.
15. Calculate the gradient of the line joining $(-1, 3)$ and $(4, 3)$.
16. Determine the gradient of the line joining $(2, -2)$ and $(-2, 6)$.
17. If an object moves from (x, y) to $(x + 10, y + 5)$, what is the gradient of its path?

18. A line has a gradient of $\frac{1}{3}$. If the x-coordinate increases by 15, by how many units does the y-coordinate change?

19. Calculate the gradient of the line joining $(1.5, 3.2)$ and $(4.5, 7.6)$.

20. Determine the gradient of a line parallel to the line joining $(2, 3)$ and $(5, 11)$.

Hard Questions

21. The line through $(-4, 2)$ and $(x, -10)$ has a gradient of -3. Find the value of x.

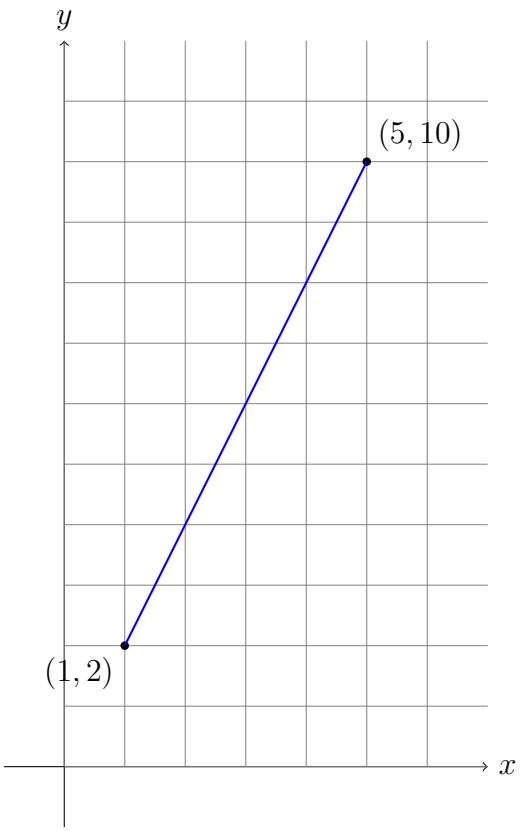
22. The line L passes through $(3, 7)$ and $(a, -5)$ and has a gradient of -4. Determine the value of a.

23. Given two points $A(p, 2p)$ and $B(p + 5, 2p + 7)$, calculate the gradient of the line joining them. Express your answer in simplest form.

24. Determine the gradient of the line joining the midpoints of the segments joining $A(1, 2)$ to $B(5, 10)$ and $C(2, 3)$ to $D(8, 15)$.

25. Find the value of k such that the points (k, k^2) and $(4, 16)$ lie on a straight line with a gradient of 4. (Ensure the two points are distinct.)

26. Examine the diagram below and calculate the gradient of the line joining the two labelled points.



27. A line is described by the equation $f(x) = mx + c$. If $f(2) = 3$ and the gradient $m = 5$, calculate $f(7)$.

28. Two points on a line are given by $(a, 5)$ and $(a + 4, 17)$. Determine the gradient of the line in terms of a.

29. A line passes through $(k, 0)$ and $(0, k)$ where $k \neq 0$. Express the gradient of this line in simplest form.

30. Verify that parallel lines have equal gradients. If one line has a gradient of $\frac{2}{3}$ and a second line passing through $(5, 1)$ and $(8, k)$ is parallel to it, determine the value of k.