

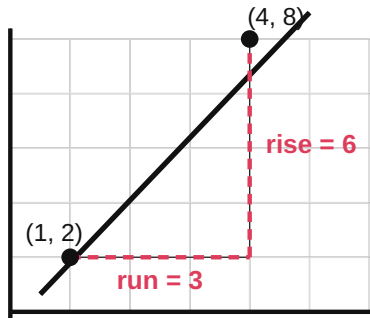
Boost Free Lessons - Year 9 Maths

Lesson 16: Gradient of a Line

Name: _____ Grade: _____ Date: _____

Worked Example 1

Find the gradient of the line through (1, 2) and (4, 8).



1. The gradient m is $\frac{\text{rise}}{\text{run}}$, which is $\frac{\text{change in } y}{\text{change in } x}$.
2. Rise = $8 - 2 = 6$.
3. Run = $4 - 1 = 3$.
4. $m = \frac{6}{3} = 2$. The line goes up to the right, so the gradient is positive.

$m = 2$

Worked Example 2

Find the gradient of the line through (-2, 5) and (3, -5).

1. Take the points in the same order for both the rise and the run.
2. Rise = $-5 - 5 = -10$.
3. Run = $3 - (-2) = 5$.
4. $m = \frac{-10}{5} = -2$. A negative gradient means the line slopes downwards to the right.

$m = -2$

Remember: $m = \frac{\text{rise}}{\text{run}}$. A positive gradient rises to the right and a negative gradient falls to the right. A horizontal line has $m = 0$, and a vertical line has an undefined gradient.



Question 1: Find the gradient of the line through each pair of points.

1. $(0, 0)$ and $(2, 6)$

2. $(1, 2)$ and $(4, 11)$

3. $(0, 1)$ and $(5, 6)$

4. $(2, 3)$ and $(6, 11)$

5. $(1, 9)$ and $(4, 3)$

6. $(0, 7)$ and $(7, 0)$

7. $(-2, 1)$ and $(2, 9)$

8. $(-1, 5)$ and $(3, -7)$



Question 2: Find the gradient of the line through each pair of points.

1. $(0, 0)$ and $(4, 2)$

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

3. $(2, 7)$ and $(2, 1)$

4. $(0, 5)$ and $(6, 5)$

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

6. $(1, -4)$ and $(5, 2)$



Question 3: Answer the following questions.

1. A line has a gradient of 3 and passes through (0, 1). Find y when $x = 4$.
2. A wheelchair ramp rises 1 m over a horizontal run of 12 m. Find its gradient.
3. Explain what a gradient of 0 tells you about a line.
4. A line passes through (2, 5) and (6, 13). Find its gradient.
5. A roof rises 2.4 m over a horizontal run of 4 m. Find the gradient as a fraction in simplest form.





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Answers: Gradient of a Line**Question 1**

- | | |
|------|-------|
| 1. 3 | 5. -2 |
| 2. 3 | 6. -1 |
| 3. 1 | 7. 2 |
| 4. 2 | 8. -3 |

Question 2

- | | |
|-------------------------------------|-------------------------------|
| 1. $\frac{1}{2}$ | 4. 0 (the line is horizontal) |
| 2. $\frac{1}{4}$ | 5. $\frac{1}{2}$ |
| 3. Undefined (the line is vertical) | 6. $\frac{3}{2}$ |

Question 3

1. $y = 13$
2. $\frac{1}{12}$
3. The line is horizontal. The y value does not change as x changes.
4. $m = 2$
5. $\frac{3}{5}$

