# Differentiation: Composite, Implicit, and Inverse Functions

AP Calculus BC · Vocabulary in context

| Word | Example |
|---|---|
| **chain rule** /tʃeɪn ruːl/ | Use the **chain rule** for a function inside another function. |
| **composite function** /ˈkɒmpəzɪt ˈfʌŋkʃn/ | A **composite function** fg(x) means f(g(x)): apply g first. fg(x) f(g(x)) g |
| **Leibniz notation** | In **Leibniz notation**, the chain rule is dy/dx = dy/du · du/dx. dy/dx = dy/du · du/dx。 |
| **outer function** | In $\sin(x^2)$, sine is the **outer function**. $\sin(x^2)$ |
| **inner function** | In $\sin(x^2)$, $x^2$ is the **inner function**. $\sin(x^2)$ $x^2$ |
| **implicit differentiation** /ɪmˈplɪsɪt ˌdɪfəˌrenʃɪˈeɪʃn/ | Use **implicit differentiation** when y is not on its own, as in $x^2 + y^2 = 25$. y $x^2$ $+ y^2 = 25$。 |
| **tangent line** /ˈtændʒənt laɪn/ | The **tangent line** touches the curve at one point and has the same slope there. |
| **perpendicular** /ˌpɜːpənˈdɪkjʊlə/ | The wall is **perpendicular** to the floor. |
| **radius** /ˈreɪdɪəs/ | The **radius** of a circle is the distance from the centre to the edge. |
| **inverse function** /ɪnˈvɜːs ˈfʌŋkʃn/ | The **inverse function** undoes the original function. |
| **reciprocal** /rɪˈsɪprəkl/ | The **reciprocal** of 4 is 1/4. 4 1/4 |



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| **inverse trigonometric function** | arcsin x is an **inverse trigonometric function**.<br>arcsin x |
| **product rule** /ˈprɒdʌkt ruːl/ | Use the **product rule** to differentiate x · sin x.<br>x · sin x |
| **quotient rule** /ˈkwəʊʃənt ruːl/ | Use the **quotient rule** to differentiate sin x / x.<br>sin x / x |
| **laws of logarithms** /lɔːz ɒv ˈlɒgərɪθəmz/ | The **laws of logarithms** say ln(ab) = ln a + ln b.<br>ln(ab) = ln a + ln b |
| **second derivative** /ˈsekənd dɪˈrɪvətɪv/ | The **second derivative** tells us how the gradient changes. |
| **higher-order derivative** | The second derivative is a **higher-order derivative**. |
| **concavity** /kənˈkævɪti/ | The second derivative tells you the **concavity**: which way the curve bends. |
| **acceleration** /əkˌseləˈreɪʃn/ | The car speeds up quickly, so its **acceleration** is large. |



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