# Applications of Integration

AP Calculus AB · Vocabulary in context

| Word | Example |
|---|---|
| — **average value** /ˈævrɪdʒ ˈvæljuː/ | The **average value** of f on [a, b] is the integral divided by b − a.<br>f [a, b] b − a |
| **continuous function** | A **continuous function** has no breaks. |
| **integral** /ˈɪntɪgrəl/ | Use an **integral** to find the area under a curve. |
| **interval** /ˈɪntəvl/ | The **interval** from 2 to 5 includes every number between them.<br>2 5 |
| **rectangle** /ˈrektæŋgl/ | The average value is the height of a **rectangle** with the same area. |
| **average rate of change** /ˈævrɪdʒ reɪt ɒv tʃeɪndʒ/ | The **average rate of change** is the change in y divided by the change in x.<br>y x |
| **Riemann sum** /ˈriːmən sʌm/ | A **Riemann sum** adds the areas of thin rectangles under a curve. |
| • **particle** /ˈpɑːtɪkl/ | Modelling the ball as a **particle** means we ignore its size and any rotation. |
| → **displacement** /dɪˈspleɪsmənt/ | After walking 3 km east, your **displacement** is 3 km east.<br>3 km 3 km |
| **total distance travelled** /ˈtəʊtl ˈdɪstəns ˈtrævld/ | **Total distance travelled** is the integral of speed. |
| **speed** /spiːd/ | The bus moves at a **speed** of 15 m/s.<br>15 m/s |
| **velocity** /vəˈlɒsɪti/ | The ball's **velocity** is 5 m/s to the left.<br>5 m/s |



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| **acceleration** /əkˌselə'reɪʃn/ | The car speeds up quickly, so its **acceleration** is large. |
| **absolute value** /'æbsəlu:t 'vælju:/ | Speed is the **absolute value** of velocity. |
| **sign change** /saɪn tʃeɪndʒ/ | A **sign change** in $f'$ from $+$ to $-$ shows a maximum.<br>$f'$ $+$ $-$ |
| **origin** /'ɒrɪdʒɪn/ | The graph of $y = x^2$ passes through the **origin**.<br>$y = x^2$ |
| **initial condition** /ɪ'nɪʃl kən'dɪʃn/ | The **initial condition** $y(0) = 5$ gives the starting value.<br>$y(0) = 5$ |
| **trapezoid** /'træpɪzɔɪd/ | Each strip under the curve is a **trapezoid**. |
| **net change** /net tʃeɪndʒ/ | The integral of a rate gives the **net change** in the amount. |
| **definite integral** /'defɪnət 'ɪntɪgrəl/ | A **definite integral** has limits and gives a number, such as an area. |
| **intersection point** /ˌɪntə'sekʃn pɔɪnt/ | Find the **intersection point** where the two curves meet. |
| **limits of integration** /'lɪmɪts ɒv ˌɪntɪ'greɪʃn/ | In $\int$ from 1 to 3, the **limits of integration** are 1 and 3.<br>1 3 $\int$ 1 3 |
| **horizontal slice** /ˌhɒrɪ'zɒntl slaɪs/ | A **horizontal slice** is integrated with respect to y.<br>y |
| **parabola** /pə'ræbələ/ | A thrown ball follows a **parabola**. |
| **cross section** /krɒs 'sekʃn/ | Each **cross section** of the solid is a square. |
| **perpendicular** /ˌpɜ:pən'dɪkjʊlə/ | The wall is **perpendicular** to the floor. |
| **volume** /'vɒlju:m/ | The **volume** of the box is $2\text{ m} \times 1\text{ m} \times 1\text{ m} = 2\text{ m}^3$.<br>$2\text{ m} \times 1\text{ m} \times 1\text{ m} = 2\text{ m}^3$ |



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| Word | Example |
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| **square** /skweə/ | The area of a **square** is its side squared. |
| **triangle** /ˈtraɪæŋgl/ | The angles in a **triangle** add to 180°.   |
| **semicircle** /ˈsemɪsɜːkl/ | A **semicircle** is half a circle. |
| **diameter** /daɪˈæmɪtə/ | Measure the **diameter** of the wire with a micrometer. |
| **solid of revolution** /ˈsɒlɪd ɒv ˌrevəˈluːʃn/ | Turn a region around a line to make a **solid of revolution**. |
| **disc** /dɪsk/ | Each slice is a **disc**. |
| **radius** /ˈreɪdɪəs/ | The **radius** of a circle is the distance from the centre to the edge. |
| **washer** /ˈwɒʃə/ | Each slice is a **washer** with a hole. |



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