**Mathematical and scientific symbols**

**Symbols**

|  |  |  |
| --- | --- | --- |
| + | plus | /'plʌs/ |
| - | minus | /'maɪnəs/ |
| ± | plus or minus | /'plʌs  ɔ:  'maɪnəs/ |
| x | multiplied by | /'mʌltɪplaɪd baɪ/  |
| / | over; divided by | /'əʊvə/ /dɪ'vaɪdəd/  |
| ÷ | divided | /dɪ'vaɪdəd/ |
| = | equals | /'ɪ:kwəlz/ |
| ≈ | approximately, similar | /ə'prɒksɪmətlɪ/ /'sɪmɪlə tʊ/ |
| ≡ | equivalent to; identical | /ɪk'wɪvələnt tʊ/ /aɪ'dentɪkl tʊ/ |
| ≠  | not equal to | /'nɒt 'iːkwəl tʊ/ |
| >  | greater than | /'greɪtə ðən/  |
| <  | less than | /'les ðən/ |
| ≥  | greater than or equal to | /'greɪtə ðən ər 'iːkwəl tʊ/ |
| ≤  | less than or equal to | /'les ðən ər' iːkwəl tʊ/ |
| ⊁ | not greater than | /'nɒt 'greɪtə ðən/ |
| ⊀ | not less than | /'nɒt 'les ðən/ |
| ≫ | much greater than | /'mʌʧ 'greɪtə ðən/ |
| ≪ | much less than | /'mʌʧ 'les ðən/ |
| ⊥ | perpendicular to | /pɜːpən'dɪkjʊlə tʊ/ |
| ∣∣ | parallel to | /'pærəlel tʊ/ |
| ≢ | not equivalent to, not identical to | /'nɒt ɪk'wɪvələnt tʊ/ /'nɒt aɪ'dentɪkl tʊ/ |
| ≄≉ | not similar to | /'nɒt 'sɪmɪlə tʊ/ |
| ² | squared | /'skweəd/ |
| ³ | cubed | /'kju:bd/  |
| 4 | to the fourth;  to the power four | /tə ðə 'fɔːθ/ /te ðə 'pɑʊə fɔː/ |
| n |  to the n; to the nth; to the power n | /tə ðɪ en; tə dɪ enθ; tə ðə pɑʊər en/ |
| √  | root; square root | /ru:t/ /skweə ru:t/ |
| ∛ | cube root | /kju:b ru:t/ |
| ∜ | fourth root  | /fɔːθ ruːt/ |
| ! | factorial | /fæk'tɔːrɪəl/ |
| % | percent | /pə'sent/ |
| ∞ | infinity | /ɪn'fɪnətɪ/ |
| ∝ | varies as; proportional to | /'vɛərɪz/  /prə'pɔːʃənəl/ |
| ˙ | dot | /dɒt/ |
| ¨ | double dot | /dʌbl dɒt/ |
| : | is to, ratio of | /reɪʃɪəʊ/ |
| f(x) fx | f; function | /ef/ /'fʌŋkʃən/ |
| f'(x) | f dash; derivative  | /dæʃ/ /dɪ'rɪvətɪv/ |
| f''x | f double-dash; second derivative | /'dʌbl dæʃ/ /'sekənd dɪ'rɪvətɪv/ |
| f'''(x) | f triple-dash; f treble-dash; third derivative | /'trɪpl dæʃ/ / trebl dæʃ/ /θɜ:d dɪ'rɪvətɪv/ |
| f(4) | f four; fourth derivative  | /fɔːθ dɪ'rɪvətɪv/ |
| ∂  | partial derivative, delta | /paːʃəl dɪ'rɪvətɪv/ /deltə/ |
| ∫ | integral | /'ɪntɪgrəl/  |
| ∑ | sum | /sʌm/ |
| w.r.t. | with respect to | /wɪð 'rɪspekt/ |
| log | log  | /lɒg/  |
| log₂x | log to the base 2 of x | /lɒg tə ðə beɪs tu: əv eks/ |
| ∴ | therefore | /'ðɛəfɔː/ |
| ∵ | because | /bɪ'kɒz/ |
| → | gives, leads to, approaches | /gɪvz/ /li:dz tʊ/ /əprəʊʧəz/ |
| / | per | /pɜ:/ |
| ∈ | belongs to; a member of;  an element of | /bɪ'lɒŋz/ /'membə/ /'elɪmənt/ |
| ∉ | does not belong to; is not a member of; is not an element of | /nɒt bɪ'lɒŋ/ /nɒt ə 'membə/ /nɒt ən 'elɪmənt/ |
| ⊂ | contained in;  a proper subset of | /kən'teɪnd ɪn/ /'prɒpə 'sʌbset/ |
| ⊆ | contained in; subset  | /'sʌbset/ |
| ⋂ | intersection | /'ɪntəsekʃən/  |
| ⋃ | union | /'juːnɪən/ |
| ∀ | for all | /fə rɔ:l/ |
| cos x | cos x; cosine x | /kɒz/ |
| sin x | sine x | /saɪn/ |
| tan x | tangent x | /tan/ |
| cosec x | cosec x | /'kəʊsek/  |
| sinh x | shine x | /'ʃaɪn/ |
| cosh x | cosh x | /'kɒʃ/ |
| tanh x  | than x | /θæn/  |
| |x| | mod x; modulus x | /mɒd/ /'mɒdjʊləs/ |
| ℃ | degrees Centigrade/Celsius | /dɪ'gri:z 'sentɪgreɪd/ |
| ℉ | degrees Fahrenheit | /dɪ'gri:z 'færənhaɪt/ |
| °K | degrees Kelvin | /dɪ'gri:z 'kelvɪn/ |
| 0°K, –273.15 °C  | absolute zero | /absəlu:t zi:rəʊ/  |
| mm | millimetre | /'mɪlɪmiːtə/ |
| cm | centimetre | /'sentɪmiːtə/ |
| cc, cm³ | cubic centimetre, centimetre cubed | /'kjuːbɪk 'sentɪmiːtə/ /'sentɪmiːtə 'kju:bd/ |
| m | metre | /'miːtə/ |
| km | kilometre | /kɪ'lɒmɪtə/ |
| mg | milligram | /'mɪlɪgræm/ |
| g | gram | /græm/ |
| kg | kilogram | /'kɪləgræm/ |
| AC | A.C. | /eɪ si:/ |
| DC | D.C. | /di: si:/ |

[^](http://www.uefap.com/speaking/symbols/symbols.htm#top)

**Examples**

|  |  |
| --- | --- |
| x + 1 | x plus one |
| x -1 | x minus one |
| x ± 1 | x plus or minus one |
| X × y | x y; x times y; x multiplied by y |
| (x — y) (x + y) |  x minus y, x plus y |
| x/y | x over y; x divided by y; |
| x ÷ y | x divided by y |
| x = 5 | x equals 5; x is equal to 5 |
| x ≈ y | x is approximately equal to y |
| x ≡ y | x is equivalent to y; x is identical with y |
| x ≠ y | x is not equal to y |
| x> y |  x is greater than y |
| x< y |  x is less than y |
| x ≥ y | x is greater than or equal to y |
| x ≤ y | x is less than or equal to y |
| 0< x < 1  | zero is less than x is less than 1; x is greater than zero and less than 1 |
| 0 ≤ x ≤ 1 | zero is less than or equal to x is less than or equal to 1; x is greater than or equal to zero and less than or equal to 1  |
| x² | x squared |
| x³ | x cubed |
| x4 | x to the fourth; x to the power four |
| xn | x to the n; x to the nth; x to the power n |
| x-n | x to the minus n; x to the power of minus n |
| √  | root x; square root x; the square root of x |
| ∛ | the cube root of x |
| ∜ | the fourth root of x |
| http://www.uefap.com/speaking/symbols/root5.gif | the nth root of x |
| (x + y)² | x plus y all squared |
| (x/y)² | x over y all squared |
| n! | n factorial; factorial n |
| x% | x percent |
| ∞ | infinity |
| x ∝ y | x varies as y; x is (directly) proportional to y |
| x ∝ 1/y | x varies as one over y; x is indirectly proportional to y |
| ẋ | x dot |
| ẍ | x double dot |
| f(x) fx | f of x; the function of x |
| f'(x) | f dash x; the (first) derivative of with respect to x |
| f''x | f double-dash x; the second derivative of f with respect to x |
| f'''(x) | f triple-dash x; f treble-dash x; the third derivative of f with respect to x |
| f(4) | f four x; the fourth derivative of f with respect to x |
| ∂v  | the partial derivative of v |
| ∂v∂θ | delta v by delta theta, the partial derivative of v with respect to θ |
| ∂²v∂θ² | delta two v by delta theta squared; the second partial derivative of v with respect to θ  |
| dv | the derivative of v |
| dvdθ | d v by d theta, the derivative of v with respect to theta |
| d²vdθ² | d 2 v by d theta squared, the second derivative of v with respect to theta,  |
| ∫ | integral |
| integral | integral from zero to infinity |
| ∑ | sum |
| http://www.uefap.com/speaking/symbols/sum4.gif | the sum from i equals 1 to n |
| w.r.t. | with respect to |
| logey | log to the base e of y; log y to the base e; natural log (of) y |
| ∴ | therefore |
| ∵ | because |
| → | gives, approaches |
| Δx → 0 | delta x approaches zero |
| limΔx→0 | the limit as delta x approaches zero, the limit as delta x tends to zero |
| LtΔx→0 | the limit as delta x approaches zero, the limit as delta x tends to zero |
| m/sec | metres per second |
| x ∈ A | x belongs to A; x is a member of A; x is an element of A |
| x∉ A | x does not belong to A; x is not  a member of A; x is not an element of A |
| A⊂ B | A is contained in B; A is a proper subset of B |
| A ⊆ B | A is contained in B; A is a subset of B |
| A ⋂ B | A intersection B |
| A ⋃ B | A union B |
| cos x | cos x; cosine x |
| sin x | sine x |
| tan x | tangent x, tan x |
| cosec x | cosec x |
| sinh x | shine x |
| cosh x | cosh x |
| tanh x  | than x |
| |x| | mod x; modulus x |
| 18 ℃ | eighteen degrees Centigrade/Celsius |
| 70 ℉ | seventy degrees Fahrenheit |

[^](http://www.uefap.com/speaking/symbols/symbols.htm#top)

**Greek alphabet**

|  |  |  |  |
| --- | --- | --- | --- |
| Α | α  | alpha | /'ælfə/ |
| Β  | β  | beta | /'bi:tə/ |
| Γ  | γ  | gamma | /'gæmə/ |
| Δ  | δ  | delta | /'deltə/ |
| Ε  | ε  | epsilon | /'epsilən/ |
| Ζ  | ζ  | zeta | /'ziːtə/ |
| Η  | η  | eta | /'iːtə/ |
| Θ  | θ  | theta | /'θiːtə/ |
| Ι  | ι  | iota | /aɪ'əʊtə/ |
| Κ  | κ  | kappa | /'kæpə/ |
| Λ  | λ  | lamda | /'læmdə/ |
| Μ  | μ  | mu | /'mjuː/ |
| Ν  | ν  | nu | /'njuː/ |
| Ξ  | ξ  | xi | /'ksaɪ/ |
| Ο  | ο  | omicron | /'əʊmɪkrən/ |
| Π  | π  | pi | /'paɪ/ |
| Ρ  | ρς  | rho | /'rəʊ/ |
| Σ  | σ  | sigma | /'sɪgmə/ |
| Τ  | τ  | tau | /'tɑʊ/ |
| Υ  | υ  | upsilon | /'jʊpsɪlən/ |
| Φ  | φ  | phi | /'faɪ/ |
| Χ  | χ  | chi | /'kaɪ/ |
| Ψ  | ψ  | psi | /'psaɪ/ |
| Ω  | ω  | omega | /'əʊmɪgə/ |

[^](http://www.uefap.com/speaking/symbols/symbols.htm#top)

**Fractions - all**

|  |  |  |
| --- | --- | --- |
| ½ | a half | /ə 'hɑ:f/ |
| ¼ | a quarter | /ə 'kwɔːtə/ |
| ¾ | three quarters | /θriː 'kwɔːtəz/ |
| ⅓ | a third | /ə 'θɜ:d/ |
| ⅔ | two thirds | /tu: 'θɜ:dz/ |
| ⅕ | a fifth | /ə 'fɪfθ/ |
| ⅖ | two fifths | /tu: 'fɪfθs/ |
| ⅗ | three fifths | /θriː 'fɪfθs/ |
| ⅘ | four fifths | /fɔː 'fɪfθs/ |
| ⅙ | a sixth | /ə 'sɪksθ/ |
| ⅚ | five sixths | /faɪv 'sɪksθs/ |
| ⅛ | an eighth | /ən 'eɪtθ/ |
| ⅜ | three eighths | /θriː 'eɪtθs/ |
| ⅝ | five eighths | /faɪv 'eɪtθs/ |
| ⅞ | seven eighths | /sevən 'eɪtθs/ |

[^](http://www.uefap.com/speaking/symbols/symbols.htm#top)

**Decimal Fractions - all**

|  |  |  |
| --- | --- | --- |
| 0.1 | nought point one | /nɔ:t pɔɪnt wʌn/ |
| 0.01 | nought point oh one | /nɔ:t pɔɪnt əʊ wʌn/ |
| 0.0001 | nought point oh oh oh one | /ten pɔɪnt əʊ əʊ əʊ wʌn/ |
| 1.1 | one point one | /wʌn pɔɪnt wʌn/ |
| 1.2 | one point two | /wʌn pɔɪnt tu:/ |
| 1.23 | one point two three | /wʌn pɔɪnt tu: θri:/ |
| 1.0123 | one point oh one two three | /wʌn pɔɪnt əʊ wʌn tu: θri:/ |
| 10.01 | ten point oh one | /ten pɔɪnt əʊ wʌn/ |
| 21.57 | twenty-one point five seven | /'twentɪ wʌn pɔɪnt  faɪv 'sevən/  |
| 2.6666666666.... | two point six recurring | /tu: pɔɪnt  sɪks rɪ'kɜ:rɪŋ/ |
| 2.612361236123... | two point six one two three recurring | /tu: pɔɪnt  sɪks wʌn tu: θri: rɪ'kɜ:rɪŋ/ |
| 2.5 million | two point five million | /tu: pɔɪnt  faɪv 'mɪljən/ |

[^](http://www.uefap.com/speaking/symbols/symbols.htm#top)

**SI Units: Prefixes**

|  |  |  |  |
| --- | --- | --- | --- |
| 10-24 | yocto  | y  | /'jɒktəʊ/  |
| 10-21 | zepto  | z  | /'zeptəʊ/ |
| 10-18 | atto  | a  | /'atəʊ/ |
| 10-15 | femto  | f  | /'femtəʊ/ |
| 10-12 | pico  | p  | /'pi:kəʊ/ |
| 10-9 | nano  | n  | /'nanəʊ/ |
| 10-6 | micro  | µ  | /'maɪkrəʊ/  |
| 10-3 | milli  | m  | /'mɪlɪ/ |
| 10-2 | centi  | c  | /'sentɪ/ |
| 10-1 | deci  | d  | /'desɪ/ |
| 103 | kilo  | k  | /'kɪləʊ/ |
| 106 | mega  | M  | /'megə/ |
| 109 | giga  | G  | /'gɪgə/ |
| 1012 | tera  | T  | /'terə/ |
| 1015 | peta | P | /'petə/ |
| 1018 | exa  | E  | /'eksə/  |
| 1021 | zetta  | Z  | /'zetə/  |
| 1024 | yotta  | Y  | /'jɒtə/  |
| 1027 | xona | X | /'zəʊnə/  |
| 1030 | weka | W | /'wekə/  |
| 1033 | vunda | V | /'vʊndə/  |

[^](http://www.uefap.com/speaking/symbols/symbols.htm#top)

**Ordinal Numbers - all**

|  |  |  |
| --- | --- | --- |
| 1st | first | /fɜ:st/ |
| 2nd | second | /'sekənd/ |
| 3rd | third | /θɜ:d/ |
| 4th | fourth | /fɔ:θ/ |
| 5th | fifth | /fɪfθ/ |
| 6th | sixth | /sɪksθ/ |
| 7th | seventh | /'sevənθ/ |
| 8th | eighth | /eɪtθ/ |
| 9th | ninth | /naɪnθ/ |
| 10th | tenth | /tenθ/ |
| 11th | eleventh | /ɪ'levənθ/ |
| 12th | twelfth | /'twelfθ/ |
| 13th | thirteenth | /θɜ:'ti:nθ/ |
| 14th | fourteenth | /fɔː'ti:nθ/ |
| 15th | fifteenth | /fɪf'ti:nθ/     |
| 16th | sixteenth | /sɪks'ti:nθ/ |
| 17th | seventeenth | /seven'ti:nθ/ |
| 18th | eighteenth | /eɪ'ti:nθ/ |
| 19th | nineteenth | /naɪn'ti:nθ/ |
| 20th | twentieth | /'twentɪəθ/ |
| 21st | twenty-first | /twentɪ'fɜ:st/ |
| 22nd | twenty-second | /twentɪ'sekənd/ |
| 23rd | twenty-third | /twentɪ'θɜ:d/ |
| 24th | twenty-fourth | /twentɪ'fɔ:θ/ |
| 25th | twenty-fifth | /twentɪ'fɪfθ/ |
| 26th | twenty-sixth | /twentɪ'sɪksθ/ |
| 27th | twenty-seventh | /twentɪ'sevənθ/ |
| 28th | twenty-eighth | /twentɪ'eɪtθ/ |
| 29th | twenty-ninth | /twentɪ'naɪnθ/ |
| 30th | thirtieth | /'θɜːtɪəθ/ |
| 31st | thirty-first | /θɜːtɪ'fɜ:st/ |
| 40th | fortieth | /'fɔ:tɪəθ/ |
| 50th | fiftieth | /'fɪftɪəθ/ |
| 100th | hundredth | /'hʌndrədθ/ |
| 1 000th | thousandth | /'θɑʊzəndθ/ |
| 1 000 000th | millionth | /'mɪljənθ/ |

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