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| Algebraic methods Use long division to find values of expression | Algebraic CQT Given that … find the constants A B C D |
| Functions and graphs Domain: Set of valid inputs  Range: Set of corresponding outputs  Absolute functions:  Turning point  Roots  Inverse function:  Nested function:  **Function Transformation**   |  |  | | --- | --- | |  |  | |  |  | |  |  | |  |  | | Graphs CQT Find unknown in given function which has 2 intersections with absolute function   * Slope of given function < slope of absolute function * Substitute both functions together |
| Graphing Trigonometric Functions: Sin, Cos, Tan, Sec, Csc, and Cot  (examples, videos, worksheets, solutions, activities)Trigonometry For a > 0  *Useful derived angle formulas*  *Given formulas* | Trigo CQT Express in the form then solve   * Solve for x with finding solutions for and displacing solution   Use something given to prove an identity   * Multiply expression by 1 (most often ) * Multiply or divide both sides of equation by   Show that the equation can be written in the form of … and solve for x   * Substitute equations into expression * Solve for x using methods such as 2 expressions multiplying = 0   Given that , find the exact value for …   * Use given to find   Given that …, prove exact value of … is n  Draw graph of f(x) in the interval …   * Efficient use of graphical calculator, with setting appropriate intervals   Derive   * s(+) + s(-) let a b -> A |
| Graphs e^x and ln x – GeoGebraExponentials | Expo CQT Find exact solutions of or other expressions with natural logs   * Natural log both sides, or * Cancel logarithms by expression , replacing whole values with logarithm forms (e.g. )Find value of unknown given values of x and y   Show max / min value of y is …   * Find y when x tends to infinite   Draw graph of f(x) showing points of interception  Solve   * Substitute and find x using quadratic |

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| Differentiation  |  |  | | --- | --- | |  |  | | *Not given rules* | | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | *Given rules* | | |  |  | |  |  | |  |  | |  |  |   **Chain rule** ***d*** from outside to inside    **Product rule**  ***d***1x2 + ***d***2x1    **Quotient rule** (given) move lower ***d*** upper – ***d*** lower x upper, lower square | Diff CQT Find the equation of tangent at a point  Chain rule: find in terms of y  Find the equation of tangent in for function   * Above rule, substitute given y-coordinate as x to to find inverse of slope   Given that , find in terms of x   * Find , then use identities and rearrange to substitute |
| Integration  * Look at the integral and think “what would produce this?” * Ignore factors at the start and multiple values after that to produce desired result * Think in different angles if you get stuck * Remember to add constant (**+ C**) at end of operation * Make sure to master differentiation * Make sure to be familiar with trigonometry identities Often require the exchange between  |  |  |  | | --- | --- | --- | |  |  | | | *Given rules* | | |  |  | | |  |  | | |  |  | |   **Common methods** | Integration CQT Given point, find f(x)   * Integrate then substitute point to find c   Use integration to find the exact area of …   * Use   Given , find the value of a  Show that  By writing , find |
| Numerical Methods | Methods CQT |
| **Change of signs**  For a continuous function, a change in sign of f(x) in the interval (a, b) ⇒ a root of f(x) = 0 in the interval (a, b)  Answering: Change of sign and continuity ⇒ root in [a, b]  **Accuracy of roots by choosing an interval**  at the last decimal place  e.g. 1.47 to 2 dp: test f(1.465) and f(1.475) for change of sign  **Iterative methods**  Rearrange formula to , and substitute as | Show that equation can be written as …  Use the iteration formula … to find the values of x1 x2 x3…  By choosing a suitable interval, prove that root = … to x d.p. |

## Equalities

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| Surds |  |  |  |  |
| Indices |  |  |  |  |
|  |  |  |  |  |
| Exponential |  |  |  |  |
|  |  |  |  |  |
| Sequences |  |  |  |  |
| Trigonometry |  |  |  |  |

## Exam tips

* Read the WHOLE question before you start your answer
* Draw clear well-labelled diagrams
* Look for clues or key words given in the question
* Write down formulae before substituting numbers
* Make sure you finish a ‘prove’ or a ‘show’ question – quote the end result
* Don’t fudge your answers (particularly if the answer is given)!
* Don’t round your answers prematurely
* Make sure you give your final answers to the required/appropriate degree of accuracy
* Check details at the end of every question (e.g. particular form, exact answer)
* Take note of the part marks given in the question
* If your solution is becoming very lengthy, check the original details given in the question
* If the question says “hence” make sure you use the previous parts in your answer
* Keep going through the paper – go back over questions at the end if time

## Symbols and notations

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| **Symbol** | **Description** | **Example** |
| N | Natural numbers | 1, 2, 3 |
| R | Real numbers | Any real numbers (false: sqrt(-1)) |
| Z | Integers | -1, 0, 1 |
| Q | Rational numbers | Numbers which are not repeating w/o patterns |
| P | Irrational numbers | Pi, sqrt(3) |
|  | For every |  |
|  | Element of |  |
| {} | Domain container |  |
| \ | Except |  |