MATHEMATICS FOR GAS ENGINEERS

This is a bespoke 1-day training course for anyone whose maths or engineering physics needs a brush up or boost in order to fully utilise British Standards, IGEM technical documents or manufacturers' instructions in their work or before taking exams. You may choose up to 6 main topics depending on their complexity.

Each topic is explained with worked examples taken from technical documentation and then an exercise is given along with marking and feedback. Candidate's own documentation can be used if advance notice is given. It may also be possible to cover a topic not listed below.

Call **0121 544 9142** or email **r-price@btconnect.com** for further information.

Mathematical topics include:

- Basic and advanced arithmetic
  - Addition
  - Subtraction as the inverse of addition
  - Multiplication as repeated addition
  - Division as the inverse of multiplication
  - Order of evaluation including brackets (BODMAS)
  - Associativity and commutativity
  - Multiplying out brackets
  - Simplifying expressions
- Estimation
- Fractions and decimal numbers
- Percentages, parts per million (ppm) and other scales
- Units of measurement
- Equations
  - Using formulae
  - Numeric evaluation using scientific and non-scientific calculators
  - Using online and handheld algebraic calculators
  - Transposition (rearrangement) of formulae
  - Inequalities
  - Quadratic equations
  - Solving implicit formulae using iterative methods
- Powers
  - Powers as repeated multiplication

- Whole number powers (squares, cubes and higher powers)
- Fractional powers (square roots and cube roots)
- Negative powers (reciprocals)
- Scientific notation for large and small numbers
- Logarithms
  - Base 10 logarithms
  - Natural logarithms
  - Change of base
- Basic calculus
  - Differentiation
  - Integration
  - Exponential growth and decay
- Numbers
  - Negative numbers
  - Rational and irrational numbers
  - Imaginary and complex numbers

Physics / engineering topics include:

- Pressure
  - Gauge pressure
  - Absolute pressure
- Ideal gas laws
  - Boyle's Law
  - Charles' Law
  - Gay-Lussac's Law
  - Avogadro's number
  - Equation of state
- Fluid flow
  - Gas flow in pipework
  - Laminar and turbulent flow
  - Reynolds' number
  - Friction factor
- Heat input, heat output and efficiency
- Calorific value and Wobbe number
- Natural draught flue sizing
- Further combustion analysis
- Estimating air change rates using CO_2 decay methods
- Dimensional analysis