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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Equations and Formulae** |
| 1. Solve | To find the **answer**/value of something  **Use inverse operations** on both sides of the equation (balancing method) until you find the value for the letter. | Solve  Add 3 on both sides  Divide by 2 on both sides |
| 2. Inverse | **Opposite** | The inverse of addition is subtraction.  The inverse of multiplication is division. |
| 3. Rearranging Formulae | **Use inverse operations** on both sides of the formula (balancing method) until you find the expression for the letter. | Make x the subject of  Multiply both sides by z  Add 1 to both sides  Divide by 2 on both sides  We now have x as the subject. |
| 4. Writing Formulae | **Substitute letters for words** in the question. | Bob charges £3 per window and a £5 call out charge.  Where N=number of windows and C=cost |
| 5. Substitution | **Replace letters with numbers**.  Be careful of . You need to square first, then multiply by 5. | Find:  1.  2.  3. |

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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Solving Quadratics by Factorising** |
| 1. Quadratic | A quadratic expression is of the form  where and are numbers, | Examples of quadratic expressions:  Examples of non-quadratic expressions: |
| 2. Factorising Quadratics | When a quadratic expression is in the form find the two numbers that **add to give b** and **multiply to give c**. | (because 5 and 2 add to give 7 and multiply to give 10)  (because +4 and -2 add to give +2 and multiply to give -8) |
| 3. Difference of Two Squares | An expression of the form can be factorised to give |  |
| 4. Solving Quadratics | Isolate the term and square root both sides.  Remember there will be a **positive and a negative solution**. |  |
| 5. Solving Quadratics | **Factorise** and then **solve = 0**. |  |
| 6. Solving Quadratics by Factorising | **Factorise** the quadratic in the usual way.  **Solve = 0**  Make sure the equation = 0 before factorising. | Solve  Factorise: |
| 7. Factorising Quadratics when | When a quadratic is in the form  1. Multiply a by c = ac  2. Find two numbers that add to give b and multiply to give ac.  3. Re-write the quadratic, replacing with the two numbers you found.  4. Factorise in pairs – you should get the same bracket twice  5. Write your two brackets – one will be the repeated bracket, the other will be made of the factors outside each of the two brackets. | Factorise  1.  2. Two numbers that add to give +5 and multiply to give -24 are +8 and -3  3.  4. Factorise in pairs:  5. Answer = |
| 8. Solving Quadratics by Factorising | **Factorise** the quadratic in the usual way.  **Solve = 0**  Make sure the equation = 0 before factorising. | Solve  Factorise: |

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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Further Quadratics** |
| 1. Quadratic | A quadratic expression is of the form  where and are numbers, | Examples of quadratic expressions:  Examples of non-quadratic expressions: |
| 2. Factorising Quadratics | When a quadratic expression is in the form find the two numbers that **add to give b** and **multiply to give c**. | (because 5 and 2 add to give 7 and multiply to give 10)  (because +4 and -2 add to give +2 and multiply to give -8) |
| 3. Difference of Two Squares | An expression of the form can be factorised to give |  |
| 4. Solving Quadratics | Isolate the term and square root both sides.  Remember there will be a **positive and a negative solution**. |  |
| 5. Solving Quadratics | **Factorise** and then **solve = 0**. |  |
| 6. Solving Quadratics by Factorising | **Factorise** the quadratic in the usual way.  **Solve = 0**  Make sure the equation = 0 before factorising. | Solve  Factorise: |
| 7. Quadratic Graph | A ‘**U-shaped**’ curve called a **parabola**.  The equation is of the form  , where , and are numbers, .  If **,** the parabola is **upside down**. | Image result for quadratic graph definition math |
| 8. Roots of a Quadratic | A root is a **solution**.  The roots of a quadratic are the **-intercepts of the quadratic graph**. | Image result |
| 9. Turning Point of a Quadratic | A turning point is the **point where a quadratic turns**.  On a **positive parabola**, the turning point is called a **minimum**.  On a **negative parabola**, the turning point is called a **maximum**. | Minimum turning pointMaximum turning point |
| 10. Factorising Quadratics when | When a quadratic is in the form  1. Multiply a by c = ac  2. Find two numbers that add to give b and multiply to give ac.  3. Re-write the quadratic, replacing with the two numbers you found.  4. Factorise in pairs – you should get the same bracket twice  5. Write your two brackets – one will be the repeated bracket, the other will be made of the factors outside each of the two brackets. | Factorise  1.  2. Two numbers that add to give +5 and multiply to give -24 are +8 and -3  3.  4. Factorise in pairs:  5. Answer = |
| 11. Solving Quadratics by Factorising | **Factorise** the quadratic in the usual way.  **Solve = 0**  Make sure the equation = 0 before factorising. | Solve  Factorise: |
| 12. Completing the Square (when | A quadratic in the form can be written in the form  1. Write a set of brackets with in and **half** the value of  2. Square the bracket.  3. Subtract and add  4. Simplify the expression.  You can **use the completing the square form** to help **find the maximum or minimum** of quadratic graph. | Complete the square of  Answer:  The minimum value of this expression occurs when , which occurs when  When ,  Minimum point = |
| 13. Completing the Square (when | A quadratic in the form can be written in the form **p**  Use the same method as above, but factorise out at the start. | Complete the square of  Answer: |
| 14. Solving Quadratics by Completing the Square | **Complete the square** in the usual way and **use inverse operations to solve**. | Solve  Answer: |
| 15. Solving Quadratics using the Quadratic Formula | A quadratic in the form can be solved using the formula:  Use the formula if the quadratic does not factorise easily. | Solve  Answer: |

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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Inequalities** |
| 1. Inequality | An inequality says that two values are **not equal**.  means that a is not equal to b. |  |
| 2. Inequality symbols | means **x is greater than 2**  means **x is less than 3**  means **x is greater than or equal to 1**  means **x is less than or equal to 6** | State the integers that satisfy  -1, 0, 1, 2, 3, 4 |
| 3. Inequalities on a Number Line | Inequalities can be shown on a number line.  **Open circles** are used for numbers that are **less than or greater than**  **Closed circles** are used for numbers that are **less than or equal or greater than or equal** |  |
| 4. Graphical Inequalities | Inequalities can be represented on a coordinate grid.  If the inequality is **strict** () then use a **dotted line**.  If the inequality is **not strict** () then use a **solid line**.  **Shade** the **region** which satisfies all the inequalities. | Shade the region that satisfies: |
| 5. Quadratic Inequalities | **Sketch the quadratic graph** of the inequality.  If the expression is then the answer will be **above the x-axis**.  If the expression is then the answer will be **below the x-axis**.  Look carefully at the inequality symbol in the question.  Look carefully if the quadratic is a **positive or negative parabola**. | Solve the inequality  Sketch the quadratic:    The required region is below the x-axis, so the final answer is:  If the question had been , the answer would have been: |
| 6. Set Notation | A **set** is a **collection of things**, usually numbers, denoted with brackets  means ‘the set of all x’s, such that x is greater than or equal to 7’  The ‘x’ can be replaced by any letter.  Some people use ‘:’ instead of ‘|’ | is a set. |

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| **Topic/Skill** | **Definition/Tips** | **Example**  **Topic: Simultaneous Equations** |
| 1. Simultaneous Equations | A set of **two or more equations**, each involving **two or more variables** (letters).  The **solutions** to simultaneous equations **satisfy both**/all of the **equations**. |  |
| 2. Variable | A **symbol**, usually a **letter**, which **represents a number** which is usually unknown. | In the equation , is the variable. |
| 3. Coefficient | A **number** used to **multiply** a **variable**.  It is the number that comes before/in front of a letter. | 6z  6 is the coefficient  z is the variable |
| 4. Solving Simultaneous Equations (by Elimination) | 1. **Balance** the **coefficients** of one of the variables.  2. **Eliminate** this variable by adding or subtracting the equations (**Same Sign Subtract, Different Sign Add**)  3. **Solve** the linear equation you get using the other variable.  4. **Substitute** the value you found back into one of the previous equations.  5. **Solve** the equation you get.  6. **Check** that the two values you get satisfy both of the original equations. | Multiply the first equation by 2.  Same Sign Subtract (+10x on both)  Substitute in to equation.  Solution: |
| 5. Solving Simultaneous Equations (by Substitution) | 1. **Rearrange** one of the equations into the form or  2. **Substitute** the right-hand side of the rearranged equation into the other equation.  3. Expand and **solve** this equation.  4. **Substitute** the value into the or equation.  5.  **Check** that the two values you get satisfy both of the original equations. | Rearrange:  Substitute:  Solve:  Substitute:  Solution: |

**Knowledge Organiser**