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| **Topic/Skill**  | **Definition/Tips****Topic: Iteration**  | **Example** |
| 1. Iteration | The act of **repeating a process** over and over again, often with the aim of **approximating** a desired result more closely.**Recursive** Notation: $x\_{n+1}=\sqrt{3x\_{n}+6}$ | $$x\_{1}=4$$$$x\_{2}=\sqrt{3×4+6}=4.242640…$$$$x\_{3}=\sqrt{3×4.242640…+6}=4.357576…$$ |
| 2. Iterative Method | To create an iterative formula, **rearrange** an equation with more than one x term to **make one of the x terms the subject**.You will be given the first value to substitute in, often called $x\_{1}$.**Keep substituting in your previous answer** until your answers are the same to a certain degree of accuracy. This is called converging to a limit.Use the ‘ANS’ button on your calculator to keep substituting in the previous answer. | Use an iterative formula to find the positive root of $x^{2}-3x-6=0$ to 3 decimal places.$x\_{1}=4$ Answer:$$x^{2}=3x+6$$$$x=\sqrt{3x+6}$$So $x\_{n+1}=\sqrt{3x\_{n}+6}$$$x\_{1}=4$$$$x\_{2}=\sqrt{3×4+6}=4.242640…$$$$x\_{3}=\sqrt{3×4.242640…+6}=4.357576…$$Keep repeating…$$x\_{7}=4.372068..=4.372 \left(3dp\right)$$$$x\_{8}=4.372208…=4.372 (3dp)$$So answer is $x=4.372 (3dp)$ |
| 3. Solving Simultaneous Equations (Graphically) | **Draw the graphs** of the two equations.The **solutions** will be **where the lines meet**.The solution can be written as a **coordinate**. | $y=5-x$ and $y=2x-1.$They meet at the point with coordinates (2,3) so the answer is $x=2$ and $y=3$ |
| 4. Solving Linear and Quadratic Simultaneous Equations | Method 1: If both equations are in the same form (eg. Both $y=$…):1. Set the equations **equal to each other**.2. **Rearrange** to make the equation **equal to zero**.3. **Solve** the quadratic equation.4. **Substitute** the values back in to one of the equations.Method 2: If the equations are not in the same form:1.  **Rearrange** the linear equation into the form $y=...$ or $x=...$2. **Substitute** in to the quadratic equation.3. **Rearrange** to make the equation **equal to zero**.4. **Solve** the quadratic equation.5. **Substitute** the values back in to one of the equations.You should get **two pairs of solutions** (two values for $x$, two values for $y$.)Graphically, you should have **two points of intersection**. | Example 1Solve $y=x^{2}-2x-5$ and $y=x-1$$$x^{2}-2x-5=x-1$$$$x^{2}-3x-4=0$$$$\left(x-4\right)\left(x+1\right)=0$$$x=4$ and $x=-1$$y=4-1=3$ and $y=-1-1=-2$ Answers: (4,3) and (-1,-2)Example 2Solve $x^{2}+y^{2}=5$ and $x+y=3$$$x=3-y$$$$\left(3-y\right)^{2}+y^{2}=5$$$$9-6y+y^{2}+y^{2}=5$$$$2y^{2}-6y+4=0$$$$y^{2}-3y+2=0$$$$\left(y-1\right)\left(y-2\right)=0$$$y=1$ and $y=2$$x=3-1=2$ and $x=3-2=1$Answers: (2,1) and (1,2) |
| 5. Quadratic Graph | A ‘**U-shaped**’ curve called a **parabola**.The equation is of the form$y=ax^{2}+bx+c$, where $a$, $b$ and $c$ are numbers, $a\ne 0$. If $a<0$**,** the parabola is **upside down**. | Image result for quadratic graph definition math |
| 6. Roots of a Quadratic  | A root is a **solution**.The roots of a quadratic are the $x$**-intercepts of the quadratic graph**. | Image result |
| 7. 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 |
| 8. Cubic Graph | The equation is of the form $y=ax^{3}+k$, where $k$ **is an number**.If $a>0$, the curve is **increasing**.If $a<0$, the curve is **decreasing**. | Image result for cubic function definition mathImage result for cubic function definition math |

**Subject: Maths**

**Knowledge Organiser**