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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Coordinates and Linear Graphs**  |
| 1. Coordinates | Written in **pairs**. The **first** term is the **x-coordinate** (movement **across**). The **second** term is the **y-coordinate** (movement **up or down**) | A: (4,7)B: (-6,-3) |
| 2. Midpoint of a Line | Method 1: **add the x coordinates and divide by 2**, **add the y coordinates and divide by 2**Method 2: Sketch the line and find the values half way between the two x and two y values.  | Find the midpoint between (2,1) and (6,9)$\frac{2+6}{2}=4$ and $\frac{1+9}{2}=5$So, the midpoint is (4,5) |
| 3. Linear Graph | **Straight line** graph.The general equation of a linear graph is$$y=mx+c$$where $m$ **is the gradient** and $c$ **is the y-intercept**.The **equation** of a linear graph can contain an **x-term**, a **y-term** and a **number**. | Example:Image result for linear graphOther examples:$x=y$ $y=4$ $x=-2$ $y=2x-7$ $y+x=10$ $2y-4x=12$  |
| 4. Plotting Linear Graphs | Method 1: **Table of Values**Construct a table of values to calculate coordinates.Method 2: **Gradient-Intercept Method** (use when the equation is in the form $y=mx+c$)1. Plots the y-intercept2. Using the gradient, plot a second point.3. Draw a line through the two points plotted.Method 3: **Cover-Up Method** (use when the equation is in the form $ax+by=c$)1. Cover the $x$ term and solve the resulting equation. Plot this on the $x-axis.$2. Cover the $y$ term and solve the resulting equation. Plot this on the $y-axis.$3. Draw a line through the two points plotted. | Image result for gradient intercept methodImage result for cover up method straight line graphs |
| 5. Gradient | The gradient of a line is how **steep** it is.**Gradient =** $$\frac{Change in y}{Change in x}=\frac{Rise}{Run}$$The gradient can be positive (sloping upwards) or negative (sloping downwards) |  |
| 6. Finding the Equation of a Line given a point and a gradient | **Substitute** in the **gradient (m)** and **point (x,y)** in to the equation $y=mx+c$ and **solve for c**. | Find the equation of the line with gradient 4 passing through (2,7).$$y=mx+c$$$$7=4×2+c$$$$c=-1$$$$y=4x-1$$ |
| 7. Finding the Equation of a Line given two points | Use the two points to **calculate the gradient**. Then **repeat the method above** using the gradient and either of the points. | Find the equation of the line passing through (6,11) and (2,3)$$m=\frac{11-3}{6-2}=2$$$$y=mx+c$$$$11=2×6+c$$$$c=-1$$$$y=2x-1$$ |
| 8. Parallel Lines | If two lines are **parallel**, they will have the **same gradient**. The value of m will be the same for both lines. | Are the lines $y=3x-1$ and $2y-6x+10=0$ parallel?Answer:Rearrange the second equation in to the form $y=mx+c$$$2y-6x+10=0\rightarrow y=3x-5$$Since the two gradients are equal (3), the lines are parallel. |
| 9. Perpendicular Lines | If two lines are **perpendicular**, the **product** of their **gradients** will always equal **-1**.The gradient of one line will be the **negative reciprocal** of the gradient of the other line.You may need to rearrange equations of lines to compare gradients (they need to be in the form $y=mx+c)$ | Find the equation of the line perpendicular to $y=3x+2$ which passes through (6,5)Answer:As they are perpendicular, the gradient of the new line will be $-\frac{1}{3}$ as this is the negative reciprocal of 3.$$y=mx+c$$$$5=-\frac{1}{3}×6+c$$$$c=7$$$$y=-\frac{1}{3}x+7$$Or$$3x+x-7=0$$ |

**Knowledge Organiser**