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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: 2D Representations of 3D Shapes**  |
| 1. Net | A pattern that you can **cut and fold** to make a **model** of a **3D shape**. | Image result |
| 2. Properties of Solids | **Faces = flat surfaces****Edges = sides/lengths****Vertices = corners** | A cube has 6 faces, 12 edges and 8 vertices.Image result for cube |
| 3. Plans and Elevations | This takes 3D drawings and produces 2D drawings.**Plan View**: from **above****Side Elevation**: from the **side****Front Elevation**: from the **front** |  |
| 4. Isometric Drawing | A method for visually **representing 3D objects in 2D**. | Image result for math definition isometric drawing |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Properties of Polygons**  |
| 1. Square | * **Four equal sides**
* **Four right angles**
* **Opposite sides parallel**
* **Diagonals bisect** each other at **right angles**
* **Four lines** of **symmetry**
* **Rotational symmetry** of **order four**
 |  |
| 2. Rectangle | **• Two pairs** of **equal sides • Four right angles • Opposite sides parallel** **• Diagonals bisect** each other**, not at right angles• Two lines** of **symmetry • Rotational symmetry** of **order two** |  |
| 3. Rhombus | **• Four equal sides • Diagonally opposite angles are equal • Opposite sides parallel • Diagonals bisect** each other at **right angles • Two lines** of **symmetry • Rotational symmetry** of **order two** |  |
| 4. Parallelogram  | **• Two pairs** of **equal sides • Diagonally opposite angles are equal • Opposite sides parallel • Diagonals bisect** each other**, not at right angles• No lines** of **symmetry • Rotational symmetry** of **order two** |  |
| 5. Kite | **• Two pairs** of **adjacent sides** of **equal** length **• One pair** of **diagonally opposite angles are equal** (where different length sides meet) **• Diagonals intersect** at **right angles, but do not bisect • One line** of **symmetry****• No rotational symmetry** |  |
| 6. Trapezium | * **One pair** of **parallel sides**
* **No lines of symmetry**
* **No rotational symmetry**

Special Case: Isosceles Trapeziums have one line of symmetry. |  |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Shape Transformations**  |
| 1. Translation | **Translate** means to **move a shape**. The shape does not change **size** or **orientation**. | Image result for translation maths |
| 2. Column Vector | In a column vector, the **top** number moves **left (-) or right (+)** and the **bottom** number moves **up (+) or down (-)** | $\left(\begin{matrix}2\\3\end{matrix}\right)$ means ‘2 right, 3 up’$\left(\begin{matrix}-1\\-5\end{matrix}\right)$ means ‘1 left, 5 down’ |
| 3. Rotation | The size does not change, but the **shape is turned around a point**.Use tracing paper. | Rotate Shape A 90° anti-clockwise about (0,1)Image result for rotation maths |
| 4. Reflection | The size does not change, but the shape is ‘**flipped’** like in a **mirror**.Line $x=?$ is a **vertical line**.Line $y=?$ is a **horizontal line**.Line $y=x$ is a **diagonal line**. | Reflect shape C in the line $y=x$Image result for reflection maths |
| 5. Enlargement | The shape will get **bigger or smaller**. Multiply each side by the **scale factor**. | Scale Factor = 3 means ‘3 times larger = multiply by 3’Scale Factor = ½ means ‘half the size = divide by 2’ |
| 6. Finding the Centre of Enlargement | Draw **straight** **lines** through **corresponding corners** of the two shapes.The centre of enlargement is the point **where all the lines cross over**.Be careful with negative enlargements as the corresponding corners will be the other way around. |  |
| 7. Describing Transformations | Give the following information when describing each transformation:Look at the number of marks in the question for a hint of how many pieces of information are needed.If you are asked to describe a ‘transformation’, you need to say the **name of the type of transformation** as well as the other details. | **- Translation, Vector****- Rotation, Direction, Angle, Centre****- Reflection, Equation of mirror line****- Enlargement, Scale factor, Centre of enlargement** |
| 8. Negative Scale Factor Enlargements | Negative enlargements will **look like they have been rotated**.$SF=-2$ will be rotated, and also twice as big. | Enlarge ABC by scale factor -2, centre (1,1)Image result for negative scale factor enlargement |
| 9. Invariance | A point, line or shape is invariant if it **does not change/move** when a transformation is performed.An invariant point ‘does not vary’. | If shape P is reflected in the $y-axis$, then exactly one vertex is invariant.Image result for invariance transformation |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Bearings and Scale Diagrams**  |
| 1. Scale | The **ratio** of the **length** in a **model** to the length of the **real** thing. |  |
| 2. Scale (Map) | The **ratio** of a **distance on the map** to the actual **distance in real life**. |  |
| 3. Bearings | 1. Measure from **North** (draw a North line)2. Measure **clockwise**3. Your answer must have **3 digits** (eg. 047°)Look out for where the bearing is measured from. |  |
| 4. Compass Directions | You can use an acronym such as **‘Never Eat Shredded Wheat’** to remember the order of the compass directions in a clockwise direction.Bearings: $NE=045°, W=270° etc.$ | Image result for compass directions |

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| **Topic/Skill**  | **Definition/Tips** | **Example****Topic: Loci and Constructions**  |
| 1. Parallel | Parallel lines never meet. |  |
| 2. Perpendicular | Perpendicular lines are at right angles. There is a 90° angle between them. |  |
| 3. Vertex | A corner or a point where two lines meet. | vertex |
| 4. Angle Bisector | **Angle Bisector: Cuts the angle in half**.1. Place the sharp end of a pair of compasses on the vertex. 2. Draw an arc, marking a point on each line. 3. Without changing the compass put the compass on each point and mark a centre point where two arcs cross over. 4. Use a ruler to draw a line through the vertex and centre point. | Image result for pair of compasses |
| 5. Perpendicular Bisector | **Perpendicular Bisector: Cuts a line in half and at right angles**.1. Put the sharp point of a pair of compasses on A. 2. Open the compass over half way on the line. 3. Draw an arc above and below the line.4. Without changing the compass, repeat from point B. 5. Draw a straight line through the two intersecting arcs. |  |
| 6. Perpendicular from an External Point | The **perpendicular distance** from a point to a line is the **shortest distance** to that line.1. Put the sharp point of a pair of compasses on the point.2. Draw an arc that crosses the line twice.3. Place the sharp point of the compass on one of these points, open over half way and draw an arc above and below the line.4. Repeat from the other point on the line.5. Draw a straight line through the two intersecting arcs. |  |
| 7. Perpendicular from a Point on a Line | Given line PQ and point R on the line:1. Put the sharp point of a pair of compasses on point R.2. Draw two arcs either side of the point of equal width (giving points S and T)3. Place the compass on point S, open over halfway and draw an arc above the line.4. Repeat from the other arc on the line (point T).5. Draw a straight line from the intersecting arcs to the original point on the line.  | Image result for perpendicular from a point on a line |
| 8. Constructing Triangles (Side, Side, Side) | 1. Draw the base of the triangle using a ruler.2. Open a pair of compasses to the width of one side of the triangle.3. Place the point on one end of the line and draw an arc.4. Repeat for the other side of the triangle at the other end of the line.5. Using a ruler, draw lines connecting the ends of the base of the triangle to the point where the arcs intersect. |  |
| 9. Constructing Triangles (Side, Angle, Side) | 1. Draw the base of the triangle using a ruler.2. Measure the angle required using a protractor and mark this angle.3. Remove the protractor and draw a line of the exact length required in line with the angle mark drawn.4. Connect the end of this line to the other end of the base of the triangle. |  |
| 10. Constructing Triangles (Angle, Side, Angle) | 1. Draw the base of the triangle using a ruler.2. Measure one of the angles required using a protractor and mark this angle.3. Draw a straight line through this point from the same point on the base of the triangle.4. Repeat this for the other angle on the other end of the base of the triangle. |  |
| 11. Constructing an Equilateral Triangle (also makes a 60° angle) | 1. Draw the base of the triangle using a ruler.2. Open the pair of compasses to the exact length of the side of the triangle.3. Place the sharp point on one end of the line and draw an arc.4. Repeat this from the other end of the line.5. Using a ruler, draw lines connecting the ends of the base of the triangle to the point where the arcs intersect. | Image result |
| 12. Loci and Regions | A **locus** is a **path of points that follow a rule**.For the locus of points **closer to B than A**, create a **perpendicular bisector** between A and B and shade the side closer to B.For the locus of points **equidistant from A**, use a compass to draw a **circle**, centre A.For the locus of points **equidistant to line X and line Y**, create an **angle bisector**. For the locus of points a set **distance from a line**, create **two semi-circles** at either end joined by **two parallel lines**. |  |
| 13. Equidistant | A point is equidistant from a set of objects if the **distances between that point and each of the objects is the same**. | Image result for equidistant |

**Knowledge Organiser**