

IIS Language Policy

Appendix 1

Language Across the Curriculum for Secondary

Subject/course: Mathematics/ IGCSE

Grade Level: Class 9 (end of first year of IGCSE) or Class 10 (beginning of second year of IGCSE)

Unit: Geometry

Textbooks: **Primary text:** *IGCSE Mathematics* by Karen Morrison; Module 4/Geometry: pages 133-175

Supplementary texts: *Higher Mathematics for GCSE: A complete course for the Higher Tier* by Keith Gordon, Brian Speed, Kevin Evans; Chapter 2/ Shape: pages 22-51; Chapter 5/Geometry: pages 112- 136; Chapter 7/Constructions: pages 164- 182; Chapter 12/ Similarity: pages 293-313

London GCSE Mathematics: Higher Course by John Casson, et al.; Chapter 3/ Shapes: pages 31-58; Chapter 6/ Transformations and Loci (only Section 6.2: Bearings: pages 119-121; Section 6.6: Scale drawings and scale models: pages 135- 136; Section 6.7: Locus of a point: pages 137-141); Chapter 16/ Measure and Mensuration: pages 292- 303; Chapter 19/ Advanced Mensuration: pages 334- 355; Chapter 28/ Circle Theorems: pages 502- 526

AMSCO's GEOMETRY by Ann Xavier Gantert

Vocabulary: point, line, ray, segment, ray, angle, vertex, acute, obtuse, reflex, parallel, perpendicular, supplementary, complementary, protractor, vertical angles, parallel lines cut by a transversal, alternate interior angles (Z angles), alternate exterior angles, corresponding angles, Co-interior angles (C-angles), polygon (four sides through ten sides), triangle, isosceles, equilateral, scalene, quadrilateral, square, rectangle, parallelogram, rhombus, trapezium/trapezoid, circle central angle, circle inscribed angle, diameter, radius, tangent, secant, chord, construction, geometrical compass, bisector, perimeter, area, surface area, volume, circle arc, circle sector, net of a solid, similar, congruent, cuboid/ rectangular prism, cube, cylinder, prism, pyramid, cone, sphere, line symmetry, rotational symmetry, plane symmetry, scale drawing, angle of elevation, angle of depression, bearings, locus/ loci

Suggested Activities:

- i. *Reading:* 1) Students should be assigned textbook reading for homework, and be required to read actively by either responding to the text by developing questions, making section outlines/

summarizing key points, making study cards with questions/ answers or words/ definitions, or making revision notes on key ideas as study aids

2) Students should be assigned research assignments where they seek outside reading material either from texts they find on their own or the internet

ii. Writing: 1) For quadrilaterals, students should be required at times to write down the relevant properties of the quadrilateral that enable them to make certain assumptions in a given problem. For an introductory lesson, students can be given sample quadrilaterals that they measure with a ruler and protractor and then discover the properties on their own. They then must word the properties themselves as they see them, and organize their ideas into a written chart. The class can then share/ reflect and the teacher can facilitate proper articulation of properties.

2) For circles, students should be able to articulate in writing the theorems that enable them to proceed with their line of reasoning in their problem solution. Past IGCSE examination questions require such written explanation.

3) Students can be given incorrectly solved problems and asked to correct them in writing, which is particularly effective for polygon or area problems.

4) The AMSCO's Geometry book includes "Writing in Mathematics" writing prompts about geometrical concepts that can be used as homework assignments, warm-up activities, test questions, etc.

iii. Speaking: 1) Students can use interactive geometry software to make Powerpoint presentations on various geometrical relationships such as parallel lines cut by a transversal, vertical angles, triangle angle sums, polygon angle sums, circle theorems, etc.

2) Periodically students should be asked to present homework problems or past exam questions on the chalkboard and explain verbally how they approached the problem and the reasons behind each of their choices in their problem solving process.

3) Students can do a "round robin" where they are assigned groups, and each group is given a challenging problem to solve, so they must discuss with each other their methods of approach. Then, the groups are reorganized so that every group has a student who worked on each of the different problems, and the students must explain to their peers how to do their own problem. As a challenge for stronger students, they can be asked to design their own geometry problem, which can be quite difficult to make sure the numbers work out correctly.

iv. Listening: 1) During student presentations, the rest of the class can be required to take notes based on what they hear, or write an evaluative reflection.

2) Instead of being provided with a diagram for a geometry problem, it can be described orally to them, and students will be required to draw the picture themselves based on what they hear.

Assessment:

- 1) Students can submit written explanations along with assigned homework or test problems.
- 2) For presentations and projects, language strength should be incorporated into rubrics.
- 3) Verbal explanation of problems can be assessed according to accuracy and counted as part of the student's participation grade.

Further general ideas:

When using textbooks, the teacher of any subject, should explicitly teach how the text is organized, and point out the importance of headings, diagrams, charts and illustrations. Chapter Overviews. Graphic Organizers and visual textbook "walks" can be particularly effective, as can pointing out and paying attention to transition markers within paragraphs.

When preparing any writing, e.g. a lab report, summary or essay in any subject, students should be explicitly encouraged to use specific vocabulary and to write in the correct tone/style for the subject, using topic sentences and well-organized paragraphs. These expectations should count as part of the marks they receive.
