

Year 9 — Full learning objectives

64 objectives across 3 units · MYP Year 3

CONTENTS

1. 9.1 Architecture: Pythagoras and Trigonometry	32 objectives
2. 9.2 Equations of Lines	17 objectives
3. 9.3 Number, Games and Language of Mathematics	15 objectives

UNIT 1

9.1 Architecture: Pythagoras and Trigonometry

Area Review

1. I can calculate the areas of various shapes.
2. I can plot and identify coordinates on a Cartesian plane (xy graph).

Surds

3. I can differentiate between rational and irrational numbers.
4. I can understand the concept of surds and their approximate values.
5. I can perform simple manipulations and apply basic identities involving surds.

Pythagoras' Theorem

6. I can solve equations of the form $x = k$.
7. I can apply Pythagoras' theorem to find missing sides in right-angled triangles.
8. I can use Pythagoras' theorem for practical applications, including finding distances between two points and lengths on 3D solids (such as prisms, pyramids, cones, and spheres).
9. I can understand the informal concept of the converse of Pythagoras' theorem.
10. I can understand and use vocabulary related to 3D shapes, such as vertex, edge, and face.
11. I can classify different 3D shapes and identify their properties.
12. I can understand and create nets of 3D shapes.
13. I can calculate the surface area of prisms and cylinders.
14. I can calculate the volume of solids, including prisms, pyramids, and cylinders.
15. I can convert between units of capacity.

Formulae and Solving Equations

16. I can substitute values into given formulae.
17. I can rearrange formulae to solve for a specific variable.
18. I can solve rational equations involving rearrangement and substitution.
19. I can solve equations for a single variable.

Transformations

- 20. I can perform translations, rotations, and reflections of shapes.
- 21. I can transform individual coordinates and rigid figures on the Cartesian plane.
- 22. I can describe transformations in detail.
- 23. I can perform and describe compound transformations.

Congruence and Similarity

- 24. I can understand definitions and notation for congruence ($\equiv$) and similarity ($\sim$).
- 25. I can identify congruent figures (without specific triangle congruency rules).
- 26. I can identify similar figures using matching angle criteria.
- 27. I can find missing sides or angles in similar figures. 2.
- 28. I can understand that area scales by the square of the scale factor (sf) and convert between area units. 3.
- 29. I can understand that volume scales by the cube of the scale factor (sf) and convert between volume units.

Trigonometric Ratios

- 30. I can identify and name the sides of a right-angled triangle.
- 31. I can define sine, cosine, and tangent ratios.
- 32. I can use trigonometric ratios to find missing sides or angles in right-angled triangles.

9.2 Equations of Lines

Pre-Requisites

1. I can understand direct proportion and apply it in different contexts.
2. I can collect like terms in algebraic expressions.
3. I can substitute values into algebraic expressions. 2 12x.
4. I can simplify algebraic terms, such as 15x.
5. I can expand single brackets in algebraic expressions.
6. I can factorize expressions involving a single bracket.

Straight Lines

7. I can understand gradient as angles and ratios.
8. I can calculate the distance between two points on a Cartesian plane.
9. I can calculate the midpoint between two points.
10. I can understand the properties of parallel and perpendicular lines.
11. I can determine the equation of a line in slope-intercept form ($y = mx + c$).
12. I can graph lines from given equations.
13. I can find the equation of a line given certain information.
14. I can discuss the rate of change of one variable in relation to another.

Simultaneous Equations

15. I can solve simultaneous equations graphically.
16. I can solve simultaneous equations numerically using tables.
17. I can solve simultaneous equations algebraically using the equal value ($y = y$) method.

9.3 Number, Games and Language of Mathematics

Indices

1. I can evaluate expressions involving indices.
2. I can apply index laws (excluding fractional indices).
3. I can use scientific notation/standard form to represent numbers and perform multiplication and division.

Sets and Venn Diagrams

4. I can understand the definition of a set, including finite, infinite, and universe sets, as well as interval notation.
5. I can perform set operations, including complement, union, intersection, and identifying subsets.
6. I can identify and represent special number sets ($\mathbb{N}$, $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{Q}'$, $\mathbb{R}$) using Venn diagrams.
7. I can use Venn diagrams to represent relationships between two sets.

Fundamentals of Probability

8. I can define randomness and probability, including both experimental and theoretical probability.
9. I can understand chance processes, experiments, and simulations.
10. I can measure likelihood using numerical and descriptive measures.
11. I can represent probability in different forms, including fractions, decimals, and percentages.

Applications of Probability

12. I can determine sample spaces using Venn diagrams, lists, tables, 2D grids, and tree diagrams.
13. I can understand and calculate probabilities for compound events involving "and" and "or".
14. I can calculate expected values for multi-event experiments.
15. I can determine if games are fair based on probability.