



# Year 7 and 8

Scheme of work

This is a working document and will be reviewed on a regular basis

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# Year 7 & 8 – Unit 1 Number Properties

## Programme of Study Reference:

YEAR 7	YEAR 8	
		<p>KS3 No (b) Order positive and negative integers and decimals in order of size; use the number line as a model for ordering of the real numbers</p> <p>KS3 No (d) Use the four operations, including formal written methods, applied to integers and decimals</p>
		<p>KS3 No (a) Understand and use place value for decimals, measures and integers of any size.</p> <p>KS3 No (d) Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative.</p>
		<p>KS4 No (1) Order positive and negative integers, decimals and fractions; use the number line as a model for ordering of the real numbers; use the symbols =, ≠, &lt;, &gt;, ≤, ≥</p> <p>KS3 No (a) Understand and use place value for decimals, measures and integers of any size</p> <p>KS4 No (2) Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals).</p>
		<p>KS4 No (1) Order positive and negative integers, decimals and fractions; use the symbols =, ≠, &lt;, &gt;, ≤, ≥</p> <p>KS3 No (a) Understand and use place value for decimals, measures and integers of any size.</p> <p>KS4 No (2) Apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals).</p> <p>KS4 No (3) Recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions; use conventional notation for priority of operations, including brackets, powers, roots and reciprocals.</p>

## Learning Objectives

T/book

		<p>Order whole numbers using a number line. Place integers and decimals in order of size.</p> <p>Multiply and divide integers and decimals by 10,100, 1000 and explain the effect.</p> <p>Multiplying and dividing by a single-digit number using written methods.</p> <p>Multiplying by two digit number using written methods.</p> <p>Use standard column procedures to add and subtract integers and simple decimals.</p>
		<p>Convert between decimals, fractions and integers</p> <p>Order decimals and fractions using appropriate symbols.</p> <p>Place integers, decimals and directed numbers in order of size.</p> <p>Mental and written methods for all four operations with integers using a calculator where appropriate</p> <p>Use of BIDMAS</p>
		<p>Understand place value in big numbers and decimals.</p> <p>Be able to put the symbols =, ≠, &lt;, &gt;, ≤, ≥ between pairs of numbers.</p> <p>Be able to put two or more simple fractions in order by using equivalence</p> <p>Strengthen mental and written methods working with squares/ cubes and roots.</p> <p>Round whole numbers and to the nearest 10, 100, 1000</p> <p>Check results by considering order of magnitude and use inverse operations</p>
		<p>Division, multiplication, addition and subtraction of fractions.</p> <p>Place integers, decimals, fractions and directed numbers in order of size including where fraction to decimal conversion needs to be done.</p> <p>Use written methods for 4 rules of integers, decimals to 3 or 4 decimal places, directed numbers and fractions.</p> <p>Be able to order fractions with different denominators and find a fraction bigger than <math>\frac{7}{8}</math> but less than one.</p> <p>Be able to find a fraction half way between two others.</p>

## Keywords

Fraction, decimal, integer, order, inequality, equality, place value, thousands, hundreds, tens, units, tenths, hundredths, etc.

## Key Questions/ Criteria for success

A book of raffle tickets is numbered from 300 to 399. Some have been sold, in order, and the next available ticket is 343. How many have been sold? How many are there left? You have 44 eggs, and each egg-box can hold six eggs. How many boxes would you need? What would happen if you rounded to the nearest 10 in order to estimate a solution? Why do these calculations have the same answer?  $16 + 9$  and  $17 + 8$ ?  $17 - 9$  and  $16 - 8$ ? etc.

How many numbers are there between 1 and 2? Give me some numbers between 7.1 and 7.2  
 $1/8 = 0.125$ . What is  $3/8$ ? 80 pupils go on a trip. 25% are girls, how can you work out the number of boys?

Which is bigger 0.32 or 0.325? Put in order of size -4, -3, 9, -9, 0, -15. Convince me that  $1/3$  is bigger than  $1/4$ . Put an inequality symbol between -8 and -10. Place several fractions in order of size. What is the value of the 7 in 327654?

Can division ever make a number larger? Can multiplication ever make a number smaller? How can you check if your answer makes sense? [Last digits / estimating]

Be able to multiply by 0.2, 0.02, 3.2, divide by 0.2, 0.02, 5.2. Be able to put -8, -3,  $\pi$ ,  $\sqrt{7}$ , 3.5, 3.55 in order. Add together pairs of fractions with different denominators including mixed fractions. Find three pairs of decimals that add to 0.2. Convince me that  $7/8$  is bigger than  $7/9$ .

### Extension

Worded problems and functional problems.

Estimate answers to calculations involving the four rules of operation Directed number work with multi-step calculations. Encourage effective use of a calculator Try investigations with digits 3, 7, 5 and 2 and challenge students to find the biggest number, smallest odd number, the largest sum or product etc

Could extend to ordering sets of numbers including  $\sqrt{5}$ ,  $\pi$  and other irrationals.

### Misconceptions

$0.325 > 0.37$  because it has more numbers. Forgetting the meanings of the inequality symbols.  $1/7$  is bigger than  $1/3$  because  $7 > 3$ .

BIDMAS. Addition is before subtraction so that  $5 - 3 + 8 = -6$ .

### Real World/Problem Solving

$24 \times 21 = 42 \times 12$  Discuss.

$42 \times 14 = 84 \times 7$  but  $42 \div 14 \neq 84 \div 7$  - discuss.

Money, bank accounts, magnitude of debt.

### SMSC Links

Willingness to participate in, and respond to mathematical opportunities. Use of social skills in different contexts, including working and socialising with pupils from different religious, ethnic and socio-economic backgrounds.

### PLTS

Working in groups. Independent learning, Ask 3 before me. Build Learning Power - Resilience and resourcefulness.

### Resources

**Standards Unit:** N2 Evaluating statements about number operations NCETM

**NCETM Departmental Workshops** [Mathematical Processes and Applications](#)

**NRICH:** [How Do You Do It?](#) [Reach 100](#) [Counting Cards Up and Down Staircases](#) [Magic Vs](#) [Sealed Solution](#)

[Prison Cells](#) [Money Bags](#) [Amy's Dominoes](#)

**NRICH:** [The Remainders Game](#) [Countdown](#) [Remainders](#) [Number Daisy](#) [Got It](#)

**NRICH:** [The Greedy Algorithm](#) [Thousands and Millions](#) [Keep it Simple](#) [Egyptian Fractions](#)

# Year 7 & 8 – Unit 2 Geometry and Measure

## Programme of Study Reference:

YEAR 7	YEAR 8	
		KS3 G&M (j) Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles. KS3 No (I) Use standard units of mass, length, time, money and other measures.
		KS3 G&M (j) Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles. KS3 G&M (g) Derive and illustrate properties of triangles. KS3 No (I) Use standard units of mass, length, time, money and other measures, including with decimal quantities.
		KS3 G&M (j) Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles. KS3 G&M (g) Derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies. KS3 R&P (a) Change freely between related standard units [for example time, length, area, volume/capacity, mass].
		KS3 G&M (k) Understand and use the relationship between parallel lines and alternate and corresponding angles. KS3 G&M (o) Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D. KS4 G&M (14) Use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.).

## Learning Objectives

T/book

		Understand how to measure angles using the protractor and construct angles. Learn to describe the different types of angles; right angle, acute, obtuse and reflex and the correct notation. Understand that angles on a straight line total $180^\circ$ which allows them to find missing angles on a straight line. Understand that angles around a point totals $360^\circ$ which allows them to find a missing angle around a point. Understand why vertically opposite angles are equal and use this knowledge to find missing angles. Pupils need to be able to convert standards units of measurements, money and time.
		Learn that the interior angles of a triangle totals $180^\circ$ . Discover the properties of the equilateral and isosceles triangle and the impact of equal lengths on the angles.
		Use units of measurement to estimate, calculate and solve problems in everyday contexts involving length, area, volume, capacity, mass, time, angle and bearings; convert one metric unit to another, e.g. grams to kilograms; know rough metric equivalents of imperial measures in daily use (feet, miles, pounds, pints, gallons); read and interpret scales on a range of measuring instruments. Investigate the effect of equal lengths on angles in isosceles and equilateral triangles. Continue this investigation with other regular polygons.
		Investigate the relationship of angles between parallel lines. Learn that alternate and corresponding angles are derived from the relationship between the transversal as it cuts through parallel lines. Solve problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons, justifying and explaining reasoning with diagrams and text. Investigate the properties of 3D shapes to find Euler's Rule that $V - E + F = 2$ where $V$ = vertices, $E$ = edges and $F$ = faces. Learn how to draw the nets of cylinders, pyramids and cones. Using the knowledge of nets, explore how to find the total surface area and volume of 3d shapes. Pupils are able to convert different units (metric and imperial) of length, mass and capacity. They are able to round decimal numbers to a specified degree of accuracy.


## Keywords

Acute, right, obtuse and reflex angles, protractor, construct, vertically opposite angles, millimetre, centimetre, metre, kilometre, milligram, grams, kilogram, tonne, millilitre, centilitre, litre, interior/exterior angles, equilateral, isosceles, scalene, quadrilateral, circle, square, regular, irregular.

Parallel, alternate, corresponding, faces, edges, vertices, cubes, cuboids, prisms, cylinders, cones, spheres, total surface area, volume.

## Key Questions/ Criteria for success

Can you have an obtuse / reflex angle in a triangle?



What is the sum of angles around a point? What is the value of one of the interior angles of an equilateral triangle?
Be able to find missing angles in parallel lines and explain the reasoning behind this. Can parallel lines be curved? Be able to find the total surface area of cubes and cuboids using the appropriate units of measurements.

### Extension



Explore other angle properties in triangles, parallel lines or quadrilaterals, in preparation for future topics
Use of algebra would be suitable here so that connections can be made between algebra and geometry.
Find the total surface area of cones, cylinders and pyramids.

### Misconceptions

Incorrect use of protractor as wrong scale is used. Confusion between interior and exterior angles

### Real World/Problem Solving




### SMSC Links

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### PLTS

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### Resources



<a href="#">NRICH: Where Are They?</a> <a href="#">How Safe Are You?</a>
<a href="#">NCETM Departmental Workshops: Angle Properties</a>