

Numeracy across the curriculum audit



Curriculum Area: ART Subject Area: ART

Number/Algebra

Thirds – golden rule of composition eg. in photography

Ratios

eg. Colour maths – mixing colours in given proportions

Shape, Space & Measures

2-dimensional shapes

3-dimensional shapes and their 2D representation eg. use of tetrahedrons to make 3D sculptures

Scale and scale drawings using perspective

Enlargement eg. From a preliminary sketch to a full picture

Symmetry – rotation (fractions of turns) and reflection in patterns eg. Indian art, Islamic art, ethnic art eg. use of Photoshop to produce patterns

Tessellations eg. repeat patterns eg. Escher eg. print making eg. tetrahedrons

Geometrical terms eg. horizontal, vertical, height, width, parallel

Proportions eg. between features on a face or different objects in a picture

Optical illusion pictures – 2D representation of 3D

Examinations: GCSE Art and Design A-Level Fine Art A-Level Photography

Handling Data

Curriculum Area: BUSINESS AND COMPUTING Subject Area: COMPUTING

Number/Algebra

eg. sign and magnitude

gates, AND, OR, NOT

eg. Boolean algebra involving logic

Percentage calculations

Eg. using data from surveys

Hexadecimal numbers - base 16

Shape, Space & Measures

Using formulae eg. in spreadsheets using formulae and eg. timings between movie frames functions, inserting numeric data and eg. using timelines, transitions and calculating timing of slides in slides. eq. using formulae in spreadsheets to eq. timing of audio or video and effects alter the variables in models to assess on websites the impact eg. timing recording in podcasts and Calculation of image size (area). timing of music overlay etc. Binary code Coordinates, Distance, Angles eg. conversion to decimal and and Properties of shapes in Logo converting decimal to binary eq. programs/procedures eg. calculating in binary eg. sequence of instructions eg. Two's complement

Time

eg. use of repeat function

eg. drawing shapes

Dimensions and measurements eg. creating vector graphics

Calculating area and volume of shapes using programming and drawing plans to scale

Handling Data

Graphs from spreadsheets eg. bar chart, pie chart, line graph including x/y axis charts. Large files that have been downloaded.

Database construction and data entrv

eg. database on personal data eg. sort and filter numeric data eg. select appropriate data types number, currency, date, time etc. Validation methods SOL

Interpretation of data represented in graphs

Data handling - correlation, patterns

Importing data

Data types eg. numbers, currency, dates, times and Boolean data

Ranking in order eg. using sort functions and filtering data in spreadsheets and databases

Estimating

eg. file size, search results, graphs, file compression.

Relative sizes of numbers

eg. bits, bytes, kilobytes, megabytes, gigabytes and their relation to each other calculating sizes when considering storage.

Algorithms eg. calculations, iterations using loops

Flowcharts and their symbols

Programming eg, Scratch, Kudu, Python, App Inventor HTML, Java Script.

Examinations: GCSE Computing A-Level Computer Science

Curriculum Area: DESIGN & TECHNOLOGY Subject Area: DESIGN & TECHNOLOGY

Number/Algebra

Basic arithmetic skills +, -, \times and \div

Use of calculator

Costing and Budgeting eg. minimising wastage

Calculation of required material

Batch produce eg. quality control, costing, buying in bulk, VAT, minimisation of waste

Ratio and proportion

Shape, Space & Measures

Interpret scales on a range of measuring instruments and measure accurately, recognising the inaccuracy of measurements

Make sensible estimates of a range of measures (mm, m, km)

Convert measurements eg. m to mm

Measure and draw lines and angles to within given tolerances eg. % tolerance ±1mm tolerance

Recognition of right angle (use of term 'square')

Geometric terms of lines eg. parallel, horizontal, vertical, diagonal, perpendicular

Geometric terms of circle eg. diameter, radius, circumference, arc

Simple geometry Eg. symmetry, basic angle facts

Area and Volume eg. rectangles, cuboids and cylinders

Names of shapes and solids

Developments (nets) of solids eg. cube, square prism, cylinder, cone

Isometric and orthographic drawing eg. on triangular grid isometric paper



Construct, use and interpret scale drawings Enlargement / Reduced Drawing

Packaging / weights, quantities

Time management of tasks

Designing Nets

Symmetry

Mechanisms / Linkages Eg. paper engineering Handling Data

Ergonomic / Anthropometric data

Graphs

Flow charts

Statistical diagrams eg. bar chart, pie chart, line graph, radar chart

Procedure charts for time management of tasks

Examinations:

GCSE 3D DT

The project can be completed in 16 hours.

Curriculum Area: PERFORMING ARTS Subject Area: DRAMA

Number/Algebra	Shape, Space & Measures	Handling Data
Basic percentages as part per 100	Spatial awareness eg. position on stage in relation to other performers and the audience eg. awareness of height in order to create contrast	Research and statistical data collected relevant to the play

Percentages to compare proportions eg. comparing percentage of time for each character in a scene Designing and scaling sets

Costing and budgeting for production

Examinations: GCSE Drama Applied General Performing Arts BTEC Level 3 - Drama and Theatre Studies

Curriculum Area: ENGLISH Subject Area: ENGLISH

Number/Algebra

Numbers as words – numbers under 100 eg. In my family we have five pets

Percentages used to illustrate oral presentations and in persuasive writing eg. use of facts and figures – did you know that 28% of 14-18 year olds have a poor diet

Analysis of numerical information eg. in advertisements

Estimation of numbers of words in

- essays, eg. average of 10 words per line x number of lines
- parts of essays, eg. limiting the introduction to a given number of words/lines/time
- presentations
- monologues, eg. The Prelude, My last Duchess

Use of numbers as references eg. Chapter 4, Act 1 scene 3

Use of Roman numerals in scholarly editions of classic texts eg. Act IV scene vi

Counting / Tapping beat in poetry/Counting syllables in words/Tapping 'beats' to aid spelling

Looking at form in poetry e.g. sonnet = 14 lines, haiku

Rhythm in poetry e.g. iambic pentameter

Prefixes relating to number e.g. tri – 3, di - 2

Examinations:

GCSE English Language and English Literature A-Level English Language and English Literature Functional Skills Level 1 and 2

Shape, Space & Measures

Estimation of time linked to marks in examinations eg. 1 mark = 1 1/2 mins at GCSE

Time eg. limits for presentations

Dates 23rd May 2019 or

regular or irregular

eg. in poetry

Line length of forms termed as

Estimation / Measuring (e.g.

paragraph indentations)

Handling Data

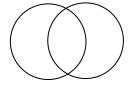
Surveys are analysed in persuasive writing at KS3

Extract data from tables and lists in KS3 and sometimes KS4

Create bar charts or pie charts to numerical form 23/05/2019 illustrate oral presentations eg. in speaking and listening exercises in KS4

> Venn diagrams for a comparative analvsis

Eg. two unseen poems, looking at themes, techniques or context



Interpret data in charts and diagrams eg. in persuasive writing occasionally in exam questions at KS4

Construct tension graphs of a narrative



Curriculum Area: DESIGN AND TECHNOLOGY Subject Area: CREATIVE I MEDIA

Number/Algebra	Shape, Space & Measures	Handling Data
Media funding/production costs Production budgets	Timings of film shots	Market Research – writing up of survey results
Percentages of tints, opacity and colour in photo shop	Camera shots – angle of camera eg low angle or high angle	Statistical diagrams
Work plans	Framing within a shot	
	Sizes of paper in photo shop	
	Sequencing in animation and story boarding	
	Composition and layout of media texts.	
	Composition, layout and role of thirds	
	Chronology when looking at historical contexts of media text	
	File resolution	
Examinations:	Btec Creative I media Applied Digital Media	

Curriculum Area: GEOGRAPHY Subject Area: GEOGRAPHY

Number/Algebra

Basic arithmetic skills +, -, × and ÷

Understand place value eg. 6.2 on a diagram or in a table, where the scale is in thousands of tonnes, means 6200 tonnes

Percentages as part per 100

Percentages to compare proportions eg. comparing percentages of land use

Axes on graphs Reading the scale correctly Selecting a "good" scale for the data

Shape, Space & Measures

Use and interpret maps and scale drawings eg. 1cm : 100 m eg. compare distances on a map " as the crow flies" with "by road"

Measure and draw lines and angles eg. position from a given location (distance + bearing)

Conversion between metric measures eg. cm to mm

Coordinates eg. 4-figure and 6-figure grid references – accuracy of map work

Construct cross-sections to scale

Gradient eg. of rivers and use of clinometer

Interpret scales on a range of measuring instruments eg. temperature on a thermometer wind speed on an anemometer rainfall in a rain gauge

direction on a compass

Handling Data

Understand and use statistical problem solving process eg. Chi square, mann whitney theory, Spearman's rank

Hypothesis testing eg. your quality of life is better the further you live from the town centre

Note: terminology null hypothesis

Design an experiment or survey

Data collection eg. tally charts and frequency tables

Extract data from printed tables or lists

Look at data to find patterns and exceptions

Charts and diagrams: construct and interpret, drawing conclusions using appropriate geographical terminology eg. KS3 Bar Chart – people per house Frequency Chart – rain Line graph – temperature Percentage bar charts 0 – 100% Pie charts – land use Scatter graphs – developmental indicators such as GDP v infant mortality Population pyramids Climate graphs

Discrete and continuous data Selection of appropriate diagram drawn on appropriate paper

Correlation

eg. on a scatter graph eg. Spearman Rank (v higher only)

Examinations:

GCSE Geography A-Level Geography BTec Travel and Tourism

Curriculum Area: HISTORY Subject Area: HISTORY		
Number/Algebra	Shape, Space & Measures	Handling Data
Basic arithmetic skills +, -, \times and \div	Measures of time eg. Decade, Century, Millennium eg. 2015 is in the 21 st century	Interpreting graphs e.g. mortality rates, unemployment over time, economic/ industrial output in countries, government expenditure, national debt, taxation rates
Basic understanding of percentages eg. 60% of the population lived in poverty	AD, BC	
Comparison of numbers eg. unemployment figures in the Weimar Republic in Germany and in the USA 6 million v. 12 million	Time lines and dates including ordering dates in chronological order $1645 ext{ 1914}$ $\downarrow ext{ 1914}$	Interpret statistical diagrams eg. a line graph of unemployment in the Weimar Republic against time, pie chart for who Hitler helped to become employed.
Comparison of native American populations	¥	
Use simple ratios eg. 1 in 3 people died during the Black		Extract data from printed tables and lists and measuring impact
Death		> eg. spread of Christianity
Find simple fractions and percentages of amounts	Sequencing events on a time line	Use the average (mean) eg. average wage
0 ↓ Centuries		
Roman Numerals for Roman History and Monarch numbers		Interpreting statistical information as an evidence source eg. evidence about the depression in America in the form of bar charts, pie charts and line graphs

Percentages for casualty figures in wars and major catastrophes

Profits – e.g. Slave trade

Examinations: GCSE AQA History A-Level AQA History

Curriculum Area: MODERN LANGUAGES Subject Area: SPANISH

Number/Algebra	Shape, Space & Measures	Handling Data
Numbers (1-1000)	Telling the time eg. 12 hour and 24 hour clock, and associated vocabulary	
Numbers (1000 & higher) eg. for use with currency, age and Bingo	Time eg. dates, names of the months and days of the week	
	Reading timetables eg. meeting arrangements and journey times	
Basic percentages including simple calculations and their relationships to fractions	Directions on a map eg. left, right, straight ahead and the compass points	

Arithmetic (4 rules)

relationships to fractions

Money Calculations eg. shopping, salaries, pocket money, bills, prices, etc.

Comparative language Eg. higher, lower, more than, less than

GCSE Spanish Examinations: A-Level Spanish

Curriculum Area: PERFORMING ARTS Subject Area: MUSIC

Number/Algebra

Shape, Space & Measures

eg. analysis of a song at a specific time

Time

Handling Data

Patterns/sequences in rhythm, keeping time

Dates and Timelines eg. Baroque period ≈ 1600 to 1760 Classical period ≈ 1750 to 1820

Values of notes and subdivision of beats Whole note – semi-breve ¾ note – dotted minim ½ note (minim) ¼ note (crotchets) ¹/₈ note (quavers) ¹/₁₆ note (semi-quavers)

Time signature (beats in the bar)

Different counting rhythms eg. ethnic music

Polyrhythms – 2 or more independent rhythms played at the same time – eg. traditional African music 2:

Musical notation and staves

Chord diagrams eg. representation of finger positions on a guitar – tab diagramss

Scales eg. Pentatonic – 5 notes

Western – 8 notes Eastern

Roman numerals eg. Primary chords – 1, 4, 5 major C, F, G I, II, III Secondary chords – 2, 3, 6 minor D, E, A i, ii, iii

Examinations: GCSE Music A-level Music

Curriculum Area: PE Subject Area: PE

Number/Algebra

Scoring sequences in various sports

Repetition exercises/sequences e.g. Reps/sets in circuit training

Percentages – Training zone calculations e.g. Aerobic exercise should be between 60 – 80% of maximum heart rate

Shape, Space & Measures

Measures of length e.g. athletics – height, length and their units

Measures of time e.g. athletics – time and their units

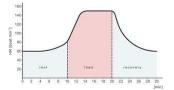
Measurement of physical attributes e.g. pulse rates

Handling Data

Tables - reading data

Collecting and recording data

Graphs - reading data and drawing graphs e.g. Time-heart rate graphs



Recovery rates post exercise, and comparison between data collected on different days to see impact of changes in, say, exercise regimes

Comparison against best

e.g. multi stage fitness test, 1 minute sit ups/press-ups, speed and agility tests.

Tally charts e.g. Collecting scores in cricket

Equations and substitution e.g. volume of blood/cardiac output = stroke capacity x heart rate

Calculations e.g. Multi stage fitness test and other relevant tests Angles e.g. turns in badminton in degrees as well as parts of turns eg. angles of release or contact in badminton, javelin, shot put and football

Estimation of distance e.g. cross country

Use of speed, distance and time e.g. in calculations of pace in different parts of a run

Examinations: KS4 - Level 2 Cambridge Nationals Level 1 and 2 Sports Science

KS5 - Level 3 BTEC National Certificate Sport

Sports offered:

- Athletics
- Soft ball
- Fitness
- Badminton
- Handball
- Football
- Rugby
- Cricket
- Cross Country
- Boxing
- Gymnastics

Curriculum Area: RE Subject Area: RE

Number/Algebra

Concept of finite and infinite i.e. Aquinas Teleological and Cosmological arguments

The Fibonacci Sequence

e.g. does this number sequence prove the existence of God? (Yr9)

The significance of number in the Bible/Church

e.g. 12 tribes of Israel, 10 plagues, 12 12 apostles, the Holy Trinity, etc.

Directed number BC / AD e.g. 4000 BC; 6000 years ago and the development of BCE / CE (Yr8)

Shape, Space & Measures

Time – dates e.g. involving Judaic calendar; millennium; Christian calendar; Islamic monthly moon-based cycle, deciding the date for Easter Sunday, the idea of God as transcendent, apostolic succession, etc.

e.g. the vastness of the Universe and God in the Big Bang and Evolution (Yr9)

Handling Data

Data and statistical examination to identify statistical trends, compare data and make an informed judgement e.g. divorce rates over time (Yr11) e.g. decrease in religious identity v. secularisation (Yr9)

e.g. number of Hindus/Muslims/Jews in the UK today compared to 50 years ago (KS3)

Timelines in the development of religion

e.g. My Faith Journey (Yr7)

e.g. The Rise of Christianity (Yr8)

e.g. The historical development of World Religions at KS3.

Data presented in the form of a table or census

e.g. exclusivism, inclusivism and pluralism in Christianity (GCSE)

Reading and interpreting graphs/ charts to make an informed judgement e.g. bar or pie charts of ethnicity or religion e.g. line graphs on poverty (Yr7) e.g. Venn diagram (Yr9) on suffering and evil e.g. General RE in 6th Form explores

e.g. General RE in 6th Form explores sociological data on things such as capital punishment, etc.

would it look like in terms of religion, poverty/wealth, languages spoken, etc.?

Percentages and Ratios

http://www.100people.org/statistics_100 stats.php?section=statistics

e.g. if the world were 100 people, what

http://www.100people.org/statistics_deta iled_statistics.php

http://www.jackhagley.com/The-Worldas-100-People

Examinations:

GCSE RS (AQA) A-Level Philosophy and Ethics (in conjunction with Broughton Hall) (OCR)

Curriculum Area: SCIENCE Subject Area: BIOLOGY, CHEMISTRY and PHYSICS

Higher pupils need the skills in bold.

Number/Algebra

Understand number size and scale, and the quantitative relationship between units eg. the prefixes of units (kilo, mega, micro, nano ...) eg. standard form

Understand when and how to use estimation

Carry out calculations involving +, -, x, \div , either singly or in combination, decimals, fractions, percentages and positive whole number powers

Provide answers to calculations to an appropriate number of significant figures

Understand and use the symbols =,

<, >, ~

Understand and use direct proportion and simple ratios eg. straight line relationships through the origin such as V = Ir and F = ma eg. transformers

Substitute numerical values into simple formulae and equations using appropriate units

eg. BIDMAS for equations such as $E_k = \frac{1}{2}mv^2$

Translate information between graphical and numeric form eg. interpretation of gradient of a graph

Interpret, order and calculate with numbers written in standard form eg. $a \times 10^n$ – shifting the digits and not the decimal point

Carry out calculations involving negative powers (only -1 for rate) eg. speed or frequency of light ms^{-1} or s^{-1}

Change the subject of an equation

Understand and use inverse proportion

Understand and use percentiles and deciles.

Shape, Space & Measures

Understand and use common measures and simple compound measures such as speed

Calculate area, perimeters and volumes of simple shapes eg. rectangle, circle, cube, cuboid, cylinder eg. surface area for cooling

Handling Data

Calculate arithmetic means

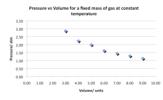
Plot and draw graphs (line graphs, bar charts, pie charts, scatter graphs, histograms), selecting appropriate scales for the axes eg. temperature v. time eg. equal interval histograms only Biology – all statistical diagrams Physics – line and scatter graphs

Issues about whether a diagram is a line graph or a scatter graph:

eg. if time is involved it is a line graph: cooling curves



eg. if time isn't involved ^a Time (and) and we are looking to see if there is a relationship, then it is a scatter graph and the line of best fit may be a curve: pressure v. volume of a gas



Extract and interpret information from charts, graphs and tables

Understand the idea of probability

Examinations: AQA GCSE Combined Science Trilogy; AQA GCSE Biology, Chemistry and Physics. A-level Physics; Chemistry and Biology; BTec Applied Human Biology; BTec Applied General Science (Chemistry Focus); BTec Applied General Science (Physics Focus)

Physics Equations- GCSE Science A/ Physics

$E = m \times c \times \theta$	E energy transferred m mass	c θ	temperature change specific heat capacity
efficiency = <u>useful energy out</u> (× 100%) total energy in			
efficiency = <u>useful power out</u> (× 100%) total power in			
$E = P \times t$	E energy transferred P power	t	time
$V = f imes \lambda$	v speed f frequency	λ	wavelength

Physics Equations – GCSE Additional Science / Physics

$a = \frac{f}{m}$ or $F = m \times a$	F resultant force m mass	а	acceleration
$a = \frac{v - u}{t}$	a acceleration v final velocity	u t	initial velocity time taken
$W = m \times g$	W weight m mass	g	gravitational field strength
$F = k \times e$	F force k spring constant	е	extension
$W = F \times d$	W work done d distance moved in the direction of the fo	F orce	
$P = \frac{E}{t}$	P power E energy transferred	t	time taken
$E_P = m \times g \times h$	E_P change in gravitational potential energy m mass	g h	
$E_k = \frac{1}{2}mv^2$	E_k kinetic energy m mass	١	/ speed
$p = m \times v$	p momentum m mass	٧	v velocity

Physics Equations – GCSE Physics

$s = v \times t$	s distance t time v speed			
$refractive \ index = \frac{\sin i}{\sin r}$	<i>i</i> angle of incidence <i>r</i> angle of refraction			
$magnification = \frac{image\ height}{object\ height}$				
$P = \frac{1}{f}$	P power f focal length			
$refractive index = \frac{1}{\sin c}$	c critical angle (Higher Tier only)			
$T = \frac{1}{f}$	T periodic time f frequency			
$M = F \times d$	Mmoment of the force f force d perpendicular distance from the line of action of the force to the pivot			
$P = \frac{F}{A}$	PpressureAcross-sectional areaFforceAforce			
$\frac{V_p}{V_s} = \frac{n_p}{n_s}$	V_p potential difference across the primary coil V_s potential difference across the secondary coil n_p number of turns on the primary coil n_s number of turns on the secondary coil			
$V_p \times I_p = V_s \times I_s$	V_p potential difference across the primary coil I_p current in the primary coil V_s potential difference across the secondary coil I_s current in the secondary coil			

Curriculum Area: BUSINESS & COMPUTING Subject Area: BUSINESS & ECONOMICS

Number/Algebra	Shape, Space & Measures	Handling Data
General arithmetic eg. cash flow calculations and forecasts (+ and -) and budgets eg. profit and loss accounts	Money	Extract data from printed tables or lists
Reading numbers correctly when		Interpret statistical diagrams
written in digits eg. 10580		eg. bar charts, pie charts and line graphs – interest rates, employment rates, economic growth
Negative numbers eg. cash flow and budgets		Moving averages and trend analysis
Interpret and use formulae (substitution) eg. break even formulae or elasticity of demand		
 Percentages Write numbers as a percentage Percentages of amounts Percentage change eg. price and income elasticity of demand Repeat percentage change Use percentages to compare proportions VAT and other taxes 		
Simple ratios eg. dividing amounts into a given ratio, net profit margins, gross profit margins, and comparison of margins from one year to the next eg. Profitability Gross and Net and Liquidity		

Construct graphs

eg. break-even graphs from multiple columns of data, correctly identifying the independent variable

Examination:

KS4 – Level 2 OCR Cambridge Nationals – Enterprise and Marketing KS4 – GCSE Business KS5 – Level 3 OCR Cambridge Technicals – Business KS5 – A Level Economics KS5 – A Level Business

Numeracy Audit July 2023

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Curriculum Area: SOCIAL SCIENCES Subject Area: PSYCHOLOGY

Number/Algebra	Shape, Space & Measures	Handling Data
Basic arithmetic skills +, -, \times and \div	Use of co-ordinates	Interpret information from different resources especially
Use of calculator	Calculating with Time	tables, flowcharts
		Data handling cycle, collecting, displaying and evaluating data skills.
Percentage calculations and comparison calculation to draw conclusions		Interpret data and statistical information/diagrams to make an informed judgement eg. analyse statistical data looking for trends and correlation, and spotting patterns, ranking in order
Binary Code		
		Draw and read graphs / charts to make an informed judgement
		e.g. barcharts, histograms, scattergraphs, line graphs
		Statistical Calculations
		e.g. T-Test, Correlation, Chi – Squared, standard deviation, etc.
		Understand different data types; primary, secondary, etc

Examinations: BTec applied psychology extended certificate

Curriculum Area: SOCIAL SCIENCES Subject Area: CRIMINOLGY

Number/Algebra	Shape, Space & Measures	Handling Data
Basic arithmetic skills +, -, \times and \div	Use of co-ordinates	Interpret information from different resources especially
Use of calculator	Calculating with Time	tables, flowcharts
		Data handling cycle, collecting, displaying and evaluating data skills.
Percentage calculations and comparison calculations to draw conclusions		Interpret data and statistical information/diagrams to make an informed judgement eg. analyse statistical data looking for trends and correlation, and spotting patterns, ranking in order
		Draw and read graphs / charts to make an informed judgement
		e.g. barcharts, histograms, scattergraphs, line graphs
		Understand different data types; primary, secondary, etc

Examinations: WJEC applied diploma in criminology

Curriculum Area: SOCIAL SCIENCES Subject Area: HEALTH AND SOCIAL CARE

Number/Algebra	Shape, Space & Measures	Handling Data
Create SMART targets	Measure aspects of health,	Interpret information from
(e.g. lose 10 kg in 6 months).	e.g. height, weight, blood pressure, body fat, peak flow, pulse rate.	different resources e.g BMI charts
Basic arithmetic skills +, -, \times and \div	Use of co-ordinates	Interpret data and statistical information to make an informed
Use of calculator		judgement eg. analyse statistical data looking for
Percentage calculations and		trends and correlation, and spotting patterns for percentages of overweight/
Comparison to draw conclusions		underweight people in the population.

Examinations: Btec Health and Social Care Level 2 Tech Award Btec Health and Social Care Extended certificate