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**Interview for the PGCE in Mathematics**

Congratulations on having been offered an interview for a place on the PCGE course for September 2024. As you will have read from the pre-interview information online, the interview process provides an insight into the course and an opportunity for you to ask questions. The interview will comprise of several different activities that enable you to demonstrate a variety of attributes and skills that successful teachers draw upon to enable learning to happen in the classroom and therefore is fair and rigorous.

This document provides an overview of the subject element of the interview and should be read in conjunction with the main webpage. There are two key processes that make up the subject element of the selection process:

**The Subject Interview**

In the specialist subject interview, you will explore with a member of the Maths Team a range of topics; these are likely to include:

· A discussion about your creative lesson planning task from the morning’s Group interview – remember this should not be based on your specialist subject. See notes about the Group interview

Your reasons for choosing this age group and mathematics

· What personal/professional skills you have that will help you become an effective teacher

· Your mathematics background and subject knowledge

· Your views of what strategies help to ensure effective teaching and learning

· Your experiences of working with young people

**THE INITIAL SUBJECT KNOWLEDGE AUDIT IN MATHEMATICS**

Below you will find a copy of the Initial Subject Knowledge Audit in Mathematics for Key Stages 3 and 4 which will help you to assess your current level of readiness for the course. I would be grateful if you would return your completed version of this document to me via email at least two days prior to the interview day. Should this not be possible, I would ask you to contact me in advance. My email address is [charlotte.cooper@canterbury.ac.uk](mailto:charlotte.cooper@canterbury.ac.uk)

We look forward to meeting you.

Best wishes,

Charlotte Cooper

Subject Lead for Secondary Mathematics in Initial Teacher Education

Canterbury Christ Church University



**Secondary Initial Subject Knowledge and Pedagogical Content Development Audit in Maths**

**Name:**

**School:**

**Date:**

What do your levels of competence look like in different topic areas?

**For each topic listed below indicate where you assess your level of competence to be currently. Please use the descriptions provided and be frank and honest in your self-assessment as this will indicate any support you might need prior to beginning the course.**

**Important note:**

*The level descriptions should be used as a guide rather than a check list, to aid you. We are not expecting you to be able to demonstrate many areas at level 3 or 4 at this stage, therefore do not worry about ticking any of the boxes as this audit is used as a tool to help support and develop your subject knowledge rather than a judgement tool.*

1. **Some/None:** No idea or unsure, insecure knowledge. Need to look it up or refresh knowledge Know the rules but need to refresh knowledge/skills
2. **I know and can do:** Quickly recall, answer exam style questions without a prompt. Know the key information, meanings and have the knowledge
3. **I understand and can explain:** Focus on teaching: Can explain how and why to someone else. Can use analogies, models or similar. Can link prior knowledge and next development stages. Understands the progression in a topic
4. **I can help others to learn:** Focus on individual learning and understanding: Can interconnect and link to other topics. Use relevance and everyday applications to motivate. Anticipate problems and difficulties through use of common misconceptions and other strategies. Understand conceptual structure. Deconstruct learning into manageable chunks. Enable meta-cognition.

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| --- | --- |
| **Topic** | Level |
| **Number** |  |
| Understand and use place value for decimals, measures and integers of any size |  |
| Fractions - all four rules, equivalent and use in problems, proper improper and mixed, fractions in ratio problems |  |
| Decimals – all four rules and conversions to % and fractions inc. terminal decimals and their fractional equivalence |  |
| Convert recurring decimals to fractions and vice versa |  |
| Percentages - including interpreting multiplicatively, % change,% greater than 100% |  |
| Directed numbers – all four operations inc. decimals and fractions |  |
| Factors of an Integer, Multiples, LCM, HCF, Prime factors, Prime Numbers |  |
| Conventional priority of operations including brackets powers, roots and reciprocals, inverse operations |  |
| Standard form - positive negative and zero powers of 10; interpret, compare and calculate |  |
| Apply and interpret limits of accuracy inc. upper and lower bounds |  |
| Rounding to appropriate degrees of accuracy inc. significant figures and decimal places |  |
| Use integer powers –positive, negative and fractional and real roots including estimations and calculations |  |
| Laws of indices |  |
| Surd manipulation and simplification inc. rationalising denominators and use of P |  |
| Use calculator efficiently & effectively |  |
|  |  |
| **Algebra** |  |
| Use and interpret algebraic notation |  |
| Substitute numerical values into formulae inc. scientific and expressions |  |
| Understand and use the concepts and vocabulary of expressions, equations, identity, inequalities, terms and factors |  |
| Simplify and manipulate algebraic expressions inc. laws of indices, factorising and expanding |  |
| Argue mathematically to show expressions are equivalent, use algebra to construct arguments and proofs |  |
| Interpret simple expressions as functions with inputs, outputs, inverse and composite functions |  |
| Understand and use standard mathematical formulae; re-arrange formulae to change the subject |  |
| Solve linear equations |  |
| Co-ordinates in all four quadrants |  |
| Recognise sketch and produce graphs of linear and quadratic functions |  |
| Use y = mx + c to calculate and interpret numerically, graphically and algebraically. Identify parallel and perpendicular lines and find equation of a line through 2 given points/ one point with gradient given |  |
| Derive an equation, translate situations or procedures into algebraic expressions or formulae |  |
| Factorising quadratic expressions including using difference of two squares |  |
| Solving quadratic equations – algebraically, graphically , completing the square and using the formula |  |
| Solve simultaneous linear equations – algebraically and graphically inc. linear/quadratic |  |
| Plot and interpret graphs inc. exponential and reciprocal and non-standard functions in real contexts and distance, speed and acceleration |  |
| Calculate or estimate gradients of graphs and areas under graphs and interpret results inc. distance-time, velocity-time and financial contexts |  |
| Recognise, interpret and sketch graphs of linear, quadratic, simple cubic, reciprocal y = 1/x, exponential y=kx and trig functions |  |
| Sketch translations and reflections of graphs |  |
| Solve linear inequalities in one or two variables and quadratic inequalities in one variable, represent solution set on number line |  |
| Generate terms of sequences using position-to-term or term-to-term rule and find and deduce expressions to calculate nth term |  |
| Recognise arithmetic and geometric sequences and other sequences such as triangular, cube numbers or Fibonacci type |  |
| Equation of a circle with centre origin, find tangent to circle at given point |  |
| Algebraic Fractions |  |
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| **Ratio, Proportion and Rates of Change** |  |
| Change between related standard units inc. time, length, area, volume/capacity, mass |  |
| Scale diagrams, factors and maps |  |
| Ratio notation inc. simplest form |  |
| Divide given quantity in two parts part:;part or whole:part, express division of quantity into two parts as ratio |  |
| Multiplicative relationship between two quantities as ratio or fraction |  |
| Percentage change problems inc. percentage increase, decrease and original value, simple interest |  |
| Compare lengths, areas, volumes using ratio notation/scale factors and links to similarity inc. trig ratios |  |
| Use and convert between related compound units inc. speed, rates of pay, density, pressure |  |
| Direct and inverse proportion inc. construct and interpreting equations and graphs |  |
| Interpret rate of change from gradient of straight line, tangents and chords |  |
| Set up, solve and interpret growth and decay problems inc. iterative processes |  |
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| **Geometry and Measures** |  |
| Properties, perimeter and area of 2D shapes; triangles, parallelograms, trapezia, circles, composite shapes |  |
| Circle definitions and properties |  |
| Volumes of cuboids inc. cubes, other prisms inc. cylinders |  |
| Ruler and compass constructions; perp. bisector, constructing a perp., bisecting an angle |  |
| Congruent triangles; criteria, construction |  |
| Translations, rotations, reflections and combinations applied to figures |  |
| Interpret and use positive, fractional and negative scale factors for enlargements |  |
| Properties of angles; at a point, straight line, vertically opposite |  |
| Relationship between parallel lines, alternate and corresponding angles |  |
| Sum of angles in triangle, derive properties and angle sum for any polygon |  |
| Name the types of angle, polygons and polyhedra |  |
| Know angle sums of triangles, quadrilaterals |  |
| Angle sums, interior and exterior angles in any polygon |  |
| Pythagoras’ theorem and trigonometric ratios; application to find angles and lengths in 2D and 3D |  |
| Apply and prove circle theorems and related results concerning angles, radii, tangents and chords |  |
| Plans and elevations of 3D shapes; construction and interpreting |  |
| Interpret and use bearings |  |
| Surface areas and volumes of spheres, pyramids, cones and composite solids |  |
| Concepts of congruence and similarity inc. relationships between lengths, areas and volumes in similar figures |  |
| Know the exact values of sin, cos Ø for 0°,30°,45°,60°,90° and tan Ø for 0°,30°,45°,60° |  |
| Sine and cosine rule for unknown lengths and angles: know and apply area = 1/2 absinC |  |
| Vectors; describe translation in 2D, addition, subtraction, multiplication by a scalar, construct geometric arguments and proofs |  |
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| **Probability** |  |
| Record, describe and analyse frequency of outcomes of simple probability |  |
| Probability scale and appropriate language |  |
| Experiments involving randomness, fairness, equally and unequally likely outcomes |  |
| Sets and unions/intersections of sets using tables, grids and Venn diagrams |  |
| Generate and use sample spaces for single and combined events with equally likely, mutually exclusive outcomes |  |
| Use a probability model to predict outcomes of future experiments; understand empirical unbiased samples tend to theoretical probability distributions |  |
| Calculate probability of independent and dependent combined events & using tree diagrams and other representations |  |
| Calculate and interpret conditional probabilities using two-way tables, tree & Venn diagrams |  |
| **Statistics** |  |
| Describe, interpret and compare single variable distributions through graphical representation |  |
| Discrete, continuous and grouped data; appropriate measures of central tendency (mean, mode and median) and spread (range, consideration of outliers) |  |
| Construct and interpret appropriate tables, bar and pie charts, pictograms for categorical data and vertical bar charts for grouped and ungrouped data |  |
| Bivariate data – describe simple relationships between two variables in observational and experimental contexts; illustrate using scatter diagrams, recognise correlation, line of best fit predictions, extrapolate and interpolate trends recognising dangers of trends |  |
| Sampling – infer properties of populations or distributions from a sample; know limitations of sampling |  |
| Interpret and construct tables and line graphs for time series data |  |
| Construct and interpret diagrams for grouped discrete and continuous data inc. histograms with equal and unequal class intervals and cumulative frequency graphs |  |
| Interpret, analyse and compare the distributions of data sets using box plots, modal class, quartiles and inter-quartile range |  |
| Apply statistics to describe a population |  |

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