SPECIALIST EDUCATION SERVICES

Mathematics Policy and Practice

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1 RATIONALE

This document should be read in conjunction with the General Curriculum Statement, which outlines specific issues underpinning our curriculum approach at SES.

The very nature and purpose of the holistic provision at our establishments means that the focus is always on the 'whole child'. This is amplified in the range of documentation, policy and practice that reflects our philosophy of '24hr' learning, coupled with our "no limits' positive psychology.

The intensity of work in this respect, with both the child and where possible, family, is beyond what any child in a mainstream setting, and in many other specialist settings, would experience because of the very purpose and nature of practice at SES.

This document sets out the policy and principles that underpin the whole process of learning across the twenty-four hour learning experience available.

> *Do not worry about your difficulties in mathematics, I assure you that mine are greater.*
>
> Albert Einstein (1879-1955)

2 AIMS AND OBJECTIVES

The aims and objectives of the SES Mathematics curriculum are commensurate with the philosophy and foundations for the teaching of Mathematics described in the National Curriculum.

2.1 MATHEMATICS AND NATIONAL CURRICULUM AIMS

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

The national curriculum for mathematics aims to ensure that all students:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that students develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

2.2 MATHEMATICS AND READING, WRITING, COMMUNICATION, MATHS AND COMPUTING SKILLS (RWCM+C)

RDCM+C skills are core elements of English, Mathematics and Computing that provide individuals with the skills and abilities they need to operate confidentially, effectively and independently in life, their communities and work. Individuals possessing these skills are able to progress in education, training and employment and make a positive contribution to the communities in which they live and work.

Development of RWCM+C skills is embedded within personalised programmes of study in Mathematics. RWCM+C skills in the curriculum are not limited to this subject. The curriculum offers opportunities for RWCM+C skills development in Mathematics which encourages working beyond the Learning Centre and making link to a wide range of learning opportunities. To be effective RWCM+C skills teaching must be relevant and allow learners to engage with real situations in the world.

SES aspires to develop learners confidence in RWCM+C skills through Mathematics by providing opportunities to:

- read and understand information and instructions, then use this understanding to act appropriately.
- Interpret given information in line with specific learning intention.
- Record evidence of learning in written form of varying formats at appropriate timescales, taking into account individual needs of learners.
- use key terminology to explore and develop knowledge and understanding..
- use verbal communication to effectively develop knowledge and understanding
- to acknowledge listening as integral to developing knowledge and understanding
- to seek opportunities to develop mathematically skills in the areas of using and applying, number, shape, space and measure and handling data.
- to integrate opportunities for a contextualized use of computing applications

2.3 MATHEMATICS AND PERSONAL AND SOCIAL DEVELOPMENT (PSD)

Effective planning for PSD in Mathematics must ensure that relevant elements are embedded into; individual learning episodes, sequences of work, teaching approaches and learning outcomes. When this is done well, it will build individual confidence and enrich the experiences of learners and support their progress in Mathematics while increasing coherence across the curriculum.

At SES mastery of PSD skills is integral to all aspects of Learning Opportunities through a holistic and cross-curricular approach. We seek to ensure pupils demonstrate that they can develop and then apply their PSD skills in an extensive range of subject based and real life contexts. In Mathematics we promote the

consolidation of core PSD skills by structuring learning opportunities to promote development in this area. Progress in PSD is reflected in personalised PSD files and Learning Centre Education Plans.

2.4 MATHEMATICS AND THE SEMH (SOCIAL EMOTIONAL AND MENTAL HEALTH) DIMENSION

Many of the students coming to our establishments may well have had difficult experiences with mathematics, either in the way it has been taught or in the way they have received the teaching. Their low self esteem and poor self image as learners, coupled with their learned avoidance behaviours often used for self protection against the risk of failure, mean that they may never have experienced the excitement and satisfaction of success in maths.

Our aim is to provide experiences that will improve the child's self esteem allowing him to develop confidence and at the same time enjoy success in areas of endeavour specific to the subject. Mathematics offers a uniquely powerful set of tools including forms of communication, logical reasoning, problem-solving skills, and the ability to think in abstract and creative ways.

The specific curriculum objectives are as follows:

a. To develop the ability to communicate mathematical information and ideas. *(Very often SEMH students use their inappropriate and extreme behaviour to communicate with others, particularly when the task in hand holds challenges for them or risks exposing the lack of knowledge).*

b. To appreciate the inter-related nature of mathematics. (Many SEMH students prefer an over-simplified mechanical approach to mathematics and struggle to understand or relate to the inter-related nature of the subject)

c. To develop in students a fascination of some aspect of mathematics at their individually appropriate level of operation. (The ability to be absorbed by the fascination of mathematics implies a level of interest, curiosity, confidence and knowledge which many SEMH students do not have).

d. To develop open mindedness, initiative and flexibility in the students approaches to problem solving and investigations. *(Very often open minded approaches and taking initiatives are fearful to SEMH students because of their lack of self confidence and fear of failure. Equally they can be rigid in their thinking, wanting to stay on "safe" territory).*

e. To develop logical, reflective, clear strategies in dealing with mathematical tasks. *(Very often SEMH students react in an unpredictable or emotional way first and only come to more logical, reflective and rational thought after time and support from adults)*

f. To develop the ability to work independently at the student's own level. *(Very often SEMH students may come to over-rely on adult support and 1:1).*

g. To develop the ability to work collaboratively. *(Very often SEMH students find great difficulty in sharing materials, equipment and adult support).*

h. To enable students to work on in-depth projects as well as shorter individual task. *(Very often SEMH students find difficulty with being patient and persevering with longer in-depth tasks preferring short tasks that are over quickly)*

i. To develop self-confidence in approaching mathematical tasks. *(Very often SEMH students lack confidence because of previous experiences with tasks that have not been carefully matched to their ability or with adults who have not offered sufficient support. There may equally be huge gaps in their learning due to their behaviour).*

3 MATHEMATICS AND EVERY CHILD MATTERS OUTCOMES

Although the Every Child Matters agenda changed to "Help children achieve more", it remains a useful vehicle to conceptualise a holistic approach to children's needs.

3.1 ENJOY AND ACHIEVE

Mathematics can be enjoyed as a worthwhile activity for its own sake and as a powerful tool in a wide range of applications. Enjoyment stems from the creative and investigative aspects of mathematics, from developing mathematical ways of perceiving the world and recognising underlying structures and connections between mathematical ideas.

Mathematics is a subject that empowers students to prove results. Students develop their problem-solving, decision-making and reasoning skills through working on a range of tasks.

3.2 BE HEALTHY

Mathematics enables students to understand the numerical data related to becoming and staying healthy. Monitoring nutritional intake, blood sugar levels and cardiovascular health are all examples where mathematics assists understanding and can lead to making healthy decisions. By becoming financially capable, young people are able to exert greater control over factors affecting their health such as housing and money management. Strategy games and logic puzzles are an important part of maintaining mental health.

3.3 STAY SAFE

Understanding risk through the study of probability is a key aspect of staying safe and making balanced risk decisions. Students learn to understand the probability scale and use it as a way of communicating risk factors. They develop an understanding of how data leads to risk estimates. By understanding probability and risk factors young people are able to make informed choices about investments, loans and gambling.

3.4 ACHIEVE ECONOMIC WELL-BEING

An understanding of mathematics, and confidence in using a variety of mathematical skills, are both key to young people's ability to play their part in

modern society. The skills of reasoning with numbers, interpreting graphs and diagrams and communicating mathematical information are vital in enabling individuals to make sound economic decisions in their daily lives. Mathematics skills and habits of mind are highly prized by many employers and mathematics is a gatekeeper to many careers and professions.

3.5 MAKE A POSITIVE CONTRIBUTION

Having confidence and capability in mathematics allows students to develop their ability to contribute to arguments using logic, data and generalisations with increasing precision. This in turn allows students to take a greater part in a democratic society. Becoming skilled in mathematical reasoning means students learn to apply a range of mathematical tools in familiar and unfamiliar contexts

4 THE IMPLEMENTATION OF MATHEMATICS

SES recognises, but is not limited to, the common framework provided by the structuring of Mathematics within the National Curriculum.

4.1 EQUAL OPPORTUNITIES

SES is committed to ensuring that all students are treated with equality of regard.

This will involve:

- Providing equality of opportunity in the Mathematics curriculum in an attempt to maximise the potential of each individual pupil.
- Treating as of equal value the different needs, interests and abilities of individual students.
- Through their experience of mathematics pupils should have respect for others and that all should be treated as equals.

In pursuing this policy with regard to individual students, there are four categories of difference between groups of students in which it is generally acknowledged that 'treatment as equals' may be problematic and for which it is therefore important to have specific policies. These are:

- Racial/cultural differences
- Social-class differences
- Ability differences
- Gender differences

4.1.1 Racial/Cultural Differences

It is vital that staff avoid any racial bias or stereotyping with respect to the particular individuals who are from ethnic-minority backgrounds and that they are alert to and willing to challenge any such discrimination or stereotyping by other students.

4.1.2 Gender Differences

Equal opportunities in terms of participation are carefully considered, however, issues of prejudiced attitudes and stereotyping towards the opposite sex can be in existence and can potentially be magnified in our environments, especially given the contextual background and past experiences of our young people.

Staff should therefore be aware of this and should be willing to challenge any such discrimination or stereotyping by students. Furthermore such risks can be mitigated through planned teaching strategies.

4.1.3 Social Class Differences

Staff should be aware of making assumptions about student's levels of knowledge and opportunities for acquisition of knowledge whatever their background.

4.1.4 Ability Differences

SES establishments are resourced such that students receive a highly individualised curriculum based on their Portfolio of Achievement and Needs. Implicit in this is a response to differing levels of ability.

It is also important that protected characteristics as defined in the SES Equality and Diversity Policy are considered when planning and implementing teaching practice to ensure equal opportunities. This policy should therefore be read in conjunction with the SES Equality and Diversity Policy and Practice document and the DfE guidance around our equality duty.

4.2 MATHEMATICS AS A CROSS CURRICULAR SUBJECT

It is important to stress the inter-relationship of mathematics with many other areas of the curriculum and with aspects of communication and social functioning beyond the Learning Centre day. At each establishment every aspect of its operation is viewed as a potential vehicle for building upon student's mathematical understanding and skills. All staff need to be skilled at finding unobtrusive ways of taking advantage of the total living experience without this intruding on the naturalness of domestic living.

Cross curriculum dimensions provide important unifying areas of learning that help young people make sense of the world and give education relevance and authenticity. They reflect the major ideas and challenges that face individuals and society.

Dimensions can add a richness and relevance to the curriculum experience of young people. They can provide a focus for work within and between subjects and across the curriculum as a whole, including the routines, events and ethos of the school.

Cross curriculum dimensions include:

- identity and cultural diversity
- healthy lifestyles

- community participation
- enterprise
- global dimension and sustainable development
- technology and the media
- creativity and critical thinking

4.3 MATHEMATICS AND COMPUTING

Computing is incorporated as an integral element into all aspects of the curriculum. (See Computing Policy and Practice document). Computing plays a fundamental role in enriching and enabling curriculum delivery. Specifically designed programmes and software play a major role in addressing specific mathematical development for students.

Purposeful and appropriate application of Computing in subjects offers students opportunities to:

- use their Computing capability to assist and progress their learning in mathematics;
- engage in higher-order thinking skills, for example, by using Computing to undertake detailed analysis when modelling data;
- demonstrate, apply and reinforce their understanding of Computing capability within a range of subject contexts. The transferability of Computing capability is an important aspect of progression in students' knowledge, skills and understanding.

Using computers gives students a sense of achievement especially in respect of visual appearance where the final result can be a perfectly presented piece of work. The positive feedback is immediate.

Students can assess and correct their own work. A good piece of software that puts the child in control of his own learning will do this. The process of self-assessment is not always as easy to achieve in other learning situations.

Using a computer enables results to be presented in a greater variety of ways. When using a word processor, it is easy to alter the layout of a page.

The speed of the computer will help students to become more proficient at handling and retrieving data. Tasks that take a long time when using pen and paper are easily accomplished while maintaining interest and avoiding long and tedious manipulation of information.

Computers allow simulations of experiences that would be difficult to arrange otherwise. Fighting the after effects of an oil slick or seeing the result of a volcanic explosion on screen can give students a safe experience of the decisions and problems involved.

The use of computers develops group skills in certain tasks. Students will discuss the best course of action in a programme or perhaps decide upon the right question to ask in a database search.

The use of software, and Internet based materials to teach and reinforce key maths skills and concepts.

Specific possibilities within the Mathematics Curriculum are:

- Database as a source of data for data analysis:
- Dynamic geometry software to make geometric constructions, to study relationships by measuring angles, lengths and areas, to explore geometric transformations and to understand the nature of necessity and sufficiently for certain conditions to hold;
- Graphic calculators to capitalise on the benefits of hand held technology, to explore functions through their graphs, to analyse statistics and to study sequences and iteration;
- Logo to explore shape, to develop the concept of function and to learn the nature of algorithmic processes through developing the necessary programming skills;
- Spreadsheets to explore the behaviour of functions and to find optimum solutions, to solve equations, to explore number patterns, to investigate algebraic identities and to store and manipulate statistical date.

Computing tasks should be clearly indicated within planning documentation and the link between mathematics and computer programming which is a core aspect of the computing curriculum should be made explicit in order to support progress in this area.

4.4 TEACHING AND LEARNING STYLES

- Activities should bring together different areas of mathematics
- The order of activities should be flexible
- Activities should be balanced between tasks which develop knowledge skills and understanding and those which develop the ability to tackle practical problems
- Activities should be balanced between the applications of mathematics and ideas which are purely mathematical
- Activities should be balanced between activities that are short in duration and those that have scope for development over an extended period.
- Activities should, where appropriate, use students' own interests or questions either as starting points or as further lines of development
- Activities should, where appropriate, involve both independent and co-operative work
- Tasks should include those which have an exact result or answer and those which have many possible outcomes
- Activities should be balanced between different modes of learning - doing, observing, talking and listening, discussing with teachers and other students, reflecting, drafting, reading and writing
- Activities should encourage students to use mental arithmetic and paper and pencil methods, and to become confident in the use of a range of mathematical tools and new technology. Students should have plenty of opportunity to develop and practice their own mental strategies.
- Activities should encourage students to become competent in collecting, recording and processing data.

- there should be a strong element of student negotiation and involvement in the targets identified within their Portfolio of Achievement and Needs
- the range of potential resources and stimuli is inexhaustible and a variety should be used to maintain interest and motivation.

4.5 PLANNING FOR MATHEMATICAL EXPERIENCES

The planning of Mathematics is guided by, but not limited to, the National Curriculum Framework for Mathematics.

Planning for Mathematics will take a variety of forms for which personalised learning episodes and units of work will include:

- Individual work
- Group Work
- Classroom based learning
- Extended learning in the wider community

Each student at SES, will receive appropriate and significant support from our Specialist SEN teacher, who completes extensive assessments and develops personalised intervention programmes to support individual learning needs.

4.5.1 Learning Outside the Classroom

SES supports and endorses the Learning Outside the Classroom initiative as its principles and philosophy match the SES Vision Statement. We believe that every young person should experience the world beyond the classroom as an essential part of learning and personal development, whatever their age, ability or circumstances.

The use of places other than the classroom for teaching and learning often provide the most memorable learning experiences and help us to make sense of the world around us by making links between feelings and learning. They stay with us into adulthood and affect our behaviour, lifestyle and work. They influence our values and the decisions we make. They allow us to transfer learning experienced outside to the classroom and vice versa.

Students can benefit from well-organised visits, community activities and getting involved in wider learning projects (such as helping to organise information, reviewing policies and providing peer support). As students progress, work placements and visits help shape their decisions about future opportunities.

All children and young people have the opportunity to participate in both focused field trips and extended residential weeks, throughout a range of local and national locations. In addition to the social and personal benefits, these offer real life knowledge and experience that can be developed in context.

4.5.2 Units of Work /Episodes of Learning

- A unit of work will relate to the National Curriculum Programmes of Study, as well as, where applicable, to the requirements of any examination syllabus chosen in KS4
- A unit of work is intrinsically flexible; it is useful to use a variety of approaches and teaching strategies covering the same core unit to develop a variety of skills.
- A unit of work may be based on specific mathematical skills; used as introduction, consolidation or revision.
- A unit of work may rely on a variety of media; audio, DVD, ICT, or equipment/games.
- A unit of work may be designed to be revisited as many times as is judged necessary across all ages and key stages.
- A unit of work may take a whole group approach to specific aspects of core mathematical skills, such as problem solving or collation of data well as informing aspects of some individual programmes.
- Units of work are designed primarily to be enjoyable, to encourage success, to enrich and enthuse the experience of each individual and to offer the opportunity of development across the experience of mathematics.
- Units of work may be based on a bespoke personalised interest or passion to re-engage the student in the learning process

Structuring of maths lessons will vary, according to the needs of individuals, however use of regular formative and/or summative assessment will support sequential development of knowledge and understanding.

The timing and order of each section is tailored to meet the individual needs of the students and sessions are generally 45 mins in duration. This structure is not seen as a rigid format, but more of a useful and adaptable vehicle for mathematics teaching. At times mathematics lessons may involve project-based learning, for example a cycle ride may be used to estimate and calculate speed, distance and time.

4.6 PRESENTATION OF WORK

At SES we believe presentation of work is vital aspect of creating a positive and stimulating environment and in enhancing student motivation and self-esteem. Presentation of work can take a wide variety of forms ranging from:

- Written format
- Recording (oral and photographic)
- Displays
- Through use of computing and digital media
- Through witness statements created by pupils and adults

Adults at SES are expected to make a professional judgement with regards to each individual pupil's aptitude and ability in terms of facilitating presentation of work. We seek to continually implement our 'No Limits' thinking in the way we facilitate presentation of work, ensuring feedback is given to support young people's continual progress in this area.

4.7 MATHEMATICS AS AN ACCREDITED SUBJECT

The type of accreditation offered to students is matched to their individual need and ability level. Currently three routes to accreditation are available. Students can take the OCR Cambridge Progression in Mathematics Awards, ranging from Entry Level 1 through to Level 2. These are bite sized, credit based units. Students can also access Functional Skills at Entry Level or Levels 1 and 2.

Our preferred GCSE course is EdExcel Mathematics, which can be taken at two levels: Foundation and Higher. The current syllabus is divided into four main areas, Number, Algebra, Shape Space and Measure and Handling Data.

Due to our personalised approach to learning chronological age is not seen as a barrier to accreditation.

4.8 PROGRESSION IN MATHEMATICS

By using the framework of key concepts and processes advised in National Curriculum programmes of study it is intended that students will progress through building up an understanding of these in relation to their subject knowledge. This will include:

- A gradual extension of content, increasing complexity, greater awareness and understanding
- Increasing the scale of studies, more generalised knowledge and use of abstract ideas
- Improving skill and precision in practical and intellectual Mathematical tasks

Planning will encompass the introduction, development and consolidation of the key concepts and processes. To allow for progression planning should reflect:

- A steady acquisition of new skills and knowledge
- Consolidation of skills and knowledge in a range of relevant contexts
- Opportunities for students to apply skills, knowledge and understanding in a range of relevant contexts
- Use of texts and sources which are familiar and unfamiliar and which increase in complexity as abilities develop
- Use of information and communication technology in open and closed research work

4.8.1 Continuity

In order to build on the experiences of every child at SES establishments there is continuity in the framework of the Mathematics NC programme of study with students expected to know, apply and understand the matters, skills and processes specified for each key stage. The latest National Curriculum has significantly reduced the prescribed content, and due to the personalisation of learning at SES, progress and outcomes are not determined by academic year of age. Decisions about where students are taught on the framework relates to their starting points, maturity, capability and personal interests.

At SES we aspire to measure progress using an APP (Assessing Pupil Progress) approach. We are continually developing a 'fit for purpose' assessment framework to support staff in planning for progress and ensure an effective, consistent and quantifiable measure of pupil progress which is operated across both SES establishments.

The APP tracking system is guided, but not limited to the National Curriculum framework to ensure the needs of our learners are met on an individual basis.

The SES APP framework for Mathematics forms part of the wider and continually developing SES progression framework.

4.9 DIFFERENTIATION

Students at our establishments will clearly differ in ability and teaching should take account of this by providing a range of learning situations and approaches. In addition the philosophy of SES is such that personalised learning is a cornerstone.

Differentiation is a process not a single event. This process involves recognising the variety of individual needs within a group, planning to meet those needs, providing appropriate delivery and evaluating the effectiveness of the activities in order to maximise the achievements of individual students.

Mathematics provides wide opportunities for differentiation by:

- Input
- Resource
- Task
- Support
- Outcome
- Response

In planning for our students the following factors should be considered:

- Activities should build on what our students already know and can do
- Our students need immediate and regular encouragement, praise and reward
- The activities should be broad enough to allow scope for development and not prevent more able students from extending their learning
- The work should be pitched at the age, maturity and ability of the group and or individual
- Tasks should be differentiated according to individual student needs
- Consider the balance between group activities and individual differentiated tasks for specific students

To achieve this, clear attention should be given to the following:

- A range of appropriate equipment
- Using a variety of teaching methods to elicit a particular response
- Organising the group in different ways appropriate to particular aims
- Setting open-ended tasks so that students can respond at their level
- Issuing different 'challenges' to different students

- Providing extension work for students with greater ability
- Allowing time for individual diagnosis, teaching and feedback.

The method of assessment and reporting should provide feedback that is appropriate to students of differing abilities. It should aid their future learning by providing knowledge but should also give them support and encouragement. More specifically, the teacher should consider:

- Resources reading levels and ease of use
- Availability of a range of media/software
- Availability of a range of support equipment
- Where ICT is being used, simplified software guides
- Provision of a variety of tasks to cover the main content area
- Take account of time available to support individuals/group
- Other adult/student support
- Student/student support e.g. pairing
- Various ways of praising achievement
- Use of visual prompts to support learning

To overcome any potential barriers to learning in mathematics, some students may require:

- specific help with number recall or the interpretation of data represented in graphs, tables or bar charts, to compensate for difficulties with long- or short-term memory or with visual discrimination
- access to tactile and other specialist equipment for work relating to shape, space and measures, to overcome difficulties in managing visual information
- help in interpreting or responding to oral directions when making mental calculations, to compensate for difficulties in hearing or with auditory discrimination
- access to equipment or other resources, to overcome difficulties in thinking and working in the abstract. This may include linking mathematics to computing, use of technological equipment or kinaesthetic interventions such as numicon.

In assessment:

- when judgements against level descriptions are required, these should, where appropriate, allow for the provision above.

4.10 ASSESSMENT AND RECORDING

Assessment is part of an ongoing process that informs future planning and subsequent learning. All assessments should take account of:

- Skills, knowledge and understanding acquired
- The contexts of the activity
- The purpose of the activity

Effective formative and summative assessment:

- is embedded in planning, teaching and learning

- requires a shared understanding of learning objectives and success criteria between teacher and learner
- draws on evidence of learners' achievement and progress from a wide range of contexts within and beyond the classroom
- values information that teachers retain in their heads, as well as concrete evidence produced by learners
- is based on evidence generated in the course of continuous teaching and learning, engagement with learners through observation, discussion, questioning, and review and analysis of work
- helps to shape and refine future teaching and learning, and to personalise the experience of individual learners
- provides the basis for discussions with learners themselves, their parents/carers and with other professionals about their strengths, areas for development and future learning targets
- is the foundation upon which periodic assessment can be based
- recognises and celebrates learners' progress in the light of their previous performance and motivates them to improve further
- promotes independence and self-motivation
- develops the capacity for peer and self-assessment among learners.

Assessment is a continuous process and testing and accreditation are built in at various stages of a students development.

Any system of evaluation and assessment should:

- Identify what has been taught and learnt
- Monitor students progress continually
- Monitor students progress in cross-curricular elements
- Establish students' needs as a basis for further planning and teaching.

Student involvement in the assessment and evaluation process is critical.

Evidence can be gleaned from:

- Observing
- Questioning and listening
- Discussion
- Written work, audio and video tape recording, drawings, charts, etc.
- Specific assessments tied to curriculum materials.

4.10.1 <u>The marking of students work</u>

Teachers' responses to students' work should be positive, encouraging, sympathetic, honest and appropriate. Marking should be completed in a pragmatic way, as appropriate to the needs of the child and whenever possible completed in their presence. Further areas of study can then be negotiated with the child.

- Students should be made aware of the assessment criteria being employed, particularly before tackling new situations and subsequently when marking work

- Students should, as a result of the interaction, be aware of the next steps in their learning
- It is sometimes useful for students to respond to each others work

4.10.2 Record Keeping

Records are kept in the form of long term planning (Curriculum Overview), Medium Term Planning (unit objectives) and short term planning (detailed planning of learning episodes). A record of progress is evident in the on-going feedback (verbal and written) between adult and pupil. Where appropriate an evidence base is collated for an episode of learning this can take various forms e.g. files, exercise books, scrap books, digital media files.

4.10.3 Individual Programmes

- The Portfolio of Achievement and Needs of each student will inform the global priority targets to be addressed for the child.
- More detailed educational objectives will be identified by Learning Centre staff and students, and negotiated targets reached.
- Targets set will be specific, measurable, attainable, realistic and time related.
- Targets will always be compatible with the requirements of the National Curriculum and/or Portfolio of Achievement and Needs

4.11 USING CALCULATORS

There are skills in using a calculator that need to be taught and learnt. A policy of 'allowing students to use a calculator' is not sufficient. What is needed is a school policy that encourages students of all ages and abilities to use calculators in appropriate situations and provides clear guidance on the procedures needed to obtain maximum benefit from their use. In particular, attention needs to be given to the estimation, accuracy and interpretation of results. If there is only one operation involved the procedure is obvious, but where there is more than one operation the procedures to be used on the calculator must be considered.

To use a calculator only to check written calculations is inappropriate but to use mental or simple written approximations to check results obtained from a calculator is sensible.

Numeracy is the ability to handle a four function calculator sensibly. Hence students need to understand and use:

- Single digit arithmetic
- Powers of ten
- Place value
- Awareness of number operation

When it is permissible to use a calculator

- When it motivates and encourages success
- When it increases student ability to handle large numbers
- When it increases understanding of the number system

- For checking estimates and results
- As an aid for problem solving
- In demonstrating place value
- To practice calculator keyboard familiarity

When it is not permissible to use a calculator

- When to do so would encourage laziness
- When the lesson objective is to develop mental maths techniques and skills
- When its use prevents students from using recording methods which they can remember for occasions when they do not have calculators
- When it is used as a sole means of problem solving
- In the absence of 'working out' evidence

5 SMSC AND BRITISH VALUES IN MATHEMATICS

At SES we believe the development of SMSC and promotion of British Values, should be embedded within all areas of teaching and learning across both the school and residential setting. This policy should be read in conjunction with the Spiritual, Moral, Cultural and Social Policy and Practice document and the British Values Policy and Practice document.

5.1 SMSC

At SES we develop SMSC in many aspects of the curriculum through ensuring opportunities for SMSC development are extensive and frequent. These opportunities are reflected in planning documents as well as in outcomes for pupils.

Examples of SMSC development within Mathematics are:

Spiritual

- Developing deep thinking and questioning the way in which the world works promotes the spiritual growth of students.
- Students are encouraged to experiment, problem solve and understand and then apply their knowledge, for example exploring patterns and sequences in the natural world and symmetry, for example tessellations such as using Rangoli.
- To discuss and explore concepts such as infinity, complex numbers and patterns and relationships as well as concepts such as the scale and enormity of the world and universe, speed of light and time.
- To explore the wonder of the human mind through great thinkers and their concepts and discover codes and riddles for example the Fibonacci pattern.

Moral

- Mathematics, quantitative data and statistics allow people to make comparisons and judgements which can both create and solve moral dilemas, for example those which stem from financial systems and money.

- Applying and exploring the skills required to better understand and solve various potentially moral issues or problems, for example collecting data in surveys, analyzing data or creating solutions to solve problems.
- To identify problems in real life contexts and how these can have a moral element for example involving finance, data or conservation, such as calculating carbon footprints, population density or food miles.

Social

- Mastery of mathematical concepts allows young people to better understand and connect with the world around them and in turn leads to greater self-esteem.
- Solving problems builds determination and thinking skills and presenting these to others develops a sense of self-confidence. Although not always possible we will always seek to work in groups and to encourage collaboration to develop listening, communication and tolerance.
- Where possible we seek to develop powers of logic, reasoning and the ability to work and communicate methodically to others.
- When appropriate we will seek to further develop pupils social skills through participation in main-stream maths education, attending workshops or events that enable exploration of mathematics in groups both familiar and unfamiliar.

Cultural

- Through mathematics we explore the breadth of cultures that have contributed to mathematics as we understand it today with concepts and symbolism drawn from Egyptian, Roman, Indian, Islamic, Greek and Russian roots, for example Pythagoras' Theorum.
- We explore and research cultural patterns for example Islamic tile tessellation, cultural methodologies such as Russian/Chinese multiplication and Abacus, lattice and Napier\s Bones technique or the chunking techniques used by South American street children.
- Mathematics can be a universal language and has allowed students to integrate into classes during exchange trips and calculating exchange rates, for example Finland

5.2 BRITISH VALUES

Promotion of British values is an integral part of life at SES. We believe that the promotion of such values should be inherent in teaching and learning as well as in the wider community. We fundamentally believe that the promotion of British Values is an essential strategy in preventing radicalisation. This document should therefore be read in conjunction with our Radicalisation Policy and Practice document.

Examples of the promotion of British values within Mathematics are:

Rule of Law

- In order for laws to be enforced some have a quantitative element, understanding mathematics enables students to better understand limits and tolerances, quantities and measures.

- Understanding of mathematics enables students to better grasp such concepts and better understand their rights and the rights of others, this could include speak limits, age limits, alcoholic units as well as aspects of employment such as minimum wage and calculating tax.

Democracy

- The democratic process is rooted in the representing the views of the population and mathematical concepts underpin the collection, analysis and presentation of such data.
- The use of surveying techniques, creation of trends, pie charts and averages all help to understand and represent the views of people on a community, region and national level.
- Students are encouraged to participate, follow and understand the democratic processes active in the community and on the news around the world and to understand the context of these and the mathematical concepts that underpin the democratic process.

Individual Liberty

- Students can understand individual liberty through developing understanding of numerical constraints on behaviour such as paying tax, income, limits, thresholds and tolerances, for example mortgage applications linked to income.
- At SES it is a fundamental belief that pupils should be respected and provided with a learning environment in which to express themselves freely, yet respectfully.

Mutual respect and tolerance of those with different faiths and beliefs and for those without faiths

- Collaborative working is integral to many aspects of Mathematics, including producing presentations and speeches developing mutual respect.
- Studying literature offers pupils the opportunity to explore different cultural themes including exploring different faiths and beliefs.