PRIMARY SUBJECT LEADERS

# Science

Name: _____

School: _____

LA/Trust: _____

Date: _____

Hounslow Education Partnership

## Science Subject Leaders (Sept 2021)

This workbook has been designed specifically to support the work of subject leaders in primary schools as they keep a record of both their actions and the outcomes of these actions.

This Science Subject Leaders Workbook is the companion document to the Science Subject Leaders Resource File.

There are subject leaders resource files & workbooks for the following subjects:

- Art & Design
- Computing
- English
- Design & Technology
- Geography
- History
- Maths
- MfL
- Music
- PE
- PSHE
- Science

The structure of each workbook follows the same format:



(***www*** – what went well; ***ebi*** – even better if)

## Part A: Subject leader audit questions

| TASK | NOTES | COMPLETED | DATE |
|---|---|---|---|
| Am I clear about the NC Aims for Science? | | | |
| Have I checked out the subject association website to identify resources for:<br>* Me, as the subject leader<br>* Teachers/assistants | | | |
| Have I completed an audit of my own knowledge, skills & understanding against these aims? | | | |
| Have I identified sources to support me in my own subject knowledge? | | | |
| Have I written a Statement of Intent for Science? | | | |
| In writing the Statement of Intent, did I refer to paragraph 179 of Deep Dive Resource 1? | | | |
| Re: Para: 179, do I have a written response for each of the five bullet points? | | | |
| Has this statement been approved by HT/SLT/all staff? | | | |
| Have I developed a monitoring calendar so that I am able to build up an accurate and up-to-date overview of the www/ebi in Teaching, Learning & Assessment (TLA) for Science? | | | |

# Science:

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|---|---|---|---|
| **Have I clarified with my line manager what good or better TLA in Science 'looks' like? (and hence what is not yet 'good' enough)** | | | |
| **Supplementary questions:** | | | |
| How long have I been the subject leader for Science, and what support (CPD) have I received either internally or externally? | | | |
| What resources do I use to support me as a subject leader? | | | |
| **How have I designed the Science curriculum?** | | | |
| What am I trying to achieve through the Science curriculum? | | | |
| What scheme of learning does the school follow (published or your own)? | | | |
| How is this subject taught, and why? | | | |
| How do children progress in this subject from one year to the next? (Remember that progress is knowing more, remembering more and being able to do more.) | | | |
| How do I ensure that pupils retain their subject knowledge? | | | |
| How do I ensure that pupils with SEND (as well as those entitled to Pupil Premium) benefit from the curriculum in this subject? | | | |

# Science:

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|---|---|---|---|
| What would I expect an inspector to see when they visit Science lessons and speak to the pupils? | | | |
| **How do teachers clarify any misconceptions by pupils?** | | | |
| What links are made between Science and other subjects – can I give an example of where this works particularly well? | | | |
| Can I tell of any examples where I have supported other teachers/assistants in Science and the impact that this has had on their teaching/pupils' learning? | | | |

## Part B: Snapshot www/ebi for Science

| THE KEY STRENGTHS IN: |
| --- |
| **Teaching, learning & assessment in Science are:** |
| **The Science curriculum are:** |

| THE MAIN AREAS WE NEED TO DEVELOP IN: |
| --- |
| **Teaching, learning & assessment in Science are:** |
| **The Science curriculum are:** |

## Part C: Statement of curriculum intent

**From the Ofsted Education Inspection Framework (EIF)**

***Intent***

**Para: 196.**
In evaluating the school's educational intent, inspectors will primarily consider the curriculum leadership provided by school, subject and curriculum leaders.

**Para: 197.**
The judgement focuses on factors that both research and inspection evidence indicate contribute most strongly to an effective education and pupils achieve highly. These factors are listed below.

- The school's curriculum is rooted in the solid consensus of the school's leaders about the knowledge and skills that pupils need in order to take advantage of opportunities, responsibilities and experiences of later life. In this way, it can powerfully address social disadvantage.
- It is clear what end points the curriculum is building towards and what pupils need to know and be able to do to reach those end points.
- The school's curriculum is planned and sequenced so that new knowledge and skills build on what has been taught before and towards its clearly defined end points.
- The curriculum reflects the school's local context by addressing typical gaps in pupils' knowledge and skills.

**Science: Statement of Intent (School name):**

Write your Statement of Intent here:

## Part D: Science & cultural capital

**From the Ofsted Education Inspection Framework (EIF)**

***Cultural capital***

**Para: 203.**
As part of making the judgement about the quality of education, inspectors will consider the extent to which schools are equipping pupils with the knowledge and cultural capital they need to succeed in life. Our understanding of 'knowledge and cultural capital' is derived from the following wording in the national curriculum:

'It (cultural capital) is the essential knowledge that pupils need to be educated citizens, introducing them to the best that has been thought and said and helping to engender an appreciation of human creativity and achievement.'

How Science at (School x) contributes to the development of pupils' cultural capital:

## Part E: Subject leaders response to the Ofsted June 2021, research report into Science

https://www.gov.uk/government/publications/research-review-series-science/research-review-series-science

## High-quality Science education may have the following features:

### Curriculum progression: what it means to get better at science

| Main findings | My commentary |
|---|---|
| The curriculum is planned to build increasingly sophisticated knowledge of the products (substantive knowledge) and practices (disciplinary knowledge) of science. | |
| Disciplinary knowledge (identified in the 'working scientifically' sections of the national curriculum) comprises knowledge of concepts as well as procedures. | |
| When pupils develop their disciplinary knowledge, they learn about the diverse ways that science generates and grows knowledge through scientific enquiry. This is not reduced to a single scientific method or taken to mean just data collection. | |
| The curriculum outlines how disciplinary knowledge advances over time and teaches pupils about the similarities and differences between each science. | |
| Pupils are not expected to acquire disciplinary knowledge simply as a by-product of taking part in practical activities. Disciplinary knowledge is taught. | |
| Scientific processes such as observation, classification or identifying variables are always taught in relation to specific substantive knowledge. They are not seen as generalisable skills. | |

| What do I need to do next | |
|---|---|

## Organised knowledge within the curriculum

| Main findings | My commentary |
|---|---|
| In the early years, pupils are introduced to a wide-ranging vocabulary that categorises and describes the natural world. These words are not too technical but provide the 'seeds' for developing scientific concepts that will be built on in later years. | |
| Attainment targets, specification points and the EYFS educational programmes are broken down into their component knowledge. | |
| Substantive knowledge is sequenced so that pupils build their knowledge of important concepts such as photosynthesis, magnetism and substance throughout their time at school. | |
| Knowledge is sequenced to make the deep structure of the scientific disciplines explicit. This allows teachers and pupils to see how knowledge is connected. | |
| Disciplinary knowledge is sequenced to take account of:<br>• its hierarchical structure<br>• the best substantive contexts in which to teach it. | |
| Once disciplinary knowledge is introduced, it is used and developed in a range of different substantive contexts. | |
| Planning for progression takes account of what is taught in other subjects. For example, the science curriculum should be coherent with what is taught in mathematics. Where there are differences, these are made explicit to pupils and teachers. | |

| What do I need to do next | |
|---|---|

## Other curricular considerations

| Main findings | My commentary |
|---|---|
| Sufficient curriculum time is allocated for pupils to embed what they have learned in long-term memory through extensive practice before moving on to new content. | |
| The component knowledge pupils need in order to read, write, represent and talk science is identified and sequenced. | |
| Curriculum plans consider how component knowledge introduced at one point in time influences future learning. This ensures that knowledge builds incrementally from pupils' prior knowledge and so pupils' misconceptions are less likely. | |
| The curriculum anticipates where pupils are likely to hold misconceptions. These are explicitly addressed, and pupils learn how the misconception is different to the scientific idea. | |
| Pupils know when and why models and rules can be used in science, which includes knowing what they can and cannot be used for. | |
| **What do I need to do next** | |

## Curriculum materials

| Main findings | My commentary |
|---|---|
| Online resources match what the curriculum is intending pupils to learn and are not a source of errors/misconceptions. | |

| | |
|---|---|
| If science kits are used, they help achieve the curriculum intent and the activities themselves do not become the curricular goal. | |
| High-quality textbooks are used as an important resource for learning and teaching science. | |
| **What do I need to do next** | |

## Practical work

| Main findings | My commentary |
|---|---|
| The curriculum is sequenced so that pupils have the necessary disciplinary and substantive knowledge to carry out practical work successfully and learn from it. | |
| The purpose of practical work is clear in relation to curriculum content so that practical activities can be set up and managed to develop pupils' disciplinary and/or substantive knowledge. | |
| Practical activities form part of a wider instructional sequence that gives pupils time to connect theory to observation. | |
| Pupils are not expected to learn disciplinary knowledge only through taking part in practical work – disciplinary knowledge should be taught using the most effective methods. | |
| Pupils encounter the full range of objects and phenomena they are studying through both laboratory and fieldwork. These encounters should take pupils beyond their everyday experiences to develop a sense of wonder and curiosity about the material world. | |
| **What do I need to do next** | |

## Pedagogy: the teaching of science

| Main findings | My commentary |
|---|---|
| Activities are carefully chosen so that they match specific curriculum intent. | |
| Teachers use systematic teaching approaches, where learning is scaffolded using carefully sequenced explanations, models, analogies and other representations to help pupils to acquire, organise and remember scientific knowledge. | |
| Teaching takes account of the limited working-memory capacity of their pupils when planning lessons. | |
| Pupils are not expected to arrive at scientific explanations by themselves without sufficient prior knowledge. | |
| Systematic approaches, alongside carefully selected texts, are used to teach the most important vocabulary in science. | |
| Pupils have regular opportunities in the early years and primary classrooms to learn vocabulary through story and non-fiction books, rhymes, songs and oral rehearsal. | |
| **What do I need to do next** | |

## Assessment

| Main findings | My commentary |
|---|---|
| Teachers and pupils are clear on the purpose of assessment. There is clarity about what is being assessed. | |

| | |
|---|---|
| Assessment is not overly burdensome on teachers' time in relation to marking, recording or feedback. | |
| Feedback is focused on the science content and not on generic features. Teachers have sufficient subject knowledge to be able to do this. | |
| Pupils regularly retrieve knowledge from memory to help them remember and organise their knowledge. This is coupled with feedback. Teachers think carefully about what pupils are being asked to retrieve and whether this prioritises the most important content. | |
| Overuse of external assessment items, such as GCSE or A-level questions, is avoided because this narrows the curriculum and leads to superficial progress that does not prepare pupils for further study. | |
| Systems are in place to support teachers to make accurate decisions when assessing pupils' work. This includes supporting primary teachers with statutory teacher assessment of science at key stages 1 and 2. | |
| **What do I need to do next** | |

## Systems at subject and school level

| Main findings | My commentary |
|---|---|
| Teachers, teaching assistants and technicians have access to high-quality subject-specific CPD to develop subject knowledge and pedagogical content knowledge. This is aligned to the curriculum. | |
| In primary schools, there is at least one teacher who specialises in teaching science and science leaders have dedicated leadership time. | |

# Science:

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|---|---|
| Science teachers engage with subject associations, and take responsibility, with support from the school, for developing their own subject knowledge throughout their career. | |
| Early-stage teachers in particular have timetables that allow them to develop expertise in one science and that do not give them too many key stages to teach. | |
| Timetables allocate appropriate teaching time to science, reflecting its status as a core subject in the national curriculum. There are particular concerns that pupils in some primary schools are not receiving sufficient curriculum time to learn science. | |
| Pupils have access to sufficient practical resources to take part in demanding practical work, either independently or in appropriately sized groups that enable first-hand experiences. | |
| **What do I need to do next** | |

## Part F: Annual monitoring calendar

1) Exemplar calendar
2) Your version
3) Checklist: groups
4) Annual overview
5) Evidence collected against NC Aims

## Exemplar calendar

| Month | Learning Observation | Pupil Voice * suggest doing this at the same time as 'pupil work' | Pupil Work | Any Other Activity |
|---|---|---|---|---|
| September | xxx | week 3/4: talk to pupils about experiences in subject last year | if new to post, search out pupils' work from previous year to get an overview of learning against the subject's NC Aims | meet with teachers to clarify 'understanding' of NC Aims/expectations for end of topic 'goals' |
| October | learning walk in EY/KS1/L & U KS2 (eg – visits to YN, Y2, 4 & 6) | talk to pupils* in those classes you've visited | * always try to talk to pupils with 'samples' of their learning with them | always feedback the www/ebi from any monitoring/review activities |
| November | learning observations in EY/KS1/L & U KS2 (eg – a selection of YR, 1, 3 & 5) | talk to pupils* in those classes you've visited | * always try to talk to pupils with 'samples' of their learning with them | always feedback the www/ebi from any monitoring/review activities |
| December | xxx | | | Gather feedback from teachers from term 1 (re: www/ebi)<br>Prepare termly update of www/ebis *(for feeding back to HT/SLT – and possibly linked Governing Body (GB) representative)* |
| January | xxx | talk to pupils about experiences in subject last term | | meet with teachers to clarify 'understanding' of NC Aims/expectations for end of topic 'goals' |

| | | | | |
|---|---|---|---|---|
| February | learning walk in EY/ KS1/L & U KS2 (eg – visits to YR, Y1, 3 & 5) (*check whether the www/ebis from term 1 are the same/improving … )* | talk to pupils* in those classes you've visited | * always try to talk to pupils with 'samples' of their learning with them | |
| March | learning observations in EY/KS1/L & U KS2 (eg – a selection of YN, 2, 4 & 6) (*check whether the www/ebis from term 1 are the same/improving … )* | talk to pupils* in those classes you've visited | * always try to talk to pupils with 'samples' of their learning with them | |
| April | | | | Gather feedback from teachers from term 2 (re: www/ebi)<br>Prepare termly update of www/ebis |
| May | follow-up learning observations/walks to assess whether the wwws are still wwws and whether any ebis have moved in the direction of a www | talk to pupils* in those classes you've visited | * always try to talk to pupils with 'samples' of their learning with them | |
| June | follow-up learning observations/walks to assess whether the wwws are still wwws and whether any ebis have moved in the direction of a www | talk to pupils* in those classes you've visited | * always try to talk to pupils with 'samples' of their learning with them | Gather feedback from teachers from terms 1-3 (re: www/ebi) |
| July | | | | Gather feedback from teachers from terms 1-3 (re: www/ebi)<br>Complete subject self-evaluation report/action plan for the next academic year<br>*(share with HT/SLT – and possibly also linked GB representative)* |

# Science:

## Your version

| Month | Learning Observation | Pupil Voice * suggest doing this at the same time as 'pupil work' | Pupil Work | Any Other Activity |
|---|---|---|---|---|
| September | | | | |
| October | | | | |
| November | | | | |
| December | | | | |

# Science:

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|---|---|---|---|---|
| | | | | |
| January | | | | |
| February | | | | |
| March | | | | |

# Science:

| | | | | |
|---|---|---|---|---|
| April | | | | |
| May | | | | |
| June | | | | |
| July | | | | |

# Science:

| | | | | |
|---|---|---|---|---|
| | | | | |

## Checklist: Have I included as many as possible of the following 'groups' of pupils?

| Group | When | Who |
|---|---|---|
| EYFS | | |
| KS1 | | |
| KS2 (Lower) | | |
| KS2 (Upper) | | |
| Lower/Middle/Upper Ability pupils | | |
| Disadvantaged/Non-disadvantaged pupils | | |
| Pupils with SEND | | |
| EAL pupils | | |
| (What other 'groups' do you need to focus on?) | | |

# Science:

## Annual overview

| Month | Learning Observation | Pupil Voice | Pupil Work | Any Other Activity |
|---|---|---|---|---|
| September | | | | |
| October | | | | |
| November | | | | |
| December | | | | |
| January | | | | |
| February | | | | |
| March | | | | |
| April | | | | |
| May | | | | |
| June | | | | |
| July | | | | |

## Evidence collected against NC Aims

| NC Aims | How science works (Scientific enquiry) | Organisms, their behaviour and the environment | Materials, their properties and the earth | Energy, forces and space |
|---|---|---|---|---|
| Yr N www | | | | |
| Yr N ebi | | | | |
| Yr R www | | | | |
| Yr R ebi | | | | |
| Yr 1 www | | | | |
| Yr 1 ebi | | | | |
| Yr 2 www | | | | |
| Yr 2 ebi | | | | |
| Yr 3 www | | | | |
| Yr 3 ebi | | | | |
| Yr 4 www | | | | |
| Yr 4 ebi | | | | |
| Yr 5 www | | | | |
| Yr 5 ebi | | | | |
| Yr 6 www | | | | |
| Yr 6 ebi | | | | |

## Monitoring Calendar B (Summary)

| | | | | |
|---|---|---|---|---|
| Yr N | | | | |
| Yr R | | | | |
| Yr 1 | | | | |
| Yr 2 | | | | |
| Yr 3 | | | | |
| Yr 4 | | | | |
| Yr 5 | | | | |
| Yr 6 | | | | |

# Science:

## Overall Summary

| NC Aims | How science works (Scientific enquiry) | Organisms, their behaviour and the environment | Materials, their properties and the earth | Energy, forces and space |
|---|---|---|---|---|
| www | | | | |
| ebi | | | | |

## Part G: Science self-evaluation report

This is the author's initial interpretation of a best-fit between the previous subject criteria and the current (2021) Quality of Education (QoE) criteria.
(See Subject Leaders Resource File for this information).

| **INTENT** | | |
|---|---|---|
| **NEW HANDBOOK** | **EVIDENCE** | **OLD SUBJECT CRITERIA** |
| Leaders adopt or construct a curriculum that is ambitious and designed to give all pupils, particularly disadvantaged pupils and including pupils with SEND, the knowledge and cultural capital they need to succeed in life. This is either the national curriculum or a curriculum of comparable breadth and ambition. [*If this is not yet fully the case, it is clear from leaders' actions that they are in the process of bringing this about.]* | | Leaders are well informed by current developments in the subject and are aware of developments in science education, including in other schools and by national agencies and associations.<br>The curriculum is broad, balanced and well informed by current research and development in science education. It meets the learning needs of all groups of pupils and ensures effective continuity and progression, including in scientific enquiry and pupils' understanding of how science works. |
| The school's curriculum is coherently planned and sequenced towards cumulatively sufficient knowledge and skills for future learning and employment. *[If this is not yet fully the case, it is clear from leaders' actions that they are in the process of bringing this about.]* | | Planned experiences for learning promote progress within and between year groups, and maintain a good balance between all four areas of the science National Curriculum. In primary schools, the key ideas are regularly reinforced over time through practical work. In secondary schools, sufficient time and high-quality practical resources to teach science through practical investigation and illustration are provided, with the result that students are motivated to study the subject further at 16 and 18.<br>Good advice and guidance on progression in science beyond compulsory education is embedded in the curriculum, and pathways do not limit progression, |

| | | |
|---|---|---|
| | | particularly if vocational subjects are taken at Key Stage 4. |
| The curriculum is successfully adapted, designed or developed to be ambitious and meet the needs of pupils with SEND, developing their knowledge, skills and abilities to apply what they know and can do with increasing fluency and independence. *[If this is not yet fully the case, it is clear from leaders' actions that they are in the process of bringing this about.]* | | |

# Science:

| IMPLEMENTATION | | |
|---|---|---|
| **NEW HANDBOOK** | **EVIDENCE** | **OLD SUBJECT CRITERIA** |
| Teachers have good knowledge of the subject(s) and courses they teach. Leaders provide effective support for those teaching outside their main areas of expertise. | | Teachers have a clear understanding of progression in science skills, knowledge and understanding and how the 'big ideas' of science can be understood through increasingly demanding details and concepts. As a result, they use an appropriate range of resources and teaching strategies to promote good learning across all aspects of the subject.<br>There are shared common purposes among those involved in teaching science. Teachers have good opportunities to share practice among themselves and have access to subject training within and beyond the boundaries of the school, where appropriate. Science reflects wider whole-school priorities including consistent application of literacy and numeracy policies. |
| Teachers present subject matter clearly, promoting appropriate discussion about the subject matter being taught. They check pupils' understanding systematically, identify misconceptions accurately and provide clear, direct feedback. In so doing, they respond and adapt their teaching as necessary without unnecessarily elaborate or individualised approaches. | | Teachers give pupils many opportunities to show and apply their own knowledge, skills and understanding of science, and give extended explanations.<br>Pupils enjoy science and apply themselves well. They are able to explain the subject's value and show an appreciation of the impact of science on society, themselves and its contribution to life in a technological age. |
| Over the course of study, teaching is designed to help pupils to remember long term the content they have been taught and to integrate new knowledge into larger ideas. | | They research science issues using different sources of information. They demonstrate some originality in their approach, coming up with new ideas on how to tackle a problem or display data. They show |

| | | |
|---|---|---|
| | | imagination in forming hypotheses and in the way they go about their science work.<br>They show confidence and competence in the full range of stage-appropriate practical work, including planning and carrying out science investigations in groups or individually. |
| Teachers and leaders use assessment well, for example to help pupils embed and use knowledge fluently, or to check understanding and inform teaching. Leaders understand the limitations of assessment and do not use it in a way that creates unnecessary burdens on staff or pupils. | | Pupil progress in science is tracked during the year with feedback from this used to drive intervention and extension activities. |
| Teachers create an environment that focuses on pupils. The textbooks and other teaching materials that teachers select – in a way that does not create unnecessary workload for staff – reflect the school's ambitious intentions for the course of study. These materials clearly support the intent of a coherently planned curriculum, sequenced towards cumulatively sufficient knowledge and skills for future learning and employment. | | Pupils use their scientific knowledge and understanding well in most situations to give accurate explanations or solve challenging problems requiring appropriate control of several variables, and report their findings clearly using accurate scientific language. |
| The work given to pupils is demanding and matches the aims of the curriculum in being coherently planned and sequenced towards cumulatively sufficient knowledge. | | Pupils regularly work independently, often taking the initiative in individual work and when working with others. |
| Reading is prioritised to allow pupils to access the full curriculum offer. | | |
| A rigorous and sequential approach to the reading curriculum develops pupils' fluency, confidence and | | |

| | | |
|---|---|---|
| enjoyment in reading. At all stages, reading attainment is assessed and gaps are addressed quickly and effectively for all pupils. Reading books connect closely to the phonics knowledge pupils are taught when they are learning to read. | | |
| The sharp focus on ensuring that younger children gain phonics knowledge and language comprehension necessary to read, and the skills to communicate, gives them the foundations for future learning. | | |
| Teachers ensure that their own speaking, listening, writing and reading of English support pupils in developing their language and vocabulary well. | | |

# Science:

| IMPACT | | |
|---|---|---|
| **NEW HANDBOOK** | **EVIDENCE** | **OLD SUBJECT CRITERIA** |
| Pupils develop detailed knowledge and skills across the curriculum and, as a result, achieve well. This is reflected in results from national tests and examinations that meet government expectations, or in the qualifications obtained. | | They show confidence and competence in the full range of stage-appropriate practical work, including planning and carrying out science investigations in groups or individually.<br>Pupils use their scientific knowledge and understanding well in most situations to give accurate explanations or solve challenging problems requiring appropriate control of several variables, and report their findings clearly using accurate scientific language.<br>Pupils enjoy science and apply themselves well. They are able to explain the subject's value and show an appreciation of the impact of science on society, themselves and its contribution to life in a technological age. |
| Pupils are ready for the next stage of education, employment or training. They have the knowledge and skills they need and, where relevant, they gain qualifications that allow them to go on to destinations that meet their interests and aspirations and the intention of their course of study. Pupils with SEND achieve the best possible outcomes. | | Over time, the proportion of male and female pupils that progress to post-16 science studies is similar to the proportions nationally. |
| Pupils' work across the curriculum is of good quality. | | Opportunities to promote spiritual, moral, social and cultural development are systematically planned and delivered to ensure every pupil benefits. |
| Pupils read widely and often, with fluency and comprehension appropriate to their age. They are | | Good links are forged with other subjects and the wider community to provide a range of enrichment |

| | | |
|---|---|---|
| able to apply mathematical knowledge, concepts and procedures appropriately for their age. | | activities that promote pupils' learning and engagement with science. |

## Part H: CPD Log

1) CPD I have attended
2) CPD I have delivered

**CPD I have attended**

| Date | Title | Provider | Actions |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**CPD I have delivered**

| Date | Title | Who to | Impact/feedback |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

## Part I: Subject leader development plan

Subject: _____

Subject Leader: _____

Academic year: _____

| Date | Target | Record of actions taken | Impact/evaluation | Target achieved (& date) |
|---|---|---|---|---|
| **Autumn Term** | | | | |
| **Spring Term** | | | | |
| **Summer Term** | | | | |
| **End of year summary** | | | | |