



**Assessing pupils' progress
in Secondary science at
Key Stage 3**

Teachers' handbook



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1. Assessing pupils' progress (APP) – an introduction

In May 2008, the Department for Children, Schools and Families (DCSF) published The Assessment for Learning Strategy¹.

The aims of the strategy are that:

- **every child** knows what progress they are making, and understands what they need to do to improve and how to get there. They get the support they need to be motivated, independent learners on an ambitious trajectory of improvement;
- **every teacher** is equipped to make well-founded judgements about pupils' attainment, understands the concepts and principles of progression, and knows how to use their assessment judgements to forward plan, particularly for pupils who are not fulfilling their potential;
- **every school** has in place structured and systematic assessment systems for making regular, useful, manageable and accurate assessments of pupils, and for tracking their progress;
- **every parent** and carer knows how their child is progressing, what they need to do to improve, and how they can support the child and their teachers.

The AfL Strategy document provides a vocabulary that helps to clarify the three linked aspects of assessment which can be consistently applied across curriculum areas and phases.

Day-to-day assessment provides a wide range of evidence of learning in specific contexts which shapes immediate next steps.

Periodic review of this evidence gives a clear profile of pupils' achievement across a whole subject and informs and shapes future planning and targets for improvement.

When required, these judgements and insights can be more formally shared between pupils, parents and teachers **at transitional** points between year groups, schools and phases.

The key features of these three assessment viewpoints are summarised here:

Day-to-day	Learning objectives made explicit and shared with pupils Peer and self-assessment in use Pupils engaged in their learning and given immediate feedback
Periodic	Broader view of progress across subject for teacher and learner Use of national standards in the classroom Improvements to medium-term curriculum planning
Transitional	Formal recognition of pupils' achievement Reported to parents/carers and next teacher(s) May use external tests or tasks

The APP approach supports teachers' assessment and their understanding of pupils' attainment and progress in each of these three linked aspects but it is particularly designed to strengthen periodic assessment.

This handbook focuses on the process of periodic assessment, and also refers to aspects of day-to-day practice that provide evidence for periodic assessment. It does not deal directly with the process of transitional assessment.

¹<http://publications.teachernet.gov.uk/default.aspx?PageFunction=productdetails&PageMode=publications&ProductId=DCSF-00341-2008>

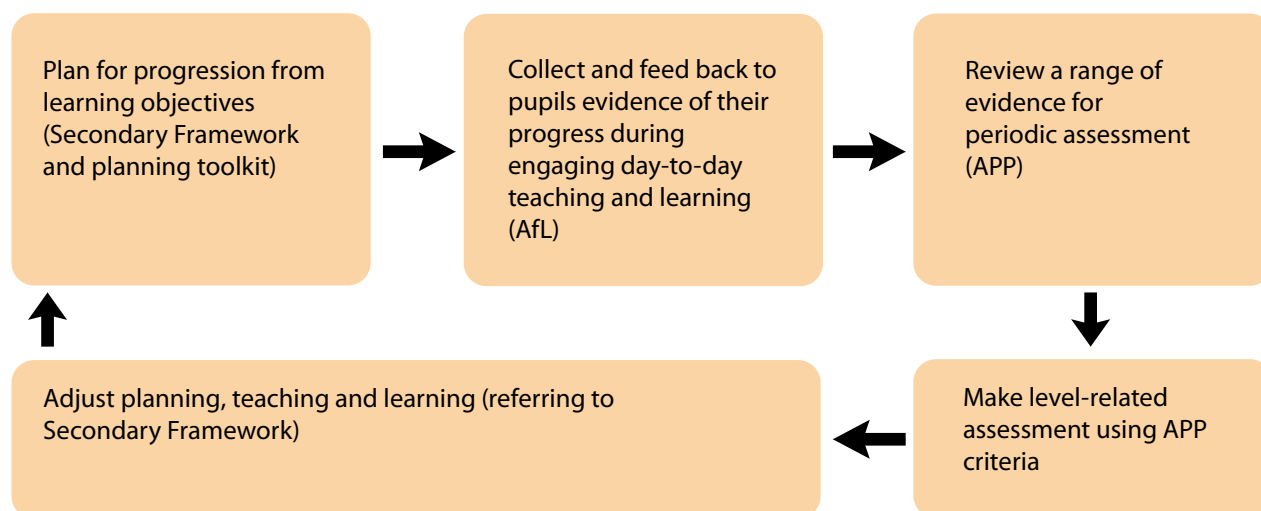
1.1 What is APP?

APP is a structured approach to periodic assessment, enabling teachers to:

- use diagnostic information about pupils' strengths and weaknesses to improve teaching, learning and rates of pupils' progress;
- track pupils' progress over a key stage or longer.

Using APP materials, teachers can make more consistent level-related judgements in National Curriculum subjects. The APP approach improves the quality and reliability of teacher assessment and has proved to be robust, manageable and effective in practice.

APP supports planning for progression in learning and helps teachers to develop their skills and judgements in assessing pupils' progress. It involves generating evidence of progress through effective teaching and learning and then 'stepping back' periodically to review pupils' achievement in relation to National Curriculum levels.



1.2 What are the benefits of adopting APP?

APP is valuable to teachers because it has the potential to enhance pupils' progress by:

- increasing the consistency and reliability of teacher assessment;
- supporting teachers in aligning their judgements systematically with national standards;
- linking day-to-day and periodic approaches to assessment;
- providing high-quality evidence to inform next steps in pupils' learning and reporting on pupils' progress;
- integrating assessment into planning for progression;
- providing a National Curriculum attainment target level when needed, from an informed, holistic evaluation of progress against APP assessment criteria.

School leaders and teachers who have been involved in the APP pilots have reported that the main advantages for a department of adopting APP are that it:

- gives a detailed profile of what a pupil can do in relation to the assessment criteria;
- contributes to improved learning and more responsive teaching;
- contributes to the professional development of all teachers, particularly of less-experienced colleagues;

- helps teachers prioritise areas of the curriculum where teaching and learning need to be strengthened;
- strengthens AfL, and in particular questioning and talk about pupil understanding in lessons.

1.3 How does APP contribute to the AfL Strategy?

APP provides systematic support for the three linked aspects of assessment:

Aspect	AfL Strategy	APP contribution
Day-to-day	Learning objectives made explicit and shared with pupils Peer-and self-assessment in use Pupils engaged in their learning and given immediate feedback	APP encourages recognition of a wide range of evidence from pupils' ongoing, day-to-day work
Periodic	Broader view of progress across subject for teacher and learner Use of national standards in the classroom Improvements to medium-term curriculum planning	APP enables the review of evidence to be systematic by focusing closely on level-related criteria in each of the assessment focuses (AFs)
Transitional	Formal recognition of pupils' achievement Reported to parents/carers and next teacher(s) Use external tests or tasks	APP strengthens teachers' assessments and their understanding of pupils' progress, so that this more formal sharing can be valid, reliable and detailed

The DCSF's AfL Strategy describes how AfL is not an isolated activity but it feeds into the school's cumulative understanding of pupils' achievements. This comes from both day-to-day and periodic assessment, with evidence contributing to an increasingly well-informed, rounded and reliable picture of an individual pupil's performance. APP will support senior leaders in schools to ensure that their approach to AfL is part of a manageable and school-wide system.

1.4 APP – background and future developments

APP materials have been developed through extensive piloting in schools. This has involved the Qualifications and Curriculum Authority (QCA) and the National Strategies and has been funded by the DCSF. National materials are now available for reading, writing and mathematics at Key Stages 1, 2 and 3 and for science and ICT at Key Stage 3.

Further work is underway to develop a consistent approach across subjects and phases. APP materials currently being developed and piloted by QCA are:

- speaking and listening at Key Stages 1, 2 and 3;
- science at Key Stages 1 and 2;
- all other foundation subjects at Key Stage 3.

Further information on the APP approach to teacher assessment is available on the QCA website at www.qca.org.uk/assessment and on the Secondary National Strategy website at www.standards.dcsf.gov.uk/nationalstrategies where, together with support for effective teaching and learning, APP materials for reading, writing, mathematics, science and ICT are available to view and download. Primary APP materials can be found at www.standards.dcsf.gov.uk/primaryframework/assessment/app.

1.5 How to use this handbook

This handbook is for subject leaders and their departments, to help them implement APP effectively in the classroom. Section 2 of this guide provides advice on putting APP into practice and section 3 demonstrates how schools can implement APP. Section 4 outlines the process required to make APP assessments.

The APP pilots have shown that the active involvement of a senior member of their school staff is critical to successful implementation of this approach. An additional leaflet is provided that suggests the initial considerations for the headteacher and school senior leadership team (SLT) when implementing APP. These include the planning decisions required to identify the staff to be involved, their continuing professional development (CPD) and training needs and the activities to secure teachers' assessment judgements through planned in-school standardisation and moderation activity.

2: APP in practice

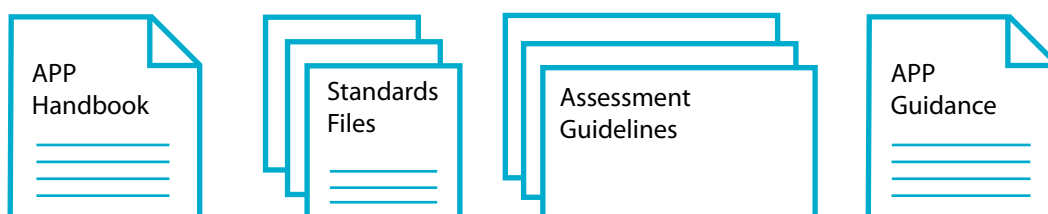
APP has a number of linked purposes.

- The identification through periodic assessment against national criteria of relative strengths and weaknesses in the different assessment focuses (AFs) that can:
 - indicate the next important learning steps for individual pupils (curricular targets);
 - reveal areas of learning that need to be strengthened in a whole class or year group through curriculum changes.
- The planning of specific outcomes for teaching and learning and well-matched assessment opportunities in schemes of learning, to ensure that pupils make two levels of progress over a key stage.
- The periodic assessment of pupils' progress through the assignment of a National Curriculum level at given intervals throughout the key stage to supply secure tracking information.

Achieving these purposes using the APP approach is straightforward.

- At the point of planning for a sequence of teaching, APP is used to identify intended assessment outcomes linked to the Framework objectives being taught, for the range of pupils in the class.
- At regular intervals, planned to fit in with school assessment policy, teachers review pupils' work using APP guidelines to build a profile of their attainment and assign overall levels for science.
- The assessments are used to inform future learning and teaching in class, curriculum planning and provision for additional support and intervention for pupils struggling to make progress.

2.1 The APP resources



There is a range of APP resources available:

- This document, **the APP handbook**, explains the whole-school context for assessment, and introduces APP as a tool for periodic assessment. It provides all of the practical guidance that departments will need to develop and embed APP in science.

- The **Standards Files** are exemplifications of national standards. These will help departments to reach consistent and reliable judgements about National Curriculum levels in science. The Standards Files are described more fully in the Appendix of this handbook.
- The **assessment guidelines** set out level-related APP assessment criteria for science. These are available in two formats. An A3 version covering levels 3 to 8 is available to download from the Framework website. Alternatively, a set of A4 versions, covering two National Curriculum levels on each sheet, is provided with the APP materials. Either version will provide a simple recording format for an individual pupil, containing the assessment criteria for each element of science.
- The **APP guidance booklet** will provide additional support for departments in implementing the APP approach.

2.2 The APP process

The diagram below summarises the sequence of events involved in APP as a series of seven steps. The sequence assumes that teachers will have already participated in standardisation exercises to ensure consistent interpretation of the assessment criteria.



At certain times, the outcomes of Step 5 will be used for the purposes of transitional assessment such as reporting on a pupil's attainment at the end of a school year.

Section 2.3 of this handbook describes each of these steps in more detail.

2.3 APP step-by-step

Step 1: Over a period of time, decide on the outcomes to be assessed and generate evidence of pupils' attainment from day-to-day teaching and learning

As part of the planning of teaching and learning for any class, teachers will identify relevant assessment criteria. Evidence is then generated over a period of time and forms the basis of the APP process of periodic assessment, which involves stepping back from the daily and weekly process of teaching, and assessing progress made across the subject over a longer period – perhaps a whole term.

Step 2: Review an appropriate range of evidence

Teachers will need to take account of a manageable range of evidence to inform and support APP assessments against the APP criteria. Teachers in the pilot project found that open-ended, less scaffolded tasks and activities allowing pupils to demonstrate more independent understanding were a rich source of evidence. Teachers will also need to consider more ephemeral evidence of pupil achievement, such as discussions between pupils and between teacher and pupils. (Note: Additional APP guidance will support this).

Step 3: Select the appropriate assessment guidelines sheet

Each pupil will need an assessment guidelines sheet that will be used to record assessments by highlighting relevant criteria. The A3 version of the guidelines sets out all levels from 3 to 8, making it easier to develop a sense of progression through the levels. Alternatively, the A4 versions of the assessment guidelines each cover two National Curriculum levels, with overlaps. For example, there are forms covering levels 3 and 4, 4 and 5, 5 and 6, and so on. If working with the A4 versions, teachers should choose an appropriate form for each pupil (they should start with a broad idea of the National Curriculum level that a pupil is working from, usually based on prior assessments) so that periodic assessments can build up a profile of the pupil's learning over time. Follow the instructions set out in Section 4: 'How to make APP assessments'.

Step 4: Highlight assessment criteria for which there is evidence

Teachers should now consider the APP criteria in relation to the assembled evidence and highlight the criteria that have been met. For many teachers, it will take time before this process becomes quick and efficient; however, the experience of the pilot project suggests that the process of agreeing levels within the department, based on the guidance in the Standards Files, will help teachers to develop a better feel for levels and progression. The pilot also highlighted the value of inter-school moderation. The Appendix to this handbook contains full guidance on using the Standards Files.

Step 5: Use the pupil's developing profile of learning to decide upon a level and sub-level

As successive assessments are made by highlighting criteria in the table, a profile of learning is established. For each strand shown on the table, a box can be ticked to indicate that a particular level has been reached. Alternatively, 'IE' can be chosen to indicate that there is currently insufficient evidence to judge progress in a particular strand or 'BL' if the judgement is that progress is below level. The periodic judgement can be refined into 'Low', 'Secure' or 'High' within the level.

At intervals, teachers will use the process described in Section 4 of this handbook to arrive at an overall National Curriculum level for individual pupils. This is done by taking into account how independently, how consistently and in what range of contexts pupils demonstrate their attainment across the separate strands. The overall level can be recorded in one of the boxes provided at the bottom of the form.

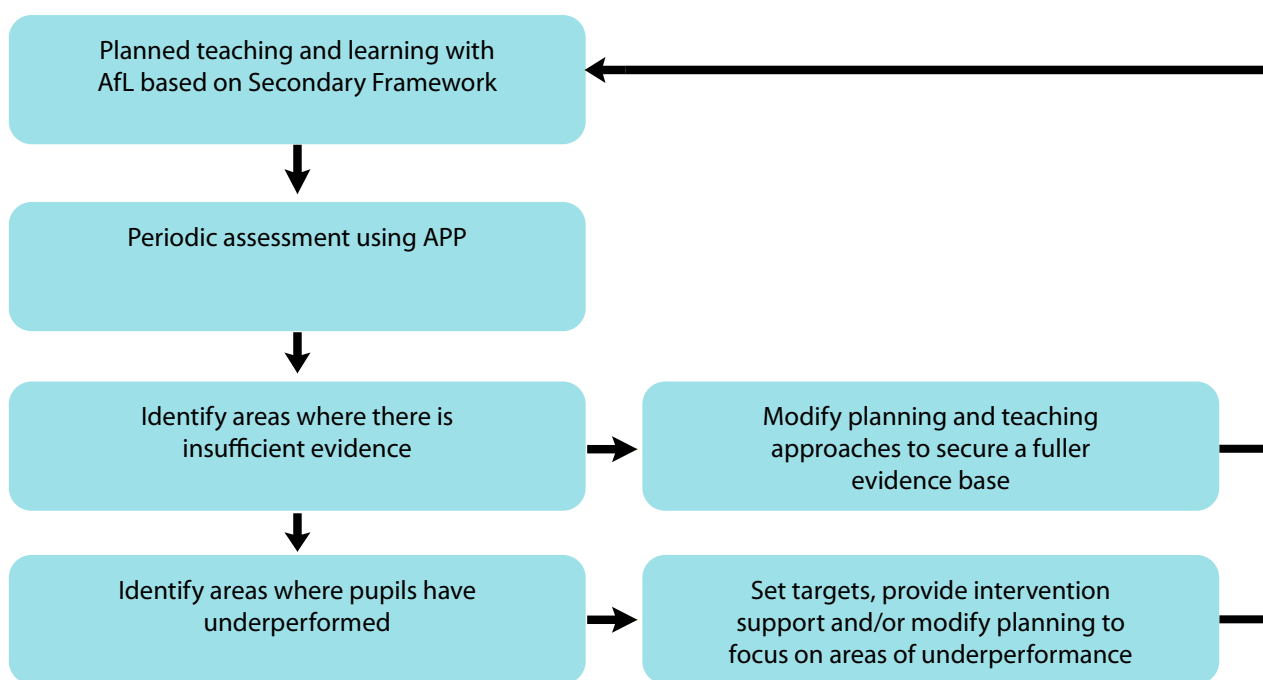
Step 6: Moderate assessments

Assessment against APP criteria inevitably involves a degree of interpretation and professional judgement. Departments will need to ensure that, before they start to use APP, teachers have the chance to become familiar with the assessment criteria, and how these are consistent with national standards (standardisation). Once they begin to make their own judgements, they need to have the chance to explain and justify a sample with other teachers to ensure consistency (moderation). The Standards Files will help both these processes, as explained in the Appendix. Teachers should make regular reference to the Standards Files to strengthen their understanding of the levels across the National Curriculum strands, and to help to resolve ambiguous or borderline assessments. Regular collaborative assessment and discussion is an important means of ensuring that assessment standards across the department are reliable and consistent.

Step 7: Make any necessary adjustments to planning, teaching and intervention

A key purpose of APP is to inform and strengthen planning, teaching and learning. This aspect of APP can have a direct and positive impact on raising standards, and can assist in the personalisation of learning.

The following diagram summarises the key aspects of this part of the APP process:



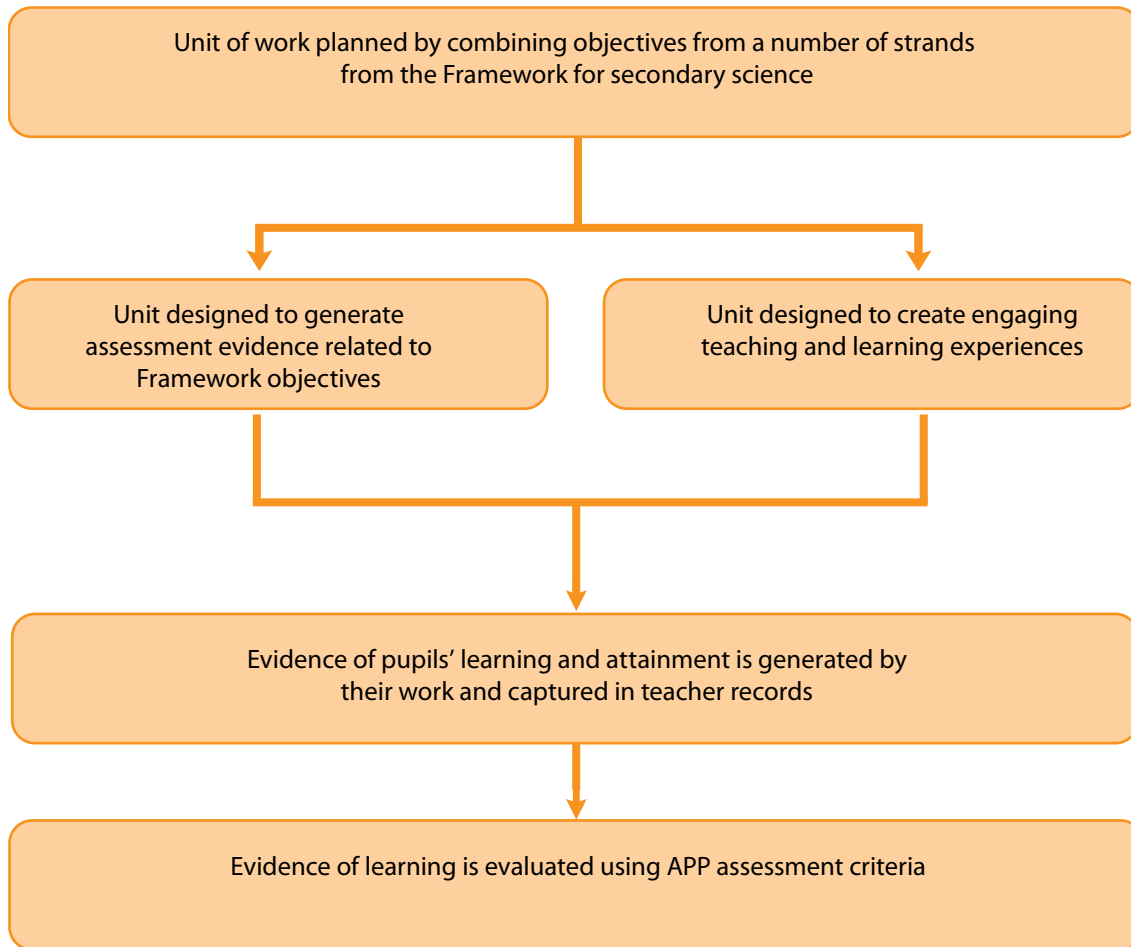
2.4 Relationships between APP, the Secondary National Strategy science Framework and the National Curriculum

The APP assessment criteria are based on the National Curriculum level descriptions and link to the Framework for secondary science.

It is important that planning for teaching and learning is based on the objectives from the Framework for secondary science. This will ensure that pupils have their broad curriculum entitlement as described in the National Curriculum. The APP assessment criteria should be used to assess learning outcomes, not to lead the curriculum.

The assessment criteria do, however, inform planning because teachers need to have an idea of the type of assessment evidence that any sequence of lessons will generate. For this reason, in the Framework for secondary science, the objectives are linked to APP assessment criteria. This allows teachers to see, in advance, the areas and focuses for assessment that their planned unit of work will allow.

This process is represented in the following diagram:



To see the way that learning objectives are linked to the APP assessment criteria, go to:

<http://nationalstrategies.standards.dcsf.gov.uk/secondary/secondaryframeworks>

The following table clarifies the distinction between the learning objectives of the Frameworks and the assessment guidelines of APP:

National Strategy Frameworks	APP guidelines
Based on the statutory programme of study for the subject, each Framework sets out in detail the learning objectives which form the basis for teachers' medium- and short-term planning. The objectives seek to identify progression in the curriculum.	Based on the statutory level descriptions for the subject, the criteria which are set out in the assessment guidelines describe the characteristic performance of pupils at each level within key aspects of the subject.
The Framework objectives are the principal reference point for planning full curriculum coverage of a subject.	The APP guidelines give teachers a basis for periodically considering the available evidence and judging how well pupils have succeeded across the subject as a whole.

National Strategy Frameworks	APP guidelines
While schools and teachers are free to plan a curriculum which will engage their particular learners, the Frameworks specify what needs to be covered within the teaching of a specific subject.	The assessment criteria are sufficiently broad to allow a wide range of evidence to be taken into account. Much of this derives from classroom teaching of the subject but evidence can be drawn from other subjects and from pupils' learning beyond the school.
Framework learning objectives are presented within 'strands'; teachers can use the curriculum progression within these strands to determine the appropriate pitch of the work for pupils of different abilities within the class.	The assessment guidelines provide a structure for looking at the evidence of pupils' learning. They focus on significant aspects of performance in the subject.
Framework learning objectives set out in reasonable detail the knowledge, skills and understanding which need to be acquired in that subject across a period of time.	APP criteria generally describe a small number of features of pupils' work or learning which are characteristic of their independent performance at each level in each strand.
Clarity about the objectives of specific teaching gives pupils a greater sense of purpose and direction. It also provides a strong basis for immediate feedback to the pupil in the specific context of the teaching and learning.	Use of the APP criteria gives teachers and pupils a broader view of learning across the whole subject over a period of time (typically over a term) and across different contexts.
The learning objectives represent the basis of a curriculum experience for every learner; teachers will organise and present them in a variety of ways and pupils in all types of settings will engage with them differentially.	APP criteria are predicated on pupils of all abilities having access to the full curriculum; they allow the variation in pupils' responses to be assessed periodically and they help teachers identify where more work is required in day-to-day learning and teaching and where medium-term planning needs to be adjusted.

3. Implementing APP

Embedding APP practice should not be seen as an end in itself. Rather, the department should be working on reviewing and strengthening all aspects of teaching and learning, using the full range of resources available in, for example, the renewed Framework and the planning toolkits. Within this work, departments should aim to make at least some APP judgements collaboratively, especially during the early stages of implementation. A collaborative approach to strengthening assessment will provide important feedback on the impact of developments in teaching and learning.

There are various ways in which the collaborative development of APP can be organised. For example, time could be allocated within departmental meetings for standardisation and moderation. Other arrangements could be made to suit the needs of particular departments. For example, a newly-qualified teacher might work with a more experienced colleague to review APP judgements made for a particular class, or an advanced skills teacher (AST) could take responsibility for leading APP developments across the department and sharing experiences and expertise with neighbouring schools.

3.1 Steps towards implementation

This section provides guidance to subject leaders and other teachers involved in implementing APP in secondary science departments. It is helpful to think of implementation in terms of the seven steps described in Section 2.

1. Over a period of time, decide on the outcomes to be assessed and generate evidence of pupils' attainment from day-to-day teaching and learning



2. Review an appropriate range of evidence



3. Select the appropriate assessment guidelines sheet



1. Over a period of time, decide on the outcomes to be assessed and generate evidence of pupils' attainment from day-to-day teaching and learning



2. Review an appropriate range of evidence



3. Select the appropriate assessment guidelines sheet



Step 1: Over a period of time, decide on the outcomes to be assessed and generate evidence of pupils' attainment from day-to-day teaching and learning.

APP is a process of periodic review of work already done, not a new assessment event. At the point of planning from the Framework, teachers will need to be aware of intended outcomes and assessment opportunities. The school assessment policy will influence when teachers will make APP judgements, although subject leaders will need to discuss with senior leaders how APP will be developed to complement and strengthen existing assessment practice. As a basic principle the work reviewed in each periodic assessment should cover a range of areas of science and at least one term's progress. This suggests that departments will most likely formalise their judgements termly, allowing meaningful contributions to whole-school pupil tracking programmes. For science departments that are making initial APP judgements, it will be useful to work collaboratively at first, to ensure that all the teachers in the department develop an understanding of the approach and a common interpretation of the APP criteria.

Step 2: Review an appropriate range of evidence

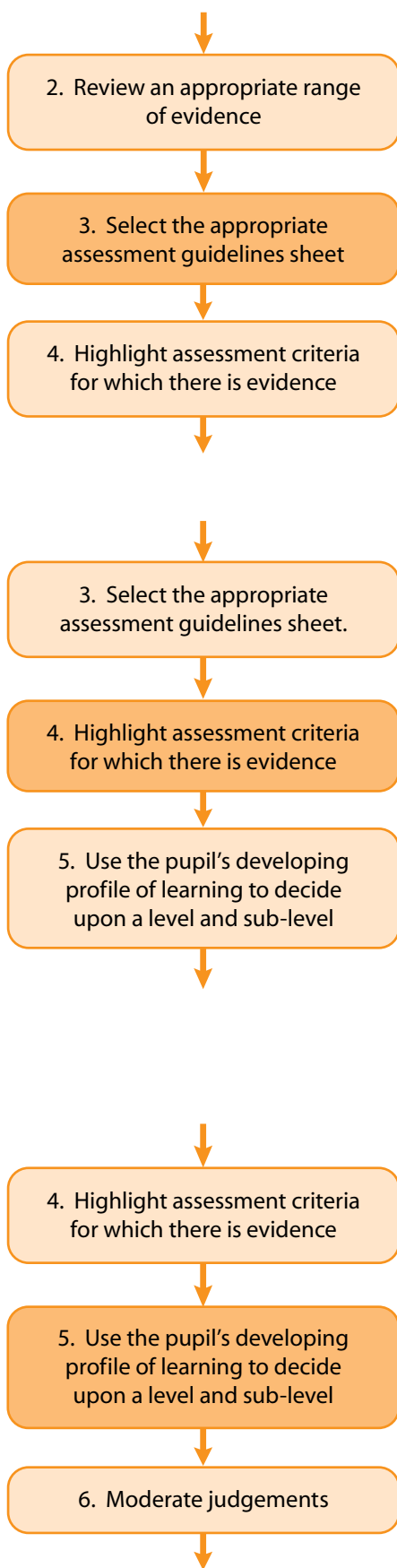
Before departments start to make APP assessment judgements they will need to:

- become familiar with the APP criteria for the relevant levels and areas of science through standardisation;
- identify in planning and teaching the relevant assessment opportunities as necessary to ensure that a full range of evidence is generated;
- be aware of the range of pupil work and records of interaction relevant to the success criteria to be addressed.

These preparatory steps could usefully be tackled over a short series of departmental meetings.

For example, a department might have agreed to work together to make APP judgements for the first term's work in Year 9. The department could then work on these activities to:

- identify the APP assessment criteria that are addressed in the relevant units;
- decide whether the teaching and learning approaches in the existing units allow sufficient scope for generating the relevant evidence. For instance:
 - are there enough opportunities for dialogue and discussion about *How science works* in a range of contexts that can allow teachers to probe pupils' understanding? How will 'ephemeral' evidence of this kind be collected or noted?
 - are there open-ended tasks that allow pupils to demonstrate their independent mastery and understanding of the key areas?
- if necessary, adjust schemes of learning so that evidence that demonstrates pupil performance will be generated and available for moderation purposes.



Step 3: Select the appropriate assessment guidelines sheet

If using the A4 version of the guidelines sheet, teachers can now work together, perhaps in small groups, to select the appropriate assessment guidelines sheet for an initial sample of pupils, based on their knowledge of the approximate National Curriculum levels at which pupils are working. The process of arriving at a reliable APP assessment can be thought of as 'zooming in' on a pupil through increasing levels of detail. At this stage, teachers can use quite general data (such as key stage test results, or science target levels) to decide on a likely level borderline and the appropriate APP form for each pupil.

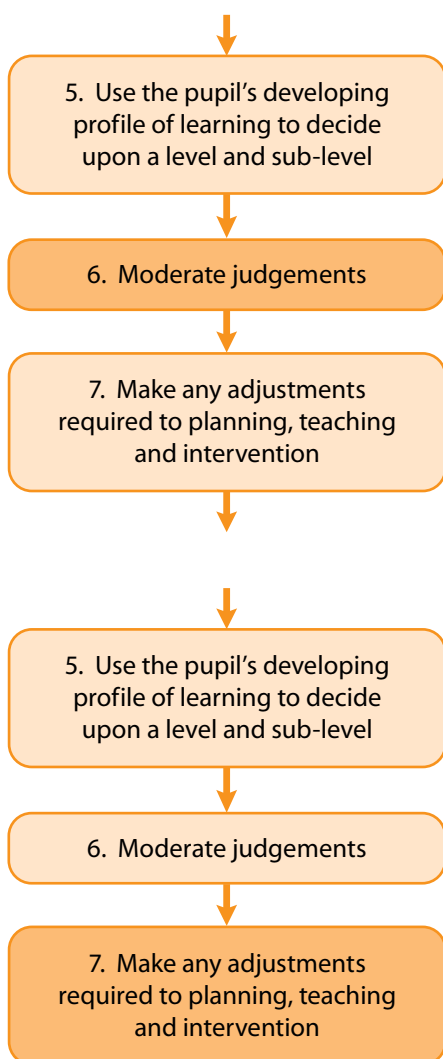
Step 4: Highlight assessment criteria for which there is evidence

This is the crucial stage at which teachers decide what constitutes 'success' for each of the criteria being considered. It is important that all of the teachers in the department develop a secure and consistent interpretation of the APP assessment criteria, so that reliable assessments can be made against national standards. For most departments, developing this expertise is likely to be a major piece of collaborative professional development to be tackled over a significant period of time. It is important that all teachers are involved in a continuing professional discussion in order to reach a consistent interpretation within the department. The Standards Files provide an agreed set of national benchmarks against which the department's judgements can be standardised and then moderated. There is more guidance on using the Standards Files in the Appendix to this handbook.

Step 5: Use the pupil's developing profile of learning to decide upon a level and sub-level

Reaching a reliable level and sub-level is another aspect of the APP process that will benefit from collaborative development. For example, pairs of teachers could work through completed assessment grids from their respective classes, and discuss and decide upon overall levels, using their knowledge of the pupils concerned.

This stage should not be rushed. It may take time before the developing profile of learning shown on the guidelines sheet has sufficient coverage to allow an overall judgement to be made. It is also likely to take time for teachers to develop the confident grasp of the criteria that is required to allow overall judgements to be made.

**Step 6: Moderating judgements**

Moderation activities could form a regular part of departmental meetings. For example, teachers could be asked to present judgements made against APP assessment criteria for a particular pupil, and to justify these judgements using evidence from the pupil's work. The use of the Standards Files to resolve differences of interpretation would be an important aspect of this work.

Most science teachers have experience of moderating and standardising pupils' work from their involvement with GCSE coursework. The skills developed will be very useful when considering APP judgements.

Step 7: Making any adjustments required to planning, teaching and intervention

As the use of APP develops, departments will build up a profile of learning for individual pupils, and will also develop their understanding of patterns of achievement across classes, year groups and units of work.

A continuing focus on moderation and standardisation will be essential to ensure that APP data is accurate and reliable. Providing this happens, APP will provide a wealth of data that will enable departments to make informed decisions about planning, teaching and intervention.

For example:

- where there is a disparity in performance on particular assessment criteria between similar classes following the same scheme of work, the teachers involved could work together, perhaps observing each other's lessons, to identify and share features of effective practice;
- APP data can be used to inform pupil tracking, and to assist early identification of pupils at risk of underachievement, for whom intervention teaching might be appropriate;
- as departments review their schemes of work, APP evidence can be used to help to evaluate the effectiveness of current approaches, and identify areas for development.

4. How to make APP assessments

The table below summarises the process to follow when using APP to make periodic teacher assessment judgements.

Materials required	Process to be followed
<p>You will need:</p> <ul style="list-style-type: none"> ● Evidence of what pupils have achieved independently that is significant and representative. This will cover a wide range of sources which may include photographic, video and verbal evidence, written and illustrative work in a variety of forms and what teachers have observed and heard in the course of day-to-day interaction with pupils. ● Assessment guideline sheets for the pupils to be assessed. ● The Standards Files for reference. 	<p>Stage 1: Making attainment target judgements</p> <ul style="list-style-type: none"> ● Select the appropriate assessment guidelines sheet for each pupil. ● Consider the evidence in relation to the criteria and highlight those which have been met. ● Decide which level offers the best-fit for each AF referring to the Standards Files as necessary, and tick the appropriate level-related box. <p>Stage 2: Making an overall level judgement</p> <ul style="list-style-type: none"> ● Use the profile of attainment as recorded in the assessment guidelines across the individual AFs to decide upon an overall level or sub-level for science. The overall level is the highest level at which all or most of the assessment criteria for each strand are highlighted. This overall level can be refined into low, secure or high sub-levels as follows: ● High – almost all the criteria for the level are highlighted across all AFs, with some criteria in the level above being highlighted for some or all AFs. ● Secure – the large majority of the criteria for the level are highlighted in each AF. There may be a few unmet criteria, but the highlighting shows that the standard for the level has been substantially met across each of the AFs. ● Low – while a significant number of the criteria for the level are highlighted, there are substantial gaps. The pupil is working within the overall level, but there are significant areas that need to be developed further before secure performance at the level is demonstrated. <p>The terms 'Low', 'Secure' and 'High' broadly equate to sub-levels a, b and c for the purposes of recording and tracking data. Rather than being based on a mathematical formula for sub-dividing a level, 'Low', 'Secure' and 'High' reflect the professional nature of the judgements that are made through APP, based on a teacher's consideration of a range of evidence over time.</p> <p>Stage 3: Checking the overall level judgement</p> <ul style="list-style-type: none"> ● Check, standardise and moderate the final judgement against the relevant Standards Files.

Appendix

The Standards Files

The Standards Files for science are a central part of the APP approach to periodic assessment. Their main purpose is to exemplify standards by giving guidance on accurate assessments and acting as a resource and reference point for teachers:

- on assessing pupils' work;
- on diagnosing pupils' strengths and weaknesses;
- for training and professional development purposes.

The files will be used to support teachers making judgements of the standard of pupils' attainment during Key Stage 3. They were compiled over a period of 12 months using evidence supplied by schools which took part in the APP pilot. The current set of files exemplify attainment at a range of levels. This will support teachers in deciding whether attainment is 'High', 'Secure' or 'Low' at each level, by comparison with the examples given. They are based on work undertaken while the 1999 programmes of study were in force, so, do not reflect planning based on the new secondary curriculum which came into force in September 2008. QCA is currently undertaking work with schools to develop new exemplification which will be available in 2009.

Each Standards File includes:

- examples of evidence generated from pupils' work in science, which have been assessed to exemplify the APP approach and show national standards;
- commentary on the evidence for each AF, which leads to a summative judgement on the pupils' work;
- an assessment guidelines sheet that records a profile of attainment across the different AFs in science as well as a National Curriculum level judgement across the subject as a whole.

Pupils' work in the Standards Files

The files exemplify attainment drawn from pupils in Years 7, 8 and 9 at National Curriculum levels 3 to 8. Each Standards File comprises a number of pieces of work. Some of the evidence is written and some of it is in the form of notes made by the teacher when working with the pupils, or when observing them in class. There are also summary notes made by the teacher about what the range of work demonstrates about a pupil's attainment in science. The level of annotation on the work presented in the Standards Files is far more than a classroom teacher would be expected to record. The Standards Files are fully annotated because they need to stand alone – the classroom teacher is not available to discuss what the evidence amounts to and what additionally they know about a pupil's work.

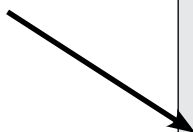
Background information about the context of the work has been kept to a minimum since each collection has been selected primarily to exemplify attainment at a particular National Curriculum level, rather than as an example of recommended curriculum practice. In most cases, the pupils' work in a file represents a small sample of the pupils' output during the period. In each case, the criterion for the size of the collection is the same: how much is sufficient to support a teacher in making a level judgement against each AF?

National standards exemplified

Each collection of a pupil's work is assessed using an assessment guidelines sheet. Three kinds of annotation or commentary may support assessment of the pupil's work.

Assessment summary

These consider all the evidence and provide an overall level judgement



Assessing pupils' progress in science at Key Stage 3

Science Standards File

Pupil A
Year 9
High level 6

Assessment summary

Pupil A works in a set where pupils' attainment ranges from level 5 to level 7. She has strong communication and interpersonal skills, but her conceptual explanations are not yet at the same level. Her teacher assesses her to be working at high level 6, and has identified areas in which she is making some progress towards level 7.

The evidence

- 1 Rates of reaction data evaluation task
- 2 Rates of reaction investigation
- 3 Plants and photosynthesis summary booklet
- 4 Human impact poster
- 5 Presentation on sustainable development
- 6 How scientists affect our lives – homework task

Teacher's notes

Assessment focuses and the context of the pupil's work are shown

1 Rates of reaction data evaluation task**Assessment focuses**

AF3, AF5

Context

Pupils were working on a topic on rates of reaction. As a whole-class activity, the teacher gave them a briefing sheet about an experiment carried out by a fictitious student called Jimmy. Using word processing software, the pupils were required to:

- explain what valid conclusion could be drawn from Jimmy's results
- suggest how Jimmy's procedure could be improved to make it more reliable

Pupil briefing sheet

Evaluation Task

How does concentration of acid affect the rate of reaction?

Jimmy investigated this problem using the following equipment and method:

1.0 M, 2.0 M, 3.0 M HCl, medium sized marble chips, conical flask, bung and delivery tube, 100 cm³ measuring cylinder, 25 cm³ measuring cylinder, beehive shelf, water trough, balance, stop clock

Collect and set up the equipment

Measure 25 cm³ of HCl

Weigh 1.0 g marble chips

Fill the water trough and 100 cm³ measuring cylinder with water

Put the marble chips and acid in the conical flask. Quickly put in the bung with delivery tube and start the stop clock

Stop the stop clock after 1 minute and measure how much gas has been collected

Here are Jimmy's results:

Concentration of HCl (M)	Volume of gas collected (cm ³)
1.0	24
2.0	46
3.0	75

A pupil record sheet is shown on the next page indicating:

1. Highlighted areas where evidence against identified assessment criteria has been gathered;
2. The result of a periodic assessment.

Science assessment guidelines: levels 6 and 7

Name:

	AF1 – Thinking scientifically	AF2 – Understanding the applications and implications of science	AF3 – Communicating and collaborating in science	AF4 – Using investigative approaches	AF5 – Working critically with evidence
Level 7	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Make explicit connections between abstract ideas and/or models in explaining processes or phenomena ● Employ a systematic approach in deciding the relative importance of a number of scientific factors when explaining processes or phenomena ● Explain how different pieces of evidence support accepted scientific ideas or contribute to questions that science cannot fully answer ● Explain the processes by which ideas and evidence are accepted or rejected by the scientific community 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Suggest ways in which scientific and technological developments may be influenced ● Explain how scientific discoveries can change worldviews ● Suggest economic, ethical/moral, social or cultural arguments for and against scientific or technological developments ● Explain how creative thinking in science and technology generates ideas for future research and development 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Explain how information or evidence from various sources may be manipulated in order to influence interpretation ● Effectively represent abstract ideas using appropriate symbols, flow diagrams and different kinds of graphs in presenting explanations and arguments ● Explain how scientists with different specialisms and skills have contributed to particular scientific or technological developments 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Formulate questions or ideas that can be investigated by synthesising information from a range of sources ● Identify key variables in complex contexts, explaining why some cannot readily be controlled and planning appropriate approaches to investigations to take account of this ● Explain how to take account of sources of error in order to collect reliable data ● Recognise the need for risk assessments and consult, and act on, appropriate sources of information 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Explain how data can be interpreted in different ways and how unexpected outcomes could be significant ● Identify quantitative relationships between variables, using them to inform conclusions and make further predictions ● Assess the strength of evidence, deciding whether it is sufficient to support a conclusion ● Explain ways of modifying working methods to improve reliability
Level 6	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Use abstract ideas or models or multiple factors when explaining processes or phenomena ● Identify the strengths and weaknesses of particular models ● Describe some scientific evidence that supports or refutes particular ideas or arguments, including those in development ● Explain how new scientific evidence is discussed and interpreted by the scientific community and how this may lead to changes in scientific ideas 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Describe how different decisions on the uses of scientific and technological developments may be made in different economic, social or cultural contexts ● Explain how societies are affected by particular scientific applications or ideas ● Describe how particular scientific or technological developments have provided evidence to help scientists pose and answer further questions ● Describe how aspects of science are applied in particular jobs or roles 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Identify lack of balance in the presentation of information or evidence ● Choose forms to communicate qualitative or quantitative data appropriate to the data and the purpose of the communication ● Distinguish between data and information from primary sources, secondary sources and simulations, and present them in the most appropriate form 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Apply scientific knowledge and understanding in the planning of investigations, identifying significant variables and recognising which are independent and which are dependent ● Justify their choices of data collection method and proposed number of observations and measurements ● Collect data choosing appropriate ranges, numbers and values for measurements and observations ● Independently recognise a range of familiar risks and take action to control them 	<p>Across a range of contexts and practical situations pupils:</p> <ul style="list-style-type: none"> ● Suggest reasons based on scientific knowledge and understanding for any limitations or inconsistencies in evidence collected ● Select and manipulate data and information and use them to contribute to conclusions ● Draw conclusions that are consistent with the evidence they have collected and explain them using scientific knowledge and understanding ● Make valid comments on the quality of their data
BL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key: BL-Below Level IE-Insufficient Evidence

Overall assessment (tick one box only)

Low 6

Secure 6

High 6

Low 7

Secure 7

High 7

Available science Standards Files

There are currently ten Standards Files. There are two files at each of the four levels between level 3 and 6. In addition, there is one file each for levels 7 and 8. Each Standards File covers evidence of work from all five assessment focuses.

The Standards Files can be downloaded from:
www.standards.dcsf.gov.uk/nationalstrategies

Using the Standards Files

The Standards Files enable classroom teachers to have a common understanding of different levels, and the nature and demands of the different assessment focuses at each level.

There are different ways of using the Standards Files:

- to standardise judgements, i.e. to ensure teachers' judgements are in line with national standards before making assessments;
- as a reference when assessing your own pupils;
- to support moderation activity;
- to clarify what it means to make progress;
- to exemplify the APP approach.

Standardisation materials

To ensure that judgements made by teachers across the science department are in line with national standards and are consistent with each other, the science department could work together on some standardisation tasks:

- each teacher assesses one of their own pupils, and agrees their level judgement with a colleague by comparing and contrasting the pupil's work with that of a Standards File pupil at that level;
- teachers assess the work of one Standards File pupil using a training version with the references to level judgements removed, and then compare their judgements with those in the full Standards File;
- copy one or two collections of work from their own pupils, without any annotation or commentary, and ask colleagues to identify pupils in the Standards Files to which each is closest in performance;
- copy two Standards Files at the same level (e.g. Low 5 and Secure 5) with all the annotations, but take out the assessment summaries, or assessment guidelines sheets, so that groups can discuss and agree which is 'Low' and which is 'Secure'.

Subject leaders and others running training sessions with the department could use selected pupil Standards Files, to illustrate how the principles that underpin the APP model of periodic assessment operate in practice, or to illustrate particular aspects of assessment. Discussion could be focused, for example, on:

- attainment at a particular level in different year groups, or in particular assessment focuses at different levels;
- the range of potential evidence, for example, how much evidence of attainment for a particular AF is required to support a judgement;
- differences between evidence gathered from oral work and writing;
- whether it is harder to find evidence for some assessment focuses than others;
- identifying the next steps in teaching and learning for a particular pupil, or groups of pupils.

Reference

When science teachers are assessing their own pupils they can use the Standards Files for reference:

- as a benchmark when making periodic assessments;
- to compare the performance of pupils at a particular level with exemplars that have been assessed against national standards;
- to check what constitutes sufficient evidence of attainment in an assessment focus at a specific level;
- to refine judgement of what is typical of performance in adjacent levels; for example, comparing two collections of work in the same attainment target, one on either side of a level borderline;
- to check what progression in a particular AF looks like.

Supporting in-school moderation

Moderation activity generally involves a group of teachers reviewing a sample of class teachers' initial assessments, reconciling any disagreements and agreeing a final judgement. The Standards Files are essential tools in this process of bringing differing views to agreement in an evidence-based way that is in line with national standards. Disagreement can be resolved by recourse to the question: *How does the pupil under discussion compare with pupil X or Y from the Standards Files?*

Exemplifying the APP model

Subject leaders and others running training sessions could use selected pupil Standards Files, to illustrate how the principles that underpin the APP model of periodic assessment operate in practice, or to illustrate particular aspects of assessment. Discussion could be focused, for example, on:

- attainment at a particular level in different year groups, or in a particular AF at different levels;
- the range of potential evidence, for example, how much evidence of attainment for a particular AF is required to support a judgement;
- differences between evidence gathered from oral work and writing;
- whether it is harder to find evidence for some AFs than others;
- identifying the next steps in teaching and learning for a particular pupil, or groups of pupils.

Audience: Secondary science subject leaders

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DCSF Publications

PO Box 5050

Sherwood Park

Annesley

Nottingham NG15 ODJ

Tel 0845 60 222 60

Fax 0845 60 333 60

Textphone 0845 60 555 60

email: dcsf@prolog.uk.com

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