Mathematics process categories Form A

PT MATHS 5

All of the UK curricula define multiple categories of mathematical proficiency that require pupils to be able to use and apply mathematics, beyond simple recall of facts and standard procedures. While the intentions are very similar, the terminology varies between regions. *Progress Test in Maths' (PTM)* categories are based on the *Curriculum Aims* in the KS1, KS2 and KS3 National Curriculum for England (2013), also recognising the specific area of Mathematics as described in the Early Years Foundation Stage Statutory Framework (2024). The main change has been to divide 'Fluency' into two strands.

FF: Fluency in facts and procedures

Pupils can, for example:

- recall mathematical facts, terminology and definitions (such as the properties of shapes);
- recall number bonds and multiplication tables;
- perform straightforward calculations.

FC: Fluency in conceptual understanding

Pupils can, for example:

- demonstrate understanding of a mathematical concept in the context of a routine problem (for example, calculate with or compare decimal numbers, identify odd numbers, prime numbers and multiples);
- extract information from common representations, such as charts, graphs, tables and diagrams;
- identify and apply the appropriate mathematical procedure or operation in a straightforward word problem (for example, knowing when to add, multiply or divide).

MR: Mathematical reasoning

Pupils can, for example:

- make deductions, inferences and draw conclusions from mathematical information;
- construct chains of reasoning to achieve a given result;
- interpret and communicate information accurately.

PS: Problem solving

Pupils can, for example:

- translate problems in mathematical or non-mathematical contexts into a process or a series of mathematical processes;
- make and use connections between different parts of mathematics;

- interpret results in the context of the given problem;
- evaluate methods used and results obtained;
- evaluate solutions to identify how they may have been affected by assumptions made.

There is a limit to how thoroughly MR and PS can be assessed in a short, whole-curriculum test such as *PTM*, especially at younger ages where reading and English comprehension restrict the sorts of questions that can be asked. Teachers are urged to ensure that their curriculum includes a balanced diet of extended tasks, investigations, problem solving and collaborative activities.

These tables show how the questions in *PTM*5 map onto these process categories.

Process category	
FF: Fluency in facts and procedures	3a, 5, 6, 8a, 9
FC: Fluency in conceptual understanding	1a, 1b, 1c, 3b, 3c, 8b, 8c, 8d, 10, 12
MR: Mathematical reasoning	2, 3d, 7, 8e
PS: Problem solving	4, 11

Assessment for learning: following up the test activities

Each *PTM* assessment test is designed to align with the mathematics curriculum at a level appropriate for the pupils in the relevant age group. The activities may therefore be used to obtain diagnostic information about each pupil's strengths and weaknesses, and may also be used to provide a basis from which pupils' mathematical understanding may be further developed.

This section discusses some of the ways in which pupils may be helped to improve areas of weakness and to build on what they already know in order to deepen their understanding. These notes cover only a few of the possibilities. In talking to pupils and discussing the activities in which they did well, in addition to those they were unable to complete correctly, you may find approaches that are helpful to them, building on their own strengths and interests.

You will need to refer to the activities in the Pupil Booklet and the Teacher's Script in the At a Glance Guide when reading these notes, as they form the basis of the ideas suggested. The activities are referred to here by both their numbers and their names.

Formative notes on the questions

The standardised total scores on *PTM* give you an indication of the overall performance of your pupils and a basis for progress monitoring. This section is intended to help you identify the specific difficulties that pupils have with individual questions, and to suggest possible activities to help guide your future teaching.

Question 1: Ladybirds

A picture showing 4 ladybirds with different numbers of spots: pupils are asked to compare the numbers of spots, identifying **most** (part a), **least** (part b) and the **same number** (part c).

During classroom practice and activities, ensure regular use of this vocabulary whilst using a variety of manipulatives and pictorial representations with the pupils. For example, whilst outside, encourage pupils to collect varieties of natural objects, ask them which have they collected the most of, least of. Do this through guessing on the size of the collection and through physically counting. If we count up the objects, have we collected the same amount of any?

Question 2: Towers

Pupils need to look at how many cubes are within each tower and work out whether a tower of 2 cubes and a tower of 3 cubes would equal 6 cubes in total. Pupils are asked to circle Yes or No to indicate whether they agree with the statement or not. Pupils are finally asked to circle the **two** towers they think would total 6.

Pupils are being encouraged to use their mathematical reasoning skills in thinking about whether they agree with the statement or not, and to show which two towers they think would total 6.

During classroom practice, regularly encourage the pupils to agree or disagree with mathematical statements. This will encourage pupils to think at a deeper level and be able to explain 'why' they agree or disagree, explaining using mathematical vocabulary.

Question 3: Frogs

A number line of 10 frogs is displayed: pupils need to look at the blank frogs and write in the correct missing number (part a), identify a number **greater** than 4 (part b) and a number **less** than 8 (part c).

Part d displays 3 pairs of frogs with different numbers. Pupils are asked to tick pair/s of numbers that total 10.

This question is encouraging pupils to be confident in using numbers to 10 in different contexts and in using different mathematical vocabulary, which number is missing, greater than, less than and finally, thinking about number bonds to 10.

Number lines are widely used within the classroom setting and can be used in a variety of ways using different question stems such as which number/s are greater than this number etc.

Question 4: Strawberries

This question is concerned with very early division and the concept of sharing equally in the context of strawberries for snack time. The pupils have a picture of 6 strawberries and 2 plates to share equally between the two, through drawing.

Within the classroom setting there will be many opportunities to demonstrate sharing with the pupils; whilst giving out fruit at play time, bean bags during PE and many other resources. Encourage checking of, 'how can we make sure everyone has the same/equal amount?'.

Question 5: Cubes

This question requires pupils to calculate using a mixture of numbers and pictures. Looking at the numeral, pupils are asked to 'take away 3' and determine how many are left. The cubes represent how many are left and the pupils need to draw a line from the numeral to the picture that shows the answer.

Simple subtraction is an early concept introduced during Reception and encouraging pupils to do it in different ways helps to increase and promote fluency. During classroom sessions the use of fingers and resources are frequently used to aid pupils with this process of calculating 'How many are left?'

Question 6: Show me

Pupils are presented with 6 different pictures, containing different amounts. To look for pupils understanding of subitising, they are asked to tick all pictures that they feel show 5.

Again, a variety of manipulatives and pictorial representations can be used to promote fluency of what different amounts look like. Dominoes, dot patterns and hands with different numbers of fingers held up are all useful tools for learning subitising.

Question 7: Number sentences

This activity is asking the pupils to use mathematical symbols of +, - and = in the empty boxes provided, to turn them into number sentences.

Pupils should be familiar with these symbols, understand what they mean and be able to use them within their everyday mathematical learning both whilst at play and during any adult led or initiated activity. Being able to use these symbols within the more formal layout of a number sentence demonstrates a deeper understanding of mathematical reasoning.

Question 8: 10 frames

In this activity, pupils are asked to count the counters in each frame and write the answer in the empty box (part a), then to identify which frame has the most counters (part b) and which has the least (part c).

In part d, pupils are encouraged to make each 10-frame equal to the frame at the top of the page by adding counters. Part e is asking the pupils to tick two 10 frames that make a total of 10.

Many pupils will be familiar with the use of the 10-frame to help organise, distinguish and see relationships and patterns within different arrangements, improving conceptual understanding of number. They can be used within many

different practical activities and are particularly useful when you ask the question, 'show me how you know.'

Question 9: Cakes

Pupils are shown three different plates containing a mixture of cupcakes and slices of cakes; which plates show 10?

Another representation encouraging pupils to see and find pairs of numbers to 10, number bonds. Pupils should be exposed to a variety of different, everyday examples for fluency practice of number bonds to 10.

Question 10: Dominoes

Here the pupils are given five different dominoes and digits; draw a line from the domino to the digit that shows how many dots there are altogether.

Dominoes can be used to demonstrate many different mathematical concepts, but here they are being used to encourage the pupils to complete some simple addition. Dominoes are also a useful tool in practising subitising and therefore it would be hoped that the pupils would be able to identify the different amounts on each side of the domino quickly, so that they can concentrate on the simple addition.

Question 11: Sweets

A picture of identical sweets; pupils need to identify whether they think they could be shared equally or not.

Within the classroom, pupils would be encouraged to at first guess. Just by looking, do they think there is an **equal** amount? A variety of resources could be used to represent the sweets as the main aspect would be to encourage pupils to share them out equally. What would need to happen to ensure it was equal? Really promoting the language use of **'equal'**, **'the same'**.

Question 12: Cube towers

In this last question pupils are shown 5 different towers of cubes; identify the two towers that make a total of 10.

Within the classroom, pupils could be encouraged to make different towers of cubes and experiment with different pairs of numbers that total 10. How could they check they are correct?

Feedback to parents and carers

A report on the individual pupil is available to support feedback to parents or carers. This *Individual report for parents* strips away much of the technical detail that is included in the *Group report for teachers*. A series of statements, tailored for parents, is included to explain what the results mean and how learning may be affected. Recommendations focus on how the parent or carer can work with the school to support the pupil at home.

In addition to the *Individual report for parents*, you may wish to provide supporting information, either orally or in writing, explaining the process and outcomes. The following list provides you with guidelines to assist with this communication.

- Stress the school's commitment to identifying and addressing the needs of each individual pupil in order to understand and maximise their potential.
- Explain that testing with *PTM*5 is part of the school's regular assessment regime and that all pupils in the year group(s) have been tested.
- You may wish to summarise the specific outcomes and recommendations from the test for that individual pupil (which are also shown on the *Individual report for parents*).
- Parents or carers should be reassured that if they have any questions or concerns or would like any further advice on how best to support their child, then they should contact the school.

A sample letter (Figure 1) is provided to support your communications with parents/carers after testing with *PTM*5.

Figure 1: Sample parent/carer feedback letter

Dear Parent or Carer,

In school, we wish to assess all our pupils to see what their needs are and how we can best help them learn and achieve.

As part of this process, your child has completed the Progress Test in Maths 5, which assesses key aspects of maths, such as shape, number and mathematical concepts (like number bonds, subtraction and addition).

A copy of the Individual report for parents is included*. This shows your child's results and describes what these mean in terms of the ways in which they will learn best and how you can support them at home.

[If the report is not included a relevant short extract can be included instead.]

If you have any queries or concerns please contact us.

Yours faithfully,

[School/Establishment name]

* If possible, it is helpful to parents to discuss the report with them on a suitable occasion before sending it out.