

What can be achieved through Question Level Gap Analysis?

Whole School Gap Analysis for Mathematics

- Preferably analyse all year groups that are tested. However, if you need to prioritise due to time, then just analyse KS1 papers and Optional SATs (Y3, 4 and 5). This will give information that can be used with the children still in the school, whereas children who completed the KS2 paper have now left. If time is short omit analysis of the mental papers.
- Analysing KS2 papers can give you information regarding topics which need more teaching time or extra resources.

Input of Data

- Input of data is easiest if worked on in pairs with one person reading from the question papers and one inputting the data. TAs often input the data. It is probably better to do this in short bursts as after a certain point it is easy for errors to appear.
- If you are using PAT software analyse by mark point not topic or Attainment Target. Just analysing by topic or attainment target will give insufficient information.
- Once data input is complete and analysed by mark point you need to use the question level analysis of the papers to highlight strengths and weaknesses.
- Question level analysis for all year groups is compiled annually by the Primary Strategy Numeracy Team in Kent. It is to be found on Kent trust web.
www.kenttrustweb.org.uk/ask → Primary → Maths KS1 and 2 → teacher resources → SATs analysis.
Future papers will be added by the numeracy team as required.
- Print off the question level analysis from cluster web and add the percentages from PAT analysis to the right hand column. This stage could be done by a TA.
- For Y3 and Y4 it is probably easier to add Paper A percentages on one side and Paper B percentages on the other.
- Once you have all the data, the analysis really begins!

Data Analysis

- The actual analysis of data needs to be done by a teacher. The Numeracy Subject leader needs to take the overview and pull out whole school issues but class teachers also need to be involved so they understand the data and why the school is focussing on certain issues.
- As a general guide highlight strengths as questions where 75% or more answer correctly (highlight in green) and weaknesses as questions where 25% or less answer incorrectly (highlight in red). These figures, however, are flexible and are only offered as a guide. The school needs to gain as much as possible from this gap analysis so before highlighting anything please read the next 2 bullet points.
- First look at the year group objective which has been assigned to the question. This is really important to do before applying the 75% and 25% guide. For example, if analysing a Y2 paper and a question covers a Y1 objective then it could still be a cause for concern, even if a much higher figure than 25% answered it correctly. Similarly if on a Y4 paper, a Y5 objective achieved a lower score than 25% then it is not necessarily a cause for concern, and so on.

- Other points to consider when highlighting strengths and weaknesses:
 1. Note how many children took each paper and therefore what percentage each child represents. This is important for Y3 and Y4 where different numbers of children will have completed Paper A and Paper B.
 2. Use the national data provided in PAT as a benchmark for decisions as to whether to highlight questions as a weakness.
 3. In the end of KS1 paper, be aware of who took each paper. Did the more able children take the level 2 paper? Probably different issues will emerge when analysing the Level 3 paper, so note them as strengths and weaknesses for the more able mathematicians.
 4. In Y3 and Y4, there will be percentages to analyse for Paper A and B for the questions which form part of both papers. The two percentages need to be looked at together, but remember to bear in mind how many children took each paper, as the two percentages will probably represent widely differing numbers of children. Again different issues may emerge for the more able children.
 5. Sometimes it will be worth revisiting the paper, as it may be the phrasing of some questions which causes problems and it may not be appropriate to note it as a weakness.
 6. Having completed the highlighting, note down the strengths and weaknesses for each year group. Note down if an objective is highlighted more than once. It is quite helpful if you can note down similar objectives together, e.g. objectives covering shape and space.
 7. Once each year group has been analysed, the Numeracy SL can decide if there are issues emerging for the whole school – or at least across KS2. Objectives need to be grouped under topics to do this. An issue does not necessarily have to emerge in every year group to be considered a whole school weakness. Issues will probably emerge in topics such as place value, subtraction, learning of multiplication facts, division, shape and space, and word problems.
 8. Other issues will emerge which are specific to year groups or groups within a year, e.g. the more able in Y3.

What to do with the analysis

Whole school issues

- Share analysis with all staff including TAs. Do celebrate strengths as well as highlighting weaknesses. Possibly areas of strength may not need so much teaching time, although be careful about this, as children will be moving on to objectives from the next year group.
- Some issues that emerge may be due to a lack of resources for that topic. It might be worth ensuring part of the maths budget is kept back for addressing any resourcing issues.
- Other issues may highlight a need for Inset for the whole school, e.g. division and problem solving.
- Whole school issues could be dealt with through curricular layered target setting. This is most appropriate for issues concerning number and calculation as targets in these areas will make the most difference to a child's mathematical level. (See below for other ways of tackling shape and space)
- If a number of whole school issues have emerged then decide what would be appropriate to focus on for each term taking into account what will be taught in each term. E.g., Place value may be a good starting point for September as this is the focus of Block A. Division may be an issue but it may be better tackled after multiplication facts.

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- It is often more appropriate to deal with shape and space issues in other ways:

E.g.

1. Put in oral starters on shape and space every 2 to 3 weeks even when shape and space is not the focus of teaching to ensure that vocabulary is kept 'simmering.'
2. Ensure staff are using the range of ICT resources available through the Renewed Framework. Using ICT should ensure that children see a far wider range of shapes than would otherwise be available. Children need to see shapes of different sizes, regular and irregular shapes, and inverted shapes. The ITP Polygon is really useful for demonstrating this. Other useful ITPs are Symmetry, Area, Isogrid, Fix points, Co-ordinates and Calculating Angles. A split screen showing the ITP Polygon and a word document showing the relevant vocabulary or the Area ITP (showing a net of a shape) and Isogrid ITP (showing a 3D shape – best shown using at least 2 colours) can be used very effectively.
3. Ensure sufficient shape and space resources are available in the school. Although the majority of shape resources may be stored centrally there should be a selection in each classroom all the time.
4. Give a greater focus on displaying shape and space vocabulary.
5. Place more emphasis on shape and space displays using a mixture of mathematical equipment and 'real life' instances, e.g a 'Toblerone' box

Class specific issues

- Once decisions have been taken on areas to be covered as whole school issues, class teachers need the information for their own classes. Some issues may be addressed in term 6 but all the information needs to be passed on to the teacher taking the class in September.
- This information needs to be taken into account when planning, as it is an assessment of prior learning. It can also influence how much teaching time is given to a topic.
- If curricular target setting is not in place across the school, class specific issues could be dealt with through curricular layered targets.
- Class teachers may need to look at alternative approaches to teaching a topic rather than just repeating the same approach. Are there further models and images that can be used to increase understanding? (Try the ICT resources on the Renewed Framework.) Are there more practical resources that could be used?

Intervention groups

- Whilst doing question level analysis do remember to monitor the results of any children who took part in intervention groups.

Script Scrutiny

- After the gap analysis is completed a useful monitoring activity for the Subject leader can be a small sample script scrutiny discussing questions with the child who took the test to 'unpick' perceived areas of weakness.

And FINALLY.....

Whole school question level analysis in mathematics can seem a tedious process. It is, however, really worthwhile in terms of the information it can provide the school. Although the Numeracy Subject leader is likely to take the lead, it is not solely their responsibility. Input of the data needs to be shared (different schools organise this in different ways) and all staff need to be involved in the analysis (allocating staff meeting time for this is highly beneficial) so they can take ownership of the outcomes. If the issues which emerge seem overwhelming, then prioritise to decide what the school focus will be.

Appendix A

An example of issues emerging from Whole School Gap Analysis

<u>Strengths</u>	<u>Weaknesses</u>
<u>Y2</u>	
Read whole numbers to 100	Time – hour, ½ hour
Using known facts	Measuring length
Fractions	Sorting shapes
Problems – money/ totals	Problem solving with shapes
Handling data – pictograms/bar charts	Problem solving
<u>Y2 More Able</u>	
Place Value and ordering to 1000	Time – ½ hour
Mental calculation strategies	Reading scales
Number sequences	Add/ subtract near multiple of 10
Shape and space	Problem solving – money £ and p
	Problem solving – choose and use operation
<u>Y3</u>	
Handling data	5 times table (highlighted 3 times)
Reflective symmetry	Division (highlighted twice)
	£ and p notation
	Word problems and coins (highlighted 3 times)
	Right angles
<u>Y4</u>	
Use known facts	Multiples of 2,3,4,5 and 10
Multiplication and division	Division (highlighted twice)
Read simple scales	Fractions
Ordering angles	2D shape (Y2 objective)
	Capacity (Y2 objective)
	Handling data – Carroll diagrams/pictograms
<u>More Able</u>	
Use known facts	Reading scales
Decimals	Interpreting data in tables
Finding small difference	Symmetry
Number sequences	Problems – finding all possibilities
Word problems - money	
Time – 12 hour	
3D shape	
Handling data	
<u>Y5</u>	
Percentages	Use symbols < and >
Probability	Squares of numbers up to 10×10

Y5 (continued)	
Reflection	Long multiplication
	Division
	2D shapes
	Nets of shapes
	Right angles
	Perimeter
	Reading calendars
	Temperature

This analysis was done in Term 1 and the following decisions were made:

1. Whole school curricular targets were to be focussed around:

Learning of multiplication facts	Term 2
Numbers and the number system	Term 3
Division	Term 4
Problem solving – money	Term 5

2. It was decided to address shape by having a shape oral starter every 3 weeks concentrating on vocabulary which would be prominently displayed and by addressing it via a cross curricular approach. Staff were also given training on using some of the shape ITPs.
3. Reading scales was addressed by making greater use of the counting stick as a scale and using it vertically and horizontally. In addition bendy counting sticks (made from pipe lagging) were used to represent dials. It was also addressed through the curricular layered target on numbers and the number system and the use of the ITPs: Thermometer, Weighing Scales and Measuring Cylinder.
4. Problem solving was addressed via whole school Inset.
5. Other year group specific issues were dealt with by class teachers.