

Teacher Notes for Activities 1 to 3



Learning Objective

To reason logically, and to identify, create and describe patterns

Materials

Blocks such as Unifix™ cubes or counters in different colours

Focus

To explore making patterns, changing patterns and using patterns and numbers. To have students analyse what makes a pattern and make predictions based on their experiences.

Possible difficulties

- Indiscriminately moving blocks around
- Inability to keep track of what they are trying
- Difficulty in repeating a consistent pattern
- Content to find only one or two possibilities

Extension

- Students can be encouraged to make and describe more complex patterns of their own.

Teacher Notes for Activity 4



Learning Objective

To reason logically and use patterns to represent and solve problems

Materials

Blocks such as Unifix™ cubes, Multilink™ cubes or other counters (For each group, 10 in total: 5 red, 3 blue and 2 green.)

Focus

To analyse problems with a three-dimensional aspect. This extends the previous work with coloured blocks. There are a number of solutions to this problem, and students should be encouraged to explore and try a number of different possibilities.

Possible difficulties

- Only making houses
- Mixing the colours in the apartments
- Not realising that a different order gives a different solution

Extension

- Use the 'Block Street' blackline masters and make up other criteria for students to make streets.
- Take a digital photo of each block street and ask the students to write about their street, listing how many houses and apartments there are.



Learning Objective

To identify and use information in a problem

Focus

These activities explore the reading and interpretation of information to solve problems involving numeration. No addition or subtraction is needed. Students analyse the problem to locate the required information, decide what information is not needed and then use comparison, rather than addition or subtraction, to obtain solutions.

Possible difficulties

- An inability to compare numbers
- Combining all numbers present, rather than seeing that some information is not needed
- Using the cue 'more' to find an answer by adding rather than comparing
- Combining the information about bugs and beetles
- Not determining which information to use first when graphing

Extension

- In pairs, have the students use the problem structure on page 9 to write problems of their own to give to other students to solve.



Learning Objective

To analyse and sort data according to one or more criteria

Focus

These activities explore sets of objects to make decisions about how and what criteria can be used to organise them. Identifying, analysing and writing about the specific criteria to sort objects is needed for students to find solutions. Students should be encouraged to explore and try a number of different possibilities.

Possible difficulties

- Needing help to think of how the objects can be sorted
- Sorting according to only one criteria
- Placing the clothes into drawers but not according to any criteria
- Using two sets of clothes and drawing each of the four hats only once

Extension

- Make an A3-sized display of the animals and write how they have been sorted.
- Discuss whether some of the clothes would be best hung in a cupboard rather than using the chest of drawers.
- Look at a bedroom cupboard and sort what could be hung up and what could go into the drawers.
- Explore what would happen if there were three clothes with four types of hats.

Teacher Notes for Activity 11



Learning Objective

To read, interpret and analyse information

Focus

This activity explores relationships among numbers and uses this analysis to find a number that matches specific criteria. This process encourages students to disregard numbers that are not possible rather than simply look for the ones that are likely to work.

Some students will use the information provided to discard numbers until only the correct number remains. Other students may prefer to try each number in turn against all of the criteria until only one number suits all of the conditions.

Possible difficulties

- Selecting a number only based on the first criteria
- Not using all of the criteria
- Selecting a number only based on the last criteria

Extension

- Students think of a number and make up criteria to match, using similar criteria of between, greater than and smaller than.
- The new problem is given to other students to try and solve.
- Students could start with a one-digit number and then try it with a two-digit number.



Learning Objective

To interpret and organise information in a series of interrelated problem statements

Focus

These activities explore ways to put given numbers into problem situations so that the resulting story makes sense. Students need to read the stories carefully to work out which number goes where. The numbers are not listed in the order they are used in the story. This thinking is then extended so that students think of their own numbers to fit problem situations.

Possible difficulties

- Putting the numbers in the correct order in the story
- Not considering the sense of the story
- Inability to see that there can be more than one answer
- Not taking into account the context of the story when selecting numbers
- Difficulty thinking up their own numbers for a story for it to make sense

Extension

- Students can be encouraged to write further stories of their own and swap them with others in the class to solve.
- Students could write stories with and without numbers.



Problem-solving

To analyse and use information in addition problems

Materials

Counters or blocks

Focus

These activities explore word problems that require addition. Students need to determine what the problem is asking in order to find a solution. Analysis of the problems reveals that more information may be needed.

Counters or blocks can be used to assist with these problems. Students are not simply concerned with basic facts but also about reading for information and determining what the problems are asking.

Possible difficulties

- Inability to identify the need to add to find a solution
- The need to add two different items to get a solution
- Adding all of the numbers written rather than just the numbers required

Extension

- Using the problems on page 23 as a model, have students write simple problems for other students to solve.

Teacher Notes for Activity 18



Learning Objective

To solve problems involving money and to make decisions based on particular criteria

Materials

Some students may need counters, play money or a calculator

Focus

This activity explores the concepts of reading for information, obtaining information from another source (the picture) and using both to find solutions. The problems are about using money, making decisions based on money and comparing amounts of money, rather than addition or mental facts.

Solutions can be obtained using materials and comparison of amounts. The item amounts have been kept small to assist with the problem-solving. Counters, blocks, play money or a calculator can be used if needed. This investigation lends itself to using a calculator and could be used to introduce this tool or to extend work previously completed on a calculator.

Possible difficulties

- Confusion with the \$ (dollar) symbol
- The concept of 'enough money' as opposed to an 'exact amount'
- Not buying different things when necessary
- Thinking the exact amount of \$10 has to be spent as opposed to not spending all that is available

Extension

- Make a list of all the different possibilities of how students could spend their \$10.
- In pairs, have students write other questions about the toy animals.



Learning Objective

To investigate patterns and order and make predictions based on these

Focus

These activities build and extend the earlier activities of using coloured blocks, as well as introduce ordinal numbers as an aspect of forming and describing patterns. Students are required to manipulate items (both real and drawn) to fit particular criteria and determined patterns, including how they relate to ordinal place.

Possible difficulties

- Moving blocks around indiscriminately
- Focusing on the particular positions; e.g. forming a line where the fourth block is red and the seventh block is blue, but without a pattern in between—blocks are just in a line and no pattern is evident
- Difficulty in repeating a consistent pattern

Extension

- Have students make patterns in which three blocks are specified.
- In pairs, have one student decide the criterion for a pattern while the other student makes the pattern.
- In pairs, play a game where one student forms a pattern behind a barrier that stops the other from seeing the pattern. The first student then describes the pattern, using colours and ordinal numbers, to the other student. The second student forms this pattern, as he/she understands it to be, on his/her side of the barrier. When the second pattern has been completed, the barrier is removed and the two patterns are compared.
- Have students use a table to find the results of their car races.



Learning Objective

To organise data and make predictions

Materials

Some students may need materials to assist them

Focus

These activities explore the various ways sandwiches can be made using two different types of bread and one of three fillings. The variations are then recorded. These explorations are then extended to include a larger number of bread types and fillings. In order to manage the possibilities, it is important to organise the data in a list or table, or to use materials.

Possible difficulties

- Not using a table or list to manage the data
- Inability to see that a ham and cheese sandwich is the same as a cheese and ham sandwich

Extension

- Make a class table showing the possible combinations using one, two and three types of bread with the three fillings.
- Explore what would happen with four fillings and the possible combinations.
- Students could list the sandwiches they would choose to make and take to a picnic.

Teacher Notes for Activity 25



Learning Objective

To solve problems involving money and to make decisions based on particular criteria

Materials

Some students may need counters, play money or a calculator

Focus

This activity explores reading for information, obtaining information from another source (a drawing) and using it to find solutions. The problems are about using money, making decisions based on money and comparing amounts of money, rather than addition or mental facts. Solutions can be obtained by using materials and comparing amounts. The item amounts have been kept small to assist with the problem-solving. Counters, blocks, play money or a calculator can be used if needed. This investigation builds on the earlier 'Toy Animals' investigation on page 35. It has the added dimension of a number of items for a particular price while the 'Toy Animals' investigation involved only one item for a particular price.

Possible difficulties

- Confusion with the \$ (dollar) symbol
- The concept of 'enough money' as opposed to an 'exact amount'
- Not buying different things when necessary
- Thinking the exact amount of \$8, \$7 or \$5 has to be spent as opposed to not spending all that is available

Extension

- Make a list of all the different possibilities for the last three questions.
- In pairs, ask students to write other questions about a fruit shop and give them to another pair to solve.



Learning Objective

To organise data and make predictions

Materials

Coloured pencils and counting materials, if needed

Focus

These activities explore the recording of different ways ice cream and chocolates can be organised according to various criteria. In each investigation, there are more cones or boxes than needed. This requires the students to carefully analyse their solutions and to begin to be able to justify their responses.

Possible difficulties

- Colouring all of the cones or boxes, whether or not they are all needed
- Not organising the data and just randomly positioning any combination
- Using the same combination more than once

Extension

- Revisit the problem on page 51 and explore the possibilities of using any combination of flavours, rather than only one scoop of each flavour; e.g. two chocolate and one vanilla.



Learning Objective

To use diagrams, make predications and reason logically

Materials

Drawing materials, including coloured pencils

Focus

These activities explore how many pegs are needed to hang towels in various combinations, as well as exploring the different paths between two points. Students are required to make predictions and use diagrams to gather the information needed to find solutions. The problems could be completed using multiplication; however, they can also be done using a diagram and counting, using addition with counters, calculating doubles or with a calculator.

Possible difficulties

- Putting two pegs on each towel when there should be three pegs per two towels
- Taking only the most direct route and not thinking about all the other possibilities

Extension

- Make a table listing how many towels and pegs are used when there are two pegs per towel and how many are used when there are three pegs per two towels.
- Use several enlarged pictures to show all of the different paths.



Learning Objective

To visualise relationships among two-dimensional shapes

Materials

Square tiles, and grid paper or cut-out squares and shapes

Focus

These activities explore arrangements of squares and other shapes. Spatial thinking, as well as logical thinking and organisation, is involved as students investigate all possible arrangements and extensions. Being able to visualise patterning of this form will assist students in solving many other problems, including number, measurement, and chance and data, as well as other spatial situations.

Possible difficulties

- Not joining squares along a side
- Making only one or two possible shapes
- Inability to visualise the pattern needed to grow a shape
- Only rotating or flipping existing shapes to create duplicates

Extension

- Investigate other shape patterns that 'grow' using different numbers of squares or shapes.

Teacher Notes for Activity 35



Learning Objective

To use visualisation to understand measurement

Materials

Drawing materials, counters

Focus

This activity explores the concept of reading and interpreting information to solve problems involving distance travelled. Analysis of the problems reveals that the distance entails movement back and forth; for example, climbing forward three metres and then slipping back one metre is an actual travelling distance of two metres. Some students may need to draw a diagram or act out each problem to fully grasp the concept.

Possible difficulties

- Figuring out how far was really travelled when moving forward and back

Extension

- Make a table showing how far each animal travelled each day.