Activity 1

COLOURED CUBES

Discussion

This question requires students to visualise how coloured cubes are arranged to form larger cubes. Students need to bear in mind that a cube with a height and width of 2 cubes will have a total of 8 cubes, a 3-by-3 cube will have 27 cubes, and so on – multiplying side x side x side (or side^3) to find the total.

Activity 2

GROWING CUBES

Discussion

Students are asked to extend an arrangement of cubes in a Latin square (where each row and column have exactly one of 3 or more different coloured cubes), to a cube in which each horizontal and vertical row or column have exactly one cube of each colour. Students will need to visualise these patterns to guide their building of the complete cubes and some degree of 'try and adjust' will probably be needed. Students are encouraged to create systematic arrangements as they complete the tasks and describe the pattern of the blocks in the middle of the arrangements. This may lead some students to start with the 3-by-3 cube and build layers all around to complete a 4-by-4 cube. All arrangements would be possible with a single cube at the centre of an arrangement of an odd number of colours, while arrangements made of an even numbers of colours would have a 2-by-2 cube in their centre. The actual descriptions given will vary according to the arrangements chosen for the initial Latin square, but all are essentially the same with different colours occupying different positions.

Activity 3

VIEWING CUBES

Discussion

This set of investigations encourages students to see three-dimensional shapes in terms of the component two-dimensional forms. Viewing from above, the front and one side are sufficient to capture the details of a three-dimensional figure. Another way of providing a plan for a building is to use a grid that tracks the number of cubes in each position of the base.

Activity 4

MARKET DAYS

Discussion

Question 1

For this problem, Lindsay is clearly not actually going to sell half an egg! At each step, there must be an odd number of eggs. When she sells these eggs, they will both get half of the nearest even number and the customer will get 1 extra egg.

Question 2

A diagram can also be used for this question to determine the relationships among the information. Base 10 materials could also be used to model the 170 eggs and how they need to be distributed over the markets so that, at the second market, the number is 10 less than half of the first.

Question 3

This question is similar to the first problem, but this time the seller must add 2 to the number of chickens left to find half of the number he had to sell. Counters or a diagram could readily show this.

Activity 11

DESERT ADVENTURES

Discussion

Students read the information on the page and use it to solve problems. Students who are not familiar with 24-hour time can still do the activity using a conversion table. The investigation can be used to explore the concept of 24-hour time. Students need to read for information from a number of sources and fit this information against set criteria.

There are a number of flights that fit the criteria, with other flights arriving at Uluru either too early or too late. Once a flight has been deemed too late, then others that are later still can be automatically excluded; for example, if the Desert Sand flight at 15 10 would not arrive at Uluru before dinner, then the flights at 15 25, 16 50 and 17 45 can also be ruled out – these flights no longer need to be considered.

Similar thinking can be used for the flights that are too early; for example, catching the Red Centre flight at 09 45 would get to you to the hotel at around 13 05, which is too early. As such, all flights prior to this time would also be too early and can be quickly excluded.

Students need to think in terms of 24-hour time for the flight information, but the before-and-after times of 2 pm and 6.30 pm are in 12-hour time. Students need to take into consideration that 2 pm and 6.30 pm are 14 00 and 18 30 respectively.

The information regarding the taxi and the waiting time at the airport is needed for problem 5 to determine what the latest time to leave home and still arrive at the airport on time is. Some students may try to include this in their travel calculations. The bus leaves the airport every 15 minutes starting at 7 am, which means a bus leaves on the hour and 15, 30 and 45 minutes past each hour. However, if the plane arrives at 14 15, then they will not be able to catch the 14 15 bus as they need to first exit the plane and collect their luggage. Students need to consider this when answering the problem.

Activity 28

USING DESIGNS

Discussion

This page continues the work on area. Rather than using complex calculation to find the area of triangles, students should be encouraged to search for shapes that can be created from the triangles. For example, in question 1, students can form a square with sides 18 m in length from the four triangles. For questions 2 and 3, students need to closely examine the sections of the smaller squares that are shaded. They will soon realise that the different shaded areas complement each other and provide whole squares. The last question uses the thinking that the square is made up of triangles.

Activity 41

SHELLEY BEACH

Discussion

In these questions, the information needs to be carefully analysed to determine the distance of each shell from the starting line, the number of shells that are set out for the race and the distance to run to pick up and return each shell to the bucket, being that only one shell can be collected at a time. Some students may use counters to represent the race and see what is happening.

Another way is to look for a pattern:
4, 4(1 + 2), 4(1 + 2), 4(1 + 2 + 3), 4(1 + 2 + 3 + 4), …
The total must be 4 × the sum of all the numbers 1–50. This result can be found by using a very famous method supposedly first shown by a mathematician named Karl Gauss when he was only a young boy.

Activity 50

COST

Discussion

Careful reading of each problem is required to determine what each problem is asking. With Question 3, one way to solve the problem is to find a common multiple, such as 24. The last question requires students to calculate how many 250-gram packs can be made from 10 kg of cheese and then to use this information to solve how much profit is made over a month.

Activity 52

AREA

Discussion

Students need to be able to visualise the way the shape in Question 1 is made from three squares, each of which is made of four smaller squares. In this way, the shape can be seen as the sum of two large squares and two small squares; or one large square and two shapes made of three small squares; or three large squares with an area of half a large square (or two small squares) removed.

For Question 2, half of the large rectangle is made of two smaller rectangles, each of which contains two small triangles. This means that the smaller triangle must be seen as half of the area of the larger triangle and one-eighth of the area of the whole shape.