Birthday Party Balloons and Guests	
Problem wording	All the guests at Isabel's birthday party get the same number of balloons. In addition, one balloon is attached to the door to show there's a birthday party going on inside. **Identification of specific cases, recognition of structure and formulation of a conjecture** When there are three guests, they need 10 balloons. How did you find the answer? When there are six guests, they need 19 balloons. How did you find the answer? When there are two guests, they need seven balloons. How did you find the answer? **Validating a conjecture** When there are five guests, how many balloons do they need? Why? The teacher should pose the same question for other examples, changing the number of guests. The following numbers are suggested for the specific examples to elude carrying in the additions. Numbers under 20 → - 1, 4, 5, 7, 8, 9, 10 [with which students can count on their fingers]. - 11, 12. Over 20 and less than 100 → - 20, 21, 22, 23, 30, 31, 32, 33. - Multiples of 10 may be easy to work with. Numbers greater than 100 → digits from 0 to 3 only. **Other ways to introduce new specific examples** Choose a number of guests (_____). If Isabel invites that many, how many balloons does she need? Explain how you found the answer. **Generalising a conjecture** If she invites 'lots of' guests how many balloons does she need? If she invites an 'infinite number of' guests how many balloons does she need? How would you explain to Isabel what she should do to find the number of balloons she needs for her party? Is that always the way to find the answer? How do you know?

	Choose a letter to represent 'however many' guests. How many balloons will you need? How can we figure out how many? **Other ways to ask about the general case** If there are R guests, how many balloons are needed? If there are B guests, how many balloons are needed? If there are Y guests, how many balloons are needed? Are the following statements correct? Why? - When there are Z guests, Z+Z+Z balloons are needed. - When there are Z guests, W balloons are needed. - When there are Z guests, 3*Z+1 balloons are needed. - When there are Z guests, Z balloons are needed.
Purpose	• To build on specific cases to discover the rule governing the function. • To apply the rule governing the function to specific numerical cases. • To generalise the functional relationship. • To generalise the functional relationship in cases involving an indeterminate quantity.
Suggestions for classroom delivery	In this task, students should find the functional relationship when given two pairs of values for the variables. Suggested materials include photos of the guests and manipulatives for the balloons to enable students to distribute them and see the relationship between the variables. For instance:  Depending on the number of guests, students may use different strategies to find the number of balloons. Where small, readily represented numbers are involved, they may prefer to count on their fingers or add. Numbers over 10 induce multiplicative strategies. If students generalise the relationship as 3x+1, the teacher may challenge them by changing the data saying for instance: 'If they put two balloons on the door, what would you do to find the number of balloons they need?' The teacher then asks them to relate the two datasets and propose a conclusion.

	Students should be encouraged to arrange the data in tables, which helps them recognise regularity.