T-shirt Sales	
Problem wording	Carlos wants to earn money selling T-shirts with the school's emblem to go on a trip with the rest of the class. He earns 3 euros for every T-shirt sold. **Identification of specific cases, recognition of structure and formulation of a conjecture** 1. Small groups of students are asked to try to answer the question: How much can Carlos earn? The idea is for students to propose specific and/or general examples or cases and formulate a conjecture on the relationship between the number of T-shirts sold and the amount of euros earned. **Validating a conjecture** Write a 'T' after the following statements if they are true and an 'F' if they are false. Explain your answer. When you think a statement is false, correct it by changing whatever is necessary. 2. When Carlos sells 5 T-shirts, he earns 10 euros. 3. When Carlos sells 23 T-shirts, he earns 69 euros. 4. When Carlos sells 1000 T-shirts, he earns 3000 euros. 5. When Carlos sells 1 000 000 T-shirts he earns 4 000 000 euros. **Generalising a conjecture** 6. Carlos earns double the amount of euros as the number of T-shirts he sells. 7. When Carlos sells Z T-shirts, he earns 3xZ euros. 8. When Carlos sells Z T-shirts, he earns N euros. **Other ways to ask about specific examples** 9. Carlos sold another 20 T-shirts, so he earned another 60 euros. 10. When Carlos sells double the number of T-shirts, he earns double the mount of euros. **Exploring the inverse relationship** 11. Carlos earned 18 euros, so we know he sold six T-shirts. 12. Carlos earned 150 euros, so we know he sold 60 T-shirts. 13. Carlos wants to earn 900 euros, so he needs to sell 300 T-shirts. 14. Carlos needs to sell a number of T-shirts equal to one-third of the amount of euros he wants to earn. 15. Carlos wants to earn Z euros. That means he must sell Y T-shirts. 16. Carlos wants to earn Z euros. That means he must sell Z T-shirts.

<table>
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Additional activity

Make up your own true-false statements about the number of T-shirts Carlos sells and the money he earns. Say whether the statements are true or false and explain why.

Fill in the table (which should include direct and inverse relationships)

The table below gives some information on the number of T-shirts Carlos sells and the money he earns. Fill in the blanks.

<table>
<tr><th>Number of T-shirts sold</th><th>Euros earned</th></tr>
<tr><td>3</td><td></td></tr>
<tr><td>4</td><td></td></tr>
<tr><td></td><td>18</td></tr>
<tr><td></td><td>30</td></tr>
<tr><td></td><td>30</td></tr>
<tr><td>20</td><td></td></tr>
<tr><td>32</td><td></td></tr>
<tr><td>50</td><td></td></tr>
<tr><td></td><td>3 x 100</td></tr>
<tr><td></td><td>600</td></tr>
<tr><td>900 : 3</td><td></td></tr>
<tr><td></td><td>3.000</td></tr>
<tr><td>N</td><td></td></tr>
<tr><td></td><td>3 x Y</td></tr>
<tr><td>Z : 3</td><td></td></tr>
<tr><td></td><td>D</td></tr>
</table>

</td></tr>
<tr><td>Purpose</td><td>

- 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.

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<tr><td>Suggestions for classroom delivery</td><td>

The tasks proposed are meant to be performed in more than one classroom session. Students should first work on the direct (amount of euros earned knowing the number of T-shirts sold) and secondly on the inverse relationship. They should then establish how the two are inter-related.

If students have never worked on tasks involving a function, the idea may be introduced by exploring specific examples. They should be encouraged to identify the variables (number of T-shirts and amount of euros) and the relationship between them. The examples posed should involve both numbers easy to work with and large, difficult numbers. Even where unable to find the result of the operation, some students may express the relationship.

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	As students' earliest written responses may be brief and imprecise, their written exercises should be pooled in a full classroom session. The clarity of the explanations and the precision of the mathematical vocabulary should be assessed. The outcome should be a collective text with which students learn to reason clearly and precisely. When asked to create their own true/false statements, students should be reminded to relate them to the context. A variation on this task would be to ask them to challenge a classmate to answer their true/false statements and then discuss between them whether the answer is right or wrong. When completing the two-column, table students may systematically apply the direct relationship, even when filling in cells in the number of T-shirts column, which is wrong. In that case, students should be guided to reason correctly, reading the column headings jointly and posing key questions when filling in the empty cells, such as: I know Carlos sold three T-shirts, how can I find how many euros he earned?, or I know Carlos earned 18 euros, how can I find how many T-shirts he sold?