

## Teacher Notes

### Introduction

Pupils can work on this problem individually or with others.

- They can discuss how to break the problem into manageable steps to help them:
  - calculate the cost of the extension;
  - work out the maximum cost of the additional expenses; and
  - calculate the profit as a percentage of the buying price.
- They can compare approaches and agree how to communicate their response using mathematical notation.

This problem deals with a pupil's ability to calculate the profit from selling an apartment as a percentage of the original buying price after considering the cost of adding an extension that requires area calculations.

### What I know (think)

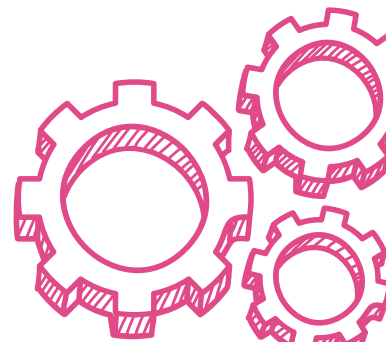
The pupils should know from the given problem:

- Amelia is a property developer and has seen an apartment for sale that costs £115 000.
- She is considering buying it and adding an extension to increase its value.
- There is a plan of the apartment, which includes the extension Amelia wants.
- If the apartment had the extension, it would be worth £145 000.
- The extension will cost £1500 per square metre, plus up to an additional 20%.
- Amelia wants to make a profit of between 6% and 8% from selling the apartment with the extension added.

### What I need to know (identify)

Pupils need to identify:

- how much profit could be made from selling the apartment excluding the cost of the extension;
- what the area for the extension in square metres is;
- how much it would cost to build the extension, with and without the additional expenses;
- what the profit would be including the cost of the extension, with and without the additional expenses; and
- what the profit would be as a percentage of the buying price, with and without the additional expenses.



# Property Developer (Continued)

## What I need to do (employ)

Pupils may choose to approach the problem using their own steps and strategies, but they should arrive at the same expected conclusion as shown in the solution. This approach shows how pupils could employ their mathematics:

First, pupils work out how much profit could be made from buying and selling the apartment:

- They subtract the price Amelia would pay for the apartment from the price she would sell it for (£30 000).

Second, pupils calculate how much the extension could cost:

- They determine the width and length of the extension from the plan and multiply the dimensions together to get the area.
- They multiply the area by the cost per square metre to find the cost of the extension, without the additional expenses.
- They multiply the cost of the extension by 1.2 (or other suitable method for adding 20%) to find the cost including the maximum additional expenses.

Third, pupils calculate the possible profits from selling the apartment including the cost of the extension:

- They subtract the cost of the extension without the additional expenses from £30 000.
- They subtract the cost of the extension with the maximum additional expenses from £30 000.

Fourth, pupils calculate the profits as a percentage of the buying price:

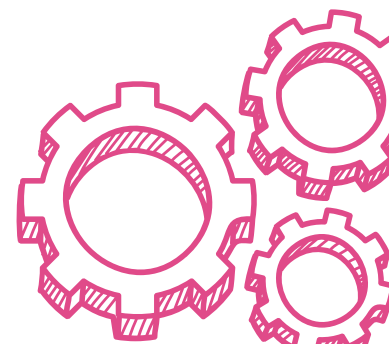
- They divide the profit without the additional expenses by the buying price and then multiply by 100, and round appropriately.
- They divide the profit with the additional expenses by the buying price and then multiply by 100, and round appropriately.

Fifth, pupils determine whether Amelia should buy the apartment based on their calculations and her desire to make a profit of between 6% and 8%:

- They use mathematical language and notation to communicate their decision and support their decision with an appropriate argument.
- They take into account the possible profit depending on how much Amelia might need for additional expenses.

Additionally, pupils could calculate the percentage of additional expenses that will make a profit of 6%. Pupils do not need to do this but it would help to support their argument:

- They multiply the buying price by 0.06 (or other suitable method for finding 6%).
- They calculate the total cost of the extension by subtracting their answer from £30 000.
- They calculate the additional cost of the extension by subtracting the total cost of the extension from the cost of the extension without any additional costs.
- They divide the additional cost of the extension by the cost of the extension without any additional costs and multiply by 100.

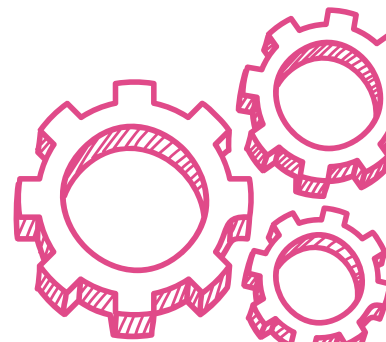


# Property Developer (Continued)

## What I did (review)

Pupils will use self-assessment, peer assessment or teacher feedback to decide whether they have approached the problem as intended.

- Did they work out how much profit could be made from buying and selling the house, excluding the cost of the extension?
- Did they calculate the area of the extension?
- When they had calculated the cost of the extension did they consider the cost with and without the additional expenses?
- Then, when they calculated the profits, did they consider the cost with and without the additional charges?
- When they calculated the profits as a percentage did they calculate them as a percentage of the original buying price?
- Did they provide a suitable argument for why Amelia should or should not buy the apartment, based on her expectations and their calculations?



# Property Developer (Continued)

## Curriculum Objectives

This problem should enable pupils to demonstrate their knowledge, understanding and skills through:

Developing pupils as individuals	<p><b>Demonstrate an ability and willingness to develop logical arguments</b></p> <ul style="list-style-type: none"> <li>Pupils will draw on their work and Amelia's profit margin to argue why Amelia should or should not buy the apartment.</li> </ul>
Developing pupils as Contributors to Economy and the Environment	<p><b>Explore how the skills developed through mathematics will be useful to a range of careers:</b></p> <ul style="list-style-type: none"> <li>Pupils will explore what calculations a property developer may make when deciding on whether to invest in property or not.</li> </ul> <p><b>Apply mathematical skills in everyday financial planning and decision making:</b></p> <ul style="list-style-type: none"> <li>Pupils will demonstrate how to make appropriate financial decisions based on a profit percentage margin and associated costs for developing a property.</li> </ul>

## Thinking Skills and Personal Capabilities

This problem can provide an opportunity for pupils to demonstrate a variety of the following Thinking Skills and Personal Capabilities:

Managing Information	<ul style="list-style-type: none"> <li>Plan and set goals and break a task into sub-tasks</li> <li>Communicate with a sense of audience and purpose</li> </ul>
Thinking, Problem-Solving and Decision Making	<ul style="list-style-type: none"> <li>Justify methods, opinions and conclusions</li> <li>Examine options and weigh up pros and cons</li> <li>Generate possible solutions, try out alternative approaches and evaluate outcomes</li> </ul>
Being Creative	<ul style="list-style-type: none"> <li>Experiment with ideas and questions</li> <li>Learn from and value other people's ideas</li> <li>Take risks for learning</li> </ul>
Working with Others	<ul style="list-style-type: none"> <li>Listen actively and share opinions</li> <li>Suggest ways of improving their approach to working collaboratively</li> </ul>
Self-Management	<ul style="list-style-type: none"> <li>Seek advice when necessary</li> <li>Review learning and some aspect that might be improved</li> <li>Organise and plan how to go about a task</li> <li>Focus, sustain attention and persist with tasks</li> </ul>

## Cross-Curricular Skills

This problem should enable pupils to demonstrate a variety of the following Cross-Curriculum Skills:



Using Mathematics

