



**Greenwood College
Year 12 Applications
Investigation 1 2019
Windows Problem**

Worth 5% of your year mark.

You have completed the study of bivariate data analysis in Unit 3. The purpose of this investigation is to apply what you have learnt in solving a problem.

Frank is given a sheet containing windows drawn to scale and their price from a UK company (see page 2).

He wants to know how the window company arrive at the prices shown inside the windows.

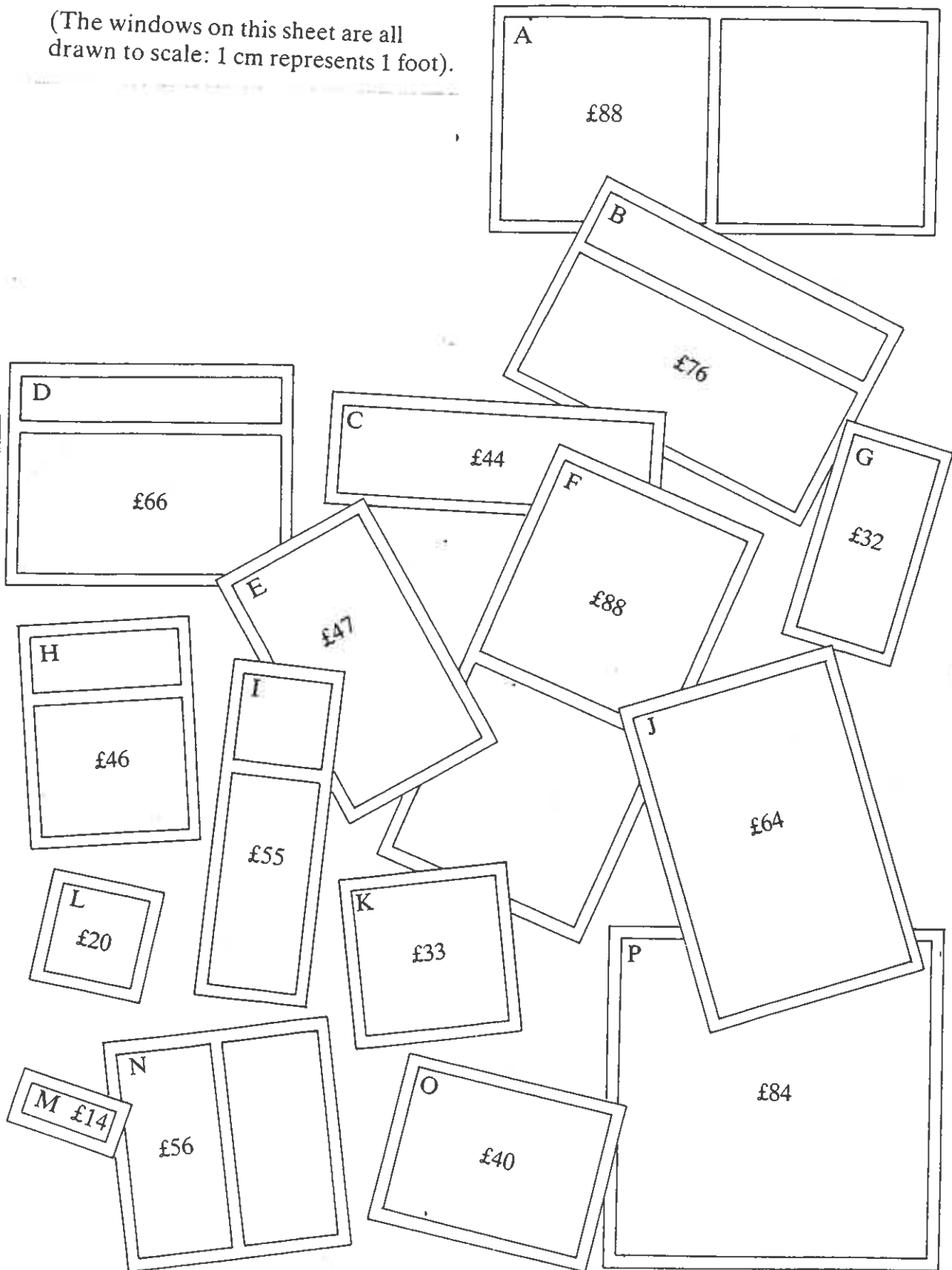
Frank is told that one of the windows has an incorrect price and he needs to determine the correct price.

Your job is to solve both problems and then submit a report to Frank.

Your report should have the following main headings: Clarify; Choose; Use; Interpret; Communicate. Use the Greenwood College 5 stage mathematical problem solving process when solving the problems and writing your report.

Your report is due by Tuesday the 9th of April 2019 (midnight). A hard copy can be given to either Mr Matkowski or Ms Hollis. It can also be emailed to ed.matkowski@education.wa.edu.au

(The windows on this sheet are all drawn to scale: 1 cm represents 1 foot).



Greenwood College
5 Stage Mathematical Problem
Solving Process

The 5 stages for solving any mathematical problem is...

- (1) Clarify the problem.
- (2) Choose the maths to solve the problem.
- (3) Use the maths to solve the problem.
- (4) Interpret and check the solution to a problem.
- (5) Communicate an obtained result.

Now to look at each section in detail.

- (1) Clarify the problem.

What does it actually mean to clarify a problem?

It means asking questions like:

What do I know?... what information can I get from the wording of the problem?

What assumptions can I make about the context of the problem? Are these valid assumptions?

What am I being asked to find out?

What will I need to find out?

(2) Choose the maths to solve the problem.

How do I find out the information I need with which to solve the problem?

What maths will I need?

How do I present my result?

What words will support my maths; will a whole pile of calculations or figures be useful – how should I organise these?

If more than one mathematical way can be used to solve this problem, which is going to be the most appropriate (In making this choice I know that I may have to reconsider once I complete the maths if my result doesn't make sense).

(3) Use the maths to solve the problem.

The **using** part of the strategy will probably be less difficult for you to learn since this is what you probably always thought maths was about. In the past your teacher would have made the decisions about what maths to use and you carried out the task. Here you will carry out the task based on the decisions you have made about which maths to use. You will carry out calculations or organise information in a way that will help you make decisions as part of solving the problem.

(4) Interpret and check the solution to a problem.

Interpreting the results you have obtained is a very important part of the problem solving process. Many students often think the problem is finished "once the maths has been done". Interpreting is really about looking objectively at the results obtained from the maths you have just carried out. Many students get very defensive of their work and find it hard to critically look at their answers. They like to think they are right because the work they have done "belongs to them".

Sometimes it is easier to do this if you either pretend it is somebody else's work or if you actually look at somebody else's work instead of your own.

You should ask questions such as:

What does all that I have done mean? So what?

Do my results seem reasonable? Why?

Is the maths I have done correct or have I made errors?

The maths I have chosen the best? Does it tell me what I want to know or will I have to go back and choose and use maths again? Why?

Are there any other factors that could have influenced my results? Are there factors that I didn't consider and should have?

(5) Communicate an obtained result.

What is the best way of communicating my results in such a way that will make them easy to read and interpret? Should I use a letter, chart, oral presentation or some other format?

What did I set out to do?

How did I do it?

What results did I come up with?

Did I have to redo anything? Why?

What would I have done differently if I did it again?

What assumptions did I make in clarifying the problem? In hindsight, were these valid?



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Windows Problem
Marking Key**

Name

Problem

Mention finding the incorrect priced window and determining how the windows are priced.

/2

Listing three realistic assumptions (cost of glass per ft² or framing per ft is the same, the cost of manufacturing is not considered,...)

/3

Choose

Listed the maths you are going to use (measuring, table, graph, correlation co-efficients, line-of-best-fit,...).

/3

Use

There were three methods students used to determine the window which was not correctly priced (outlier).

1. Removing one window and re-calculating the correlation co-efficient. Removing the outlier window will result in an increase in the correlation co-efficient.
2. Using lines-of-best-fit and residuals. The outlier window will have the largest residual.
3. Calculating and comparing price/area (or price/total framing).

Providing a table of window measurements.

/4

Drawing scatter-plots.

/4

Providing correlation co-efficients.

/4

Providing lines-of-best-fit.

/4

Determining that window I was the outlier.

/2

Re-calculating the price of window I.

/2

Determining how the windows are actually priced. The price of a window is found by adding the area of the glass and twice the total framing.

/4

No calculation evidence max 2.

Interpret

Discussion of reasonable results/errors.

/2

Discussion of whether your approach was the best.

/2

Mention of other factors that could have influenced your results.

/2

Communicate

Repeat aims, method and results. /2

Discuss improvements if you had to do this project again (e.g. combine all windows together rather than separate into one-window and two-window frames,...) /2

Mention of revising original assumptions. /2

Total	/44
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