Plumbers' prices – Teacher notes

Activity description

This activity can be used to introduce simultaneous equations and their solution using a graph. The worksheet gives instructions for drawing graphs using formulae in Excel and solving simple simultaneous equations by finding the point of intersection.

A second example, giving less help, is included for extra practice.

Suitability

Level 2 (Intermediate/Higher)

Time

1–3 hours

Resources

Student sheets
Optional: slideshow

Equipment

Computers (with Excel), printer

Key mathematical language

Formulae, simultaneous equations, gradient, intercept, point of intersection.

Notes on the activity

Students need to be familiar with Excel. In particular they must know how to enter spreadsheet formulae, use 'fill-down', and draw and format a graph using the scatter graph option.

The 'Hire a coach' activity can be used first to introduce linear graphs, then 'Plumbers' prices' used as an extension if you wish.

During the activity

Each student, or pair of students, will need a computer.

Points for discussion

If necessary, explain to students how the information about each scenario leads to the given formulae.

Discuss the answers to the 'Think about' questions on the student sheets, and ask students to suggest advantages and disadvantages in using the table of values and graph to answer such questions.

Discuss the significance of the intercept and gradient of each line and the point at which they intersect.

Extensions

Follow-up work could include comparison of gradients and intercepts, drawing graphs by hand, more difficult equations requiring transposition, and the solution of simultaneous equations by algebraic methods.

Answers

Some of the answers given below were found using algebraic methods. Allow less accurate answers from graphs.

Plumbers' prices page 1

1 $C = 19.8 + 32h$

Plumbers' prices page 3

3a £161.75, £179.80   **b** £71.63, £67.80
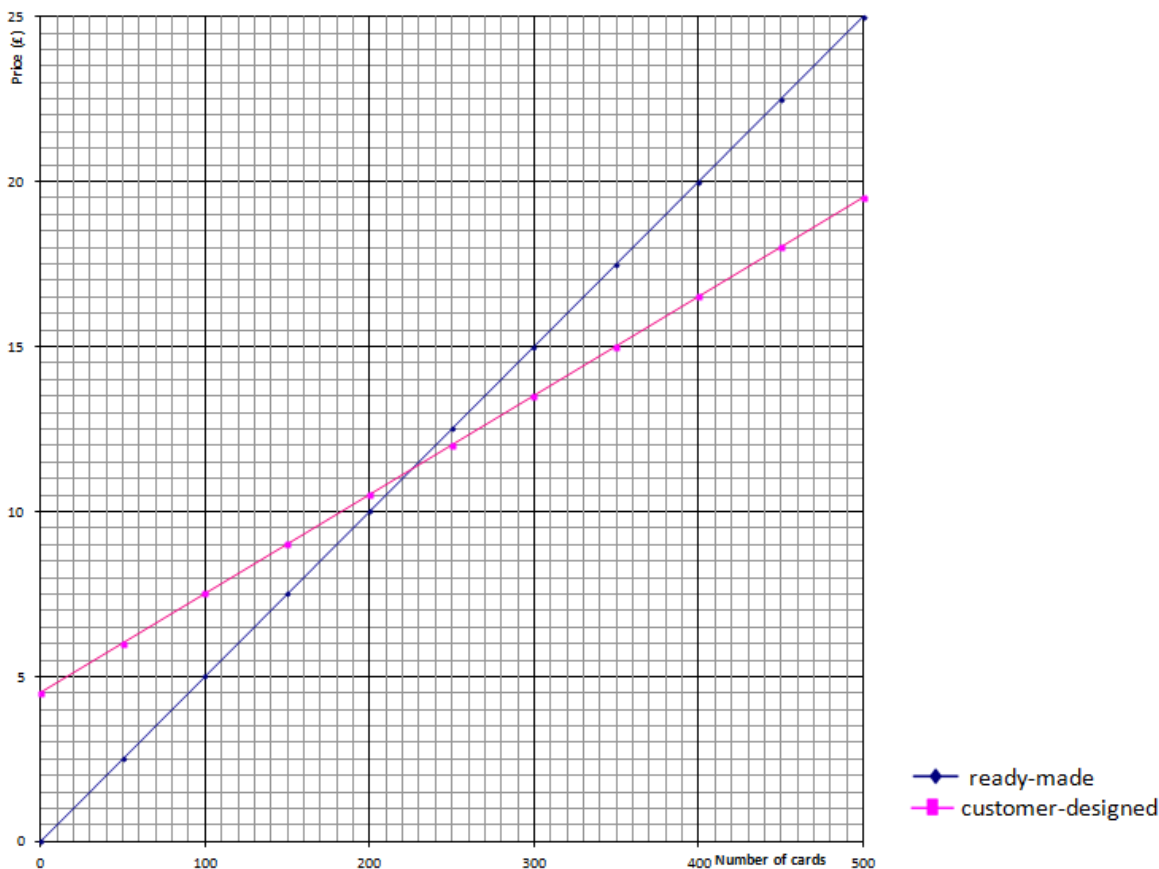**3c** £219.69, £251.80   **d** 2.1 hours, £87.40

Invitations page 4

1 $P = 0.05n$ $P = 4.5 + 0.03n$

3 See the graph below and the Excel spreadsheet provided.

Price of invitation cards

Plumbers' prices page 5

4a £6, £8.10   **b** £18.50, £15.60   **c** 225, £11.25