



Exemplar 5 :

Scatter Diagram

Objective : To construct and interpret scatter diagrams by using a spreadsheet programme

Learning Unit : Construction and Interpretation of Simple Diagrams and Graphs

Key Stage : 3

Materials Required : Spreadsheet programme - *Excel* and the file dh05_e.xls

Prerequisite Knowledge : Meaning of a scatter diagram

Description of the Activity :

1. The teacher distributes the worksheet to students.
2. Students work individually on drawing the scatter diagrams from the data on the graph paper provided in the worksheet.
3. After drawing the scatter diagrams, students compare their diagrams with their classmates and discuss whether a relation exists between the marks of the different subjects.
4. The teacher can invite some students to report their results to the class. Explanations should be given by the students to support their answers.
5. Students open the *Excel* file dh05_e.xls containing a table of the marks of the subjects. Students then draw the scatter diagrams of the marks of the other subjects as instructed in the worksheet.
6. Students are asked to draw conclusions from the scatter diagrams on the relations on the marks of the subjects concerned.

Worksheet :Scatter Diagram

The marks of 25 students in the examination are shown in the table below.

Student Number	Subject (full mark is 100)				
	Chi	Eng	Math	Phy	Chem
1	49	42	22	25	31
2	44	47	33	23	42
3	62	53	58	56	53
4	46	28	45	19	25
5	51	35	52	45	52
6	73	65	78	64	66
7	43	46	43	51	47
8	69	51	73	62	68
9	54	42	59	58	54
10	53	43	44	35	36
11	60	57	64	57	48
12	41	29	56	46	56
13	63	35	55	43	45
14	49	48	58	47	63
15	37	41	53	38	42
16	71	58	41	28	28
17	75	44	60	48	57
18	56	62	37	26	34
19	54	32	51	42	36
20	53	45	50	34	40
21	67	46	61	49	45
22	76	54	40	50	44
23	52	31	46	36	33
24	50	36	37	18	36
25	83	53	65	53	48

Key: Chi = Chinese

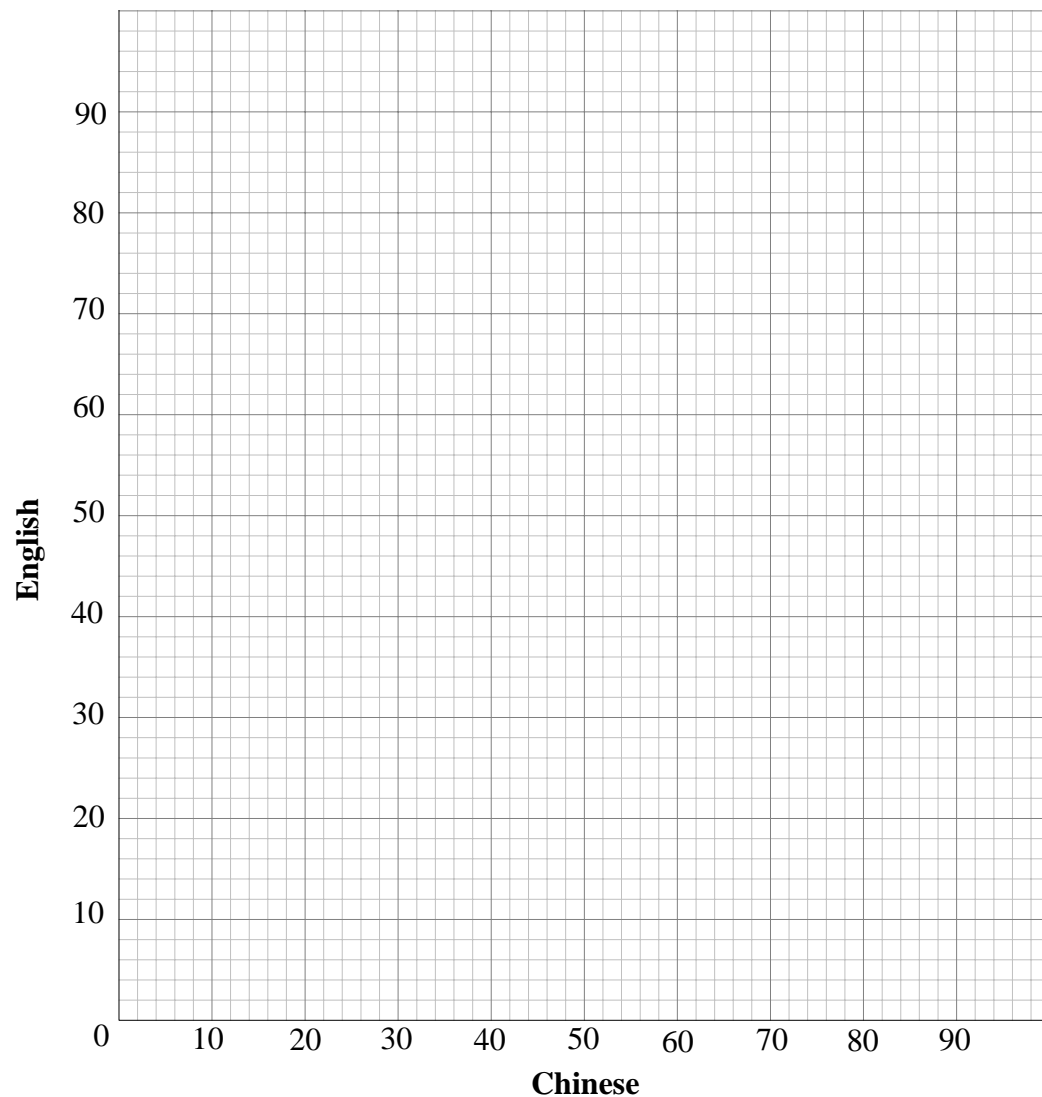
Eng = English

Math = Mathematics

Phy = Physics

Chem = Chemistry

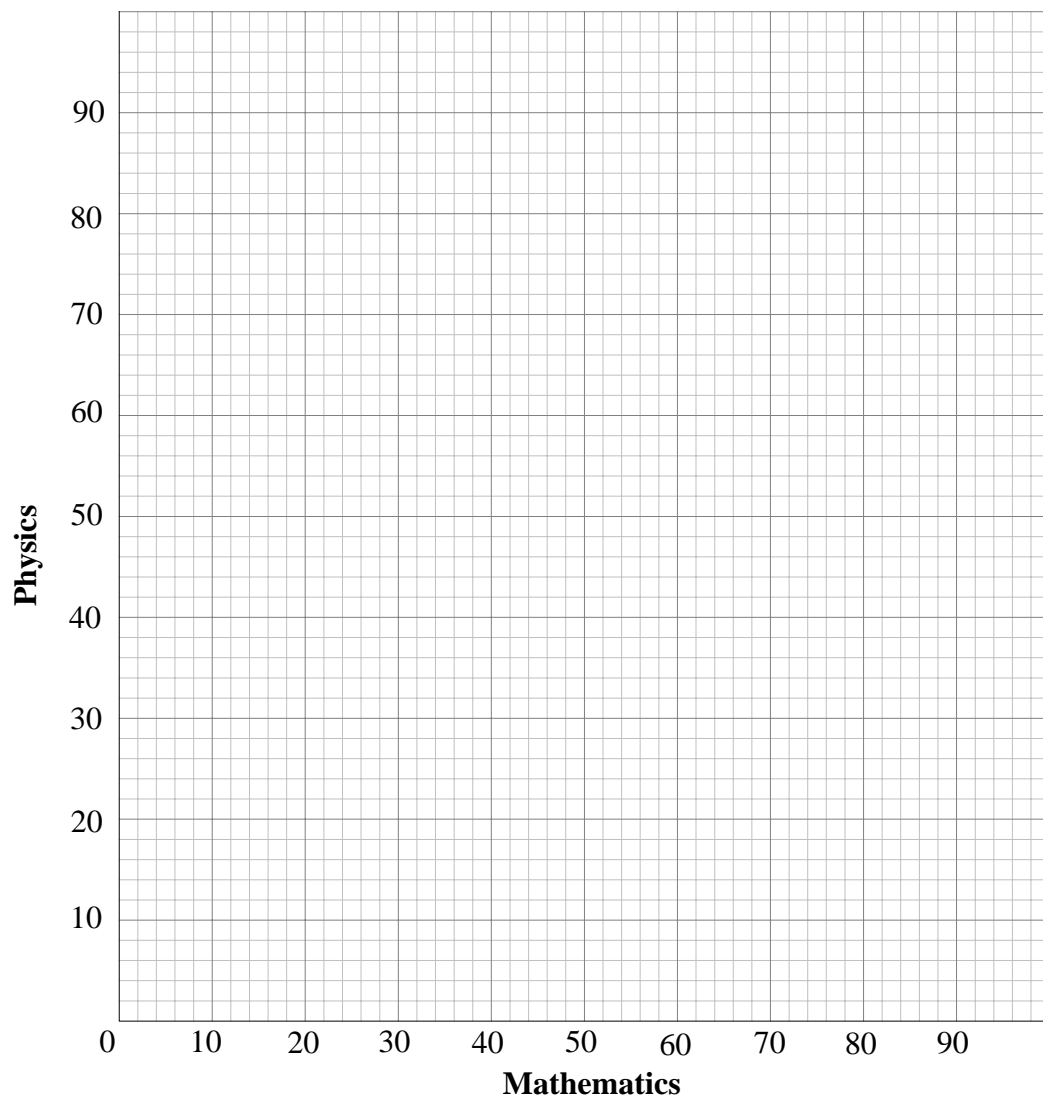
1. Plot the marks of English against those of Chinese on the graph paper below.



2. Describe the way that the points are scattered in the diagram.

3. Judging by the scattering of the points, do you think there is any relation between the marks of English and those of Chinese? Describe the relation if any.

4. Plot the marks of Physics against those of Mathematics on the graph paper below.



5. Describe the way that the points are scattered in the graph.

6. Judging by the scattering of the points, do you think there is any relation between the marks of Physics and those of Mathematics? Describe the relation if any.

7. Open the file dh05_e.xls. You can find the marks of the five subjects already entered in the table (See Figure 1).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Marks in the examination																
2	No.	Chi	Eng	Math	Phy	Chem											
3	1	49	42	22	25	31											
4	2	44	47	33	23	42											
5	3	62	53	58	56	53											
6	4	46	28	45	19	25											
7	5	51	35	52	45	52											
8	6	73	65	76	64	66											
9	7	43	46	43	51	47											
10	8	69	51	73	62	68											
11	9	54	42	59	58	54											
12	10	53	43	44	35	36											
13	11	60	57	64	57	48											
14	12	41	29	56	46	56											
15	13	63	35	55	43	45											
16	14	49	48	58	47	63											
17	15	37	41	53	38	42											
18	16	71	56	41	26	28											
19	17	75	44	60	48	57											
20	18	56	52	37	26	34											
21	19	54	32	51	42	36											
22	20	53	45	50	34	40											
23	21	67	48	61	49	45											
24	22	76	54	40	50	44											
25	23	52	31	46	36	30											
26	24	50	36	37	18	36											
27	25	63	53	65	53	48											

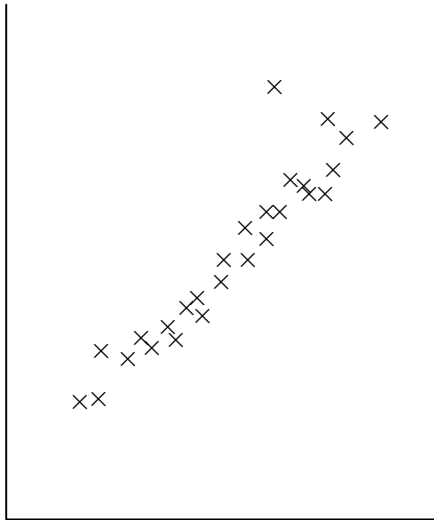
Figure 1

Use the **ChartWizard** function to plot the scatter diagrams for the following subjects and describe the relation between the marks of these subjects.

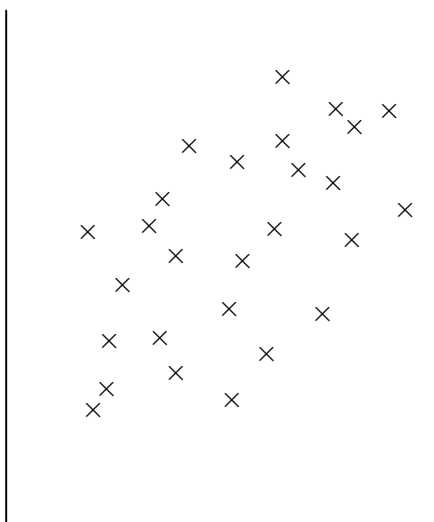
- Mathematics and English.
- Chemistry and Physics.

Notes for Teachers:

1. Revisions on drawing scatter diagrams should be done for students before the activity.
2. The following diagrams show the results generally represented by scatter diagrams.

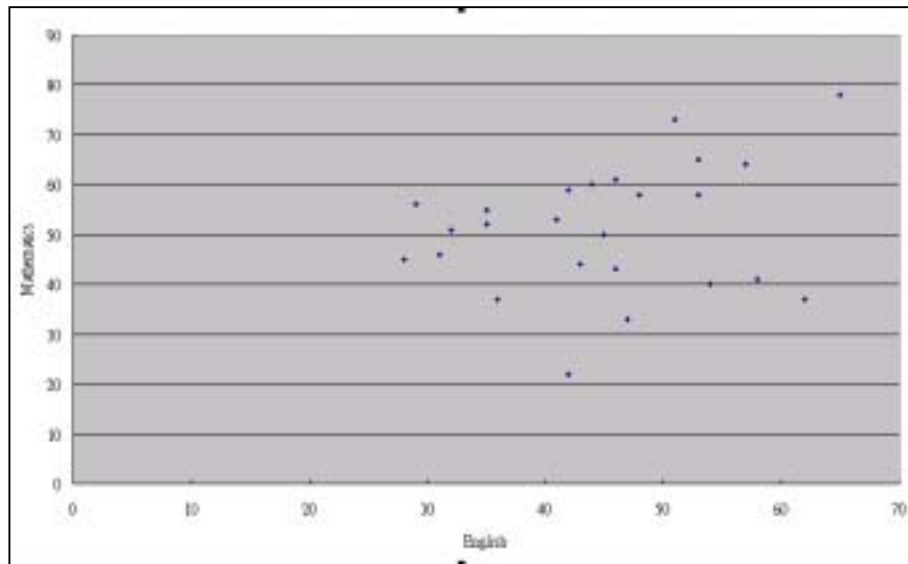


The diagram shows a strong positive relation between the two sets of data.



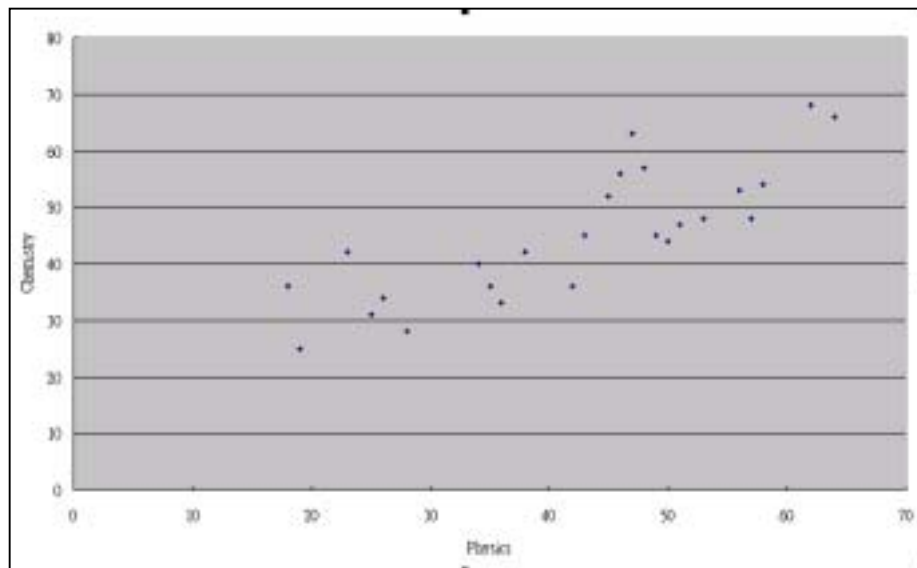
The diagram shows no significant relation between the two sets of data.

3. Answer to Question 2:
The points are scattered apart in the graph.
4. Answer to Question 3:
There is no relation between the marks of Chinese and those of English.
5. Answer to Question 5:
The points are scattered along a line.
6. Answer to Question 6:
The marks of Mathematics increase as those of Physics.
7. Answer for Question 7:
(a) Mathematics and English.



There is no relation between the marks of Mathematics and those of English.

(b) Chemistry and Physics.



The marks of Chemistry increase as those of Physics.

8. The teacher can ask students to draw scatter diagrams using combinations of the marks of different subjects in the worksheet to consolidate their concepts on scatter diagrams. Alternatively, other data sets could also be used to draw some more scatter diagrams.

Operation Procedure:

(I) The scatter diagram on the marks of English against those of Chinese is used as an example :

1. Highlight cells B3 to C27.
2. Click the **ChartWizard** button. A dialog box will appear. Select the chart type **XY (Scatter)** and click the **Next** button.
3. In the dialog box of **Step 2**, all the necessary data are filled in automatically. Click the **Next** button.
4. In the dialog box of **Step 3**, select the page **Titles**.
Enter as follows:
Chart title : (Leave blank or type a title for the graph)
Value (X) axis : Chinese
Value (Y) axis : English
5. Select the page **Legend**, uncheck the box of **Show legend** and click the **Finish** button.
6. To change the scale of the axis, right click the mouse on the axis to change the scale and choose **Format Axis**. Select the page **Scale**, input '100' in the box of **Maximum** to obtain 100 as the maximum marking shown on the axis. Press **OK**.

(II) For plotting a scatter diagram on two subjects of which the marks are not listed in adjacent columns in the table, e.g. plotting the marks of Chemistry against those of Mathematics, the following steps could be used.

1. Highlight cells D3 to F27.
2. Click the **ChartWizard** button. A dialog box showing **Step 1** of the **ChartWizard** will appear. Select the chart type **XY (Scatter)** and click the **Next** button.
3. On the Page of "**Series**" in **Step 2** of **ChartWizard**, keep **X Values** as "**=Data!\$D\$3:\$D\$27**" but change the **Y Values** to "**=Data!\$F\$3:\$F\$27**".

4. In the dialog box of **Step 3**, select the page **Titles**.
Enter as follows:
Chart title : (Leave blank or type a title for the graph)
Value (X) axis : Mathematics
Value (Y) axis : Chemistry
5. Select the page **Legend**, uncheck the box of **Show legend** and click the **Finish** button.
6. To change the scale of the axis, right click the mouse on the axis to change the scale and choose **Format Axis**. Select the page **Scale**, input '100' in the box of **Maximum** to obtain 100 as the maximum marking shown on the axis. Press **OK**.