

Exercise 1:

1. The following data shows the dose required for each of twelve antibiotics (A1-A12) to kill off 50% of samples of each of seven strains of bacteria (B1-B7). The lab conducting the tests wants to minimise the number of antibiotics required and identify which antibiotics should be used with which bacterial strains.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
B1	21	22	31	30	19	27	24	22	24	28	29	28
B2	22	10	13	18	24	12	12	14	15	19	11	21
B3	24	13	15	22	15	13	11	11	19	17	10	20
B4	32	27	30	30	22	25	23	26	25	29	31	24
B5	14	8	9	10	12	9	8	9	15	16	10	16
B6	21	25	28	24	26	21	19	22	23	20	20	19
B7	11	9	7	11	11	10	8	6	10	10	8	11

Hint: For each bacterial strain, identify the six most effective antibiotics.

Step 1: Colour the six lowest values in each row a different colour. If you find that you have to colour more than six values, decide whether or not to colour the highest values at all – e.g. if you have 8, 9, 9, 10, 10, 11, 11 then you should either colour all of the 11s or none of them.

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
B1	21	22	31	30	19	27	24	22	24	28	29	28
B2	22	10	13	18	24	12	12	14	15	19	11	21
B3	24	13	15	22	15	13	11	11	19	17	10	20
B4	32	27	30	30	22	25	23	26	25	29	31	24
B5	14	8	9	10	12	9	8	9	15	16	10	16
B6	21	25	28	24	26	21	19	22	23	20	20	19
B7	11	9	7	11	11	10	8	6	10	10	8	11

Note: if you have included the highest of the low values (the 11s in the example above) you will have a slightly different colour distribution. DO NOT WORRY! Just carry on with the steps as given below.

Next, rearrange the columns so that the columns with the most white squares are at the left of the table, and those with the most coloured squares are at the right of the table.

	A4	A10	A12	A1	A9	A5	A3	A11	A2	A6	A8	A7
B1	30	28	28	21	24	19	31	29	22	27	22	24
B2	18	19	21	22	15	24	13	11	10	12	14	12
B3	22	17	20	24	19	15	15	10	13	13	11	11
B4	30	29	24	32	25	22	30	31	27	25	26	23
B5	10	16	16	14	15	12	9	10	8	9	9	8
B6	24	20	19	21	23	26	28	20	25	21	22	19
B7	11	10	11	11	10	11	7	8	9	10	6	8

Now rearrange the rows so that the rows with the most white squares towards the left of the row are at the top and the rows with the least white squares towards the left are at the bottom. Try to make large blocks of white squares.

	A4	A10	A12	A1	A9	A5	A3	A11	A2	A6	A8	A7
B3	22	17	20	24	19	15	15	10	13	13	11	11
B5	10	16	16	14	15	12	9	10	8	9	9	8
B7	11	10	11	11	10	11	7	8	9	10	6	8
B2	18	19	21	22	15	24	13	11	10	12	14	12
B6	24	20	19	21	23	26	28	20	25	21	22	19
B4	30	29	24	32	25	22	30	31	27	25	26	23
B1	30	28	28	21	24	19	31	29	22	27	22	24

The best antibiotics to employ are A2, A3, A6, A7, A8 and A11.

Exercise 2:

The columns below contain data on renewability (yes, no) vs. usage (low, medium, high) for a set of fuel sources. Produce two mosaic plots, one based on renewability and the other on usage, to show the distribution of data. Remember that when producing a mosaic diagram the columns all have a width proportional to one of the variables while the heights vary in proportion to the other variable

Renewable	Usage	Renewable	Usage	Renewable	Usage
Yes	Medium	No	High	No	Low
No	Medium	Yes	High	No	Low
Yes	Low	Yes	Medium	Yes	Low
Yes	Medium	Yes	High	Yes	High
No	Medium	Yes	Medium	No	High
No	Medium	Yes	Medium	Yes	Low
No	High	Yes	Medium	Yes	High
Yes	Medium	Yes	Medium	No	High
No	High	No	Medium	Yes	High
Yes	High	Yes	High	Yes	Low
No	High	No	High	Yes	High
No	Medium	No	Medium	No	High
Yes	Medium	No	Medium	Yes	Low
No	Medium	No	High	Yes	High
No	Medium	Yes	High	Yes	Low
Yes	Medium	Yes	High	No	Low
No	High	Yes	Medium	Yes	High
Yes	High	No	High	No	Low

First count the number of entries in each category and record them in a table. This table will be used to calculate the width and height of each row and column.

To calculate the width of each column divide the total width of the diagram by the total number of data entries and multiply by the number of entries in that column.

	10	20	24	
24	4	9	11	NO
30	6	11	13	YES
	LOW	MED	HIGH	

To calculate the height of each rectangle in a column divide the total height of the diagram by the number of data entries in that column and multiply by the number of entries in that category.

