



The stature of a person is their height when standing upright. It is generally known that the ‘average’ man is taller than the ‘average’ woman, and that stature also varies from one nationality to another.

In this activity you will study similarities and differences in distributions of stature. Manufacturers need to take these into account when they design products.



Information sheet

The table below gives the heights of a representative sample of men and women from each of eight countries. Note that 1360 – means from 1360 up to but not including 1380, and so on.

Stature (mm)	UK		China		Japan		Netherlands		USA		France		Germany		Italy	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
under 1360	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1360 -	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1380 -	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	1
1400 -	0	1	0	6	0	2	0	0	0	1	0	1	0	1	0	1
1420 -	0	2	0	14	0	7	0	1	0	2	0	2	0	2	0	2
1440 -	0	3	0	26	0	17	0	1	0	5	0	5	0	4	0	5
1460 -	0	10	0	47	0	36	0	2	0	9	0	12	0	10	0	12
1480 -	0	15	1	78	1	65	0	7	0	18	1	22	0	17	1	21
1500 -	0	34	2	99	1	100	0	12	0	28	1	39	0	31	1	36
1520 -	0	42	4	127	3	135	0	22	1	44	2	63	1	48	0	60
1540 -	0	69	10	134	9	153	0	35	1	63	6	88	3	70	10	80
1560 -	4	91	20	139	18	152	0	61	3	82	10	113	5	92	11	98
1580 -	3	108	35	115	34	128	1	80	8	99	20	129	10	111	19	120
1600 -	20	124	55	87	58	93	0	102	11	110	32	131	21	120	30	124
1620 -	24	118	80	58	86	58	10	119	20	113	51	118	34	120	45	119
1640 -	37	115	104	35	113	31	8	115	34	107	74	101	54	109	62	102
1660 -	54	90	126	22	130	14	19	121	62	90	91	73	77	90	79	83
1680 -	90	70	124	5	133	5	34	93	56	87	110	48	99	68	94	57
1700 -	84	48	122	0	138	2	52	88	88	56	110	28	116	46	105	37
1720 -	110	29	105	4	104	1	75	58	102	39	119	15	123	29	107	21
1740 -	116	16	78	1	73	0	96	38	112	17	100	5	119	17	103	8
1760 -	100	9	60	0	48	0	114	19	111	15	89	5	105	8	92	9
1780 -	98	3	36	0	27	0	122	15	103	7	68	0	84	4	76	3
1800 -	83	2	20	0	14	0	119	7	88	4	48	2	61	2	58	1
1820 -	65	1	10	0	6	0	106	2	70	2	31	0	40	1	42	0
1840 -	43	0	5	0	2	0	80	1	51	1	18	0	24	0	28	0
1860 -	32	0	2	0	2	0	69	1	34	0	10	0	13	0	17	0
1880 -	18	0	1	0	0	0	42	0	21	0	5	0	6	0	10	0
1900 -	10	0	0	0	0	0	26	0	12	0	2	0	3	0	5	0
1920 -	5	0	0	0	0	0	14	0	6	0	1	0	1	0	3	0
1940 -	2	0	0	0	0	0	7	0	4	0	1	0	1	0	1	0
1960 -	2	0	0	0	0	0	3	0	1	0	0	0	0	0	1	0
1980 -	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
2000 or over	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

Try these. *Share the work with other students if possible.*

Use the data on the information sheet to answer the following questions for each of the eight countries.

1a Using the same appropriate scale on each of the axes, draw a histogram to show the distribution of heights for:

- i** the sample of men
- ii** the sample of women.

b Use your histograms to compare the height distribution of men with the height distribution of women.

2a Calculate the mean and standard deviation for the heights of:

- i** the sample of men
- ii** the sample of women.

b Use your answers to compare the heights of men with the heights of women.

3a Use the data on the information sheet, or your histogram for the male sample, to estimate the percentage of men in each sample whose heights lie within:

- i** one standard deviation of the mean
- ii** two standard deviations of the mean
- iii** three standard deviations of the mean.

b Repeat part **a** for the sample of women.

c Comment on your answers to parts **a** and **b**.

4 Designers often design products to cater for sizes between the 5th percentile of the female distribution and the 95th percentile of the male distribution.

Use the data on the information sheet, or your histograms, to estimate:

- a** the 5th percentile in the sample of women's heights
- b** the 95th percentile in the sample of men's heights.

Extension

5a Assume that the distribution of the height of men in each country is normal with the mean and standard deviation you found in question **2**.

For each height group with a non-zero frequency in the original sample of men:

- i** find the expected frequency in a random sample of 1000
- ii** compare your answer with the frequency in the original sample.

b Repeat part **a** for the sample of women.

Reflection

What similarities and differences have you found in the distribution of stature:

- for men and women?
- for different nationalities?

What results have you found that are true for all the distributions you have studied?