Grade 8 Mathematics Worksheet

Data handling and sampling

Questions:

1. The following information is given regarding the body fat index for a sample of female and male learners that attend your local gym:

Medical category	Body Fat index Class upper Limit		Frequency	
	Female	Male	Female	Male
Athletically fit	20	13	3	9
Physically fit	24	17	15	11
Acceptable	31	20	24	10
Borderline Obese	39	25	12	9
Medically Obese	51	50	5	12

a)   What is the sample size of the population represented in these tables?

b)   Calculate the relative frequencies for each of the categories and record your data separately for females and males.

c)   What measure can you use to check if your calculations in (b) are accurate?

d)   What is the probability that a female learner will have a body mass index of between 10 and 18 percent?

e)   Calculate the most probable result for female learners, and also list the probability of the result occurring by using your relative frequencies.

f)   Which of the male or female learners have a larger possibility of being obese? Explain.

g)   Out of a possible sample of 2 000 males, how many will be borderline obese?

Solution

1. a) The sample size is indicated by the figures in the frequency column. So there are 12 + 26 + 34 + 21 + 17 = 110.

   b) Relative frequencies:

Medical category	Frequency		Relative Frequency	
	Female	Male	Female	Male
Athletically fit	3	9	$\frac{3}{110}$	$\frac{9}{110}$
Physically fit	15	11	$\frac{15}{110}$	$\frac{11}{110}$
Acceptable	24	10	$\frac{24}{110}$	$\frac{10}{110}$
Borderline Obese	12	9	$\frac{12}{110}$	$\frac{9}{110}$
Medically Obese	5	12	$\frac{5}{110}$	$\frac{12}{110}$

   c) You can add all the probabilities. The sum must be 1, otherwise there has been a calculation error. So $\frac{3}{110} + \frac{9}{110} + \frac{15}{110} + \frac{11}{110} + \frac{24}{110} + \frac{10}{110} + \frac{12}{110} + \frac{9}{110} + \frac{5}{110} + \frac{12}{110} = \frac{110}{110} = 1$. It is therefore calculated correctly.

   d) The upper limit for this class is 20. So assuming that the first category starts from 0 to an upper limit of 20, then only 3 female learners fit this category. Thus the probability will be $\frac{3}{110} = 0,027$. This is less than 3%.

   e) The most probable result for females will be a body fat mass index that is more than 25 and up to 31. The relative frequency here is $\frac{24}{110} = 0,22$ correct to two decimal places.

   f) The males have more of a tendency towards the obese categories. 12 are medically obese, and 9 are borderline obese. That makes for a total of 21 males. Of the females, 5 are medically obese and 12 are borderline obese. That is a total of 17 females that fall in the obese categories. Of the men, there are 4 more in these categories.

   g) P(MbO) = $2000 \times \frac{9}{41} = 439$ men are borderline obese in a sample of 2 000 men.

Notice that we are looking at a sample that contains ONLY men. So the 59 results for females were removed from the sample.