500 students in class 10 were asked, "Which do you like best- Pop Music or Rock Music". The results were below;

	Pop	Rock
Boys	176	63
Girls	215	46

Calculate the value of χ^2 correct to 1 decimal place.

The two hypotheses are.
• Gender and preference for Pop and Rock are independent.
• Gender and preference for Pop and Rock are not independent.

Lay the data out in a table:

	Pop	Rock
Boys	176	63
Girls	215	46

Add up rows and columns:

	Pop	Rock	
Boys	176	63	239
Girls	215	46	261
	391	109	500

Calculate "Expected Value" for each entry:
Multiply each row total by each column total and divide by the overall total:

	Pop	Rock	
Boys	$\dfrac{239 \times 391}{500}$	$\dfrac{239 \times 109}{500}$	239
Girls	$\dfrac{261 \times 391}{500}$	$\dfrac{261 \times 109}{500}$	261
	391	109	500

Which gives us:

	Pop	Rock	
Boys	186.90	52.10	239
Girls	204.10	56.90	261
	391	109	500

Subtract expected from actual, square it, then divide by expected:

	Pop	Rock	
Boys	$\dfrac{(176 - 186.90)^2}{186.90}$	$\dfrac{(63 - 52.10)^2}{52.10}$	239
Girls	$\dfrac{(215 - 204.10)^2}{204.10}$	$\dfrac{(46 - 56.90)^2}{56.90}$	261
	391	109	500

Which is:

	Pop	Rock	
Boys	0.6357	2.2804	239
Girls	0.5821	2.0880	261
	391	109	500

Now add up those values:
0.6357 + 2.2804 + 0.5821 + 2.0880 = 5.5862