

Differences in attainment between courses

The 2010/11 academic year results

The tables in the next section show:-

Table 1 : The number of students who took both the course. The numbers are not the same for each cell since students from other programmes may also have participated.

Table 2 : The Pearson Product Moment Correlation Coefficient (r) between the two courses for the scores in each of these courses. Any scores starting with L were deemed to be 40.

Tables 3 and 4 : The intercept and slope for the linear regression line between these two courses.

Table 5 : The theory outlined in the previous section hypothesises that the relationship between these scores would be linear. This has been tested by sorting the scores for the y- and x-variables and then using linear relationship to estimate the y-variable. The Durbin-Watson d-statistic should be near to 2 if the relationship is linear. Ten of the results (indicated with *) show a significant level of autocorrelation which indicates a non-linear relationship. This has not been explored further yet.

The row of interest is the top one for COMP1148, since that is the course on which the proposed system will eventually be trialled.

If the new system were to have an effect then the correlation coefficient would be expected to improve because the results would bunch more at

one end. If both the mean score (\bar{x}) and the correlation coefficient (r) increase then the effect would have been beneficial.

Mutual correlation could be a problem for this approach. If COMP1148 becomes more understandable then students may feel generally more motivated and achieve better scores in other units too. The degree of effect can be estimated using the changes in r relative to COMP1148.

The only change to COMP1148 this academic year was the replacement of Kate Finney. The materials were the same and the method of marking was the same. It will therefore be an interesting exercise to see whether this one change made any difference that detectable statistically. This can be tested once first year scores have been finalised in September 2013. This test will show whether the statistical tool described here has any potential.

Potential further interesting areas

1. Could this approach be used to assess the effectiveness of new teaching materials as well as approaches to teaching?
2. Is there anything which can be learned about the level and effectiveness of other courses? Could it, for example, highlight areas of excellence or areas for improvement?
3. Could this approach be used in situations where non-numeric results are achieved, for example, fail, pass, merit and distinction as on National Diplomas? If so, one would have to use Spearman's Rank Correlation Coefficient instead.

Cross-Course Statistics for 2010/11 for those taking courses on the year 1 of the Computing programme

Table 1: n (Sample size - the number taking both courses)

	COMP1152	COMP1587	COMP1588	COMP1589	MATH1110	MATH1111
COMP1148	260	337	152	189	193	169
COMP1152		250	141	107	176	152
COMP1587			148	183	189	164
COMP1588				0	136	137
COMP1589					55	30
MATH1110						164

Table 2: r (Pearson's Correlation Coefficient)

	COMP1152	COMP1587	COMP1588	COMP1589	MATH1110	MATH1111
COMP1148	0.8484	0.5946	0.7911	0.6673	0.6286	0.8004
COMP1152		0.6243	0.8252	0.6835	0.6578	0.8093
COMP1587			0.7046	0.3966	0.6741	0.6203
COMP1588				*****	0.7156	0.8502
COMP1589					0.3333	0.4435
MATH1110						0.8146

Table 3: a (The intercept)

	COMP1152	COMP1587	COMP1588	COMP1589	MATH1110	MATH1111
COMP1148	16.014	36.295	10.460	30.652	31.353	10.057
COMP1152		29.412	0.090	24.484	20.785	-1.600
COMP1587			-2.544	42.100	19.897	7.610
COMP1588				*****	27.796	5.754
COMP1589					35.957	32.595
MATH1110						-5.211

Table 4: b (The slope)

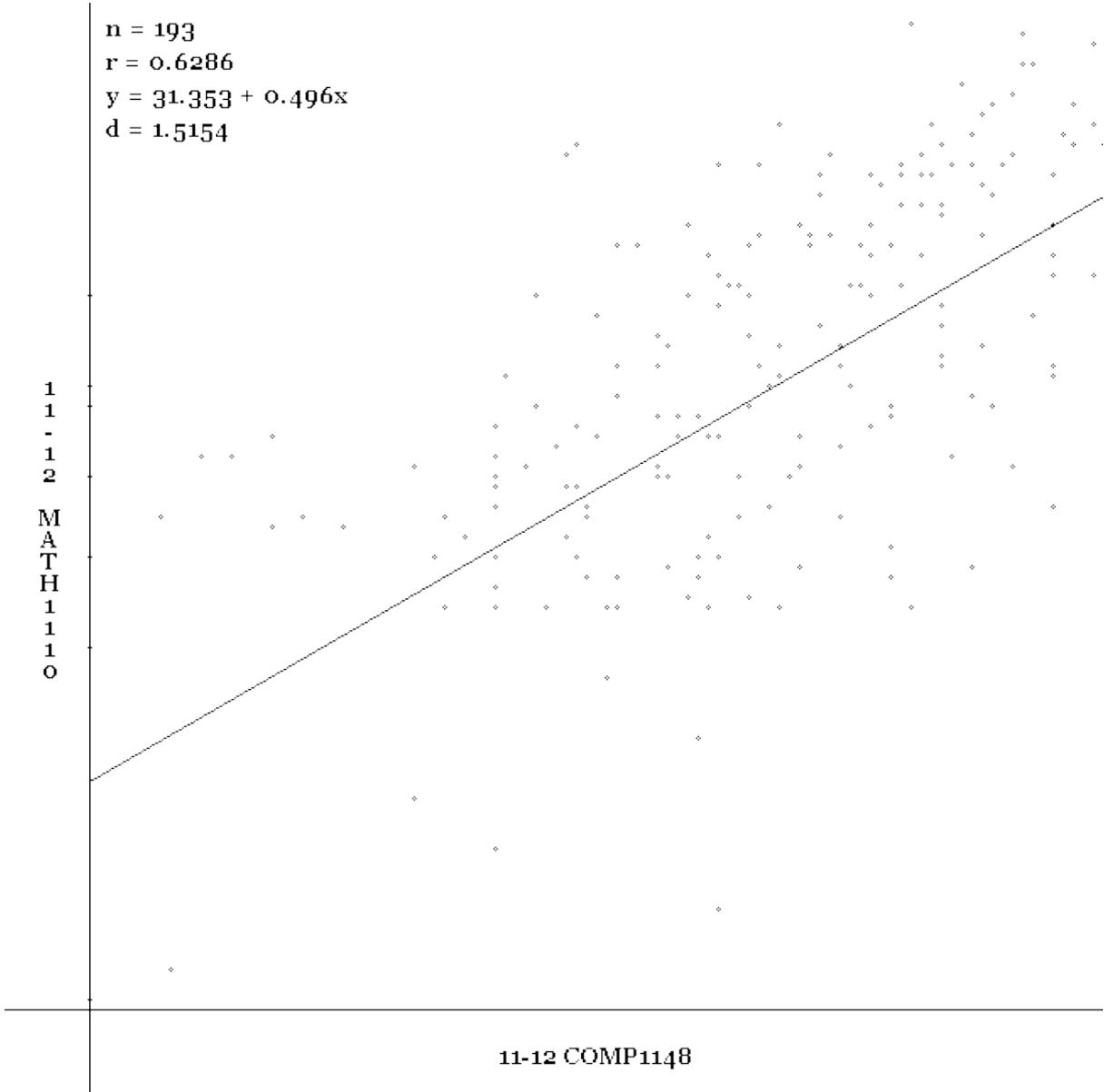
	COMP1152	COMP1587	COMP1588	COMP1589	MATH1110	MATH1111
COMP1148	0.685	0.514	0.713	0.610	0.496	0.770
COMP1152		0.681	0.914	0.780	0.686	0.980
COMP1587			0.816	0.387	0.614	0.715
COMP1588				*****	0.619	0.908
COMP1589					0.392	0.524
MATH1110						1.000

Table 5: d (Durbin-Watson d-Statistic)

	COMP1152	COMP1587	COMP1588	COMP1589	MATH1110	MATH1111
COMP1148	1.4773	1.3615	2.0456	1.5980	1.5154	1.8166
COMP1152		1.7927	2.0437	2.1814	1.9259	2.0762
COMP1587			1.7225	1.5370	1.5538	1.6947
COMP1588				*****	1.2925	1.5445
COMP1589					2.0089	2.0001
MATH1110						2.2303

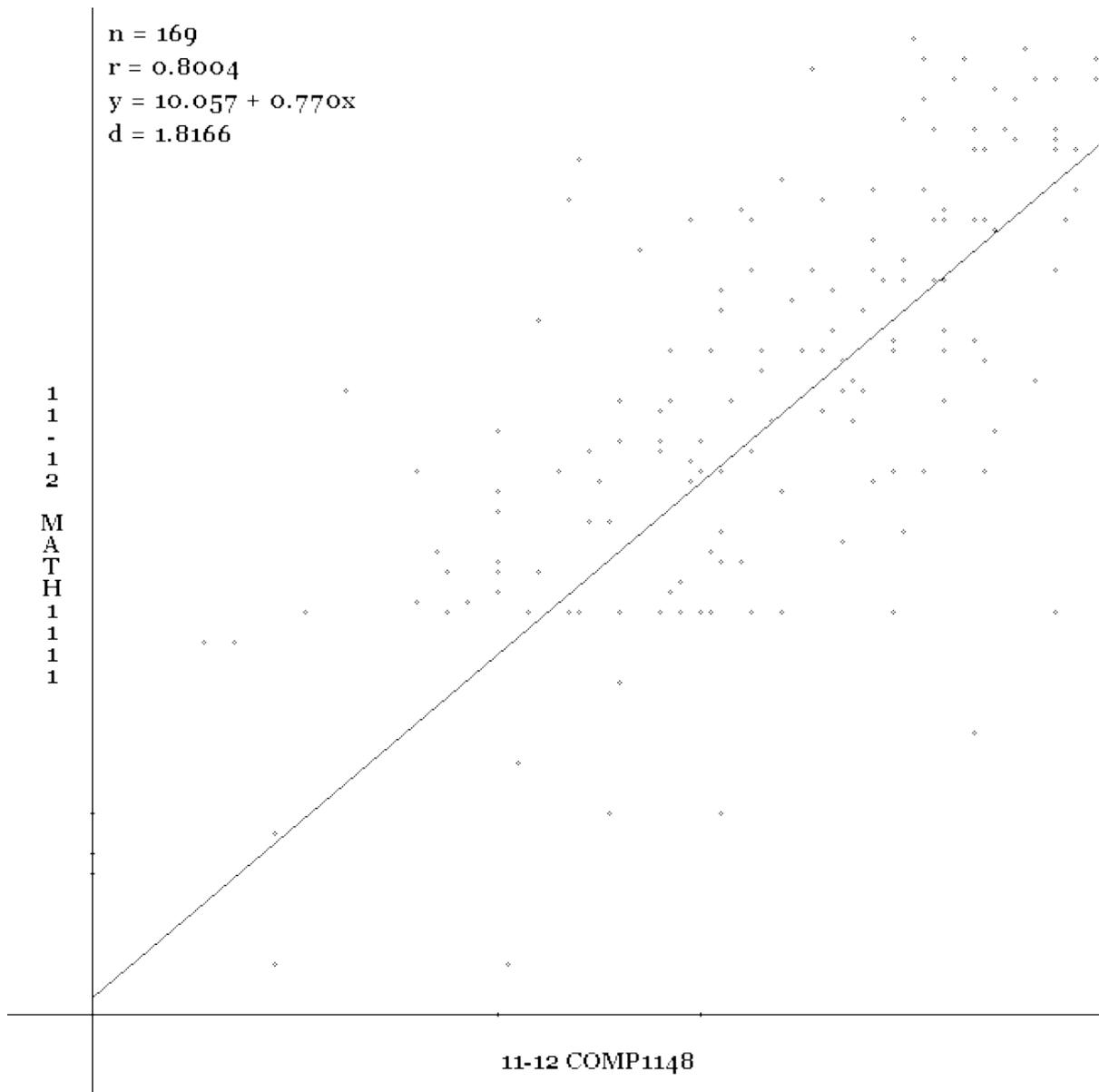
Note: Some combinations (marked *****) are mutually exclusive.

The Graphs



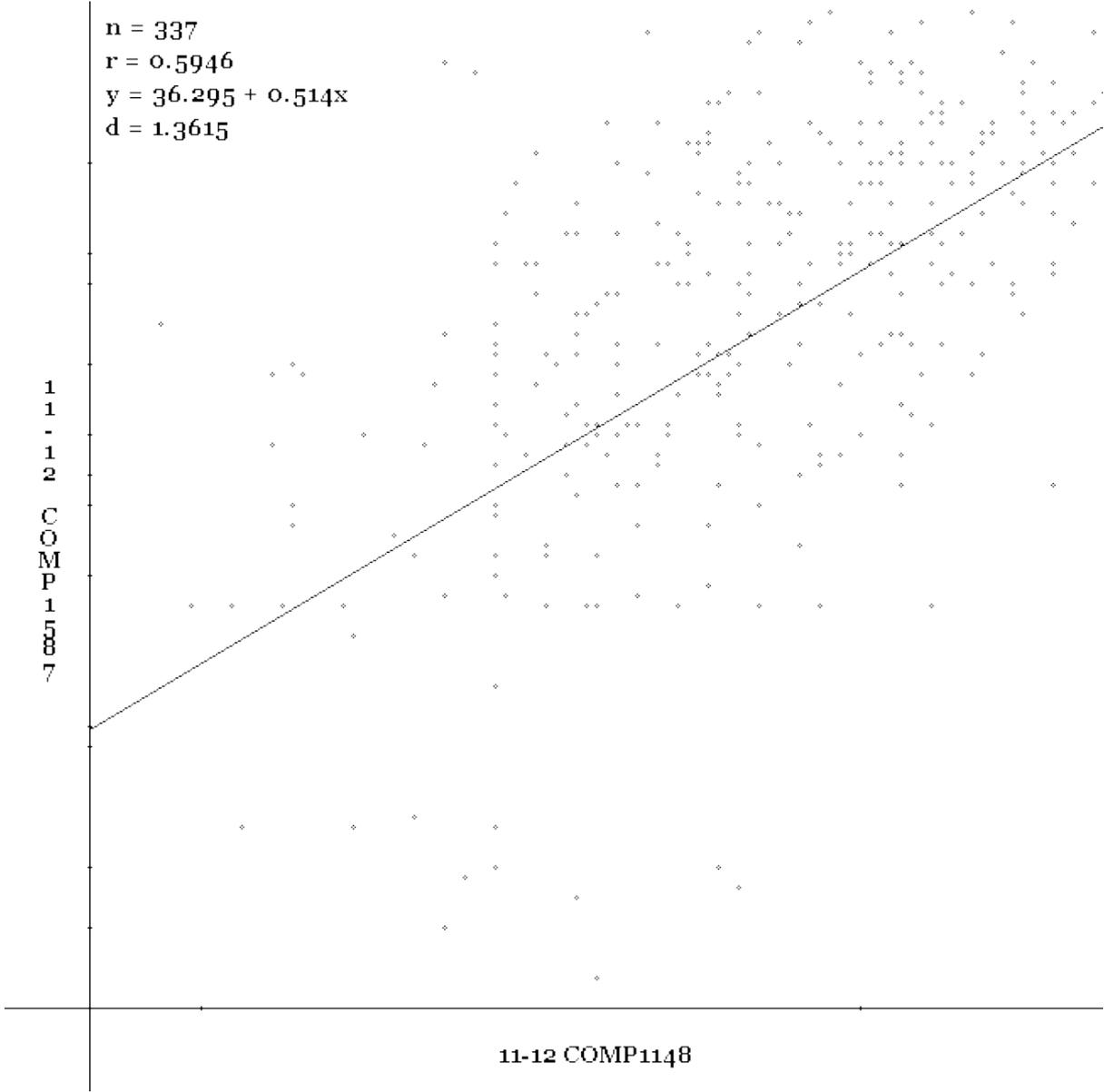
n = 169
r = 0.8004
y = 10.057 + 0.770x
d = 1.8166

1
1
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1
2
M
A
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1



n = 337
r = 0.5946
y = 36.295 + 0.514x
d = 1.3615

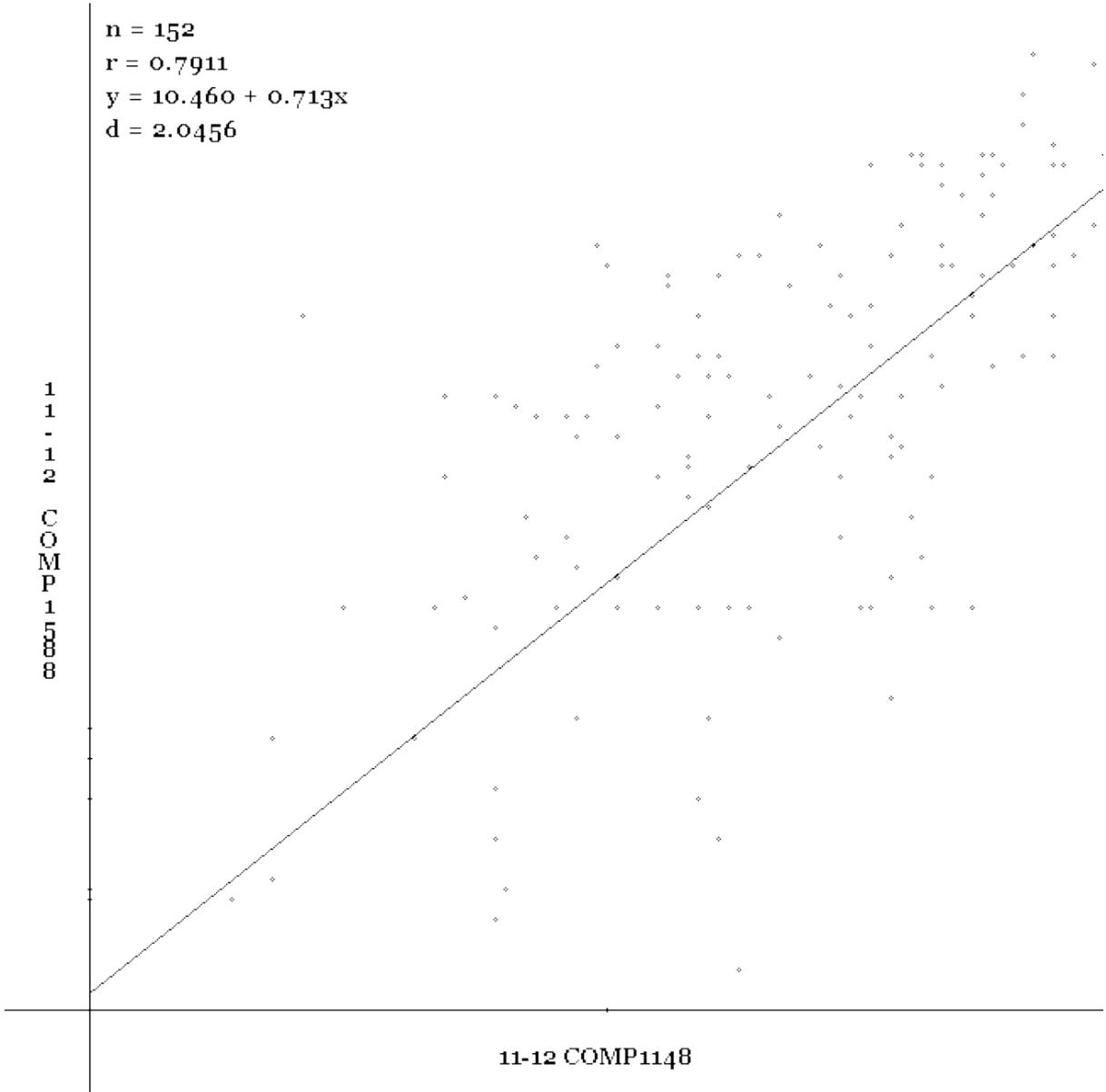
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1
1
1
2
C
M
P
1
7
0
0
7



11-12 COMP1148

n = 152
r = 0.7911
y = 10.460 + 0.713x
d = 2.0456

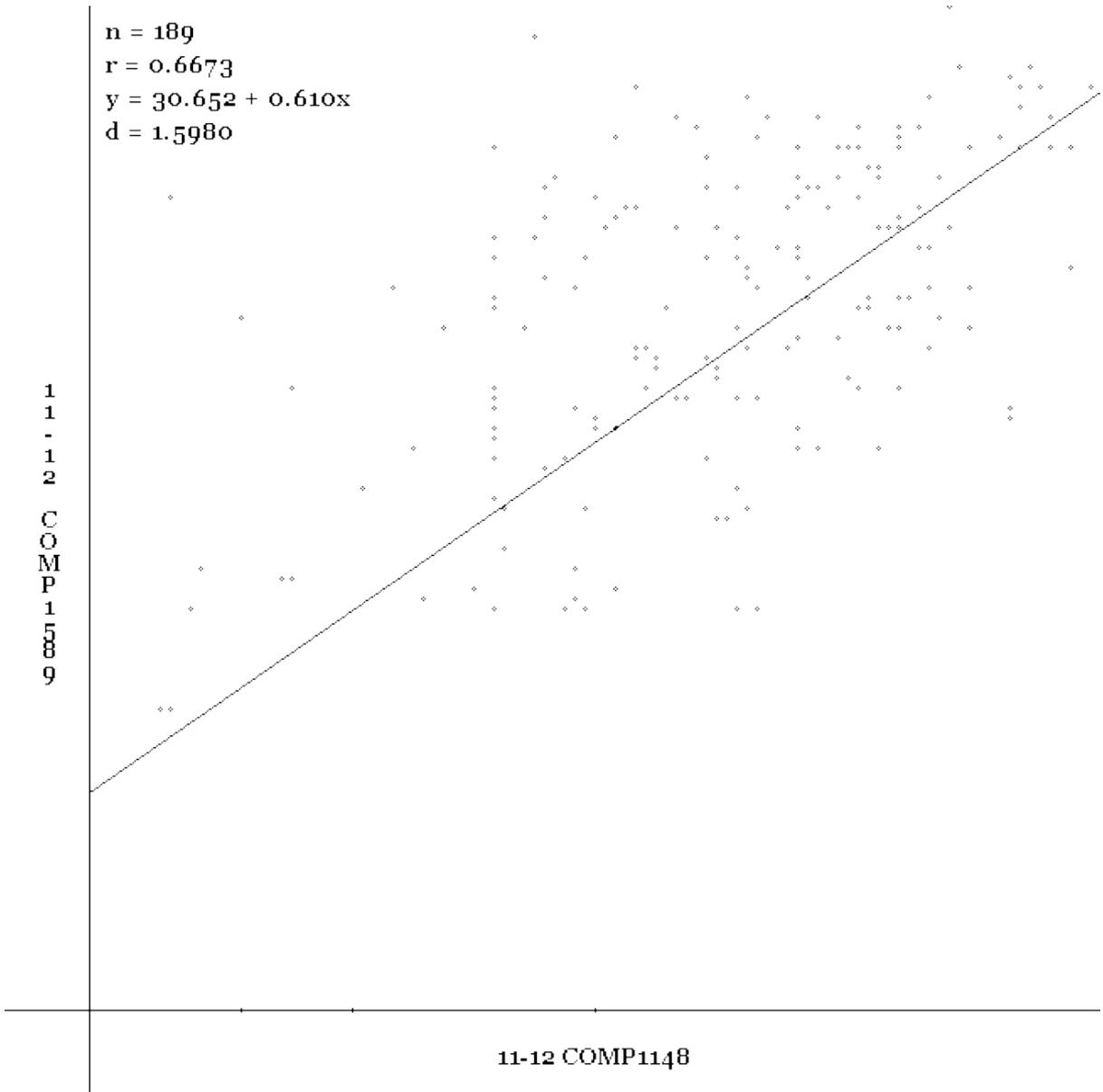
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2
C
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1
8
8
8
7



11-12 COMP1148

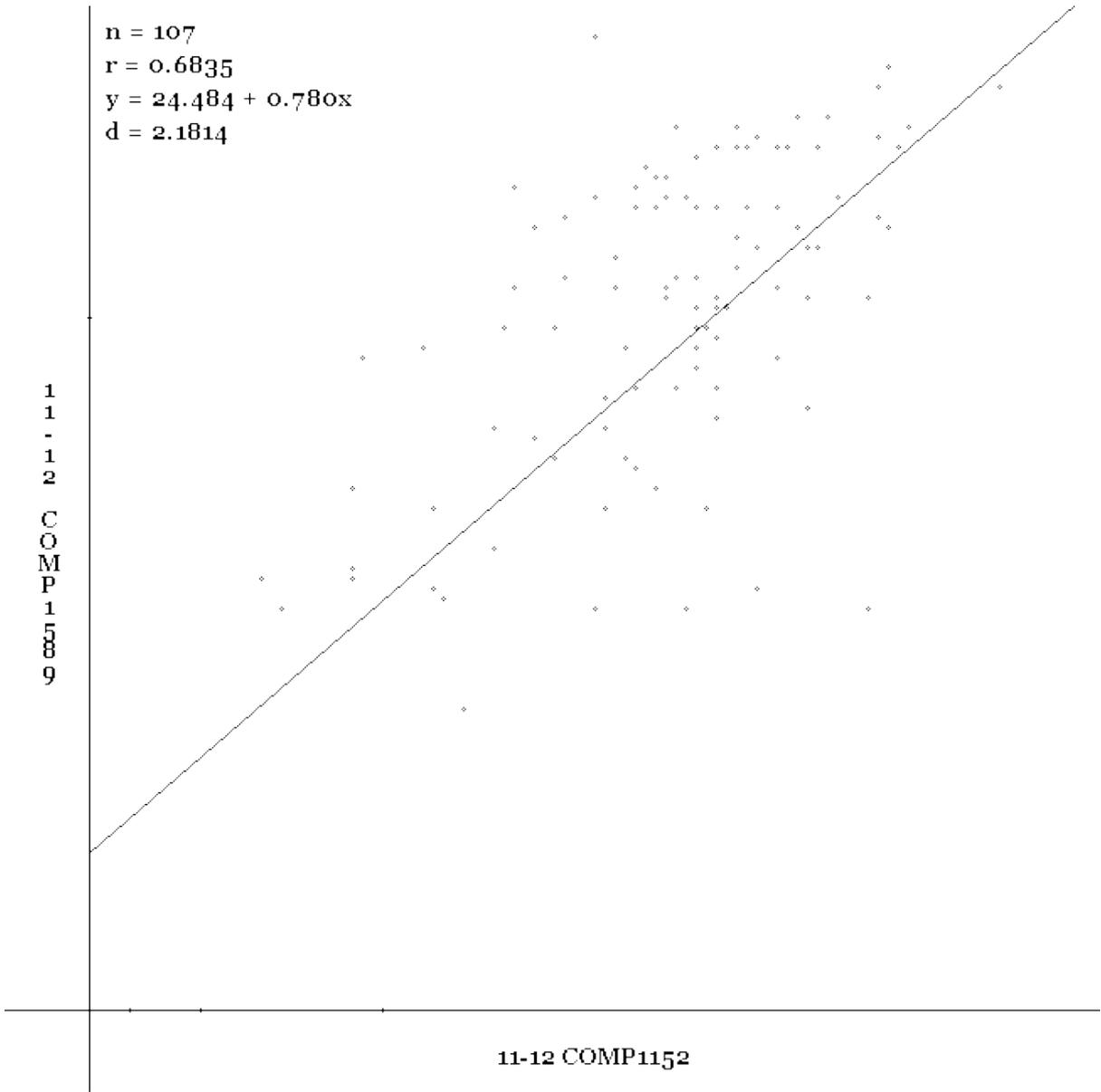
n = 189
r = 0.6673
y = 30.652 + 0.610x
d = 1.5980

1
1
1
1
2
C
O
M
P
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9
8
8



n = 107
r = 0.6835
y = 24.484 + 0.780x
d = 2.1814

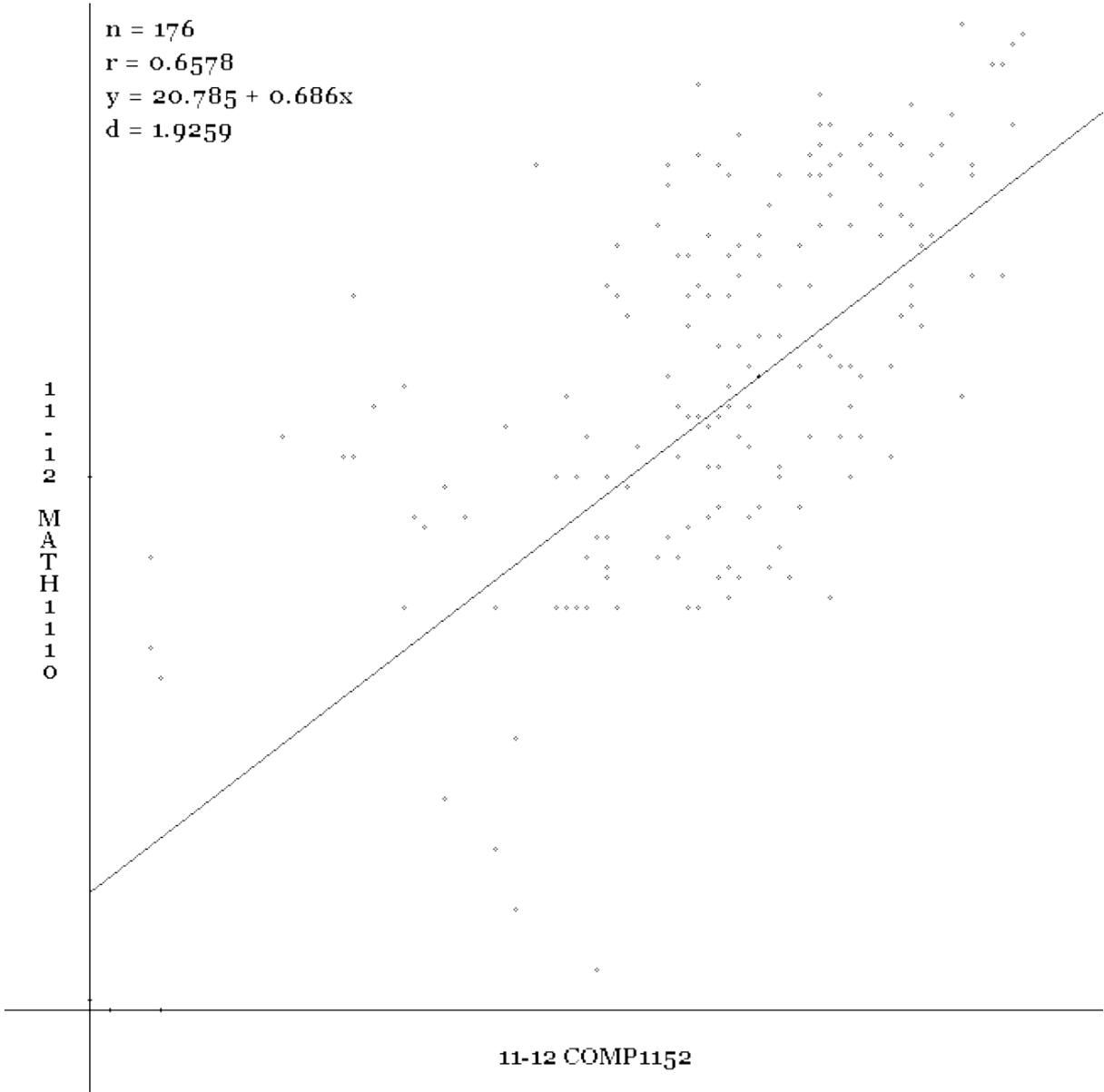
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2
C
O
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1
9
8
8
7



11-12 COMP1152

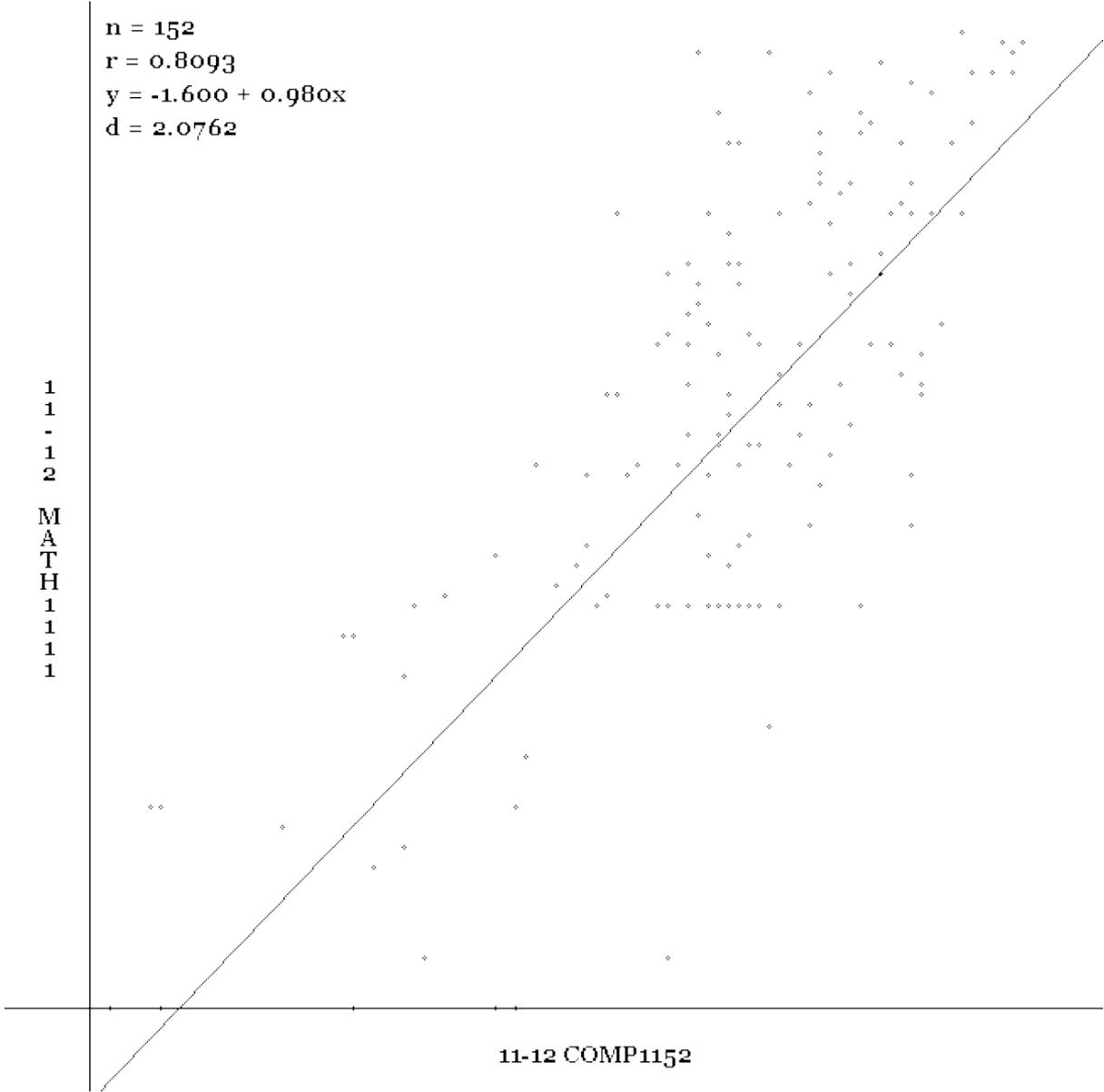
n = 176
r = 0.6578
y = 20.785 + 0.686x
d = 1.9259

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1
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1
2
M
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H
1
1
1
0



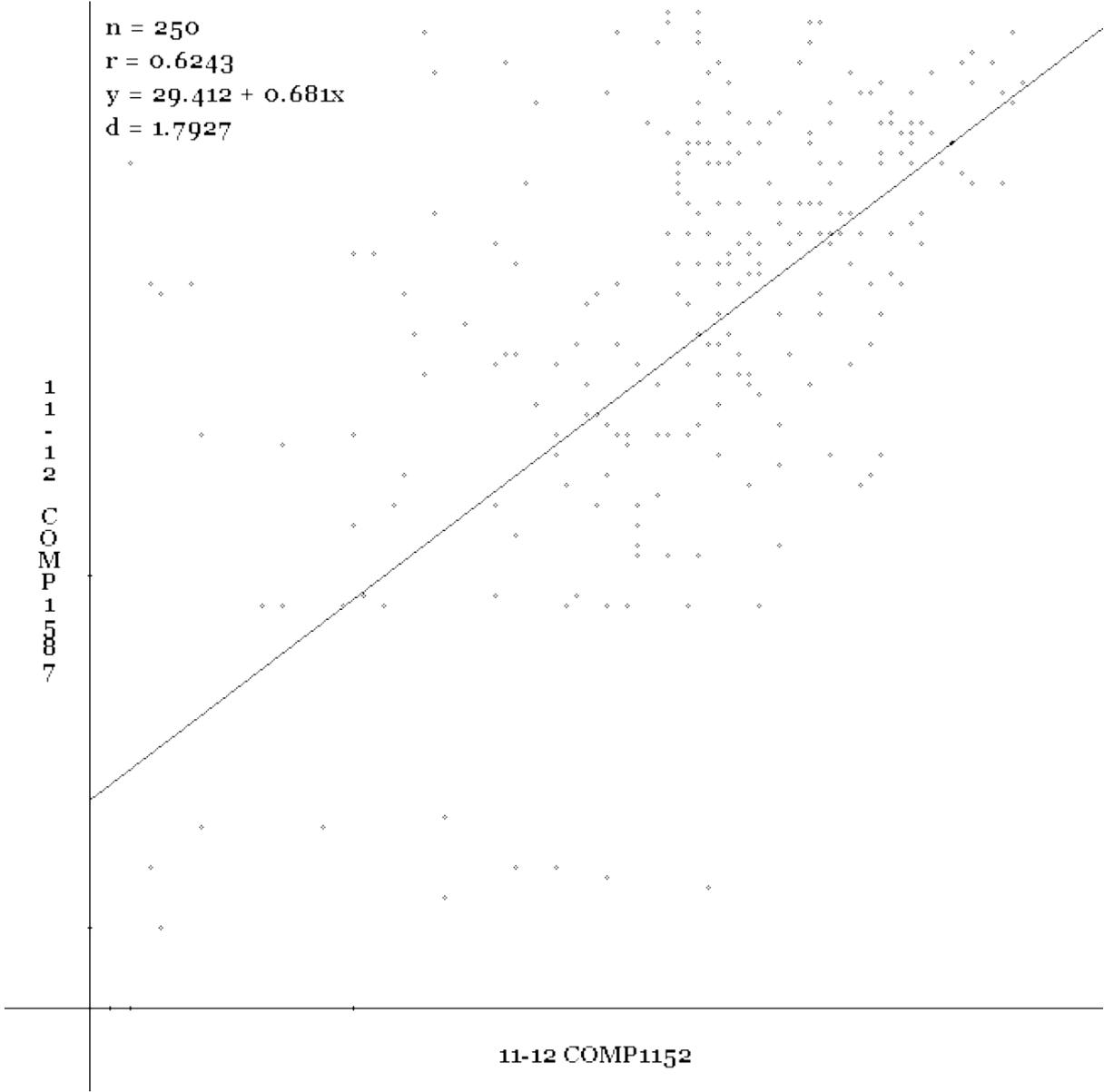
n = 152
r = 0.8093
y = -1.600 + 0.980x
d = 2.0762

1
1
-
1
2
M
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1
1
1
1



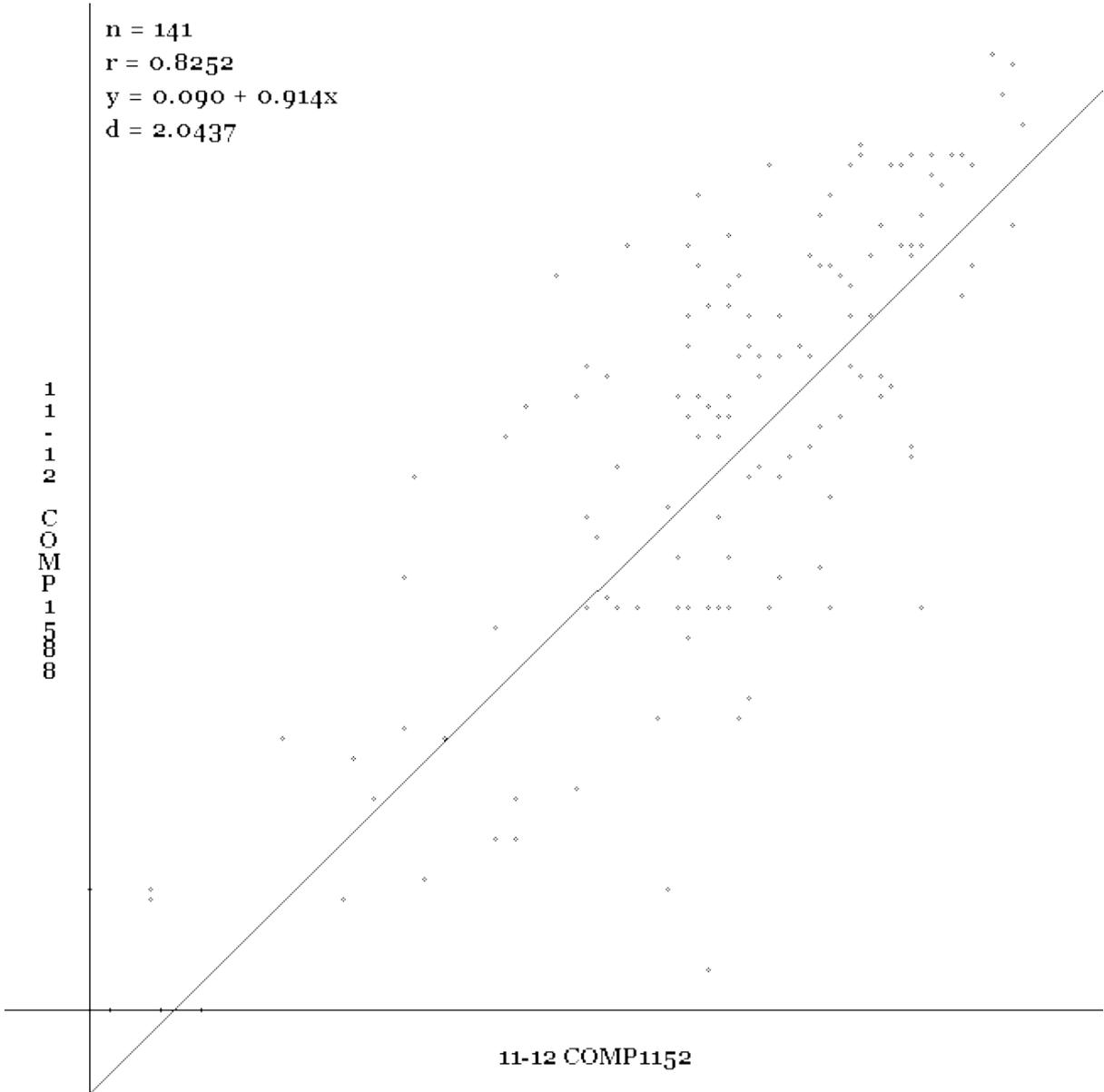
n = 250
r = 0.6243
y = 29.412 + 0.681x
d = 1.7927

1
1
1
1
2
C
M
P
1
7
8
5



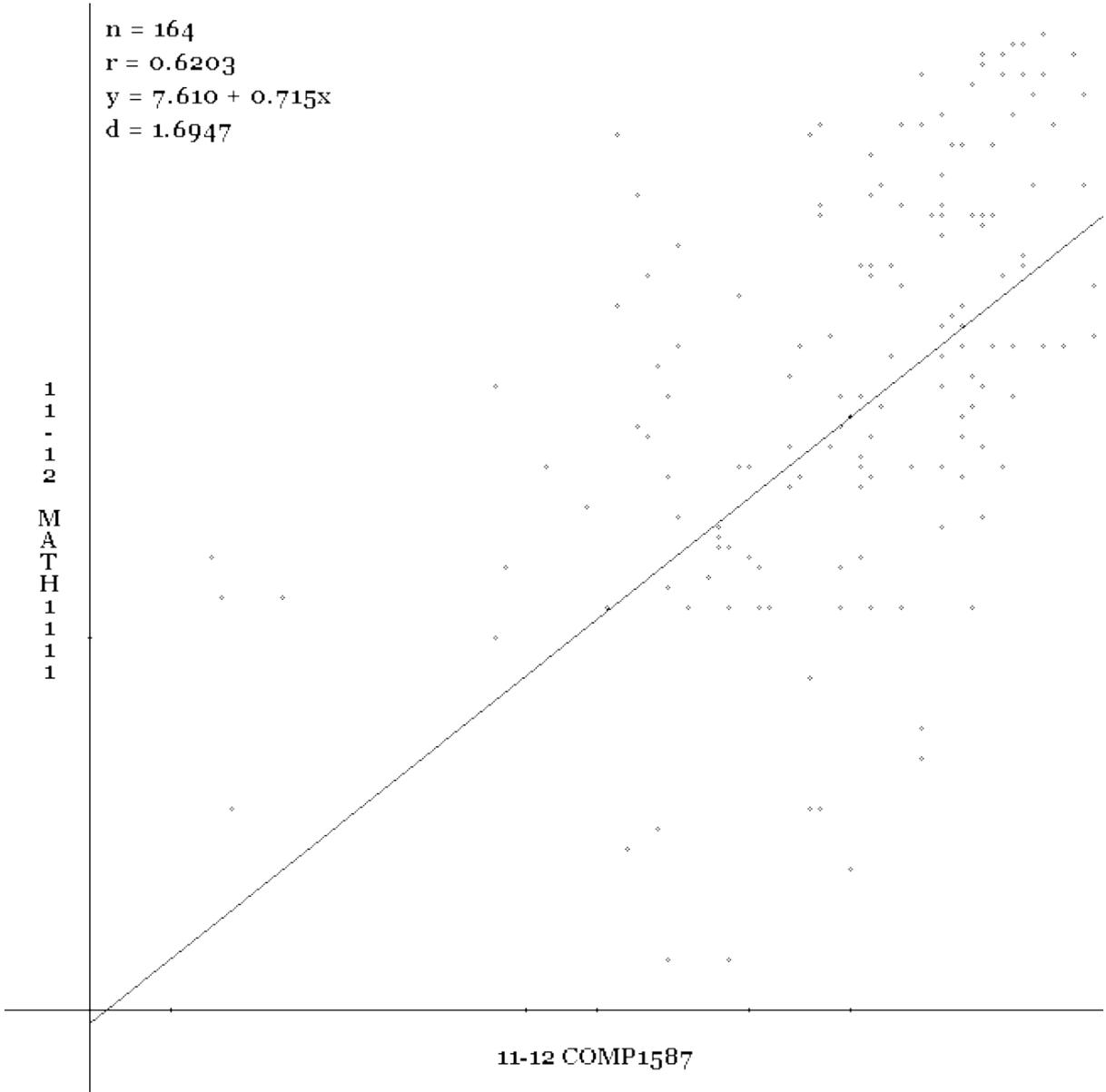
n = 141
r = 0.8252
y = 0.090 + 0.914x
d = 2.0437

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1
1
2
C
M
P
1
8887



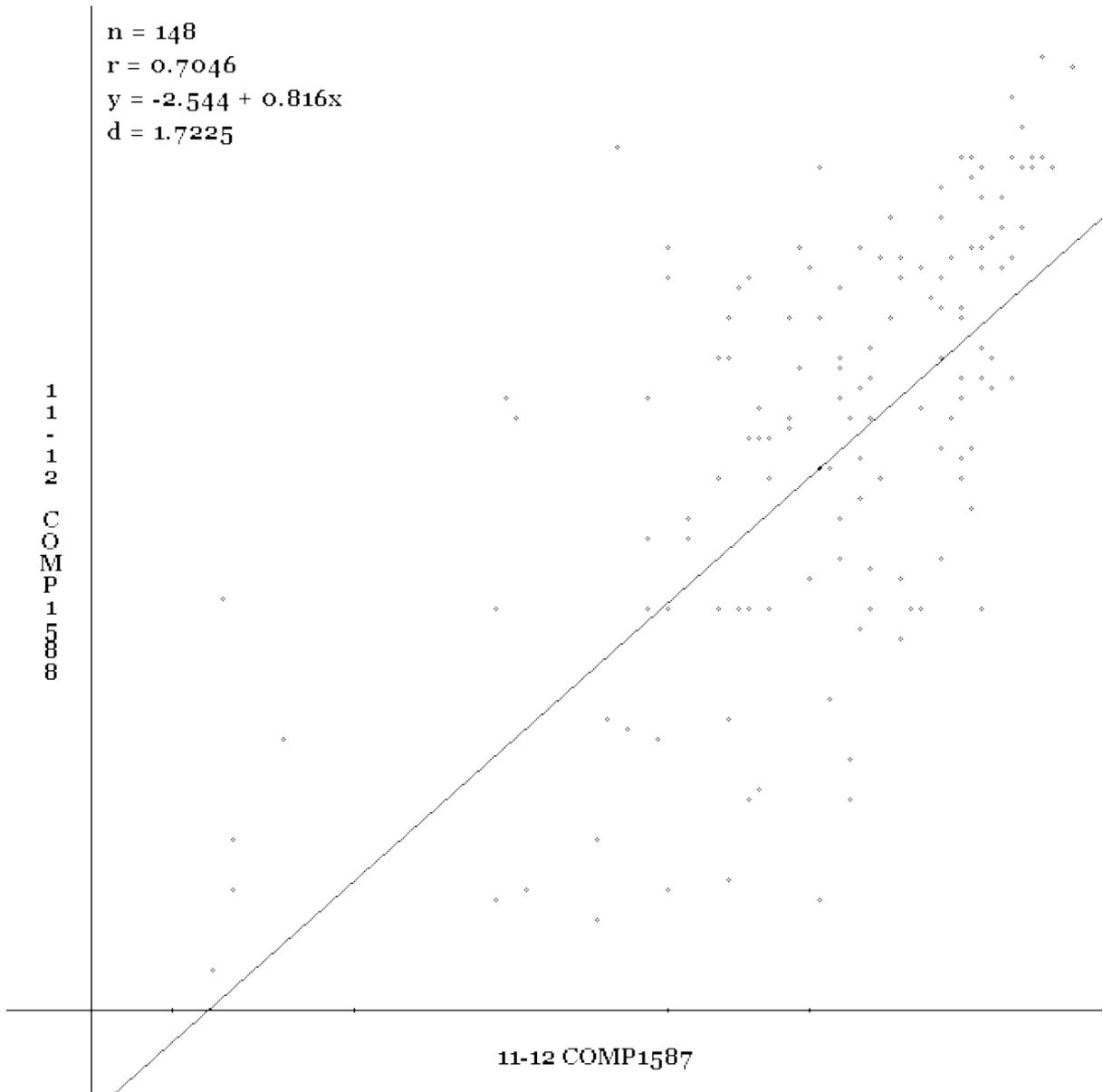
n = 164
r = 0.6203
y = 7.610 + 0.715x
d = 1.6947

1
1
-
1
2
M
A
T
H
1
1
1
1
1



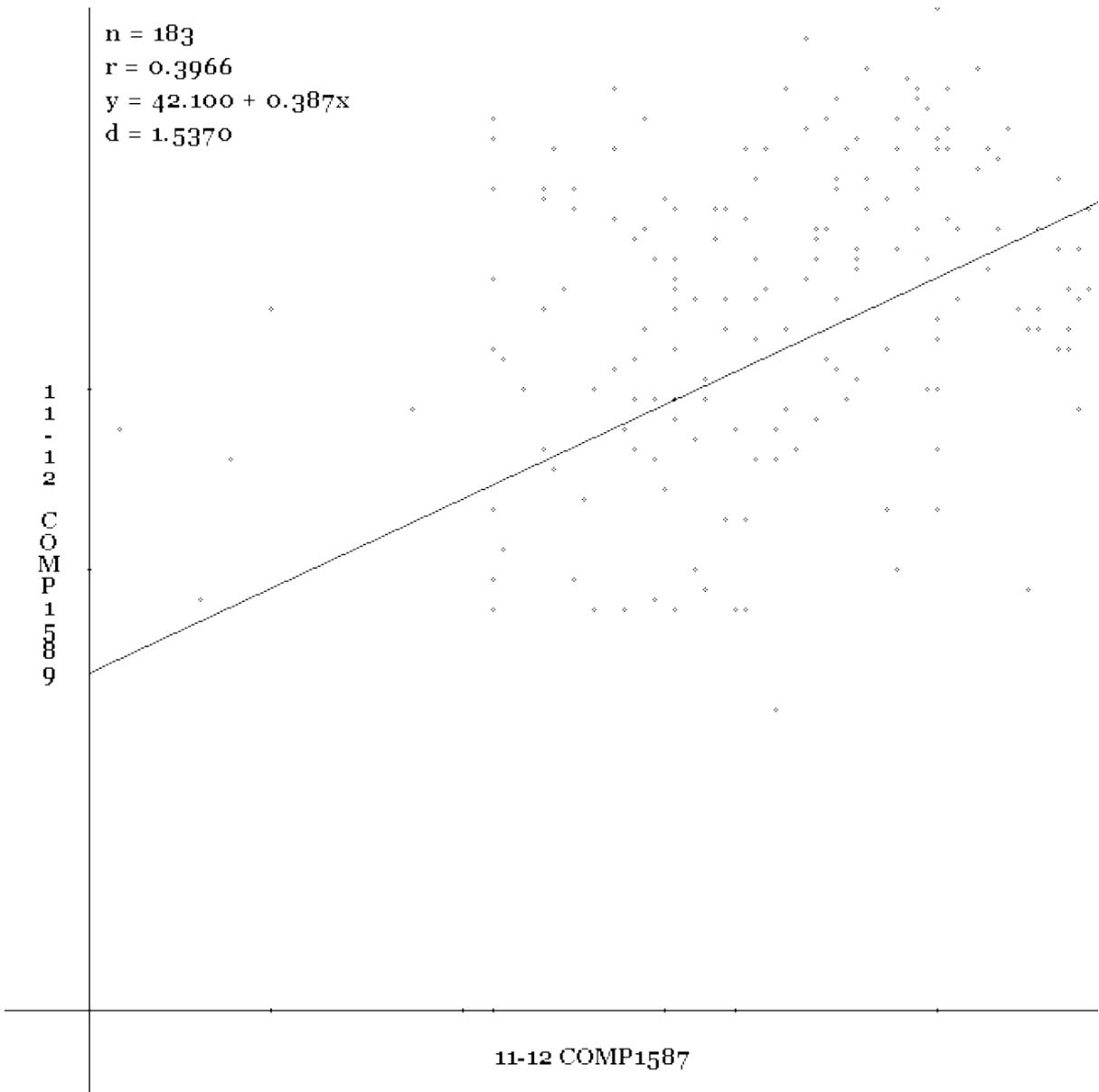
n = 148
r = 0.7046
y = -2.544 + 0.816x
d = 1.7225

1
1
1
1
2
C
O
M
P
1
5
8
7



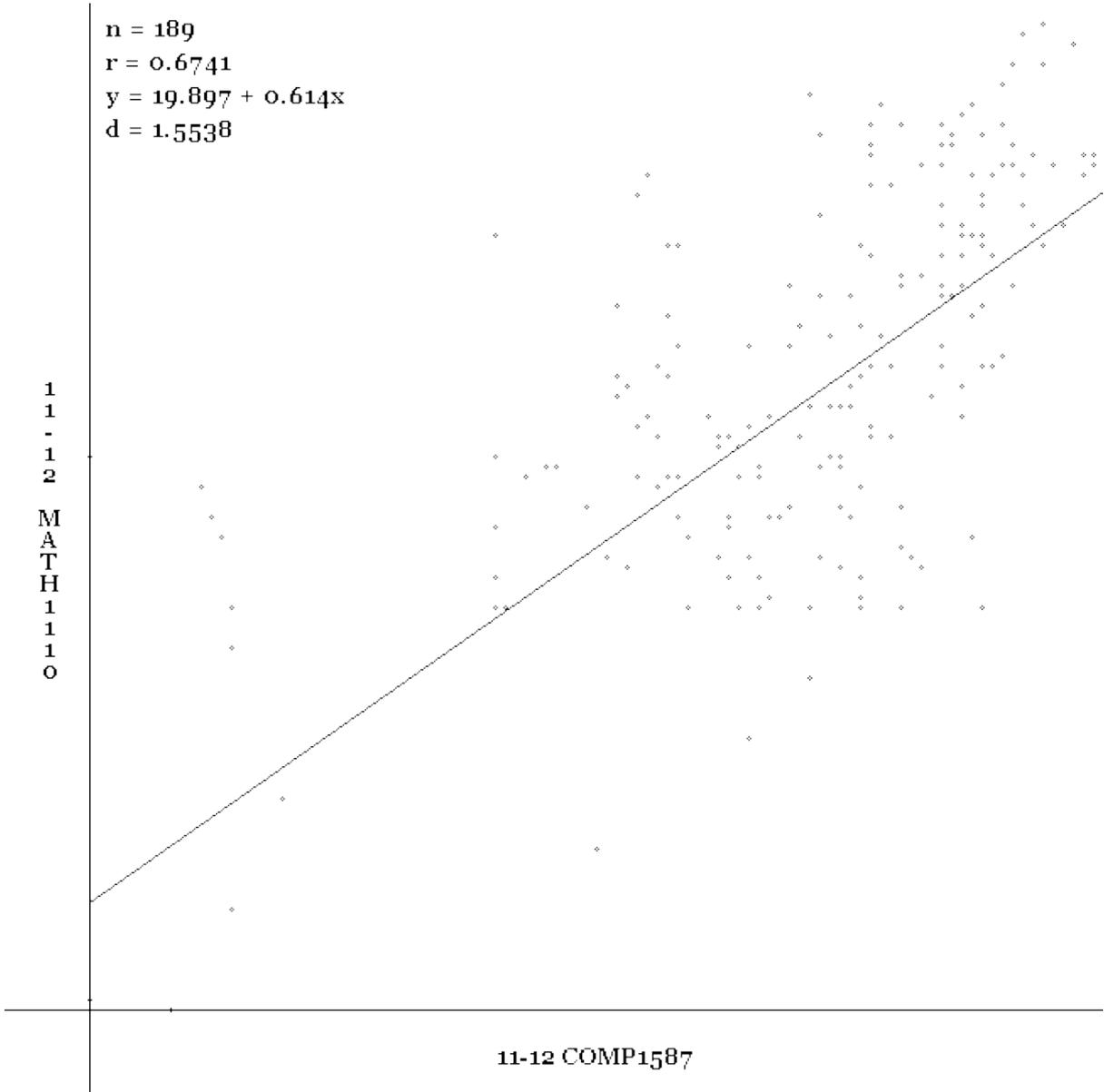
n = 183
r = 0.3966
y = 42.100 + 0.387x
d = 1.5370

1
1
1
1
2
C
O
M
P
1
8
8
7
9



n = 189
r = 0.6741
y = 19.897 + 0.614x
d = 1.5538

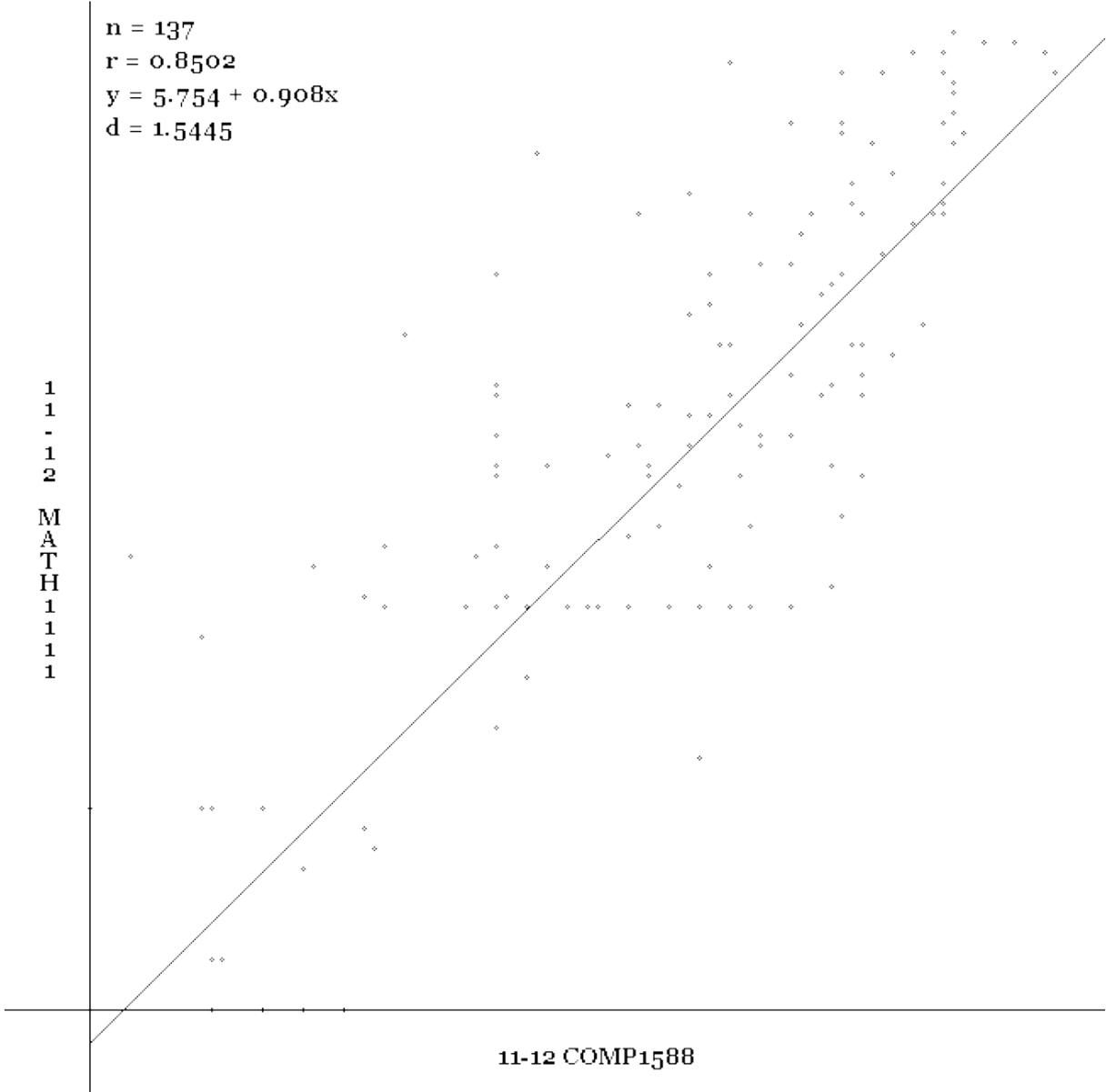
1
1
-
1
2
M
A
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H
1
1
1
1
0



11-12 COMP1587

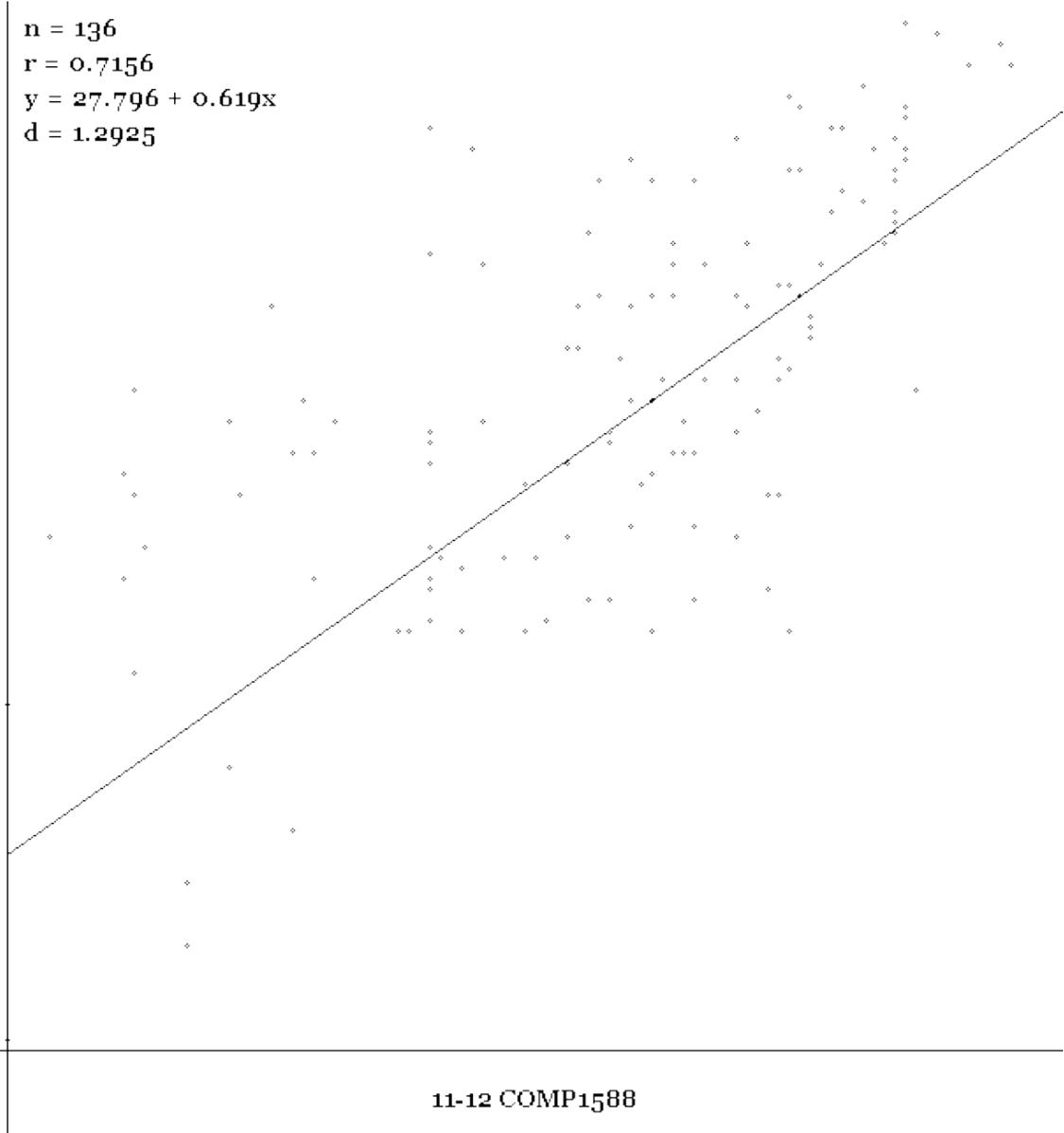
n = 137
r = 0.8502
y = 5.754 + 0.908x
d = 1.5445

1
1
-
1
2
M
A
T
H
1
1
1
1



n = 136
r = 0.7156
y = 27.796 + 0.619x
d = 1.2925

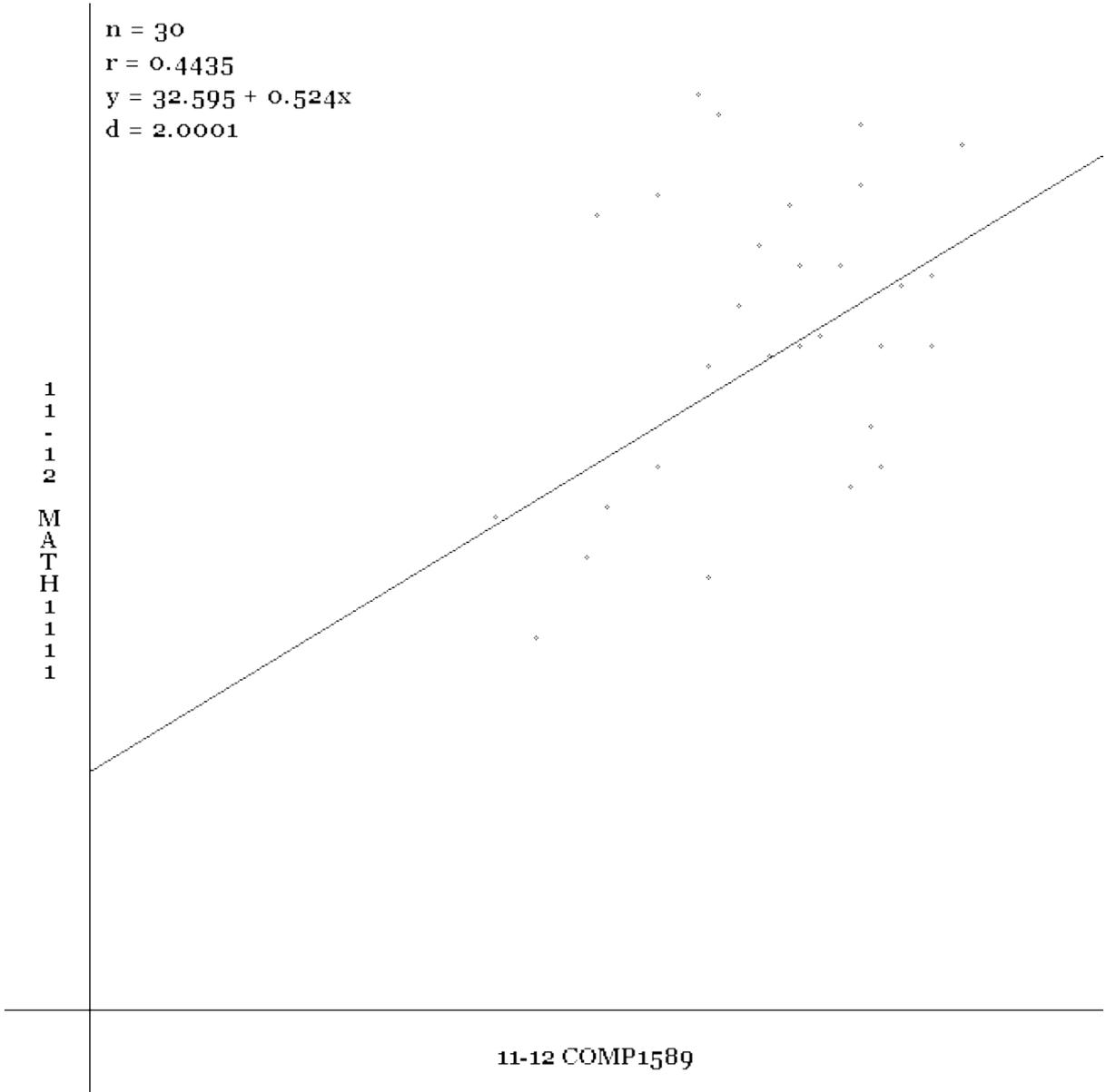
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1
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M
A
T
H
1
1
1
1
0



11-12 COMP1588

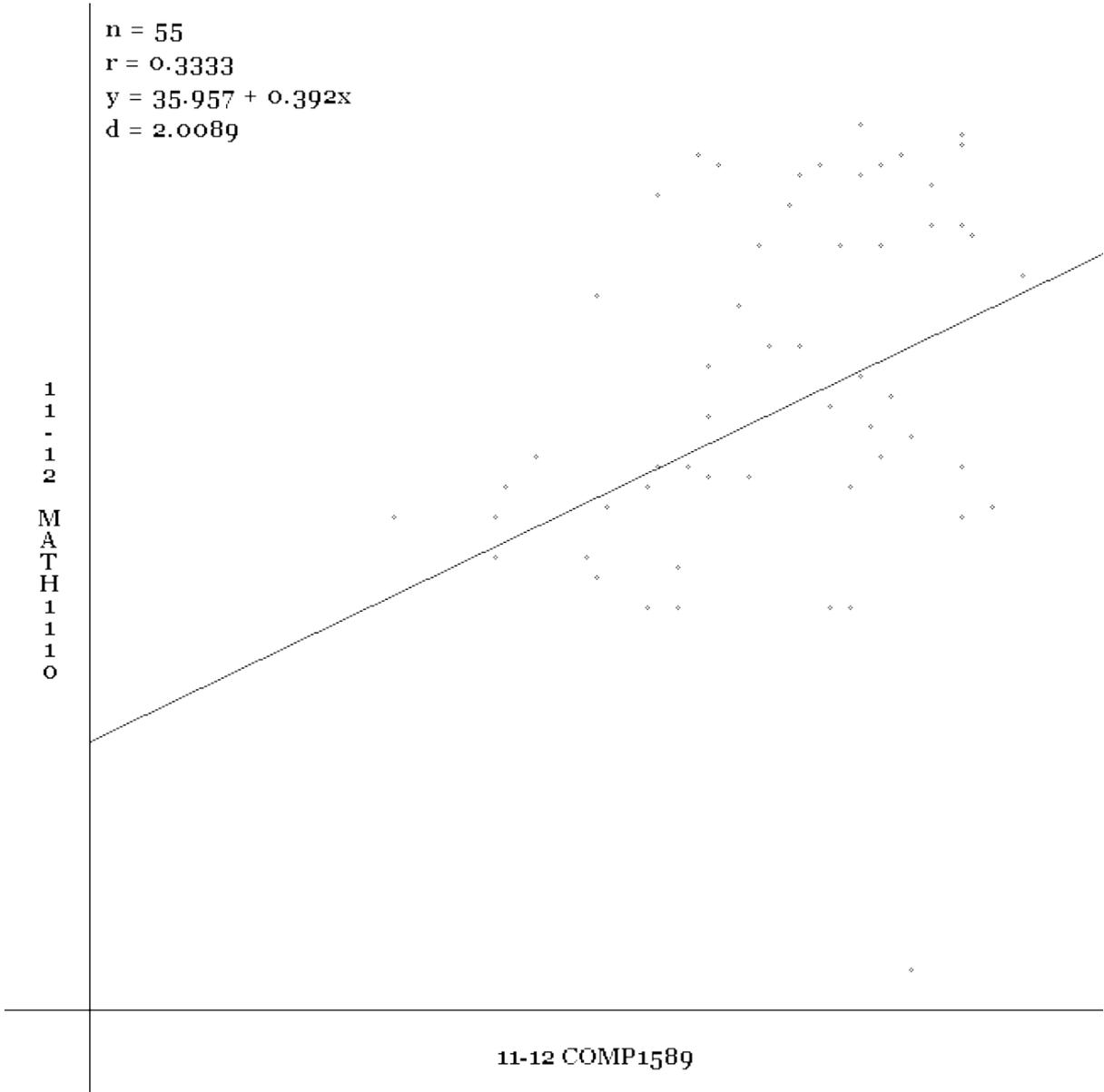
n = 30
r = 0.4435
y = 32.595 + 0.524x
d = 2.0001

1
1
-
1
2
M
A
T
H
1
1
1
1



n = 55
r = 0.3333
y = 35.957 + 0.392x
d = 2.0089

1
1
-
1
2
M
A
T
H
1
1
1
0



n = 164
r = 0.8146
y = -5.211 + 1.000x
d = 2.2303

1
1
-
1
2
M
A
T
H
1
1
1
1

