

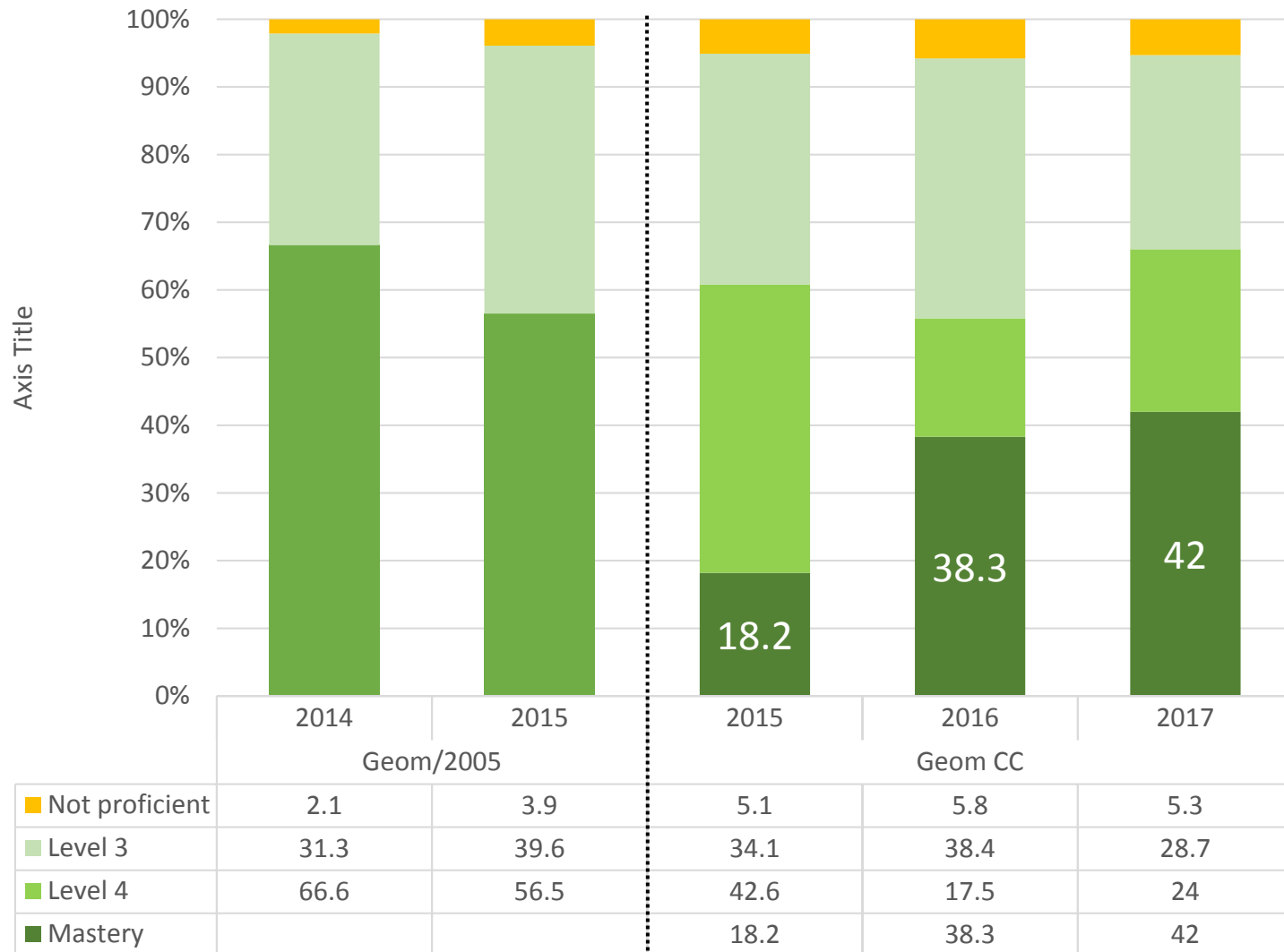
Geometry 2017

Concerns with the 2017 Regents Exam in Geometry

Data Analysis and Conclusions

Geometry – Overall Improvement

Geom Regents Exams



Concerns about Geometry Exam

- The conversion scale is too stingy (too difficult to earn a Level 4 or Level 5 grade),
- There were several flawed questions (that had to be disqualified and the points retroactively awarded),
- The reliance on complicated written question structures made the test difficult for English Language Learners and Students with Disabilities (i.e. tested language skill rather than math concept acquisition), and
- There were a number of multi-step problems in the multiple choice section – meaning that full credit would be lost for a partial mistake in any one step (again, undermining the ability to measure concept acquisition).

Items Disqualified

- NY State Education Department has already invalidated 3 items (questions) from the 2017 Geometry Exam
 - Item 14 – two answers accepted
 - Item 22 – any answer accepted
 - Item 24 – any answer accepted
- Concerns remained regarding items 11 and 27.
- Our data analysis follows...

Level 5 – Most common missed

Type	Question	Correct	Percent less than full credit
II-30 CR	30	72	67.6%
Part I	11	89	59.9%
Part I	23	96	56.8%
II-31 CR	31	120	45.9%
III-34 CR	34	124	44.1%
IV-36 CR	36	139	37.4%
II-27 CR	27	141	36.5%
Part I	18	150	32.4%
II-28 CR	28	156	29.7%
Part I	14	160	27.9%
IV-35 CR	35	162	27.0%
II-29 CR	29	170	23.4%
II-25 CR	25	176	20.7%
Part I	8	177	20.3%
Part I	4	187	15.8%
III-33 CR	33	195	12.2%
III-32 CR	32	203	8.6%
Part I	7	204	8.1%
Part I	20	204	8.1%
Part I	10	205	7.7%
II-26 CR	26	210	5.4%
Part I	15	211	5.0%
Part I	12	212	4.5%
Part I	5	213	4.1%
Part I	13	214	3.6%

Examines which items students ultimately scoring Level 5 (our strongest Geometry students) got incorrect.

Would be an indication of either a difficult item, or a flawed item.

Item 27 does not stand out, item 11 does.

Some are Multiple-Choice, some are Constructed-Response, so an analysis of partial credit is in order...

Level 5 – Percent of points earned 2016 vs. 2017

2017 Level 5			2016 Level 5		
Rank	Item	% of points	Rank	Item	% of points
1	11	40.1%	1	23	70.1%
2	23	43.2%	2	36	73.1% CR
3	31	64.6% CR	3	9	73.4%
4	30	66.2% CR	4	20	79.7%
5	18	67.6%	5	16	82.5%
6	14	72.1%	6	35	82.7% CR
7	8	79.7%	7	18	83.1%
8	27	80.0% CR	8	29	83.6% CR
9	34	84.1% CR	9	22	84.2%
10	4	84.2%	10	13	84.7%
11	29	84.2% CR	11	7	87.0%
12	28	84.9% CR	12	21	87.6%
13	36	87.7% CR	13	17	89.3%
14	25	89.0% CR	14	19	89.3%
15	7	91.9%	15	12	90.4%
16	20	91.9%	16	34	90.4% CR
17	10	92.3%	17	27	91.8% CR
18	35	92.3% CR	18	31	92.4% CR
19	15	95.0%	19	15	92.7%
20	12	95.5%	20	24	92.7%
21	33	95.8% CR	21	2	93.2%
22	5	95.9%	22	25	93.2% CR
23	13	96.4%	23	32	93.6% CR
24	19	96.4%	24	6	93.8%
25	26	97.1% CR	25	26	94.6% CR
26	1	97.3%	26	3	95.5%
27	17	97.3%	27	10	95.5%
28	2	97.7%	28	28	95.5% CR
29	32	97.9% CR	29	14	96.0%
30	9	98.2%	30	30	96.3% CR
31	3	99.1%	31	5	96.6%
32	6	99.1%	32	33	96.9% CR
33	21	99.1%	33	1	98.3%
34	16	99.5%	34	11	98.3%
35	22	100.0%	35	4	99.4%
36	24	100.0%	36	8	100.0%

2017 Level 5			2016 Level 5		
Rank	Item	% of points	Rank	Item	% of points
1	11	40.1%	1	23	70.1%
2	23	43.2%	2	36	73.1% CR
3	31	64.6% CR	3	9	73.4%
4	30	66.2% CR	4	20	79.7%
5	18	67.6%	5	16	82.5%
6	14	72.1%	6	35	82.7% CR
7	8	79.7%	7	18	83.1%
8	27	80.0% CR	8	29	83.6% CR
9	34	84.1% CR	9	22	84.2%
10	4	84.2%	10	13	84.7%
11	29	84.2% CR	11	7	87.0%
12	28	84.9% CR	12	21	87.6%
13	36	87.7% CR	13	17	89.3%
14	25	89.0% CR	14	19	89.3%
15	7	91.9%	15	12	90.4%

Note: No Level 5 student in 2016 got fewer than 70% of possible points on any question.

Compare to County

Questi	I-01	I-02	I-03	I-04	I-05	I-06	I-07	I-08	I-09	I-10	I-11	I-12	I-13	I-14	I-15	I-16	I-17	I-18	I-19	I-20	I-21	I-22	I-23	I-24
MC/CF	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC
District	90.3%	86.1%	93.5%	66.5%	83.8%	91.3%	88.0%	69.4%	81.6%	66.5%	32.7%	78.3%	87.1%	73.4%	77.9%	75.7%	79.8%	47.5%	79.7%	68.4%	92.0%	100.0%	34.0%	100.0%
Region	86.6%	75.9%	83.5%	56.0%	77.8%	79.3%	85.5%	64.1%	61.3%	53.2%	25.7%	64.8%	78.0%	75.1%	71.2%	55.2%	63.6%	38.4%	66.0%	52.1%	80.9%	100.0%	31.5%	100.0%
District	3.8%	10.2%	10.0%	10.5%	6.1%	11.9%	2.5%	5.3%	20.3%	13.4%	7.0%	13.5%	9.1%	-1.7%	6.8%	20.5%	16.2%	9.1%	13.7%	16.3%	11.2%	0.0%	2.5%	0.0%

Questi	II-25	II-26	II-27	II-28	II-29	II-30	II-31	III-32	III-33	III-34	IV-35	IV-36
MC/CF	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR	CR
District	68.8%	76.5%	61.7%	66.9%	57.9%	56.5%	34.7%	89.7%	74.5%	58.7%	71.0%	60.0%
Region	46.1%	53.6%	44.5%	46.1%	35.6%	47.6%	32.0%	70.4%	46.8%	35.2%	47.9%	34.5%
District	22.8%	23.0%	17.2%	20.8%	22.3%	8.9%	2.7%	19.3%	27.6%	23.5%	23.1%	25.5%

Note: Bottom line shows percent by which Syosset students exceeded Nassau County % correct on each item. We exceeded County for each item in question. Suggests it's not a curriculum/instruction problem.

Percent of points earned (Level 5)

Percent of points students earned at a given performance level																								
Level	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	9.1%	18.2%	45.5%	9.1%	18.2%	27.3%	72.7%	18.2%	27.3%	45.5%	18.2%	9.1%	18.2%	18.2%	0.0%	18.2%	0.0%	18.2%	27.3%	9.1%	36.4%	100.0%	27.3%	100.0%
2	58.8%	35.3%	64.7%	17.6%	41.2%	47.1%	76.5%	41.2%	17.6%	29.4%	29.4%	29.4%	29.4%	47.1%	35.3%	11.8%	17.6%	41.2%	35.3%	29.4%	52.9%	100.0%	29.4%	100.0%
3	86.8%	75.7%	88.8%	48.0%	75.7%	86.8%	84.2%	60.5%	64.5%	34.9%	23.0%	61.8%	80.3%	74.3%	61.8%	44.7%	61.8%	27.0%	61.2%	46.1%	85.5%	100.0%	28.9%	100.0%
4	93.7%	91.3%	97.6%	70.1%	84.3%	94.5%	89.0%	70.1%	86.6%	66.9%	33.1%	81.1%	92.9%	82.7%	80.3%	85.0%	86.6%	40.9%	83.5%	65.4%	97.6%	100.0%	25.2%	100.0%
5	97.3%	97.7%	99.1%	84.2%	95.9%	99.1%	91.9%	79.7%	98.2%	92.3%	40.1%	95.5%	96.4%	72.1%	95.0%	99.5%	97.3%	67.6%	96.4%	91.9%	99.1%	100.0%	43.2%	100.0%

Level	25	26	27	28	29	30	31	32	33	34	35	36	CR Avg.
1	4.5%	0.0%	9.1%	4.5%	9.1%	27.3%	0.0%	47.7%	18.2%	4.5%	12.1%	6.1%	11.9%
2	23.5%	20.6%	23.5%	11.8%	17.6%	44.1%	2.9%	67.6%	26.5%	13.2%	18.6%	15.7%	23.8%
3	49.3%	52.6%	46.7%	49.3%	31.6%	49.7%	7.9%	80.3%	53.0%	32.9%	48.1%	34.5%	44.7%
4	69.3%	83.9%	58.3%	70.1%	53.9%	51.6%	23.2%	93.3%	74.8%	56.7%	73.5%	53.4%	63.5%
5	89.0%	97.1%	80.0%	84.9%	84.2%	66.2%	64.6%	97.9%	95.8%	84.1%	92.3%	87.7%	85.3%

Items 11 and 23 perform differently from all other items. Item 27 appears difficult, but performs normally.

A

ce level	8	9	10	11	12	13	14
1	18.2%	27.3%	45.5%	18.2%	9.1%	18.2%	18.2%
2	41.2%	17.6%	29.4%	29.4%	29.4%	29.4%	47.1%
3	60.5%	64.5%	34.9%	23.0%	61.8%	80.3%	74.3%
4	70.1%	86.6%	66.9%	33.1%	81.1%	92.9%	82.7%
5	79.7%	98.2%	92.3%	40.1%	95.5%	96.4%	72.1%

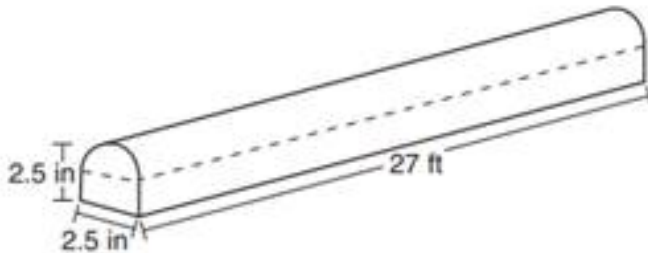
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	21	22	23	24	25	26	27
1	36.4%	100.0%	27.3%	100.0%	4.5%	0.0%	9.1%
2	52.9%	100.0%	29.4%	100.0%	23.5%	20.6%	23.5%
3	85.5%	100.0%	28.9%	100.0%	49.3%	52.6%	46.7%
4	97.6%	100.0%	25.2%	100.0%	69.3%	83.9%	58.3%
5	99.1%	100.0%	43.2%	100.0%	89.0%	97.1%	80.0%

C

What's the Deal with 23?

23 A fabricator is hired to make a 27-foot-long solid metal railing for the stairs at the local library. The railing is modeled by the diagram below. The railing is 2.5 inches high and 2.5 inches wide and is comprised of a rectangular prism and a half-cylinder.



How much metal, to the *nearest cubic inch*, will the railing contain?

- (1) 151 (3) 1808
(2) 795 (4) 2025

Note: $150.643 \times 12 = 1807.72$

Question 23

Choice	Count	Percent
1	254	47.8%
2	65	12.2%
3	180	33.9%
4	29	5.5%

Conclusion - It would appear most students knew the concept, but about half were sloppy and overlooked the unit conversion (feet to inches) and thus lost full credit.

Overall Conclusions

- Geometry 2017 differed significantly from 2016;
- 3 items are already deemed flawed;
- Our analysis shows that a 4th item (#11) performs very irregularly;
- Our review of the item shows that it has several weaknesses:
 - “All of the Above” (AOTA) item (see footnotes),
 - Answers switch from whole/part to part/whole,
 - All answers are technically correct (one is “best”).

http://www.datag.org/Websites/datagorg/files/Content/5158557/Brooks_-_10_Rules_Multiple_Choice_Question_Design.pdf

Slide 35 – question NOT recommended by Research

<https://testing.byu.edu/handbooks/betteritems.pdf> (Identical footnote p.14)

https://sites.educ.ualberta.ca/staff/Idelia/M'Choice'Tests=Haladyna_Guidelines_AME_2002.pdf

“26. Avoid All-of-the-above” p.312. Discussion on p.319