

Appendix 15A: TIMSS Advanced 2015 Context Questionnaire Scales, Advanced Mathematics

Home Educational Resources Scale, Advanced Mathematics

The Home Educational Resources (HER) scale was created based on students' responses concerning the availability of four resources described below.

Items in the TIMSS Advanced 2015 Home Educational Resources Scale, Advanced Mathematics

MSBG04	<p>Number of books in the home:</p> <ul style="list-style-type: none"> 1) 0-10 2) 11-25 3) 26-100 4) 101-200 5) More than 200 	<p>Highest level of education of either parent:</p> <ul style="list-style-type: none"> 1) Finished some primary or lower secondary or did not go to school 2) Finished lower secondary 3) Finished upper secondary 4) Finished post-secondary education 5) Finished university or higher 	MSDGEDUP ¹
MSDG06S ¹	<p>Number of home study supports:</p> <ul style="list-style-type: none"> 1) None 2) Study desk/table or own room 3) Both 		
MSDGOCCP ¹	<p>Highest level of occupation of either parent:</p> <ul style="list-style-type: none"> 1) Has never worked outside home for pay, general laborer, or semi-professional (skilled agricultural or fishery worker, craft or trade worker, plant or machine operator) 2) Clerical (clerk or service or sales worker) 3) Small business owner 4) Professional (corporate manager or senior official, professional, or technician or associate professional) 		

¹ Derived variable. For more details, see Supplement 3 of the TIMSS Advanced 2015 User Guide for the [International Database](#).

Item Parameters for the TIMSS Advanced 2015 Home Educational Resources Scale, Advanced Mathematics

Item	delta	tau_1	tau_2	tau_3	tau_4	Infit
MSBG04	0.63886	-0.93281	-0.47613	0.80516	0.60378	1.10
MSDG06S	-0.97302	-0.28994	0.28994			1.27
MSDGEDUP	-0.07938	-0.66004	-0.41662	0.85158	0.22508	0.96
MSDGOCCP	0.41354	-0.67697	1.24010	-0.56313		0.97

*Reverse coded

Scale Transformation Constants for the TIMSS Advanced 2015 Home Educational Resources Scale, Advanced Mathematics

Scale Transformation Constants

A = 7.705317

B = 2.192074

Transformed Scale Score = 7.705317 + 2.192074 • Logit Scale Score

Equivalence Table of the Raw Score and the Transformed Scale Score for the TIMSS Advanced 2015 Home Educational Resources Scale, Advanced Mathematics

Raw Score	Transformed Scale Score	Cutpoint
0	1.48945	
1	3.86046	
2	5.08504	
3	5.98800	6.0
4	6.72756	
5	7.36772	
6	7.93623	
7	8.46945	
8	8.98566	
9	9.51161	
10	10.07874	
11	10.73945	
12	11.62325	11.6
13	13.29245	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 Home Educational Resources Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item			
			MSB604	MSD606S	MSD6EDUP	MSD6CCP
France	0.59	46	0.66	0.24	0.83	0.81
Italy	0.62	48	0.69	0.27	0.84	0.82
Lebanon	0.53	42	0.62	0.38	0.77	0.74
Norway	0.54	44	0.68	0.33	0.79	0.75
Portugal	0.69	52	0.77	0.18	0.87	0.84
Russian Federation	0.41	38	0.62	0.07	0.76	0.75
Russian Federation 6hr+	0.40	38	0.62	0.25	0.75	0.72
Slovenia	0.53	42	0.67	0.17	0.80	0.76
Sweden	0.61	48	0.72	0.47	0.77	0.76
United States	0.53	43	0.66	0.57	0.79	0.58
International Avg.	0.56	45	0.68	0.30	0.80	0.76

Relationship Between the TIMSS Advanced 2015 Home Educational Resources Scale, Advanced Mathematics, and TIMSS Advanced 2015 Advanced Mathematics Achievement

Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.32	0.10	0.07
Italy	0.30	0.09	0.06
Lebanon	0.22	0.05	0.03
Norway	0.28	0.08	0.05
Portugal	0.24	0.06	0.05
Russian Federation	0.18	0.03	0.02
Russian Federation 6hr+	0.23	0.05	0.03
Slovenia	0.21	0.04	0.04
Sweden	0.34	0.11	0.08
United States	0.25	0.06	0.04
International Median	0.25	0.06	0.05

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Safe and Orderly School-Teachers' Reports Scale, Advanced Mathematics

The Safe and Orderly School-Teachers' Reports (SOS) scale was created based on teachers' degree of agreement with the eight statements described below.

Items in the TIMSS Advanced 2015 Safe and Orderly School-Teachers' Reports Scale, Advanced Mathematics¹

Thinking about your current school, indicate the extent to which you agree or disagree with each of the following statements.

	Agree a lot	Agree a little	Disagree a little	Disagree a lot
MTBG07A 1) This school is located in a safe neighborhood -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MTBG07B 2) I feel safe at this school -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MTBG07C 3) This school's security policies and practices are sufficient -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MTBG07D 4) The students behave in an orderly manner -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MTBG07E 5) The students are respectful of the teachers -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MTBG07F 6) The students respect school property -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MTBG07G 7) This school has clear rules about student conduct -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MTBG07H 8) This school's rules are enforced in a fair and consistent manner -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Very Safe and Orderly 9.9 Safe and Orderly 6.5 Less than Safe and Orderly

¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories "Disagree a little" and "Disagree a lot" were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

Item Parameters for the TIMSS Advanced 2015 Safe and Orderly Schools - Teachers' Reports Scale, Advanced Mathematics

Item	delta	tau_1	tau_2	Infit
MTBG07A	-0.82109	-1.51458	1.51458	1.15
MTBG07B	-1.74585	-1.72523	1.72523	0.92
MTBG07C	-0.33658	-1.56042	1.56042	1.04
MTBG07D	0.39769	-1.95319	1.95319	0.83
MTBG07E	0.19117	-2.14541	2.14541	0.85
MTBG07F	1.15478	-2.08336	2.08336	0.94
MTBG07G	0.17538	-1.48879	1.48879	1.10
MTBG07H	0.98450	-1.53824	1.53824	1.05

Scale Transformation Constants for the TIMSS Advanced 2015 Safe and Orderly Schools - Teachers' Reports Scale, Advanced Mathematics

Scale Transformation Constants

$$A = 8.173896$$

$$B = 0.95666$$

$$\text{Transformed Scale Score} = 8.173896 + 0.95666 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and the Transformed Scale Score for the TIMSS Advanced 2015 Safe and Orderly Schools - Teachers' Reports Scale, Advanced Mathematics

Raw Score	Transformed Scale Score	Cutpoint
0	3.37625	
1	4.67674	
2	5.40155	
3	5.94826	
4	6.41573	6.5
5	6.84650	
6	7.26412	
7	7.68378	
8	8.11417	
9	8.55968	
10	9.01824	
11	9.48591	
12	9.96410	9.9
13	10.46579	
14	11.02538	
15	11.73354	
16	12.98778	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 Safe and Orderly Schools - Teachers' Reports Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			MTBG07A	MTBG07B	MTBG07C	MTBG07D	MTBG07E	MTBG07F	MTBG07G	MTBG07H
France	0.90	59	0.70	0.71	0.78	0.84	0.80	0.71	0.77	0.79
Italy	0.85	49	0.60	0.67	0.69	0.81	0.79	0.75	0.57	0.68
Lebanon	0.84	48	0.50	0.62	0.56	0.71	0.74	0.74	0.80	0.82
Norway	0.84	48	0.50	0.64	0.52	0.74	0.77	0.80	0.76	0.75
Portugal	0.88	54	0.62	0.68	0.81	0.80	0.77	0.75	0.70	0.75
Russian Federation	0.83	47	0.50	0.69	0.74	0.83	0.81	0.68	0.73	0.43
Russian Federation 6hr+	0.78	41	0.70	0.55	0.59	0.76	0.72	0.62	0.70	0.41
Slovenia	0.91	61	0.74	0.75	0.83	0.79	0.82	0.78	0.75	0.80
Sweden	0.80	43	0.50	0.54	0.63	0.83	0.76	0.76	0.51	0.66
United States	0.90	61	0.54	0.70	0.81	0.85	0.85	0.86	0.78	0.83
International Avg.	0.86	52	0.58	0.67	0.71	0.80	0.79	0.76	0.71	0.72

Relationship Between the TIMSS Advanced 2015 Safe and Orderly Schools - Teachers' Reports Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.16	0.02	0.02
Italy	0.07	0.00	0.03
Lebanon	0.13	0.02	0.00
Norway	0.07	0.01	0.01
Portugal	0.04	0.00	0.00
Russian Federation	0.14	0.02	0.03
Russian Federation 6hr+	0.17	0.03	0.05
Slovenia	0.17	0.03	0.03
Sweden	0.08	0.01	0.01
United States	0.03	0.00	0.02
International Median	0.08	0.01	0.02

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

School Discipline Problems–Principals’ Reports Scale, Advanced Mathematics

The School Discipline Problems–Principals’ Reports (DAS) scale was created based on principals’ responses concerning the eleven potential school problems described below.

Items in the TIMSS Advanced 2015 School Discipline Problems–Principals’ Reports Scale, Advanced Mathematics

		To what degree is each of the following a problem among twelfth grade students in your school?			
		Not a problem	Minor problem	Moderate problem	Serious problem
MCBG11A	1) Arriving late at school -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11B	2) Absenteeism (i.e., unjustified absences) -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11C	3) Classroom disturbance -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11D	4) Cheating -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11E	5) Profanity -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11F	6) Vandalism -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11G	7) Theft -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11H	8) Intimidation or verbal abuse among students (including texting, emailing, etc.) -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11 I	9) Physical injury to other students -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11J	10) Intimidation or verbal abuse of teachers or staff (including texting, emailing, etc.) -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MCBG11K	11) Physical injury to teachers or staff -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Hardly Any Problems 10.0 Minor Problems 7.2 Moderate to Severe Problems

Item Parameters for the TIMSS Advanced 2015 School Discipline Problems - Principals' Reports Scale, Advanced Mathematics

Item	delta	tau_1	tau_2	tau_3	Infit
MCBG11A	1.17742	-3.15684	-0.15587	3.31271	1.32
MCBG11B	1.45295	-2.15166	-0.29819	2.44985	1.30
MCBG11C	0.19376	-1.84784	-0.67552	2.52336	0.88
MCBG11D	0.54002	-2.57666	-0.59148	3.16814	1.15
MCBG11E	-0.23367	-1.81279	-0.33749	2.15028	0.87
MCBG11F	-0.49122	0.42442	-1.36426	0.93984	0.69
MCBG11G	-0.42249	0.12894	-1.20999	1.08105	0.69
MCBG11H	0.03725	-0.81699	-1.25629	2.07328	0.78
MCBG11I	-0.61113	0.68322	-1.40198	0.71876	0.61
MCBG11J	-0.63015	0.69434	-1.66531	0.97097	0.74
MCBG11K	-1.01274	1.42144	-0.55467	-0.86677	0.56

Scale Transformation Constants for the TIMSS Advanced 2015 School Discipline Problems - Principals' Reports Scale, Advanced Mathematics

Scale Transformation Constants

$$A = 7.71961$$

$$B = 0.975134$$

$$\text{Transformed Scale Score} = 7.71961 + 0.975134 \cdot \text{Logit Scale Score}$$

**Equivalence Table of the Raw Score and the Transformed Scale Score
for the TIMSS Advanced 2015 School Discipline Problems - Principals'
Reports Scale, Advanced Mathematics**

Raw Score	Transformed Scale Score	Cutpoint
0	3.51299	
1	4.63283	
2	5.15247	
3	5.48517	
4	5.72627	
5	5.91593	
6	6.07244	
7	6.20925	
8	6.33188	
9	6.44442	
10	6.55006	
11	6.65149	
12	6.75093	
14	6.95014	
15	7.05580	
16	7.16645	7.2
17	7.28461	
18	7.41311	
19	7.55522	
20	7.71471	
21	7.89534	
22	8.10206	
23	8.33660	
24	8.60078	
25	8.89568	
26	9.22471	
27	9.59087	
28	10.00271	10.0
29	10.47049	
30	11.00615	
31	11.62931	
32	12.40529	
33	13.73050	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 School Discipline Problems - Principals' Reports Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item										
			MCBG1A	MCBG1B	MCBG1C	MCBG1D	MCBG1E	MCBG1F	MCBG1G	MCBG1H	MCBG1I	MCBG1J	MCBG1K
France	0.94	65	0.61	0.65	0.79	0.70	0.88	0.89	0.80	0.88	0.91	0.87	0.85
Italy	0.96	72	0.49	0.77	0.87	0.72	0.74	0.94	0.95	0.91	0.95	0.94	0.92
Lebanon	0.98	84	0.84	0.88	0.90	0.87	0.94	0.95	0.96	0.91	0.94	0.93	0.94
Norway	0.85	46	0.65	0.74	0.67	0.58	0.78	0.72	0.66	0.63	0.74	0.69	0.61
Portugal	0.93	62	0.50	0.75	0.81	0.71	0.75	0.86	0.86	0.86	0.88	0.85	0.72
Russian Federation	0.75	34	0.56	0.67	0.65	0.58	0.73	0.52	0.48	0.56	0.58	0.39	-
Russian Federation 6hr+	0.77	34	0.65	0.66	0.72	0.60	0.70	0.56	0.50	0.54	0.57	0.05	-
Slovenia	0.76	37	0.26	0.27	0.53	0.53	0.66	0.68	0.66	0.58	0.80	0.64	0.83
Sweden	0.78	32	0.52	0.54	0.59	0.41	0.53	0.71	0.68	0.67	0.58	0.62	0.20
United States	0.88	47	0.55	0.56	0.79	0.62	0.78	0.77	0.78	0.74	0.73	0.65	0.47
International Avg.	0.87	53	0.55	0.65	0.73	0.64	0.75	0.78	0.76	0.75	0.79	0.73	0.69

A dash (-) indicates comparable data not available.

Relationship Between the TIMSS Advanced 2015 School Discipline Problems - Principals' Reports Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

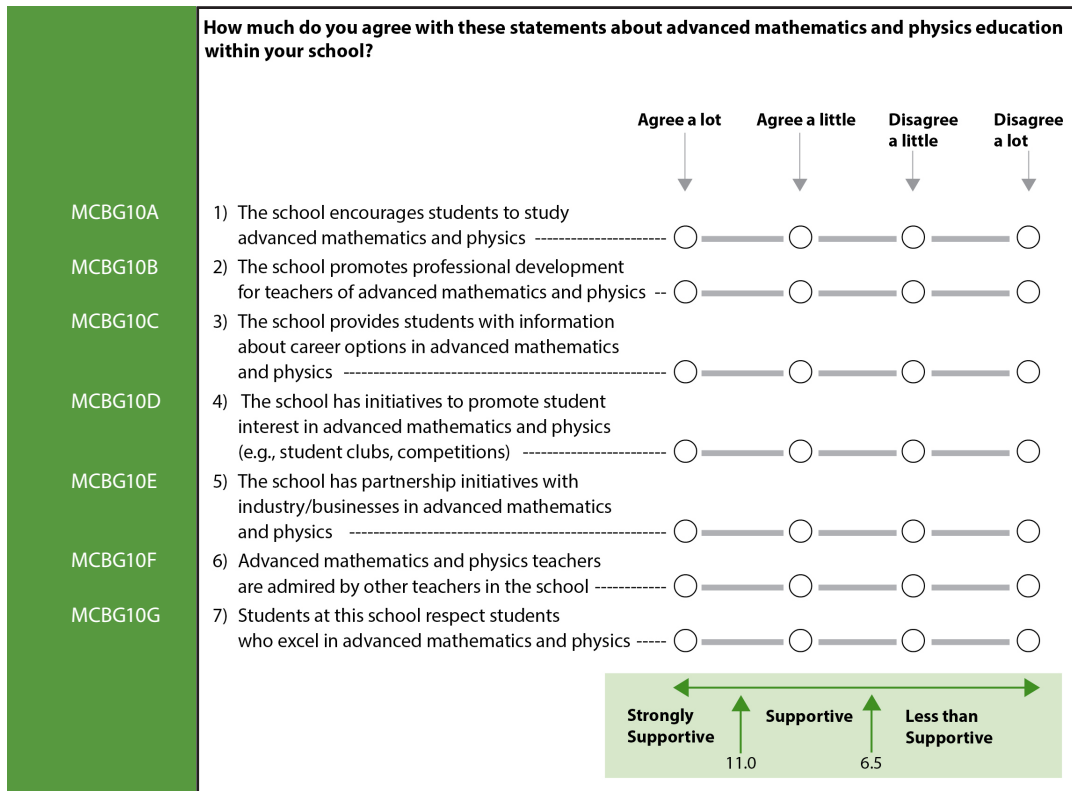
Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.10	0.01	0.00
Italy	0.21	0.04	0.06
Lebanon	0.10	0.01	0.01
Norway	0.18	0.03	0.01
Portugal	0.03	0.00	0.00
Russian Federation	0.15	0.02	0.00
Russian Federation 6hr+	0.02	0.00	0.00
Slovenia	0.25	0.06	0.03
Sweden	0.09	0.01	0.01
United States	0.16	0.03	0.02
International Median	0.15	0.02	0.01

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

School Supports Advanced Mathematics and Physics Education—Principal Version Scale, Advanced Mathematics

The School Supports Advanced Mathematics and Physics Education—Principal Version (SMP) scale was created based on principals’ responses characterizing the seven aspects described below.

Items in the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education—Principal Version Scale, Advanced Mathematics¹



¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories “Disagree a little” and “Disagree a lot” were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

Item Parameters for the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Principal Version Scale, Advanced Mathematics

Item	delta	tau_1	tau_2	Infit
MCBG10A	-0.97501	-1.02632	1.02632	0.90
MCBG10B	-0.49096	-1.21322	1.21322	0.96
MCBG10C	-0.81296	-1.29416	1.29416	0.94
MCBG10D	-0.54344	-1.00501	1.00501	0.95
MCBG10E	1.78310	-0.57696	0.57696	1.06
MCBG10F	1.03554	-0.58860	0.58860	0.94
MCBG10G	0.00373	-0.96389	0.96389	0.97

Scale Transformation Constants for the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Principal Version Scale, Advanced Mathematics

Scale Transformation Constants

$$A = 8.749167$$

$$B = 1.410095$$

$$\text{Transformed Scale Score} = 8.749167 + 1.410095 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and the Transformed Scale Score for the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Principal Version Scale, Advanced Mathematics

Raw Score	Transformed Scale Score	Cutpoint
0	2.89865	
1	4.69620	
2	5.68613	
3	6.45357	6.5
4	7.12107	
5	7.73084	
6	8.30187	
7	8.84425	
8	9.36982	
9	9.89666	
10	10.43956	
11	11.02451	11.0
12	11.71058	
13	12.61631	
14	14.32251	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Principal Version Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			MCBGT0A	MCBGT0B	MCBGT0C	MCBGT0D	MCBGT0E	MCBGT0F	MCBGT0G	
France	0.66	34	0.70	0.60	0.62	0.56	0.50	0.60	0.46	
Italy	0.73	40	0.81	0.73	0.68	0.60	0.67	0.31	0.46	
Lebanon	0.75	41	0.61	0.64	0.73	0.76	0.56	0.60	0.56	
Norway	0.65	35	0.34	0.56	0.70	0.49	0.40	0.79	0.73	
Portugal	0.73	39	0.55	0.66	0.58	0.69	0.49	0.69	0.66	
Russian Federation	0.72	40	0.55	0.58	0.58	0.71	0.55	0.77	0.66	
Russian Federation 6hr+	0.69	41	0.71	0.78	0.65	0.65	0.52	0.62	0.53	
Slovenia	0.69	36	0.62	0.64	0.63	0.64	0.63	0.51	0.49	
Sweden	0.71	37	0.78	0.60	0.62	0.58	0.60	0.52	0.51	
United States	0.78	44	0.57	0.63	0.71	0.77	0.60	0.67	0.70	
International Avg.	0.71	38	0.62	0.63	0.65	0.64	0.56	0.61	0.58	

Relationship Between the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Principal Version Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

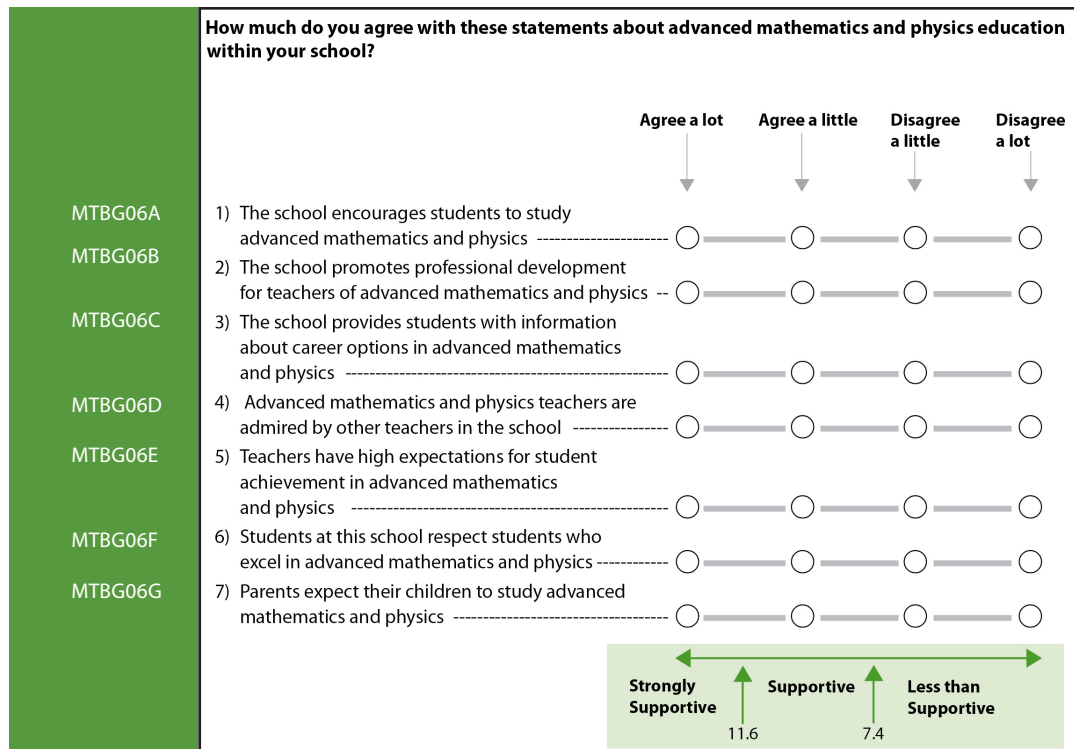
Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.02	0.00	0.00
Italy	0.06	0.00	0.00
Lebanon	0.10	0.01	0.00
Norway	0.17	0.03	0.05
Portugal	0.03	0.00	0.01
Russian Federation	0.16	0.03	0.01
Russian Federation 6hr+	0.21	0.04	0.02
Slovenia	0.29	0.09	0.04
Sweden	0.06	0.00	0.00
United States	0.10	0.01	0.01
International Median	0.10	0.01	0.01

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

School Supports Advanced Mathematics and Physics Education—Teacher Version Scale, Advanced Mathematics

The School Supports Advanced Mathematics and Physics Education—Teacher Version (SMP) scale was created based on teachers’ responses characterizing the seven aspects described below.

Items in the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education—Teacher Version Scale, Advanced Mathematics¹



¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories “Disagree a little” and “Disagree a lot” were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

Item Parameters for the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Teacher Version Scale, Advanced Mathematics

Item	delta	tau_1	tau_2	Infit
MTBG06A	-0.83359	-1.13874	1.13874	0.90
MTBG06B	0.36769	-0.90518	0.90518	1.09
MTBG06C	0.01503	-1.05692	1.05692	0.98
MTBG06D	0.90364	-0.63126	0.63126	0.93
MTBG06E	-0.28192	-1.24591	1.24591	0.98
MTBG06F	-0.41669	-1.02854	1.02854	1.09
MTBG06G	0.24584	-1.19301	1.19301	1.10

Scale Transformation Constants for the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Teacher Version Scale, Advanced Mathematics

Scale Transformation Constants

A = 9.498786

B = 1.425402

Transformed Scale Score = 9.498786 + 1.425402 • Logit Scale Score

Equivalence Table of the Raw Score and the Transformed Scale Score for the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Teacher Version Scale, Advanced Mathematics

Raw Score	Transformed Scale Score	Cutpoint
0	3.88749	
1	5.67991	
2	6.64185	
3	7.36800	7.4
4	7.98333	
5	8.54226	
6	9.06318	
7	9.56156	
8	10.04970	
9	10.54426	
10	11.05900	
11	11.62342	11.6
12	12.28865	
13	13.18972	
14	14.91360	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Teacher Version Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item						
			MTBC006A	MTBC006B	MTBC006C	MTBC006D	MTBC006E	MTBC006F	MTBC006G
France	0.58	29	0.47	0.41	0.47	0.52	0.58	0.73	0.52
Italy	0.72	38	0.69	0.59	0.70	0.66	0.62	0.40	0.62
Lebanon	0.72	38	0.74	0.72	0.65	0.52	0.61	0.48	0.56
Norway	0.72	38	0.70	0.52	0.60	0.77	0.67	0.62	0.34
Portugal	0.72	38	0.66	0.71	0.64	0.59	0.62	0.41	0.64
Russian Federation	0.83	50	0.65	0.81	0.74	0.72	0.57	0.76	0.66
Russian Federation 6hr+	0.75	42	0.62	0.76	0.77	0.66	0.59	0.54	0.55
Slovenia	0.66	33	0.64	0.71	0.63	0.56	0.55	0.51	0.34
Sweden	0.66	33	0.63	0.38	0.70	0.48	0.63	0.61	0.53
United States	0.78	44	0.68	0.60	0.74	0.70	0.52	0.70	0.68
International Avg.	0.71	38	0.65	0.60	0.65	0.61	0.60	0.58	0.54

Relationship Between the TIMSS Advanced 2015 School Supports Advanced Mathematics and Physics Education - Teacher Version Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.06	0.00	0.00
Italy	0.13	0.02	0.02
Lebanon	0.04	0.00	0.01
Norway	0.08	0.01	0.02
Portugal	0.06	0.00	0.00
Russian Federation	0.22	0.05	0.03
Russian Federation 6hr+	0.15	0.02	0.01
Slovenia	0.24	0.06	0.03
Sweden	0.07	0.00	0.00
United States	0.01	0.00	0.01
International Median	0.07	0.00	0.01

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Students Like Learning Advanced Mathematics Scale

The Students Like Learning Advanced Mathematics (SLM) scale was created based on students' degree of agreement with the twelve statements described below.

Items in the TIMSS Advanced 2015 Students Like Learning Advanced Mathematics Scale

How much do you agree with these statements about the mathematics you are studying?					
	Agree a lot	Agree a little	Disagree a little	Disagree a lot	
MSBM20A	1) When I do mathematics problems, I sometimes get completely absorbed -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20B	2) I get a sense of satisfaction when I solve mathematics problems -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20C*	3) I feel bored when I do my mathematics schoolwork* -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20D	4) I like studying for my mathematics class outside of school -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20E	5) It is interesting to learn mathematics theory -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20F*	6) I dread my mathematics class* -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20G	7) I am studying mathematics because I like to learn new things -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20H	8) I enjoy figuring out challenging mathematics -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20I	9) Mathematics is one of my favorite subjects -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20J	10) Jobs that require advanced mathematics skills seem interesting to me -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20K*	11) I wish I did not have to study mathematics* -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM20L	12) I enjoy thinking about the world in terms of mathematical relationships -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* Reverse coded

Very Much Like Learning Advanced Mathematics 11.8 Like Learning Advanced Mathematics 9.1 Do Not Like Learning Advanced Mathematics

Item Parameters for the TIMSS Advanced 2015 Students Like Learning Advanced Mathematics Scale

Item	delta	tau_1	tau_2	tau_3	Infit
MSBM20A	-0.59588	-1.40851	-0.22921	1.63772	1.28
MSBM20B	-1.08963	-0.57708	-0.49790	1.07498	1.10
MSBM20C*	0.39039	-1.70328	-0.19453	1.89781	1.30
MSBM20D	0.79348	-1.59115	-0.11154	1.70269	1.13
MSBM20E	0.39789	-1.25999	-0.18804	1.44803	1.03
MSBM20F*	-0.55711	-1.10780	0.07358	1.03422	2.03
MSBM20G	0.00711	-1.53161	-0.11150	1.64311	0.89
MSBM20H	-0.16988	-1.21083	-0.10307	1.31390	0.85
MSBM20I	0.21802	-0.68925	-0.03127	0.72052	0.73
MSBM20J	0.15044	-0.99874	-0.14656	1.14530	0.95
MSBM20K*	-0.28490	-0.61660	-0.08438	0.70098	1.31
MSBM20L	0.74007	-1.30692	0.04757	1.25935	1.11

*Reverse coded

Scale Transformation Constants for the TIMSS Advanced 2015 Students Like Learning Advanced Mathematics Scale

Scale Transformation Constants

A = 9.128252

B = 1.556567

Transformed Scale Score = 9.128252 + 1.556567 • Logit Scale Score

**Equivalence Table of the Raw Score and the Transformed Scale Score
for the TIMSS Advanced 2015 Students Like Learning Advanced
Mathematics Scale**

Raw Score	Transformed Scale Score	Cutpoint
0	2.17529	
1	3.91526	
2	4.74499	
3	5.30942	
4	5.74558	
5	6.11032	
6	6.42755	
7	6.71198	
8	6.97262	
9	7.21536	
10	7.44367	
11	7.66218	
12	7.87192	
13	8.07472	
14	8.27223	
15	8.46589	
16	8.65702	
17	8.84686	
18	9.03665	9.1
19	9.22759	
20	9.42092	
21	9.61793	
22	9.82004	
23	10.02874	
24	10.24570	
25	10.47196	
26	10.71137	
27	10.96623	
28	11.24022	
29	11.53811	
30	11.86658	11.8
31	12.23465	
32	12.65864	
33	13.16494	
34	13.80785	
35	14.72417	
36	16.55930	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 Students Like Learning Advanced Mathematics Scale

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item											
			MSBM20A	MSBM20B	MSBM20C*	MSBM20D	MSBM20E	MSBM20F*	MSBM20G	MSBM20H	MSBM20I	MSBM20J	MSBM20K*	MSBM20L
France	0.88	45	0.71	0.46	0.61	0.68	0.76	0.32	0.76	0.76	0.83	0.65	0.76	0.56
Italy	0.85	46	-0.47	0.41	0.64	0.78	0.66	0.39	0.81	0.80	0.85	0.79	0.76	0.63
Lebanon	0.74	30	0.47	0.59	0.33	0.45	0.63	0.08	0.68	0.66	0.72	0.67	0.30	0.62
Norway	0.89	45	0.66	0.42	0.66	0.68	0.75	0.41	0.76	0.79	0.84	0.67	0.69	0.59
Portugal	0.90	47	0.64	0.57	0.64	0.73	0.70	0.48	0.74	0.76	0.83	0.69	0.78	0.61
Russian Federation	0.91	51	0.65	0.75	0.59	0.67	0.74	0.42	0.80	0.84	0.84	0.82	0.62	0.68
Russian Federation 6hr+	0.91	51	0.69	0.76	0.57	0.67	0.73	0.43	0.78	0.85	0.85	0.81	0.60	0.68
Slovenia	0.90	47	0.71	0.44	0.51	0.67	0.52	0.65	0.78	0.82	0.84	0.78	0.76	0.65
Sweden	0.91	49	0.66	0.57	0.69	0.72	0.79	0.43	0.78	0.80	0.85	0.71	0.73	0.60
United States	0.91	50	0.68	0.58	0.58	0.63	0.74	0.66	0.76	0.79	0.82	0.76	0.70	0.71
International Avg.	0.87	46	0.52	0.53	0.58	0.67	0.70	0.43	0.76	0.78	0.82	0.73	0.68	0.63

*Reverse coded

Relationship Between the TIMSS Advanced 2015 Students Like Learning Advanced Mathematics Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

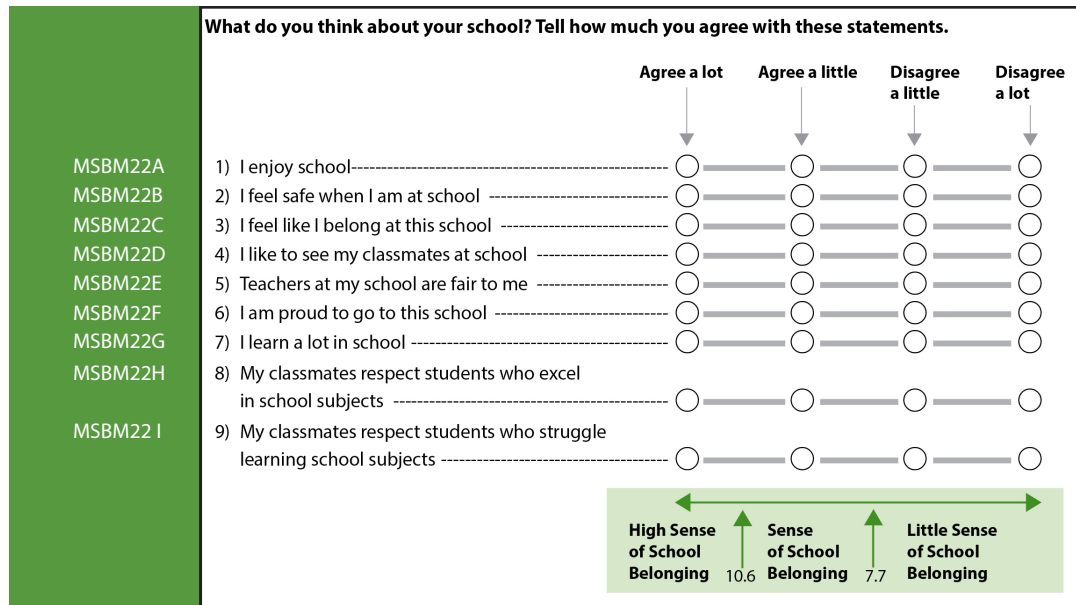
Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.51	0.26	0.21
Italy	0.35	0.13	0.10
Lebanon	0.29	0.08	0.06
Norway	0.48	0.23	0.20
Portugal	0.50	0.25	0.21
Russian Federation	0.37	0.13	0.12
Russian Federation 6hr+	0.37	0.14	0.13
Slovenia	0.52	0.27	0.24
Sweden	0.54	0.29	0.24
United States	0.38	0.14	0.12
International Median	0.48	0.23	0.20

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Students' Sense of School Belonging Scale, Advanced Mathematics

The Students' Sense of School Belonging (SSB) scale was created based on students' degree of agreement with the nine statements described below.

Items in the TIMSS Advanced 2015 Students' Sense of School Belonging Scale, Advanced Mathematics



Item Parameters for the TIMSS Advanced 2015 Students' Sense of School Belonging Scale, Advanced Mathematics

Item	delta	tau_1	tau_2	tau_3	Infit
MSBM22A	0.39975	-1.19908	-0.58547	1.78455	1.12
MSBM22B	-0.15512	-0.80900	-0.70858	1.51758	1.03
MSBM22C	0.28834	-1.11210	-0.31747	1.42957	0.95
MSBM22D	-0.80465	-0.67223	-0.64404	1.31627	1.22
MSBM22E	0.00294	-1.42359	-0.45338	1.87697	1.11
MSBM22F	0.41761	-1.13239	-0.45103	1.58342	0.95
MSBM22G	-0.24169	-1.34822	-0.66654	2.01476	1.01
MSBM22H	-0.10713	-1.24202	-0.52085	1.76287	1.10
MSBM22I	0.19995	-1.32373	-0.51026	1.83399	1.33

Scale Transformation Constants for the TIMSS Advanced 2015 Students' Sense of School Belonging Scale, Advanced Mathematics

Scale Transformation Constants

$$A = 7.993523$$

$$B = 1.272937$$

$$\text{Transformed Scale Score} = 7.993523 + 1.272937 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and the Transformed Scale Score for the TIMSS Advanced 2015 Students' Sense of School Belonging Scale, Advanced Mathematics

Raw Score	Transformed Scale Score	Cutpoint
0	2.80092	
1	4.17041	
2	4.81527	
3	5.25552	
4	5.59943	
5	5.88979	
6	6.14726	
7	6.38344	
8	6.60565	
9	6.81902	
10	7.02747	
11	7.23422	
12	7.44214	
13	7.65463	7.7
14	7.87272	
15	8.10081	
16	8.34184	
17	8.59861	
18	8.87410	
19	9.17103	
20	9.49135	
21	9.83727	
22	10.21291	
23	10.62626	10.6
24	11.09778	
25	11.66982	
26	12.45741	
27	13.98330	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 Students' Sense of School Belonging Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			MSBM22A	MSBM22B	MSBM22C	MSBM22D	MSBM22E	MSBM22F	MSBM22G	MSBM22H	MSBM22I	
France	0.81	40	0.72	0.67	0.67	0.58	0.56	0.73	0.63	0.56	0.56	
Italy	0.83	43	0.71	0.71	0.76	0.53	0.62	0.79	0.68	0.52	0.53	
Lebanon	0.85	45	0.63	0.79	0.76	0.57	0.63	0.73	0.67	0.64	0.59	
Norway	0.84	45	0.73	0.70	0.78	0.67	0.58	0.72	0.66	0.60	0.56	
Portugal	0.82	42	0.73	0.69	0.73	0.58	0.52	0.77	0.67	0.54	0.56	
Russian Federation	0.89	55	0.79	0.76	0.81	0.69	0.66	0.82	0.71	0.69	0.70	
Russian Federation 6hr+	0.89	54	0.78	0.74	0.81	0.70	0.65	0.79	0.72	0.68	0.70	
Slovenia	0.85	45	0.71	0.68	0.78	0.57	0.61	0.78	0.74	0.58	0.53	
Sweden	0.85	48	0.79	0.70	0.80	0.65	0.58	0.75	0.69	0.61	0.60	
United States	0.86	48	0.71	0.66	0.78	0.70	0.65	0.79	0.72	0.66	0.56	
International Avg.	0.85	46	0.73	0.71	0.76	0.61	0.60	0.76	0.69	0.60	0.58	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Relationship Between the TIMSS Advanced 2015 Students' Sense of School Belonging Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.20	0.04	0.04
Italy	0.05	0.00	0.01
Lebanon	0.08	0.01	0.01
Norway	0.16	0.03	0.02
Portugal	0.07	0.00	0.01
Russian Federation	0.12	0.02	0.01
Russian Federation 6hr+	0.09	0.01	0.01
Slovenia	0.22	0.05	0.04
Sweden	0.20	0.04	0.04
United States	0.07	0.01	0.01
International Median	0.12	0.02	0.01

Students Value Advanced Mathematics Scale

The Students Value Advanced Mathematics (SVM) scale was created based on students' degree of agreement with the nine statements described below.

Items in the TIMSS Advanced 2015 Students Value Advanced Mathematics Scale

		How much do you agree with these statements about the mathematics you are studying?			
		Agree a lot	Agree a little	Disagree a little	Disagree a lot
MSBM21A	1) Learning mathematics will help me get ahead in the world-----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM21B	2) It is important to do well in my mathematics class -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM21C*	3) The mathematics I am studying is not useful for my future* -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM21D	4) My parents are pleased that I am taking advanced mathematics -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM21E	5) Doing well in mathematics will help me get into the university of my choice -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM21F*	6) Learning advanced mathematics does not seem to be a worthwhile exercise* -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM21G	7) My parents think that it is important that I do well in my mathematics class-----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM21H	8) I like telling people I am studying advanced mathematics -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MSBM21 I	9) Learning advanced mathematics will give me more job opportunities -----	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
*Reverse coded					

Item Parameters for the TIMSS Advanced 2015 Students Value Advanced Mathematics Scale

Item	delta	tau_1	tau_2	tau_3	Infit
MSBM21A	0.07051	-1.13081	-0.21324	1.34405	0.94
MSBM21B	-0.33686	-1.13710	-0.21075	1.34785	0.84
MSBM21C*	0.58705	-1.02374	-0.04630	1.07004	1.35
MSBM21D	-0.34160	-0.88413	-0.47165	1.35578	0.93
MSBM21E	-0.16646	-0.40870	-0.14215	0.55085	0.90
MSBM21F*	0.03347	-0.91420	-0.19645	1.11065	1.57
MSBM21G	-0.65475	-0.83420	-0.49183	1.32603	0.93
MSBM21H	0.90365	-1.13939	0.07749	1.06190	1.25
MSBM21I	-0.09501	-0.78067	-0.26783	1.04850	0.81

*Reverse coded

Scale Transformation Constants for the TIMSS Advanced 2015 Students Value Advanced Mathematics Scale

Scale Transformation Constants

A = 8.202488

B = 1.658016

Transformed Scale Score = 8.202488 + 1.658016 • Logit Scale Score

Equivalence Table of the Raw Score and the Transformed Scale Score for the TIMSS Advanced 2015 Students Value Advanced Mathematics Scale

Raw Score	Transformed Scale Score	Cutpoint
0	1.74486	
1	3.54182	
2	4.39260	
3	4.97121	
4	5.42447	
5	5.80430	
6	6.13612	
7	6.44041	
8	6.72231	
9	6.98816	
10	7.24296	
11	7.49073	
12	7.73488	
13	7.97837	8.0
14	8.22472	
15	8.47440	
16	8.73231	
17	9.00052	
18	9.28212	
19	9.57930	
20	9.89879	
21	10.24631	
22	10.63156	
23	11.07036	11.0
24	11.58834	
25	12.24488	
26	13.18781	
27	15.09728	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 Students Value Advanced Mathematics Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item									
			MSBM21A	MSBM21B	MSBM21C*	MSBM21D	MSBM21E	MSBM21F*	MSBM21G	MSBM21H	MSBM21I	
France	0.81	41	0.65	0.62	0.63	0.59	0.68	0.65	0.58	0.58	0.75	
Italy	0.85	46	0.79	0.74	0.63	0.61	0.69	0.69	0.53	0.58	0.79	
Lebanon	0.67	32	0.41	0.71	0.42	0.67	0.64	0.31	0.63	0.45	0.65	
Norway	0.73	35	0.69	0.68	0.39	0.63	0.67	0.65	0.52	0.35	0.62	
Portugal	0.83	44	0.76	0.68	0.64	0.64	0.67	0.70	0.55	0.50	0.76	
Russian Federation	0.83	45	0.72	0.76	0.36	0.75	0.75	0.51	0.73	0.58	0.78	
Russian Federation 6hr+	0.82	45	0.74	0.77	0.30	0.75	0.76	0.50	0.72	0.52	0.80	
Slovenia	0.73	34	0.72	0.44	0.46	0.70	0.57	0.08	0.63	0.60	0.77	
Sweden	0.76	36	0.73	0.54	0.64	0.60	0.61	0.68	0.44	0.39	0.67	
United States	0.81	42	0.74	0.73	0.60	0.63	0.66	0.62	0.58	0.48	0.76	
International Avg.	0.78	39	0.69	0.66	0.53	0.65	0.66	0.54	0.58	0.50	0.73	

*Reverse coded

Relationship Between the TIMSS Advanced 2015 Students Value Advanced Mathematics Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

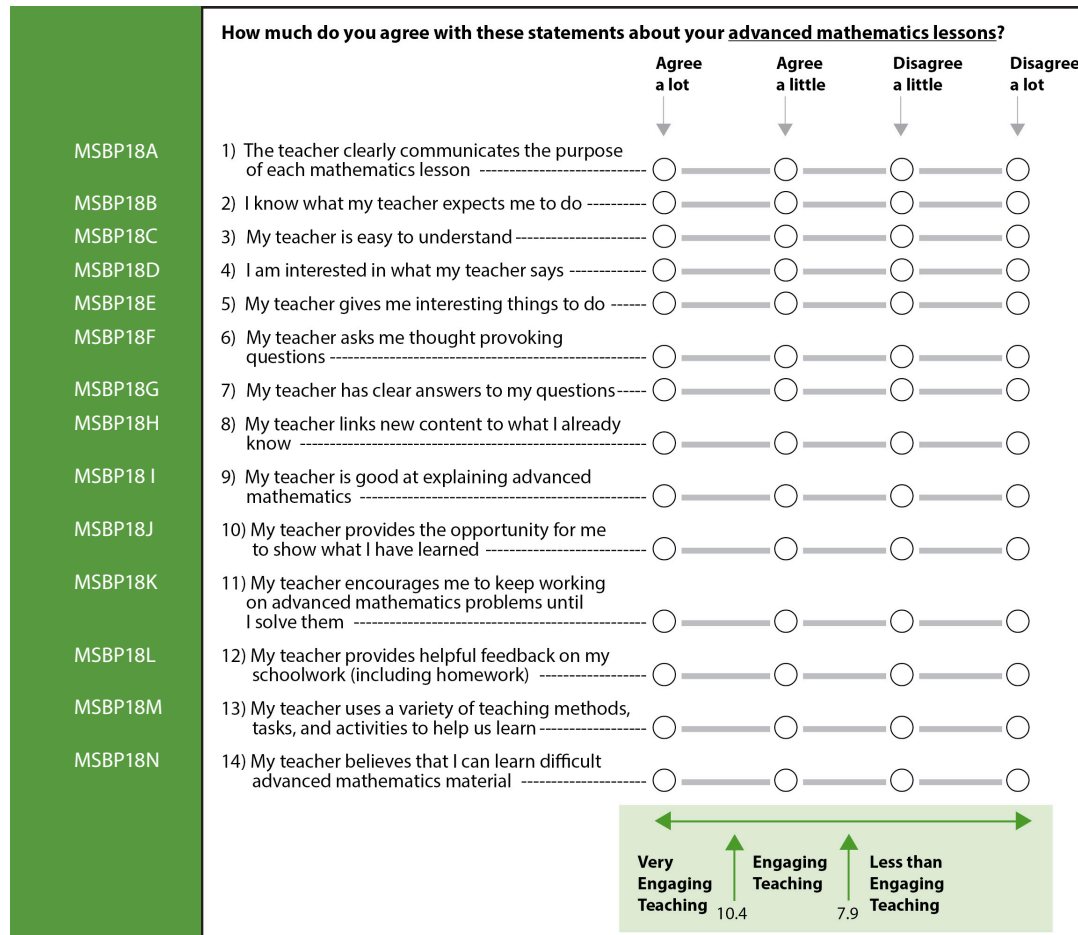
Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.36	0.13	0.11
Italy	0.24	0.06	0.05
Lebanon	0.25	0.06	0.04
Norway	0.23	0.05	0.04
Portugal	0.36	0.13	0.11
Russian Federation	0.29	0.08	0.07
Russian Federation 6hr+	0.28	0.08	0.08
Slovenia	0.40	0.16	0.14
Sweden	0.24	0.06	0.04
United States	0.24	0.06	0.05
International Median	0.25	0.06	0.05

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Students' Views on Engaging Teaching in Advanced Mathematics Lessons Scale

The Students' Views on Engaging Teaching in Advanced Mathematics Lessons (EML) scale was created based on students' degree of agreement with the fourteen statements described below.

Items in the TIMSS Advanced 2015 Students' Views on Engaging Teaching in Advanced Mathematics Lessons Scale



Item Parameters for the TIMSS Advanced 2015 Students' Views on Engaging Teaching in Advanced Mathematics Lessons Scale, Advanced Mathematics

Item	delta	tau_1	tau_2	tau_3	Infit
MSBM18A	-0.27752	-1.49392	-0.31185	1.80577	0.88
MSBM18B	-0.52469	-1.55270	-0.46138	2.01408	1.13
MSBM18C	0.02085	-1.52655	-0.20957	1.73612	0.83
MSBM18D	0.15229	-1.49964	-0.38439	1.88403	1.21
MSBM18E	0.83288	-1.83818	-0.20095	2.03913	0.96
MSBM18F	0.32078	-1.44837	-0.23359	1.68196	1.18
MSBM18G	-0.08348	-1.31458	-0.29135	1.60593	0.96
MSBM18H	-0.47204	-1.41178	-0.47480	1.88658	1.03
MSBM18I	-0.40869	-1.16049	-0.28104	1.44153	0.79
MSBM18J	-0.25862	-1.91696	-0.35479	2.27175	1.06
MSBM18K	-0.07877	-1.57597	-0.14124	1.71721	1.07
MSBM18L	0.30429	-1.59816	-0.19349	1.79165	1.12
MSBM18M	0.53568	-1.70713	-0.02321	1.73034	1.14
MSBM18N	-0.06296	-1.38459	-0.35309	1.73768	1.20

Scale Transformation Constants for the TIMSS Advanced 2015 Students' Views on Engaging Teaching in Advanced Mathematics Lessons Scale, Advanced Mathematics

Scale Transformation Constants

A = 8.028837

B = 1.168415

Transformed Scale Score = 8.028837 + 1.168415 • Logit Scale Score

**Equivalence Table of the Raw Score and the Transformed Scale Score
for the TIMSS Advanced 2015 Students' Views on Engaging Teaching in
Advanced Mathematics Lessons Scale, Advanced Mathematics**

Raw Score	Transformed Scale Score	Cutpoint
0	2.25920	
1	3.58079	
2	4.21671	
3	4.65055	
4	4.98578	
5	5.26436	
6	5.50518	
7	5.71976	
8	5.91528	
9	6.09775	
10	6.26742	
11	6.42988	
12	6.58608	
13	6.73753	
14	6.88552	
15	7.03109	
16	7.17519	
17	7.31924	
18	7.46246	
19	7.60644	
20	7.75182	
21	7.89911	7.9
22	8.04905	
23	8.20155	
24	8.35759	
25	8.51741	
26	8.68135	
27	8.84974	
28	9.02315	
29	9.20196	
30	9.38677	
31	9.57837	
32	9.77786	
33	9.98680	
34	10.20742	
35	10.44289	10.4
36	10.69789	
37	10.97836	
38	11.29738	
39	11.67448	
40	12.15065	
41	12.82864	
42	14.19398	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015



Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 Students' Views on Engaging Teaching in Advanced Mathematics Lessons Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item													
			M5BM18A	M5BM18B	M5BM18C	M5BM18D	M5BM18E	M5BM18F	M5BM18G	M5BM18H	M5BM18I	M5BM18J	M5BM18K	M5BM18L	M5BM18M	M5BM18N
France	0.91	46	0.69	0.65	0.77	0.64	0.70	0.63	0.75	0.61	0.80	0.63	0.66	0.63	0.64	0.66
Italy	0.92	52	0.81	0.58	0.83	0.51	0.68	0.70	0.79	0.69	0.82	0.76	0.74	0.77	0.74	0.54
Lebanon	0.91	46	0.68	0.57	0.75	0.64	0.70	0.59	0.71	0.68	0.69	0.69	0.70	0.68	0.71	0.65
Norway	0.91	45	0.69	0.68	0.79	0.59	0.70	0.58	0.73	0.70	0.78	0.68	0.59	0.70	0.59	0.58
Portugal	0.93	52	0.79	0.66	0.80	0.57	0.73	0.62	0.78	0.69	0.81	0.70	0.75	0.74	0.73	0.66
Russian Federation	0.92	50	0.77	0.64	0.76	0.76	0.75	0.56	0.75	0.63	0.79	0.64	0.65	0.76	0.75	0.65
Russian Federation 6hr+	0.90	46	0.73	0.60	0.72	0.73	0.73	0.57	0.70	0.59	0.74	0.60	0.66	0.73	0.70	0.62
Slovenia	0.92	51	0.79	0.71	0.80	0.59	0.72	0.69	0.77	0.73	0.83	0.66	0.56	0.70	0.73	0.63
Sweden	0.93	53	0.75	0.65	0.82	0.68	0.77	0.74	0.75	0.75	0.81	0.71	0.71	0.74	0.64	0.60
United States	0.94	57	0.81	0.72	0.82	0.70	0.74	0.71	0.79	0.77	0.85	0.75	0.75	0.74	0.69	0.70
International Avg.	0.92	50	0.75	0.65	0.79	0.63	0.72	0.65	0.76	0.69	0.80	0.69	0.68	0.72	0.69	0.63

Relationship Between the TIMSS Advanced 2015 Students' Views on Engaging Teaching in Advanced Mathematics Lessons Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

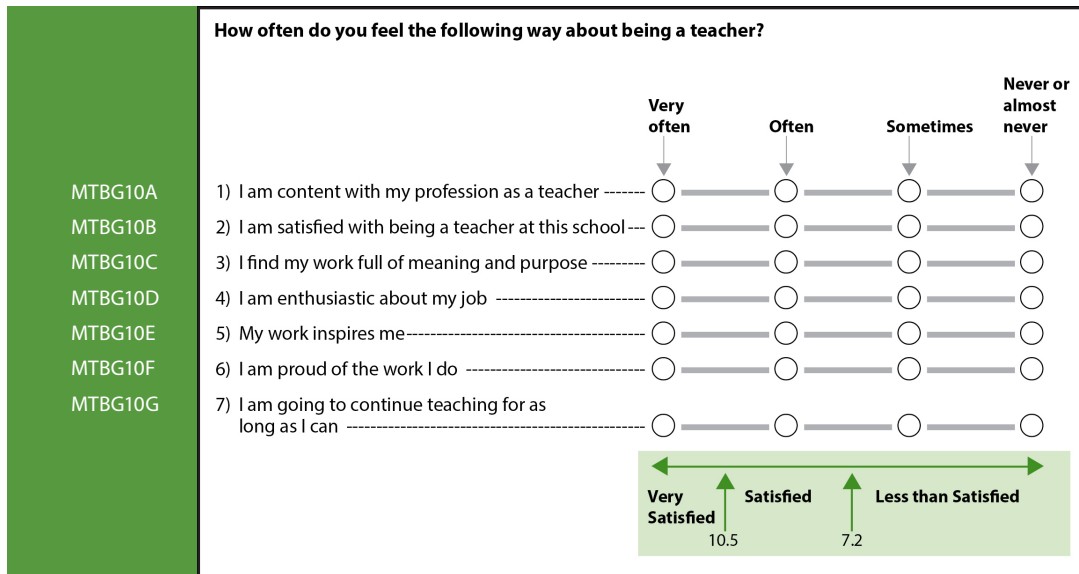
Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.26	0.07	0.05
Italy	0.09	0.01	0.01
Lebanon	0.11	0.01	0.02
Norway	0.26	0.07	0.06
Portugal	0.22	0.05	0.06
Russian Federation	0.29	0.08	0.07
Russian Federation 6hr+	0.19	0.04	0.03
Slovenia	0.31	0.09	0.09
Sweden	0.30	0.09	0.08
United States	0.20	0.04	0.04
International Median	0.26	0.07	0.06

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Teacher Job Satisfaction Scale, Advanced Mathematics

The Teacher Job Satisfaction (TJS) scale was created based on how often teachers responded positively to the seven statements described below.

Items in the TIMSS Advanced 2015 Teacher Job Satisfaction Scale, Advanced Mathematics¹



¹ For the purpose of scaling, categories in which there were very few respondents were combined. The categories “Sometimes” and “Never or almost never” were combined for all variables. The scale statistics that are reported herein reflect analysis of the items following collapsing.

Item Parameters for the TIMSS Advanced 2015 Teacher Job Satisfaction Scale, Advanced Mathematics

Item	delta	tau_1	tau_2	Infit
MTBG10A	0.02623	-1.95127	1.95127	0.88
MTBG10B	-0.43330	-1.84194	1.84194	1.13
MTBG10C	-0.61209	-1.77591	1.77591	1.01
MTBG10D	0.27416	-1.46188	1.46188	0.86
MTBG10E	0.59966	-1.80856	1.80856	0.82
MTBG10F	-0.16519	-1.70772	1.70772	1.04
MTBG10G	0.31053	-1.31610	1.31610	1.30

Scale Transformation Constants for the TIMSS Advanced 2015 Teacher Job Satisfaction Scale, Advanced Mathematics

Scale Transformation Constants

$$A = 8.820804$$

$$B = 0.846688$$

$$\text{Transformed Scale Score} = 8.820804 + 0.846688 \cdot \text{Logit Scale Score}$$

Equivalence Table of the Raw Score and the Transformed Scale Score for the TIMSS Advanced 2015 Teacher Job Satisfaction Scale, Advanced Mathematics

Raw Score	Transformed Scale Score	Cutpoint
0	4.98060	
1	6.05555	
2	6.65040	
3	7.11867	7.2
4	7.54548	
5	7.96186	
6	8.39462	
7	8.84453	
8	9.28947	
9	9.70621	
10	10.10676	
11	10.51404	10.5
12	10.96709	
13	11.54630	
14	12.61485	

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

Cronbach's Alpha Reliability Coefficient and Principal Components Analysis of the Items in the TIMSS Advanced 2015 Teacher Job Satisfaction Scale, Advanced Mathematics

Country	Cronbach's Alpha Reliability Coefficient	Percent of Variance Explained	Component Loadings for Each Item							
			MTBG10A	MTBG10B	MTBG10C	MTBG10D	MTBG10E	MTBG10F	MTBG10G	
France	0.92	69	0.85	0.82	0.85	0.88	0.82	0.78	0.81	
Italy	0.90	63	0.84	0.75	0.75	0.87	0.82	0.83	0.67	
Lebanon	0.82	51	0.77	0.69	0.78	0.76	0.66	0.65	0.66	
Norway	0.93	70	0.86	0.76	0.86	0.87	0.91	0.83	0.76	
Portugal	0.87	56	0.79	0.67	0.68	0.84	0.79	0.76	0.70	
Russian Federation	0.91	66	0.83	0.80	0.77	0.83	0.84	0.82	0.79	
Russian Federation 6hr+	0.90	62	0.81	0.76	0.77	0.82	0.81	0.78	0.76	
Slovenia	0.92	68	0.82	0.75	0.82	0.91	0.88	0.82	0.74	
Sweden	0.89	61	0.78	0.72	0.70	0.83	0.87	0.78	0.78	
United States	0.92	68	0.85	0.81	0.85	0.88	0.88	0.75	0.73	
International Avg.	0.90	63	0.82	0.75	0.78	0.85	0.83	0.78	0.74	

Relationship Between the TIMSS Advanced 2015 Teacher Job Satisfaction Scale, and TIMSS Advanced 2015 Advanced Mathematics Achievement

Country	Pearson's Correlation with Advanced Mathematics Achievement		Variance in Advanced Mathematics Achievement Accounted for by Difference Between Regions of the Scale (η^2)
	(r)	(r ²)	
France	0.05	0.00	0.00
Italy	0.04	0.00	0.01
Lebanon	-0.01	0.00	0.00
Norway	0.18	0.03	0.04
Portugal	0.06	0.00	0.00
Russian Federation	0.22	0.05	0.03
Russian Federation 6hr+	0.08	0.01	0.00
Slovenia	0.13	0.02	0.02
Sweden	0.05	0.00	0.00
United States	-0.03	0.00	0.00
International Median	0.05	0.00	0.00

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015