NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

INSIGHT REPORT SUMMARY

SCIENCE LEARNING AREA

Report purpose

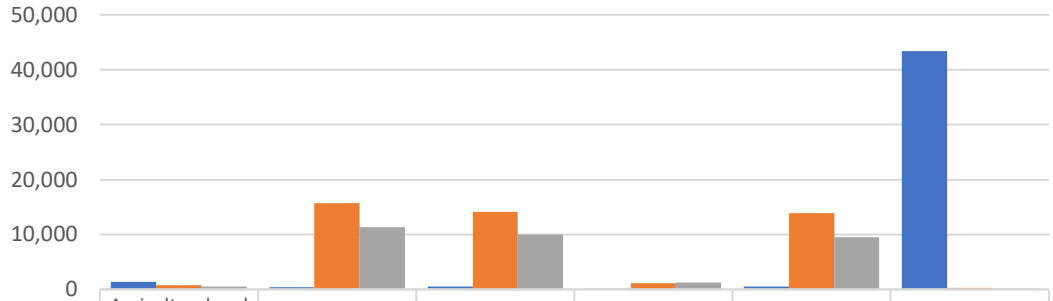
This summary report is to provide a brief overview of subject usage trends for the subjects associated with the Science Learning Area of the New Zealand Curriculum.

The report is in seven parts:

Part A - Learning Area Overview

Figure 1 shows a graphical representation of students with 14 or more credits entered in Agricultural and Horticultural Science, Biology, Chemistry, Earth and Space Science, Physics, and Science.

Figure 1: Counts of Year 11-13 students engaged with the Science Learning Area Subjects (2018)[1].



	Agricultural and Horticultural Science	Biology	Chemistry	Earth and Space Science	Physics	Science
Year 11	1,431	347	499	19	477	43,436
Year 12	733	15,657	14,092	1,124	13,934	325
Year 13	513	11,339	9,945	1,202	9,478	43

At Level 1, Science is treated as a single subject. At Levels 2 and 3 this Learning Area is defined as separate subjects[2]. The impact of this is that most Year 12 and Year 13 students will specialise in one or more of these subjects. Some students may do a mixture of standards from several of these subjects but not sufficient in any one to be considered to be engaged with that subject.

Figure 2 and Figure 3 provide several pieces of information in a single unified diagram referred to as an Upset chart. The chart is divided into 3 sections, as follows:

1. The green bars on the left show the number of students engaged in each of the science subjects.
2. The grid of dots and lines gives a graphic representation of the combinations of subjects being undertaken by each student.
3. The blue bars show the number and relative proportion of students undertaking the combination depicted in the dots and lines below.

From these charts it is possible to see how many students are engaged in each subject, and what are the most common subjects or combinations of subjects. For example, in Figure 2 in 2018 there were 15,731 Year 12 students entered for 14 or more credits in Biology at Level 2. Of these 4,170 were also engaged in Chemistry.

Figure 2 and Figure 3 show a graphical representation of Year 12 and Year 13 students, respectively, engaged with Science, where the Science standards have been broken down into their associated subjects; Biology, Chemistry, Earth and Space Science, Physics, and Science.

[1] For the purposes of this report engagement is defined as being entered for 14 or more credits from standards in the subject.

[2] Please note that Agricultural and Horticultural Science is excluded from this situation, having a separate Subject Matrix with no overlap with the other subjects in this Learning Area.

Figure 2: Counts of Year 12 Students engaged in the Science Learning Area by Subject (2018)

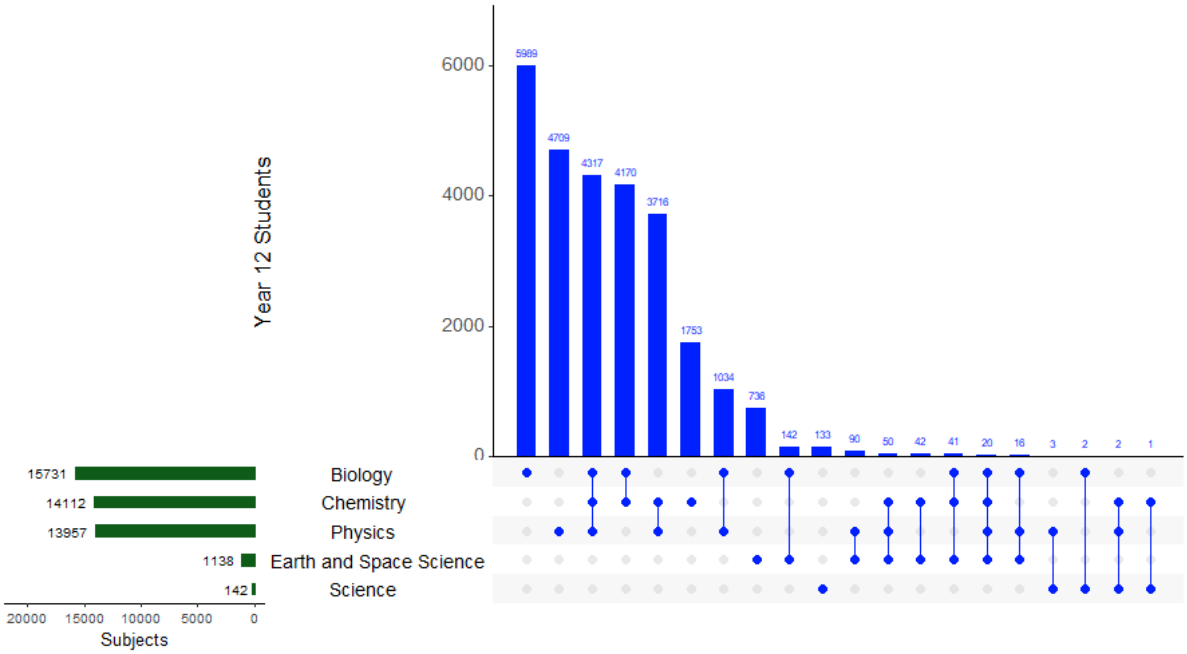
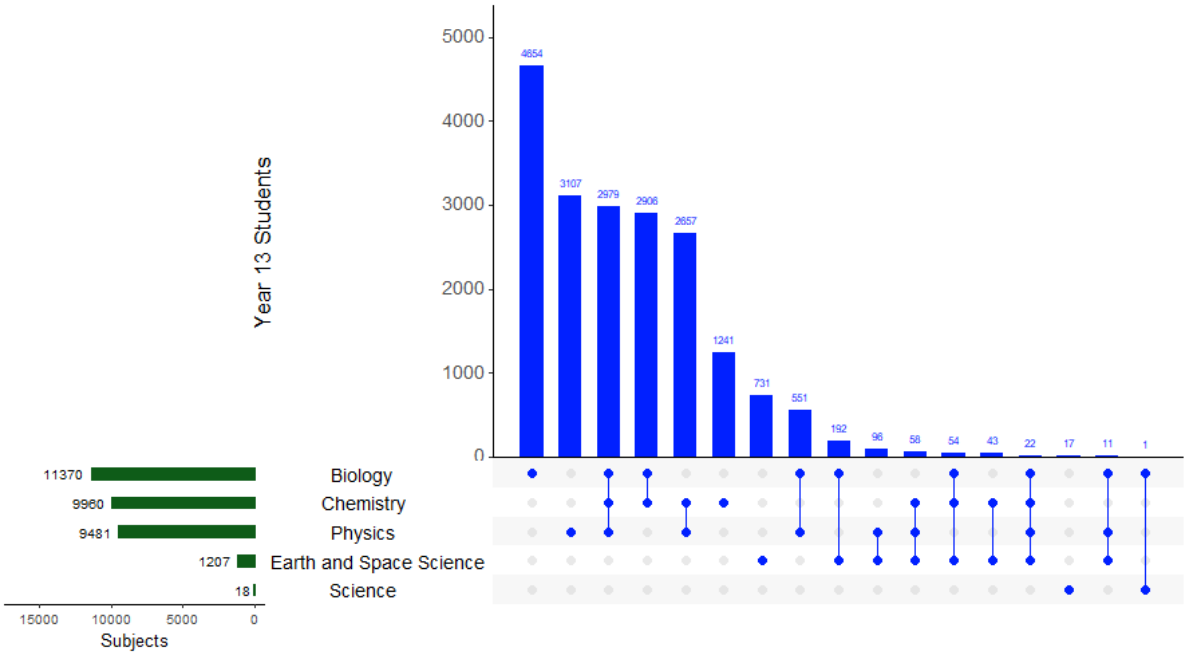


Figure 3: Counts of Year 13 Students engaged in the Science Learning Area by Subject (2018)



Part B - Agricultural and Horticultural Science

MATRIX SUMMARY

As noted, although Agricultural and Horticultural Science is part of the Science Learning Area for the purposes of this document it is not treated as part of the collection of science subjects because it has a complete pathway from Level 1 through to Level 3.

The Agricultural and Horticultural Science matrix includes five strands:

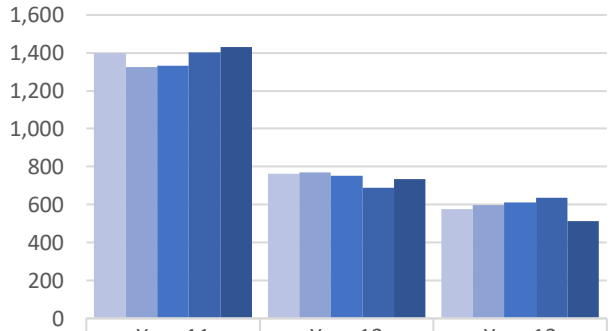
Table 1: Agricultural and Horticultural Science Matrix Summary

STRANDS	Level 1	Level 2	Level 3
Agribusiness		1 External	1 External
	1 Internal		
Livestock Production	1 External	1 External	1 External
		2 Internal	
Plant Production	1 External		1 Internal
	2 Internal	2 Internal	
Physical Environment	1 External	1 External	1 External
	2 Internal	2 Internal	
Skills and Investigations			
	2 Internal	1 Internal	1 Internal
Credit Total:	**39 Credits**	**40 Credits**	**24 Credits**

STUDENT ENGAGEMENT

Figure 4 shows the pattern of student engagement since 2014.

Figure 4: Counts of Year 11-13 students engaged with Agricultural and Horticultural Science (2014-2018)[3].



	Year 11	Year 12	Year 13
2014	1,399	763	577
2015	1,324	771	597
2016	1,332	753	613
2017	1,404	689	636
2018	1,431	733	513

[3] For the purposes of this report engagement is defined as being entered for 14 or more credits from standards in the subject.

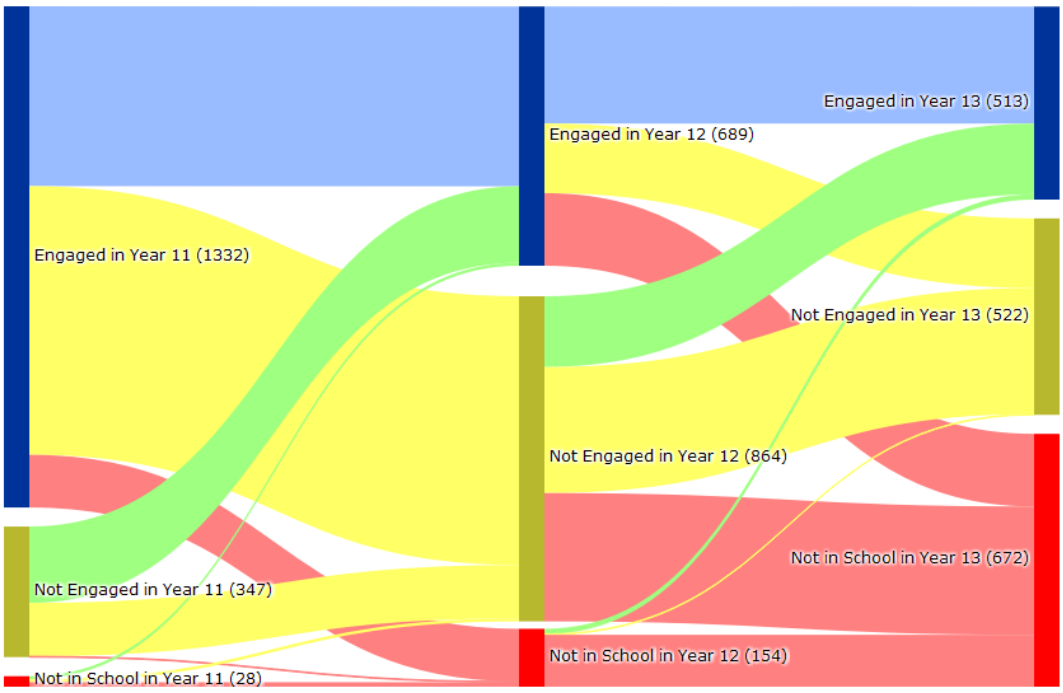
STUDENT RETENTION

Figure 5 shows a graphical representation of the movement and retention of students with 14 or more credits entered in the subject in any one of the years 2016, 2017, or 2018, and their movements across that timespan.

- The vertical blue bars show the number of students engaged in the subject in Year 11 on the left, Year 12 in the middle, and Year 13 on the right.
- The blue flows denote students that continued with the subject from one year to the next.
- The green flows denote students that had not previously done the subject but took it up in the year.
- The yellow flows denote students that did not continue with the subject but did remain at school in the following year.
- The red flows show students that left school so did not continue the subject in the following year.

For many subjects a small number of students will EITHER leave school OR remain at school but choose not to continue with the subject in the following year but come back to the subject in Year 13. These students are represented by green flows back into Year 13 from either the yellow or red flows from Year 11.

Figure 5: Agricultural and Horticultural Science student flows across year levels (2016-2018)



For a detailed breakdown of the data used to build the diagram in Figure 5, see Table 2 on page 6.

Table 2: Agricultural and Horticultural Science student flows across year levels (2016-2018)

Year 11 (2016)	Year 12 (2017)	Year 13 (2018)	Students
Engaged in subject	Engaged in subject	Engaged in subject	233
Engaged in subject	Engaged in subject	Not engaged in subject	110
Engaged in subject	Engaged in subject	Not in School	135
Engaged in subject	Not engaged in subject	Engaged in subject	38
Engaged in subject	Not engaged in subject	Not engaged in subject	335
Engaged in subject	Not engaged in subject	Not in School	341
Engaged in subject	Not in School	Not engaged in subject	2
Engaged in subject	Not in School	Not in School	138
Not engaged subject	Engaged in subject	Engaged in subject	77
Not engaged subject	Engaged in subject	Not engaged in subject	69
Not engaged subject	Engaged in subject	Not in School	57
Not engaged subject	Not engaged in subject	Engaged in subject	142
Not engaged subject	Not in School	Engaged in subject	2
Not in School	Engaged in subject	Engaged in subject	1
Not in School	Engaged in subject	Not engaged in subject	6
Not in School	Engaged in subject	Not in School	1
Not in School	Not engaged in subject	Engaged in subject	8
Not in School	Not in School	Engaged in subject	12

Part C - Biology

MATRIX SUMMARY

The achievement standards matrix for Biology includes:

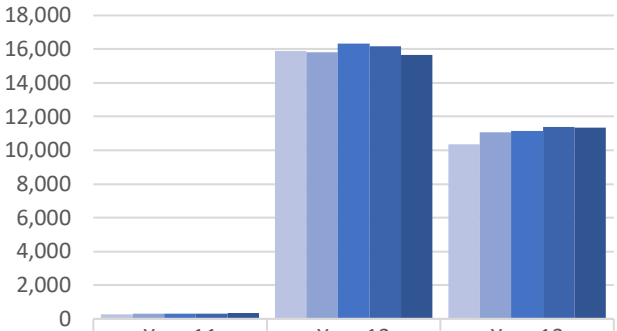
Table 3: Biology Matrix Summary

STRANDS	Level 1	Level 2	Level 3
Living World		3 External	3 External
		5 Internal	4 Internal
Credit Total:		**29 Credits**	**26 Credits**

STUDENT ENGAGEMENT

Figure 6 shows the pattern of student engagement since 2014. This also includes a small number of Year 11 students undertaking Level 2 or 3 standards in Biology.

Figure 6: Counts of Year 11-13 students engaged with Biology (2014-2018)[4].



	Year 11	Year 12	Year 13
2014	267	15,906	10,358
2015	290	15,822	11,054
2016	296	16,312	11,142
2017	306	16,191	11,395
2018	347	15,657	11,339

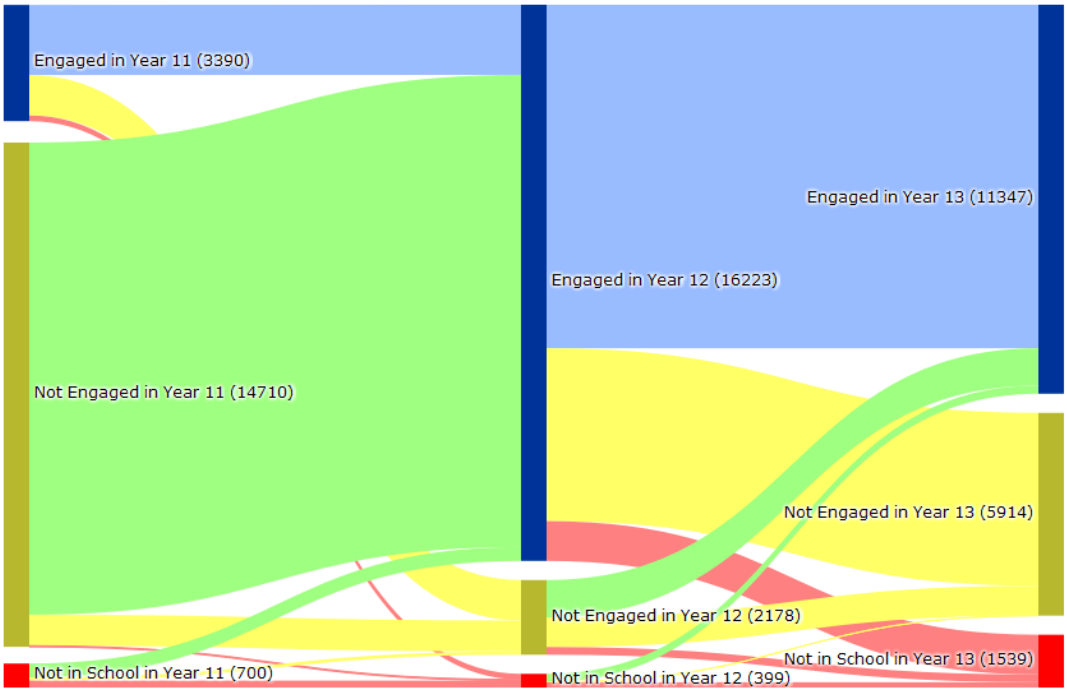
STUDENT RETENTION

Please note that this section shows student flows through standards within the Living World strand, i.e. part of the Level 1 Science Matrix, and the complete Biology Matrix. This composite forms a pathway through Years 11 to 13, and Levels 1 to 3, across two subject matrices which assess the concepts of Biology.

[4] For the purposes of this report engagement is defined as being entered for 14 or more credits from standards in the subject.

Figure 7 shows a graphical representation of the movement and retention of students with 14 or more credits entered in the strand in any one of the years 2016, 2017, or 2018, and their movements across that timespan.

Figure 7: Living World student flows across year levels (2016-2018)



For a detailed breakdown of the data used to build the diagram in Figure 7, see Table 4 below.

Table 4: Living World student flows across year levels (2016-2018)

Year 11 (2016)	Year 12 (2017)	Year 13 (2018)	Students
Engaged in subject	Engaged in subject	Engaged in subject	1,328
Engaged in subject	Engaged in subject	Not engaged in subject	600
Engaged in subject	Engaged in subject	Not in School	117
Engaged in subject	Not engaged in subject	Engaged in subject	92
Engaged in subject	Not engaged in subject	Not engaged in subject	864
Engaged in subject	Not engaged in subject	Not in School	224
Engaged in subject	Not in School	Engaged in subject	4
Engaged in subject	Not in School	Not engaged in subject	6
Engaged in subject	Not in School	Not in School	155
Not engaged subject	Engaged in subject	Engaged in subject	8,462
Not engaged subject	Engaged in subject	Not engaged in subject	4,336
Not engaged subject	Engaged in subject	Not in School	975
Not engaged subject	Not engaged in subject	Engaged in subject	904
Not engaged subject	Not in School	Engaged in subject	33
Not in School	Engaged in subject	Engaged in subject	229
Not in School	Engaged in subject	Not engaged in subject	108
Not in School	Engaged in subject	Not in School	68
Not in School	Not engaged in subject	Engaged in subject	94
Not in School	Not in School	Engaged in subject	201

Part D - Chemistry

MATRIX SUMMARY

The achievement standards matrix for Chemistry includes:

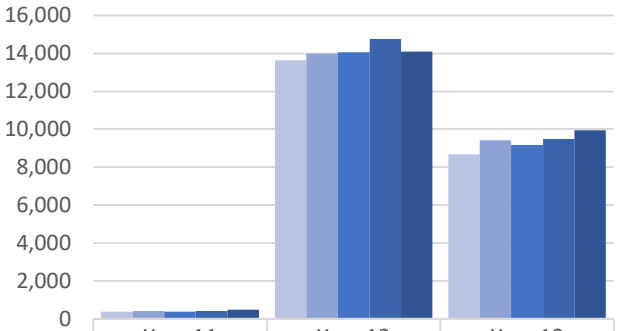
Table 5: Chemistry Matrix Summary

STRANDS	Level 1	Level 2	Level 3
Material World		3 External	3 External
		4 Internal	4 Internal
Credit Total:		**26 Credits**	**28 Credits**

STUDENT ENGAGEMENT

Figure 8 shows the pattern of student engagement since 2014. This also includes a small number of Year 11 students undertaking Level 2 or 3 standards in Chemistry.

Figure 8: Counts of Year 11-13 students engaged with Chemistry (2014-2018)[5].



	Year 11	Year 12	Year 13
2014	368	13,620	8,676
2015	414	13,998	9,406
2016	369	14,052	9,154
2017	421	14,750	9,486
2018	499	14,092	9,945

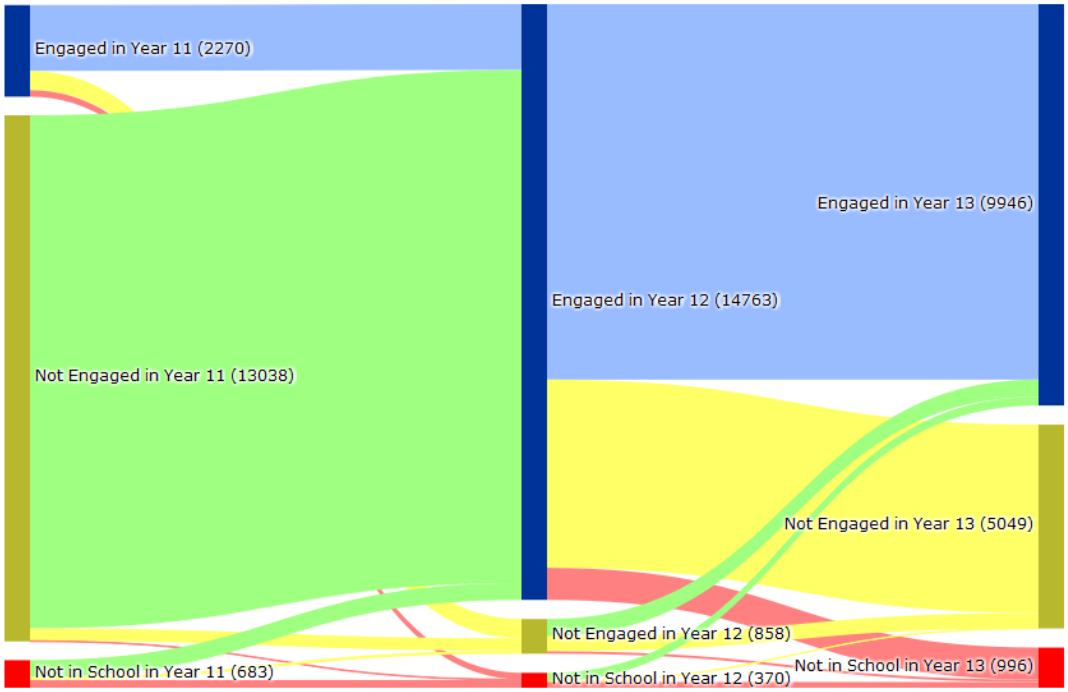
STUDENT RETENTION

Please note that this section shows student flows through standards within the Material World strand, i.e. part of the Level 1 Science Matrix, and the complete Chemistry Matrix. This composite forms a pathway through Years 11 to 13, and Levels 1 to 3, across two subject matrices which assess the concepts of Chemistry.

[5] For the purposes of this report engagement is defined as being entered for 14 or more credits from standards in the subject.

Figure 9 shows a graphical representation of the movement and retention of students with 14 or more credits entered in the subject in any one of the years 2016, 2017, or 2018, and their movements across that timespan.

Figure 9: Material World student flows across year levels (2016-2018)



For a detailed breakdown of the data used to build the diagram in Figure 9, see Table 6 below.

Table 6: Material World student flows across year levels (2016-2018)

Year 11 (2016)	Year 12 (2017)	Year 13 (2018)	Students
Engaged in subject	Engaged in subject	Engaged in subject	1,068
Engaged in subject	Engaged in subject	Not engaged in subject	491
Engaged in subject	Engaged in subject	Not in School	72
Engaged in subject	Not engaged in subject	Engaged in subject	46
Engaged in subject	Not engaged in subject	Not engaged in subject	373
Engaged in subject	Not engaged in subject	Not in School	59
Engaged in subject	Not in School	Engaged in subject	7
Engaged in subject	Not in School	Not engaged in subject	10
Engaged in subject	Not in School	Not in School	144
Not engaged subject	Engaged in subject	Engaged in subject	7,952
Not engaged subject	Engaged in subject	Not engaged in subject	4,097
Not engaged subject	Engaged in subject	Not in School	665
Not engaged subject	Not engaged in subject	Engaged in subject	308
Not engaged subject	Not in School	Engaged in subject	16
Not in School	Engaged in subject	Engaged in subject	284
Not in School	Engaged in subject	Not engaged in subject	78
Not in School	Engaged in subject	Not in School	56
Not in School	Not engaged in subject	Engaged in subject	72
Not in School	Not in School	Engaged in subject	193

Part E - Earth and Space Science

MATRIX SUMMARY

The achievement standards matrix for Earth and Space Science includes:

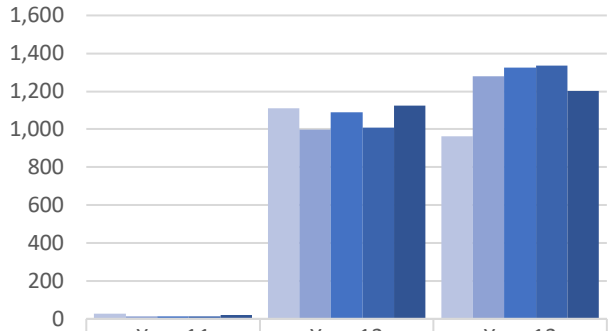
Table 7: Earth and Space Science Matrix Summary

STRANDS	Level 1	Level 2	Level 3
Planet Earth & Beyond		3 External	2 External
		4 Internal	4 Internal
Credit Total:		**28 Credits**	**24 Credits**

STUDENT ENGAGEMENT

Figure 10 shows the pattern of student engagement since 2014. This also includes a small number of Year 11 students undertaking Level 2 or 3 standards in Earth and Space Science.

Figure 10: Counts of Year 11-13 students engaged with Earth and Space Science (2014-2018)[6].



	Year 11	Year 12	Year 13
2014	29	1,109	963
2015	15	998	1,278
2016	12	1,089	1,325
2017	13	1,007	1,336
2018	19	1,124	1,202

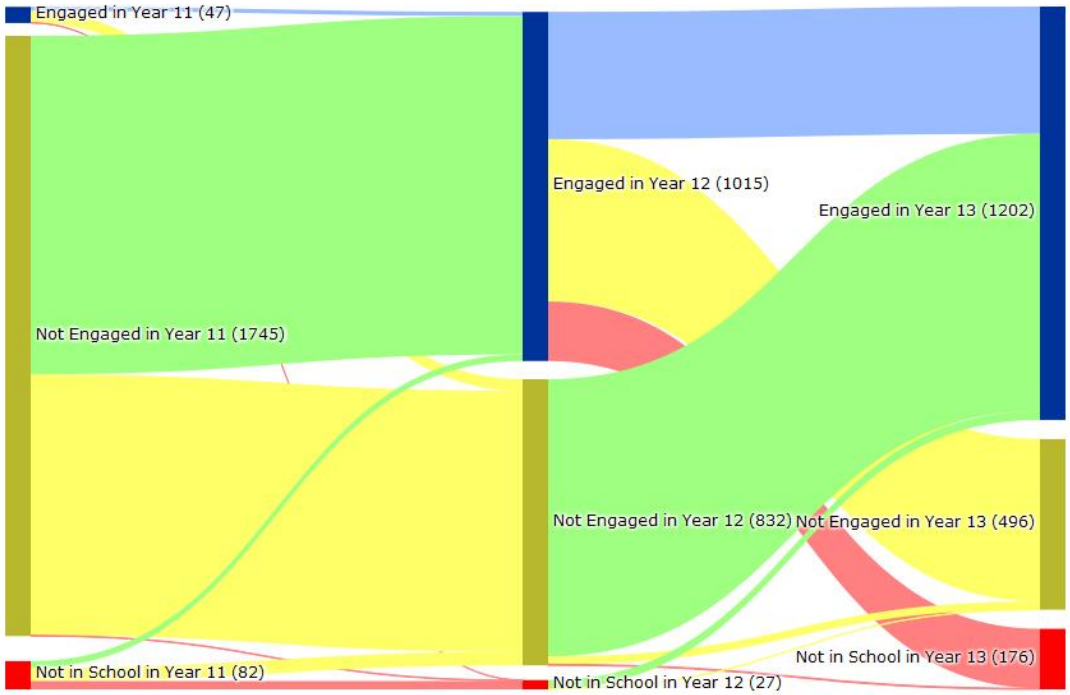
STUDENT RETENTION

Please note that this section shows student flows through standards within the Planet Earth & Beyond strand, i.e. part of the Level 1 Science Matrix, and the complete Earth and Space Science Matrix. This composite forms a pathway through Years 11 to 13, and Levels 1 to 3, across two subject matrices which assess the concepts of Earth and Space Science.

[6] For the purposes of this report engagement is defined as being entered for 14 or more credits from standards in the subject.

Figure 11 shows a graphical representation of the movement and retention of students with 14 or more credits entered in the subject in any one of the years 2016, 2017, or 2018, and their movements across that timespan.

Figure 11: Planet Earth & Beyond student flows across year levels (2016-2018)



For a detailed breakdown of the data used to build the diagram in Figure 11, see Table 8 below.

Table 8: Planet Earth & Beyond student flows across year levels (2016-2018)

Year 11 (2016)	Year 12 (2017)	Year 13 (2018)	Students
Engaged in subject	Engaged in subject	Engaged in subject	1
Engaged in subject	Engaged in subject	Not engaged in subject	7
Engaged in subject	Engaged in subject	Not in School	4
Engaged in subject	Not engaged in subject	Engaged in subject	8
Engaged in subject	Not engaged in subject	Not engaged in subject	23
Engaged in subject	Not engaged in subject	Not in School	3
Engaged in subject	Not in School	Not engaged in subject	1
Not engaged subject	Engaged in subject	Engaged in subject	360
Not engaged subject	Engaged in subject	Not engaged in subject	459
Not engaged subject	Engaged in subject	Not in School	165
Not engaged subject	Not engaged in subject	Engaged in subject	759
Not engaged subject	Not in School	Engaged in subject	2
Not in School	Engaged in subject	Engaged in subject	9
Not in School	Engaged in subject	Not engaged in subject	6
Not in School	Engaged in subject	Not in School	4
Not in School	Not engaged in subject	Engaged in subject	39
Not in School	Not in School	Engaged in subject	24

Part F - Physics

MATRIX SUMMARY

The achievement standards matrix for Physics includes:

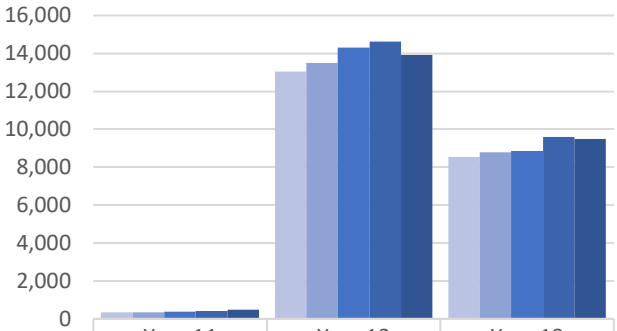
Table 9: Physics Matrix Summary

STRANDS	Level 1	Level 2	Level 3
Physical World		3 External	3 External
		3 Internal	4 Internal
Credit Total:		**26 Credits**	**29 Credits**

STUDENT ENGAGEMENT

Figure 12 shows the pattern of student engagement since 2014. This also includes a small number of Year 11 students undertaking Level 2 or 3 standards in Physics.

Figure 12: Counts of Year 11-13 students engaged with Physics (2014-2018)[7].



	Year 11	Year 12	Year 13
2014	329	13,039	8,533
2015	335	13,488	8,767
2016	363	14,306	8,849
2017	407	14,618	9,604
2018	477	13,934	9,478

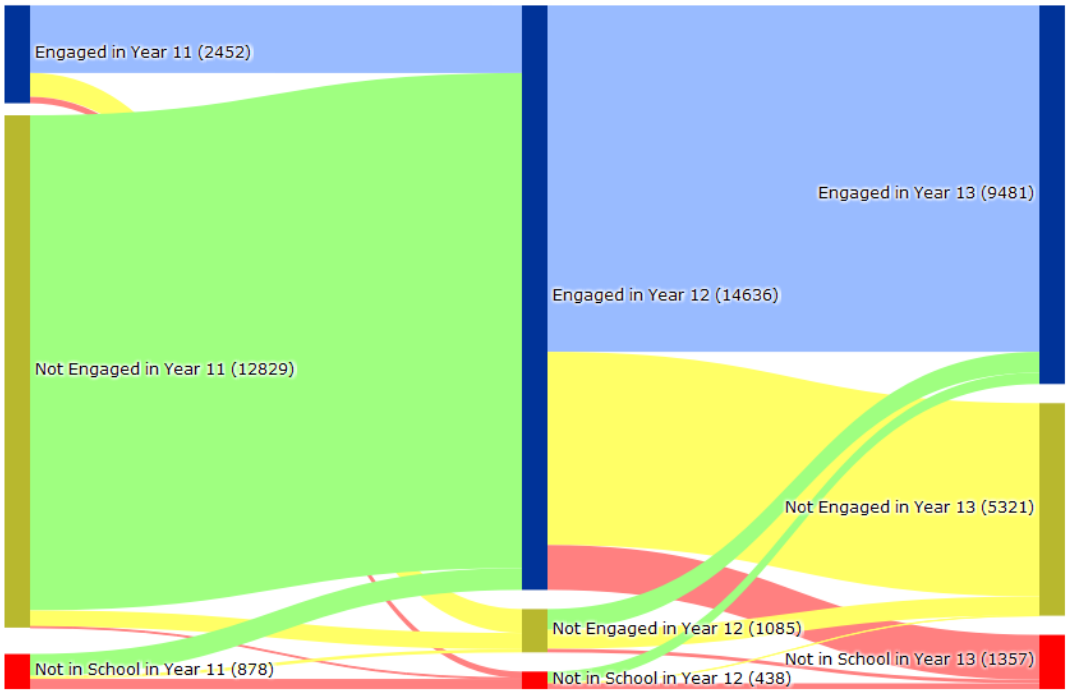
STUDENT RETENTION

Please note that this section shows student flows through standards within the Physical World strand, i.e. part of the Level 1 Science Matrix, and the complete Physics Matrix. This composite forms a pathway through Years 11 to 13, and Levels 1 to 3, across two subject matrices which assess the concepts of Physics.

[7] For the purposes of this report engagement is defined as being entered for 14 or more credits from standards in the subject.

Figure 13 shows a graphical representation of the movement and retention of students with 14 or more credits entered in the subject in any one of the years 2016, 2017, or 2018, and their movements across that timespan.

Figure 13: Physical World student flows across year levels (2016-2018)



For a detailed breakdown of the data used to build the diagram in Figure 13, see Table 10 below.

Table 10: Physical World student flows across year levels (2016-2018)

Year 11 (2016)	Year 12 (2017)	Year 13 (2018)	Students
Engaged in subject	Engaged in subject	Engaged in subject	1,046
Engaged in subject	Engaged in subject	Not engaged in subject	559
Engaged in subject	Engaged in subject	Not in School	88
Engaged in subject	Not engaged in subject	Engaged in subject	34
Engaged in subject	Not engaged in subject	Not engaged in subject	476
Engaged in subject	Not engaged in subject	Not in School	89
Engaged in subject	Not in School	Engaged in subject	8
Engaged in subject	Not in School	Not engaged in subject	8
Engaged in subject	Not in School	Not in School	144
Not engaged subject	Engaged in subject	Engaged in subject	7,275
Not engaged subject	Engaged in subject	Not engaged in subject	4,167
Not engaged subject	Engaged in subject	Not in School	955
Not engaged subject	Not engaged in subject	Engaged in subject	407
Not engaged subject	Not in School	Engaged in subject	25
Not in School	Engaged in subject	Engaged in subject	354
Not in School	Engaged in subject	Not engaged in subject	111
Not in School	Engaged in subject	Not in School	81
Not in School	Not engaged in subject	Engaged in subject	79
Not in School	Not in School	Engaged in subject	253

Part G - Science

MATRIX SUMMARY

The achievement standards matrix for Science includes four strands:

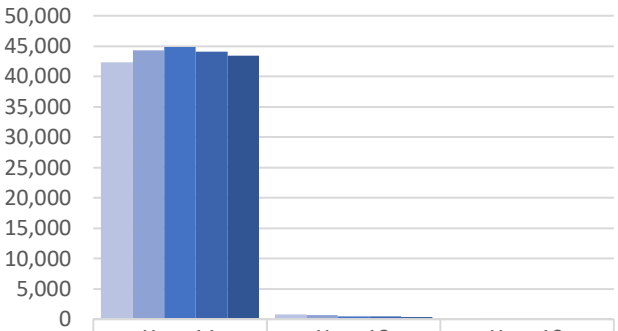
Table 11: Science Matrix Summary

STRANDS	Level 1	Level 2	Level 3
Living World	4 External		
	5 Internal		
Material World	4 External		
	5 Internal		
Physical World	4 External		
	5 Internal		
Planet Earth & Beyond			
	4 Internal		
Credit Total:	**118 Credits**		

STUDENT ENGAGEMENT

Figure 14 shows the pattern of student engagement since 2014. This also includes a small number of Year 12 and 13 students undertaking Level 1 standards in Science.

Figure 14: Counts of Year 11-13 students engaged with Science (2014-2018)[8].



	Year 11	Year 12	Year 13
2014	42,275	750	75
2015	44,294	624	65
2016	44,881	457	57
2017	44,123	458	107
2018	43,436	325	43

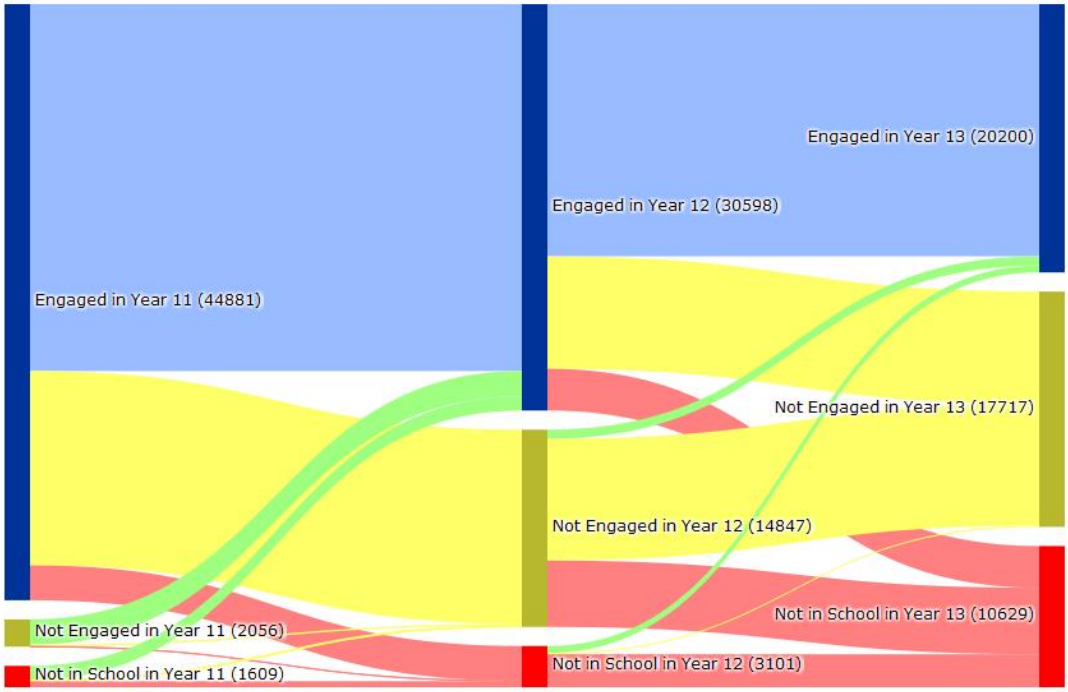
STUDENT RETENTION

Please note that this section shows student flows through standards from the Science Matrix, and any other matrices which share strands with it, i.e. the complete Science, Biology, Chemistry, Earth and Space Science, and Physics Matrices. This composite forms a pathway through Years 11 to 13, and Levels 1 to 3, across multiple subject matrices which assess the concepts of Science.

[8] For the purposes of this report engagement is defined as being entered for 14 or more credits from standards in the subject.

Figure 15 shows a graphical representation of the movement and retention of students with 14 or more credits entered in the subject in any one of the years 2016, 2017, or 2018, and their movements across that timespan.

Figure 15: Science student flows across year levels (2016-2018)



For a detailed breakdown of the data used to build the diagram in Figure 15, see Table 12 below.

Table 12: Science student flows across year levels (2016-2018)

Year 11 (2016)	Year 12 (2017)	Year 13 (2018)	Students
Engaged in subject	Engaged in subject	Engaged in subject	17,343
Engaged in subject	Engaged in subject	Not engaged in subject	7,650
Engaged in subject	Engaged in subject	Not in School	2,632
Engaged in subject	Not engaged in subject	Engaged in subject	470
Engaged in subject	Not engaged in subject	Not engaged in subject	9,157
Engaged in subject	Not engaged in subject	Not in School	4,998
Engaged in subject	Not in School	Engaged in subject	49
Engaged in subject	Not in School	Not engaged in subject	98
Engaged in subject	Not in School	Not in School	2,484
Not engaged subject	Engaged in subject	Engaged in subject	1,013
Not engaged subject	Engaged in subject	Not engaged in subject	611
Not engaged subject	Engaged in subject	Not in School	285
Not engaged subject	Not engaged in subject	Engaged in subject	130
Not engaged subject	Not in School	Engaged in subject	17
Not in School	Engaged in subject	Engaged in subject	633
Not in School	Engaged in subject	Not engaged in subject	201
Not in School	Engaged in subject	Not in School	230
Not in School	Not engaged in subject	Engaged in subject	92
Not in School	Not in School	Engaged in subject	453