

DRAFT

**PROFICIENCY ASSESSMENTS FOR
WYOMING STUDENTS (PAWS)**

**2014 Concordance Tables
Mathematics Grades 3–8**

Prepared by
Educational Testing Service

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Executive Summary

The Proficiency Assessment Wyoming Students (PAWS) is a set of standardized criterion-referenced tests in Reading, Mathematics, and Science for Grades 3 to 8. The 2014 PAWS assessments utilizes the Common Core Strands as reporting categories and becomes the new scale measuring students' academic performance on 2012 Wyoming Content Performance Standards (2012 WyCPS). PAWS assessments are designed to provide information for use as federal, state, and local indicators of the extent to which students satisfy academic performance requirements.

On 5/16/14, the WDE selected the vertical span scale as the scale of choice for the PAWS Mathematics measuring the 2012 WyCPS. A standard setting meeting will be held in July to set the cut scores for different performance levels. No information related to students' proficiency levels is available currently.

This report outlines the analyses performed and presents the concordance tables for the Spring 2014 Grades 3 to 8 Mathematics administration of the Proficiency Assessments for Wyoming Students (PAWS). In support of validity, all technical support and analyses were carried out in accordance with both the *Standards for Educational and Psychological Testing* (AERA, APA, NCME, 1999), issued jointly by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education, and the *ETS Standards for Quality and Fairness* (ETS, 2002).

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Glossary of Abbreviations

A glossary of abbreviations is given below for reference.

Abbreviation or Term	Meaning
ETS	Educational Testing Service
Form	Operational items and embedded field test items that uniquely define a (test) booklet
MC	Multiple-choice item (worth 1-point)
WDE	Wyoming Department of Education
TEST	Operational test items in a testing booklet that contribute to reported student scores
PAWS	Wyoming Proficiency Assessments for Wyoming Students
ALGEBRA	Operations & Algebraic Thinking
2012 WyCPS	2012 Wyoming Content Performance Standards
BASETEN	Number Operations – Base Ten
FRACTION	Number Operations – Fractions
MEASURE	Measurement & Data
GEOMETRY	Geometry
RELATION	Ratios & Proportional Relationships Ratios & Proportional Relationships
NUMBER	The Number System
EQUATIONS	Expressions & Equations
STATPROB	Statistics & Probability
FUNCTION	Functions

2014-2013 Concordance Tables Procedure

In 2014, new content standards were implemented thus new reporting scales were established for the PAWS Mathematics tests for grades 3 through 8. Unfortunately, the set of items between 2013 and 2014 are the field test items and cannot be used as anchors to perform an equating between 2013 and 2014 PAWS tests. Therefore, concordance tables are needed to link the 2013 test scores and 2014 test score. The concordance tables are to be used for the one-time score comparison purpose between 2013 and 2014 tests but not for future years. The equivalent groups equipercentile equating method was used to create the concordance table for each grade-level in the Mathematics test. The frequency distribution of 2013 and 2014 demographics was reviewed to evaluate the “equivalency” of two populations.

In the equipercentile equating, an X score (x) and a Y score (y) are defined as comparable if x and y have the same percentile rank in the target population, T. That is,

$$y = eg_{YT}(x) = G_T^{-1}[F_T(x)] = G_T^{-1} \circ F_T(x),$$

where $eg_{YT}(x)$ is the equivalent groups equipercentile equating function in population T that is used to convert scores on new form X (i.e., 2014 PAWS Mathematics test) to the scale of the old form Y (i.e., 2013 PAWS Mathematics test); $F_T(x)$ is the cumulative distribution function of X in the population T; and G_T^{-1} is the inverse of the cumulative distribution function $G_T(y)$, which is the cumulative distribution function of Y in the population T. In order to have inverse functions for $F_T(x)$ and $G_T(y)$, we assume that $F_T(x)$ and $G_T(y)$ are continuous and strictly increasing.

For the equipercentile equating, smoothing was performed using the loglinear univariate model, preserving the number of marginal moments that resulted in the smallest value of the Akaike Information Criterion (AIC) (Moses & Holland, 2009). For 2013 and 2014, PAWS Math score distributions of all grades, the number of moments preserved ranged from 6 to 8.

The concordance tables of 2014 and 2013 Mathematics tests based on the final chosen scale are included in Appendix C. For each grade, two matched columns of scale scores are provided. The two columns show all possible scale scores for PAWS 2013 and the corresponding PAWS 2014 scale scores, as estimated by the equating study. For example, at grade 3 a PAWS Mathematics

scale score of 442 is statistically equivalent to a PAWS 2014 scale score of 389. Without the equating study, one might erroneously conclude that there has been a loss of 53 scale score points in achievement from 2013 to 2014, while achievement has actually remained relatively stable. It must be emphasized that the design used in this analysis is sufficiently precise to permit the one-time comparison of scores when Wyoming transitioned from administering the PAWS 2013 under the 2008 standards to the 2014 PAWS tests under the 2012 WyCPS. These equated scores are estimations and, thus, small differences of a few scale score points should not be overly emphasized.

When states update their testing programs by administering a new assessment, there are often observed differences in the scores between the new and previous tests. Frequently, administering a new test results in lower scores because, along with other possible reasons, students and teachers are not familiar with the structure/ content of the new test. However, scores tend to rise as familiarity increases. Therefore, there is often a concern about an artificial drop in scores when a new test is administered, and the Wyoming Department of Education shared these concerns.

References

- AERA, APA, and NCME (1999). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.
- ETS (2002). *ETS standards for quality and fairness*. Princeton, NJ: Educational Testing Service.
- Moses, T., & Holland, P. W. (2009). Selection strategies for univariate loglinear smoothing models and their effect on equating function accuracy. *Journal of Educational Measurement*, 46(2), 159–176.

Appendix A: 2014-2013 Concordance Tables

Table A1. Mathematics Grade 3 Concordance Table

2013 PAWS	2014 PAWS
351	375
386	375
421	375
442	389
457	402
470	415
480	426
489	437
497	447
504	456
511	464
517	470
523	477
529	484
534	489
539	494
544	499
548	503
553	507
557	511
562	515
566	518
570	522
574	524
578	528
582	530
586	533
590	536
593	539
597	542
601	545
605	549
609	552
612	554
616	558
620	562
624	565
628	568
632	571
636	575

2013 PAWS	2014 PAWS
640	579
644	583
649	587
653	590
658	594
663	598
667	603
673	607
678	612
684	617
690	622
697	628
704	635
712	643
721	651
731	662
743	673
759	686
780	704
815	728
849	775

Table A2. Mathematics Grade 4 Concordance Table

2013 PAWS	2014 PAWS
366	400
400	400
435	400
456	400
471	400
483	400
493	416
502	471
509	492
516	506
523	514
529	521
534	528
540	533
545	538
549	542
554	546
558	550
563	554
567	557
571	561
574	564
578	567
582	569
586	572
589	575
593	578
596	581
600	583
603	585
607	588
610	590
614	593
617	595
620	597
624	600
627	602
631	605
634	607
638	610

2013 PAWS	2014 PAWS
641	612
645	615
649	618
652	620
656	623
660	626
664	629
668	633
673	636
677	640
682	643
687	647
692	651
697	655
703	660
709	665
715	670
722	677
730	684
739	693
749	703
762	715
777	728
798	747
833	773
867	820

Table A3. Mathematics Grade 5 Concordance Table

2013 PAWS	2014 PAWS
409	478
444	497
478	507
499	514
514	523
526	528
536	534
545	540
553	545
560	550
566	554
572	558
577	562
583	566
588	569
592	573
597	577
601	580
605	584
609	587
613	590
617	593
620	596
624	599
628	602
631	606
635	609
638	611
641	614
645	617
648	620
651	623
655	626
658	629

2013 PAWS	2014 PAWS
661	631
665	635
668	638
671	640
675	643
678	646
682	650
685	652
689	655
692	659
696	662
700	665
704	669
708	672
712	676
716	680
721	683
725	688
730	693
735	698
741	703
747	709
753	714
760	721
767	728
776	737
786	746
798	757
813	771
834	789
869	820
903	853

Table A4. Mathematics Grade 6 Concordance Table

2013 PAWS	2014 PAWS
428	440
462	447
497	463
518	487
533	503
545	517
555	530
564	541
571	549
578	556
585	562
590	568
596	574
601	580
606	584
611	588
615	593
619	598
623	601
627	605
631	609
635	612
639	615
642	618
646	621
650	624
653	627
656	630
660	632
663	635
667	638
670	641
673	643
677	646
680	649
683	652
687	655
690	658
693	660
697	663

2013 PAWS	2014 PAWS
700	666
704	670
707	673
711	676
715	679
718	682
722	686
726	689
731	693
735	698
739	701
744	705
749	710
754	715
760	720
766	725
772	731
779	738
787	745
795	753
805	762
817	773
833	787
853	805
888	834
922	873

Table A5. Mathematics Grade 7 Concordance Table

2013 PAWS	2014 PAWS
461	547
495	553
529	560
550	563
565	570
577	573
587	578
596	581
604	587
611	591
617	596
623	600
629	604
634	608
639	613
643	617
648	621
652	625
656	629
660	634
664	638
668	641
672	644
676	649
679	652
683	655
686	658
689	661
693	664
696	667
700	670
703	673
706	675
709	678
713	681
716	683
719	686
723	689
726	692
729	695

2013 PAWS	2014 PAWS
733	698
736	701
739	704
743	707
747	710
750	714
754	717
758	721
762	724
766	728
770	732
774	736
779	740
784	745
789	750
794	755
800	760
806	766
813	772
821	779
829	788
839	797
851	809
866	825
886	848
921	885
955	917

Table A6. Mathematics Grade 8 Concordance Table

2013 PAWS	2014 PAWS
474	504
508	541
542	557
563	566
578	574
590	580
600	586
608	593
616	598
623	604
629	608
635	614
640	618
645	623
650	627
654	631
659	635
663	639
667	643
671	647
674	651
678	655
682	658
685	662
688	666
692	669
695	673
698	676
701	680
705	684
708	687
711	690
714	693
717	696
720	699
723	702
726	704
729	707
732	710
735	712

2013 PAWS	2014 PAWS
738	715
742	717
745	720
748	722
751	725
754	728
758	731
761	733
765	736
768	739
772	742
776	745
779	748
783	752
787	755
792	760
796	763
801	767
806	772
811	776
817	781
823	786
830	792
837	798
846	805
856	812
868	820
883	831
903	845
938	867
971	901

