PELHAM MATH PROGRAM REVIEW COMMITTEE

REPORT

to the

SAU 28 PELHAM SCHOOL BOARD

MAY 16, 2018

Committee Membership

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Acknowledgements

From the first meeting of the committee in September until its last meeting on May 9, 2018, this group of highly dedicated educators, parents, and volunteers from the community gave freely of their time, committed to the work at hand, scrutinized, questioned, and reviewed the material time and again. What you have here is the product of their many hours, insights, and now considerable knowledge of program review.

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Executive Summary

This study was undertaken at the directive of Interim Superintendent of Schools, Dr. Betsey Cox-Buteau, to determine the efficacy of the Pelham School District, SAU 28's, K-12 math program. Eventually, due to lack of access to like data at the high school level and the limitation of time, this effort was refocused to review the K-8 math program only. It was agreed that based upon the data, grades K-8 was an area in need of intense focus for improvement. Improvement at this level would lead to improvement at the high school level, so it was agreed to limit the scope of this review to grades K-8.

Following the desire of Pelham School Board to have a true understanding of math and where it stood in the district, Dr. Betsey Cox-Buteau, solicited volunteers from the schools in Pelham, parents, and the greater community of Pelham to undergo a standard program review process. This process took eight months which allowed for the full program review process to be valid and reliable.

The program review process requires that the committee first create a list of criteria against which the math program would be measured. The committee then determined the tools with which to measure student learning against the criteria. Finally, the committee aggregated and analyzed the data, which are presented in this report.

It was determined by the committee after a careful review of available criteria that this committee would use the Common Core State Standards for Mathematics which are the present standards used by the State of New Hampshire for the annual state-wide assessments (SBAC). These criteria are also the criteria from which virtually all modern printed mathematics curriculum programs (textbook series) are developed.

Data tools were discussed and it was decided by the committee to use presently available data derived from the i-Ready assessment given to all students in K-8. It was felt by the committee that the SBAC data was redundant to the i-Ready data. Also since the SBAC is only given one time per year, the increased frequency (three times per year) of the data collection using the i-Ready assessment system would be more reliable. These depersonalized data were presented by the grade level subgroups to the entire committee for review. The data was collected during the month of September of 2017, just as the committee began its work. As the data came in, it was aggregated and entered into criterion charts. (These are found in Appendix A.) The committee then reviewed and analyzed those results recognizing and documenting the limitations of this study.

The general findings of the committee were that student learning of mathematics in grades K-8 is inadequate to meet the demands of high school math for most students. In Pelham, the instruction of mathematics in K-8 is a complex system of interwoven activities, resources, and allotted time for the subject. In many ways, one could look at the process of the instruction of mathematics K-8 as its own "culture" in that it is deeply rooted, complex, and amorphous in nature. This means that to improve math scores through increased student learning, there must be change on all levels of pursuits involving math from the students, parents, classroom, and upward through administration and even impacting the budget process.

Complete system improvement is necessary. The difficulty is organizing, planning, and steering such a large project. The review committee recommends that the Pelham School Board charge its leadership with undertaking this effort within the school system

itself. It is a monumental task, but it can be done when everyone is committed to it and the resources are provided by the community to facilitate the effort.

See the "Implications and Recommendations" section for the recommendations by the committee for action to be taken moving forward.

Introduction

At the Pelham School Board meeting, of August 9, 2017, the Interim Superintendent was given a goal to address the problem of consistently low math scores among Pelham students. When presented with a question of the effectiveness of the present math program in the district, the Interim Superintendent chose to begin that process by conducting a program review. The purpose of the review was to consider the effectiveness of the present mathematics program at meeting the state and local criterion for the education of the children of Pelham, New Hampshire for each grade level or grade span.

In response to the directive of the board, the Interim Superintendent assembled a representative group of stakeholders with whom to conduct the review. A core committee and an extended committee were created. The core committee met to conduct the business of the review and had voting privileges. The extended committee could attend core committee meetings as observers, receive all emails and work products emanating from the work of the core committee, ask questions, and make suggestions for consideration by the core committee to give guidance in their work from more stakeholders.

The following report is the result of the work completed by the committee.

The Design of the Review Process

The Mathematics Program Review Committee used a standard program review process to conduct its review.

Steps in a Standard Educational Review Process are:
1. Assemble a representative review committee.
2. Determine the criteria against which the program will be measured.
3. Determine the tools needed to assess the program against its achievement of the criteria.
4. Collect the data.
5. Analyze the collected data.
6. Write a final report with a summary of findings and recommendations.
7. Present the findings of the committee to the Pelham School Board.

Narrative

Step 1. Assembling the Review Committee

Building a representative stakeholder committee to undertake the review effort

A committee was assembled of interested stakeholders after the community and school staff were notified through the School Messenger outreach system and word of mouth. All interested parties were included in either the core committee or the extended committee. The decisions on membership were made based upon the availability of the interested party to attend the meetings and the number of similar stakeholder representatives. Core committee members needed to have wide representation of a few of each stakeholder type. The core committee contained representation from the teaching staff, school administration, SAU 28, parents, and Pelham citizens without children presently in Pelham schools. The extended committee was made up of all parties who initially expressed an interest in the being specifically on the extended committee and anyone who had expressed an interest in being on the core committee but was not able to attend due to meeting times/dates or there were more representative stakeholder like types than the core committee could accommodate.

Once the committee membership was determined, an email group was created so that all parties would remain informed.

Step 2. Determining the Criteria Against Which the Program Will Be Measured.

Creating a list of criteria against which the present program would be measured for the review

The review committee held several discussions on what the optimal mathematics standards (the criteria for acceptable student learning) for Pelham students would be. A list of existing standards was created and studied.

The resources used to assemble the criterion list are provided in Appendix C and were the:

- Common Core State Standards for Mathematics (CCSS)
- The National Council of Teachers of Math standards (NCTM)
- The International Baccalaureate program standards (IB)

This part of the process took two meetings. The core committee was divided up into groups to study and present to the committee one particular set of standards. Each group presented its set of standards and they were discussed. After learning the history and structure of each set of standards it was determined that the NCTM standards and the IB were based on the CCSS. Therefore, it only made sense to use the CCSS as the criteria on which to measure the Pelham math program. It was also noted that these standards are the

basis for the state-wide assessment in math in New Hampshire as well and it was the lack of progress with the scores on that assessment that led to the concern about the Pelham School District math program.

The criteria were reviewed and agreed upon by the entire core committee and shared, as with all emails and work products, with the extended committee. Feedback was considered. No objections were voiced or amendments made to the CCSS for the purposes of this review. These standards may be found at http://www.corestandards.org/Math/ .

Step 3. Creating Tools to Assess the Program Against Its Achievement of the Criteria.

Designing tools to collect data on student learning against the criteria

Once the work of determining the criteria against which to judge the present math program was complete, the work of determining how best to assess the present program was discussed. Sarah Marandos, the Director of Curriculum, gave a presentation on the SBAC (Smarter-Balanced Assessment Consortium) assessment and on the i-Ready assessment. Both of these are presently used in the district and there was already data available from each. The committee felt that this data would serve the purposes of the committee. So the question became whether to use the SBAC data, the i-Ready data or both. The committee was given information regarding the development of these assessments and their validity.

After some discussion, the committee discussed the merits of both assessments. The following is a list of the advantages and concerns of using each tool.

1. Advantages of the SBAC
    a. Based upon the CCSS for math
    b. Carefully administered with proper accommodations
    c. Data from grades 3-8 available
    d. High validity
    e. Adaptive
2. Disadvantages of the SBAC
    a. Given only one time per year so less opportunity to scrutinize outlier data
    b. Data is limited to grades 3-8
3. Advantages of the i-Ready assessment
    a. Newer data than SBAC
    b. Carefully administered with proper accommodations
    c. Data from grades K-8 and potentially grade 9
    d. More data is available to check against outliers as the assessment is done several times during the year
    e. Adaptive
4. Disadvantages of i-Ready
    a. Data is limited to K-8 (potentially 9)
    b. It is an online tool which may limit the fluency of its use for students who lack computer access outside of the school day.

c. There is one empirical research study[1] showing that elementary school students do not perform as well on computer-based testing if the testing does not allow them to return to previous questions and i-Ready does not. Middle school students perform mostly as well, and high school students show no variation due to the type of assessment. For the purposes of this study, the combination of proficient and approaching proficient used by the committee to highlight weakly learned standards, should be only mildly effected by this possibility, and only where the 60% margin is close. More research is needed to verify these findings.

The committee determined that it would use the i-Ready data for its advantages and refer to the SBAC data only if a question arose due to an anomaly.

Lastly, after several meetings where grade level data was reviewed, it was determined that the committee needed to set a cut-off number for a percentage of students who achieved proficient or approaching proficient so that the discussion could be more focused on the standards that most students are not mastering. This cut-off was needed because the number of standards that were not being mastered were increasing as the student assessment results progressed by grade level, and soon our discussion would be over nearly every standard if a reasonable cut-off percentage was not determined. By doing this, the focus of the committee would be confined to the CCSS Standards in which student achievement was most deficient. That level was chosen by the committee to be a combination of proficient plus approaching proficient falling below 60%.

Therefore, if the students of a particular grade level achieved a combined 60% of their grade having met approaching proficient or proficient, the committee did not discuss those standards but focused on the weaker standards instead. More information on the i-Ready Assessment can be found at https://www.curriculumassociates.com/default.aspx.

Step 4: Collecting the Data

How Data Was Collected and from Whom

The raw i-Ready data from the spring of 2017 was downloaded as individual student performance print-outs from that assessment. The spring assessment was chosen, as opposed to the fall testing, because it was an end-of-year reflection of student learning for each grade without summer regression.

To protect the privacy of the students, Dr. Cox aggregated the data onto the charts shown in Appendix A and shared the charts with the committee as they became available for the bi-weekly meetings.

[1] https://mcmprodaaas.s3.amazonaws.com/s3fs-public/Comparing%20Student%20Performance%20on%20Paper-and-Pencil%20and%20Computer-Based-Tests-AAAS%20Project%202061%20AERA%202017.pdf

Step 5: The Analysis of the Collected Data

What the Committee Discovered in the Data

As the aggregated data came to the committee from Dr. Cox, it was charted against each standard in the CCSS at each grade level for easy reading. (See Appendix A). Each meeting the committee reviewed the next grade level of data until it was clear that the last few grades, 7 & 8 in particular, missed the 60% threshold in so many standards across so many domains, that it was not useful to consider each standard individually but instead look broadly at the data to ask questions, draw conclusions and make recommendations.

Step 6: Summary of Findings, Limitations, Implications and Recommendations.

Findings

Overall, the committee found that the generally low K-8 standardized assessment scores for mathematics in the Pelham School District are caused by a complex series of cause and effect events across the instructional years of the student experience, K-8.

The general findings of the committee were that student learning in mathematics in K-8 is inadequate to meet the demands of high school math for most students. In Pelham, the instruction of mathematics in K-8 is a complex system of interwoven activities, resources, and allotted time for the subject. In many ways, one could look at the process of the instruction of mathematics K-8 as its own "culture" in that it is deeply rooted, complex, and amorphous in nature. This means that to improve math scores through increased student learning, there must be change on all levels of pursuits involving math from the students, parents, classroom, and upward through administration and even impacting the budget process.

Complete system improvement is necessary from[2]:

- what is taught,
- when,
- how,
- for how long in the schedule,
- pacing of the curriculum,
- with what resources are available,
- how common assessments are being given,
- how often and by whom,
- how intervention will keep students up with the pace of the curriculum.

The greatest difficulty of this effort will be organizing, planning, steering, and assessing such a large project over a long period of time, most likely several years.

[2] This is not meant to be an exhaustive list, only a sampling of areas immediately known to require review and possible improvement.

It is a monumental task, but it can be done when everyone is committed to it and the resources are ultimately provided by the community to facilitate the effort.

Questions & Recommendations from the Committee

The following questions and recommendations were gathered throughout the data analysis process and are listed here for the consideration of the those involved in the next steps toward the improvement of math achievement in the Pelham School District. The expectation is that these would be reviewed and considered in the planning, inquiry, and change implementation process that would come next.

Recommendations made by the Committee for review by those who will begin to address the problem of low math scores.

No.	Recommendations	Category
1	Students should have time to practice the "toolbox" in iReady prior to test taking.	Assessment
2	Examine if there is an effect on student scores in iReady when the larger font becomes smaller in grade 3.	Assessment
3	Compare the format of word problems in the text and on the assessment. Determine if there is a difference and adjust instruction to instruct in both styles.	Assessment
4	The iReady assessment should be administered after all new instruction has been introduced for the school year. Otherwise, there is no measurement on grade level for meeting yet-to-be taught standards for a particular grade level.	Assessment
5	PHS and PMS math teachers of Algebra should have common assessments and meet at least twice per year to compare assessment data.	Assessment
6	Spiraled curriculum so students remember what they have learned before	Curriculum
7	Math curriculum should clearly reflect the common core state standards	Curriculum
8	Remove items from the curriculum that are not part of the standards	Curriculum
9	Extreme emphasis on building strength in fractions and word problems at lower grades to assist in higher grades	Curriculum
10	Compare Pelham's curriculum to successful towns	Curriculum
11	Present sample test questions to students throughout the year to be ready for testing	Curriculum
12	Teachers need to use math vocabularly consistently and at all grade levels	Curriculum
13	All curriculum pacing guides should be up to date. All curriculum strands should at least be touched upon before testing.	Curriculum
14	Accountability of instructors to meet the paced curriculum should be examined.	Curriculum
15	Compare the way problems in our textbook with how problems look in iReady and use both forms in instruction.	Curriculum

16	Review the data in this report and examine the reasons why student learning is weak in clearly defined areas. Adjust curriculum and instruction to raise levels of student learning in these areas.	Curriculum
17	There were concerns expressed by committee members about the sequence of instruction and if the curriculum had been honed to deliver information in the most rational and facile way to absorb it.	Curriculum
18	Math Vocabulary should be mapped K-12 as a single, curricular item.	Curriculum
19	Expressions and Inequalities are very weak in the upper grades.	Curriculum
20	Math vocab should be coordinated between teams	Curriculum Methods
21	Paint walls (literally) with math vocabulary	Curriculum Methods
22	Practice mixed addition and subtraction problems to recognize the relationship more easily. Standard Gr2.OA.B2	Grade Level Comment - 2
23	Address the difficulty of counting within 0-1000.	Grade Level Comment - 2
24	Examine the instruction of place value and improve.	Grade Level Comment - 2
25	There is general weakness in analog time.	Grade Level Comment - 2
26	Strengthen student recognition of geometric shapes.	Grade Level Comment - 2
27	Pattern recognition is weak in grade 3.	Grade Level Comment - 3
28	Represent fractions on a number line for students	Grade Level Comment - 3
29	Practice breaking a geometric shape into equivalent fractions	Grade Level Comment - 3
30	Measuring time intervals in minutes is extremely weak. Determine if and how this is being taught.	Grade Level Comment - 3
31	Students should be fluent in representing data on a number line.	Grade Level Comment - 3
32	Word problems in Grade 3 should be broken down into steps for students to learn to ask themselves the questions that will lead to setting up the math.	Grade Level Comment - 3
33	Students need more work on a number line to understand fractions.	Grade Level Comment - 3
34	Students need to understand that shapes share attributes.	Grade Level Comment - 3
35	Students are struggling with composite and prime numbers	Grade Level Comment - 4
36	Students struggle to recognize patterns…still.	Grade Level Comment - 4
37	Weaknesses appear in multiplying 2-digit numbers, whole number quotients, and remainders.	Grade Level Comment - 4
38	Comparing fractions, equivalence of fractions, operations on fractions, and work problems with fractions all display general weakness.	Grade Level Comment - 4
39	There is general weakness in the conversion of measurements particularly in the conversion of measurements from a larger unit to a smaller unit.	Grade Level Comment - 4
40	Students need more understanding and practice in measuring angles.	Grade Level Comment - 4

41	The gap in the divergent dichotomy of student learning continues to grow greater.The students who "get it" and the students who don't is becoming clearer and greater as the students move up through the grade levels from Grade 3. The students who do not digest fractions well need to be identified early and receive intense, focused intervention. Instructional practice needs to be finely tuned to teach, reteach, clarify and practice in this, the most glaring area of learning weakness.	Grade Level Comment - 5
42	The assessment show a weakness in the understanding of the word "integer." The question of where, when, and how this is introduced within the curriculum and how it is reinforced should be addressed.	Grade Level Comment - 6
43	Full day Kindergarten should be considered so that time on early math can be expanded.	Grade Level Comment - K
44	The committee encourages teachers who love math to teach math, even at the youngest grade levels so that insprirational instruction expertise reaches every student in the grade level.	Instruction
45	Separate out the teaching of math for each grade level so that a person is specialized in math	Instructional Methods
46	With the teaching of addition and subtraction facts, don't concentrate so much on counting strategies	Instructional Methods
47	Start early with parents on the importance of knowing math facts - provide flashcards?	Instructional Methods
48	Tier 2 and 3 students should be available for intensive interventions.	Intervention
49	More time for Tier 2 intervention in the lower grades for building requisite skills	Intervention
50	Need math specialist for pull-out to work with Tier 3 kids	Intervention
51	Students should be assessed on the standards being taught in that time period every three weeks and referred for intervention if the standards for that time periods are not mastered.	Intervention
52	Assess students before beginning grade 3 fraction work for spatial reasoning. Address deficits with targeted intervention.	Intervention
53	Assess students in Kindergarten for pattern recognition. Address deficits with targeted intervention.	Intervention
54	iReady has its own, built-in intervention program. Teachers should be trained and encouraged to use it.	Intervention
55	Pattern recognition is weak in Grade 4.	Intervention
56	Tier 2 and 3 students should be available for intensive interventions	Intervention
57	More time for Tier 2 intervention in the lower grades for building requisite skills	Intervention
58	Need math specialist for pull-out to work with Tier 3 kids	Intervention
59	All teachers must be familiar with the standards	Knowing the Standards
60	Use PD time to unpack the standards and standards above and below grade level - understand the continuum.	Knowing the Standards
61	Have teachers take math methods courses and attend and give workshops	Professional Development
62	Take an inventory of teacher's backgrounds (courses) and experience (Workshops) and plan PD	Professional Development
63	Teams of teachers should analyze their data together including data a grade level higher and a grade level lower than them.	Professional Development

64	The mastery of the geometry strands show weakness early. Reasons for this should be determined and changes made to fix this.	Professional Development
65	Have teachers take math methods courses and attend and give workshops	Professional Development
66	Take an inventory of teacher's backgrounds (courses) and experience (Workshops) and plan PD	Professional Development
67	Numbers of students in lower grade classrooms is too high	Resources
68	Tier I instruction should be the focus of the first improvement effort	Professional Development
69	Math coach - true teacher of teachers	Resources
70	Partnering with parents could be used as a method for increasing learning. Information nights for parents, curriculum guides, resources could be made available. Students without home support for learning should be identified and support for learning be provided within the school day as needed.	Resources
71	Review time used for math instruction and intervention to see that it is used most effectively.	Time
72	The question of adequate instructional and intervention time in math needs to be addressed if all standards are not being covered successfully each year. Any "fluff" needs to be cleaned from the curriculum to make more time for the instruction of the standards as well.	Time
73	Increase the time devoted to math at the lower grade levels	Time
74	At least one W.I.N period per week devoted strictly to math	Time
75	More focused and data driven intervention time.	TIme

General questions raised by the committee by domain.

No.	Mathematical Domain	Question	Category
1	Counting and Cardinality - Kindergarten	Do we understand what KCC.B.4c means?	Knowing the standards
2	Counting and Cardinality - Kindergarten	How do we move those approaching students to proficient?	Intervention
3	Functions - Grade 8	Do our paced curriculum maps include functions for Gr 8?	Curriculum
4	Statistics & Probability	A complete review of 6-8 curriculum of S & P	Curriculum
5	Statistics & Probability	Does staff need PD in S&P	Professional Development
6	Statistics & Probability	S & P across the curriculum	Curriculum
7	Statistics & Probability	More time needed. Not a single student achieved Proficiency!	TIme
8	The number system	Do we teach factors & factoring as a part of learning multiplication	Curriculum

9	Expression & Equations	Is more time needed? Only 1 standard achieved.	Time
10	Expression & Equations	Does the curriculum even cover these?	Curriculum
11	Ratios and Proportional Relationships	Proficiency in fractions is needed for ratios	Instructional Methods
12	Ratios and Proportional Relationships	Cannot understand ratios if do not understand fractions, need more time on fractions	Intervention
13	Numbers & Operations - Fractions	How well are the standards of Fractions understood? The depth is critical in grade 3.	Knowing the standards
14	Numbers & Operations - Fractions	More time on fractions in grade 3	Time
15	Numbers & Operations - Fractions	Should students go any further if they do not know their multiplication facts?	Intervention
16	Geometry	Would increased attention to Geometry improve proficiency in other areas?	Curriculum
17	Geometry	Use technology to help students visualize geometry concepts	Instructional Methods
18	Geometry	Geometry should not be taught at the **end** of every grade	Curriculum
19	Operations & Algebraic Thinking	Full day kindergarten would provide more time for math standards missed here	Time
20	Operations & Algebraic Thinking	PD is needed for teachers of math in this area	Professional Development
21	Operations & Algebraic Thinking	A review of the instruction of subtraction as it relates to addition	Instructional Methods
22	Operations & Algebraic Thinking	Emphazise "addition families"	Curriculum
23	Operations & Algebraic Thinking	Emphasize multiplication fact families	Curriculum
24	Numbers & Operations in Base 10	More time on multiplication facts	Time
25	Numbers & Operations in Base 11	Intervention time devoted to increasing math literacy	Intervention
26	Measurement & Data	Review where all this fits into the curriculum pacing? is it too late?	Curriculum
27	Measurement & Data	Would increased attention to Measurement & data improve proficiency in other areas?	Curriculum
28	Measurement & Data	How can we incorporate measurement into number sense	Curriculum

General questions raised by the committee surrounding present practices, resources, etc.

No.	Questions	Category
1	Since iReady scores are not part of a student's grade, do they take the test seriously?	Assessment
3	Should we rethink the purpose of how we use the pretest?	Assessment
4	Do we celebrate student progress enough to promote interest in working on math?	Culture around math
5	Are there topics we can purposefully omit to spend more time on more important concepts?	Curriculum
6	How does Pelham's math curriculum compare to other towns?	Curriculum
7	Can we pursue math across the curriculum?	Curriculum
8	Do the students learn factor trees?	Curriculum methods
9	Do teachers understand that if a student fails to learn a standard in their grade, that it has longterm consequences?	Knowing the Standards
10	Does the sequence of the standards make sense to our staff?	Knowing the Standards
11	How well do teachers understand the standards?	Knowing the Standards
12	Do we teach the grade level standards or meet students where they are with the full set of standards?	Knowing the Standards
13	Are we supporting our teachers who find teaching math difficult?	Professional Development
14	Do we know how many teachers are truly comfortable teaching math?	Professional Development
15	Are our teacher workshop days being used effectively with regard to math?	Professional Development
16	Is the local library a source to work with getting math into story time?	Resources
17	Can other teachers take on teaching math?	Resources
18	What math courses are required for certification as an Elementary Education teacher in NH? Do our teachers know enough?	Teacher Prep
19	What is the training background of current Pelham K-8 teachers in math?	Teacher Prep
20	How many of our special education teachers have had an intensive math teaching course?	Teacher Prep
21	Should we increase the amount of time on math?	Time
22	Students who fall behind, is there enough time given to them to bring them back up to pace?	Time

Limitations of the study

a. Experience of the committee in the program review process
b. The limitations of the tool used to collect data
    i. Data was collected before teaching for the school year was completed in each grade.
    ii. The i-Ready assessment is an online tool and therefore, some students may have found using the computer to take the assessment was difficult.
c. Time available of the committee members

Implications and Recommendations

Without significant systemic change, student learning in mathematics will not improve in Pelham. The status quo is not producing improvement. It must be acknowledged that as hardworking, and admirable as the staff and administration of the Pelham School District are, to date the effort to fully tackle the deficit in learning in mathematics has not resulted in the kind of outcome that satisfies the needs of our students. This problem can only truly be solved through an effort to change the entire culture around learning mathematics by everyone who works in our schools and it must be driven by the SAU with support from the School Board.

The review committee recommends that the Pelham School Board charge its administrative leadership with undertaking the effort to improve student learning in mathematics K-8, and ultimately K-12. The administration should present a time bound improvement plan to the Board for its approval that includes work products, and measureable outcomes at check points along the way. This plan should include a complete review and consideration of the questions and recommendations provided in this report by administration.

The Board should hold the administration accountable for administering the approved plan and producing measureable improvement in student learning as reflected on national, state, and local assessments. At the same time, the Board will need to provide the budgetary support for personnel, professional development, and resources needed for the success of the plan.

Lastly, the following policy guidelines recently resurfaced in a report state-wide from Dr. Todd DeMitchell of UNH. In his report he brings back to our attention the following policy guidelines from the No Child Left Behind legislation. These guidelines are recommended to be a foundational part of moving forward with the effort to improve student learning in mathematics in the Pelham Schools.

1. *What gets measured gets done.*
2. *The goal must be within reach.*
3. *Beware goalposts can be moved.*
4. *When a measure becomes a target, it ceases to be a good measure" (also called Goodhart's law).*

5. *Prevent, track, and adapt to minimize gaming. (NOTE: Thomas Timar in a study of Utah's career ladder policy noted in a 2X2 table analysis that implementation of a reform can be just pro forma, checking boxes but not implementing it with fidelity—a caution for policymakers at all educational levels.)*
6. *Aim for real change in implementation.* [3]

Student learning in mathematics can be improved in the Pelham School District but it will require cooperation and commitment at all levels by everyone involved with the district and a change in mindset regarding mathematics and its place in our education system.

[3] Contained in an email to Statewide to Education Administrators from Dr. Todd DeMitchell (Todd.DeMitchell@unh.edu) on April 29, 2018.

APPENDICES

Appendix A: Results by Grade Level

KINDERGARTEN

KINDERGARTEN						
COMMON CORE STATE STANDARDS FOR KINDERGARTEN ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD		P	A	NKD
Counting & Cardinality	Know number names and the count sequence	KCC.A.1 for both 1s and 10s	Count to 100 by ones and by 10s...	0	62	38
		KCC.A.1 for tens only	Count to 100 by ... tens.	55	0	45
		KCC.A.1 for ones only	Count to 100 by ones...	62	0	38
		KCC.A.2	Count forward beginning from a given number within the known sequence (instead of having to begin at 1.)	62	0	38
		KCC.A.3	...Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).	86	0	14
	Count to tell the number of objects. Understand the relationship between numbers and quantities: connect counting to cardinality	KCC.B.4a	When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.	86	0	14
		KCC.B.4b	Understand that the last number name with one and only one object.	86	0	14
		KCC.B.4c	Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.	9	42	49
	Count to tell the number of objects	KCC.B.5	Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.	13	74	13
	Compare numbers	KCC.C.6	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies.	72	13	14
		KCC.C.7	Compare two numbers between 1 and 10 presented as written numerals.	37	24	39
Operations & Algebraic Thinking	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from	KOA.A.1	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.	0	58	42
		KOA.A.2	Solve addition and subtraction word problems, and add and subtract within 10 e.g., by using objects or drawings to represent the problem.	0	82	18
		KOA.A.3	Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).	0	58	42
		KOA.A.4	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.	1	13	86
		KOA.A.4	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing ...	46	7	47
		KOA.A.5	Fluently add and subtract within 5.	0	80	20
Number & Operations in Base 10	working with Numbers 11-19 to gain foundations for place value	KNBT.A.1	Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed or ten ones and one, two , three, four, five, six, seven, eight, or nine ones.	30	8	62
Measurement & Data	Describe and compare measurable attributes	KMD.A.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	50	18	32
		KMD.A.2	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.	0	68	32
	Classify objects and count the number of objects in each category	KMD.B.3	Classify objects into given categories ...	16	1	83
Geometry	Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)	KGA.A.1	Describe objects in the environment using names of shapes ...	84	8	8
		KGA.A.2	Correctly name shapes regardless of their orientations or overall size.	84	8	8
		KGA.A.3	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").	59	33	8
	Analyze, compare, create, and compose shapes	KGB.4	Analyze and compare two - ... dimensional shapes ... using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices."corners") ...	84	0	16
		KGB.4	Analyze and compare two - ... dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices."corners") and other attributes (e.g., having sides of equal length).	92	0	8
		KGB.6	Compose simple shapes to form larger shapes.	0	0	100
P = Proficient						
A - Approaching						
NKD - No Knowledge Discerned						

GRADE 1

GRADE 1						
COMMON CORE STATE STANDARDS FOR GRADE 1 ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD	CONTENTS OF STANDARD	P	A	NKD
Operations & Algebraic Thinking	Represent and solve problems involving addition and subtraction	1.OA.A.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	12	87	1
		1.OA.A.1	Use ... subtraction within 20 to solve word problems involving situations of ... comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	1	0	99
		1.OA.A.1	Use ... subtraction within 20 to solve word problems involving situations of ... taking from, ... [or] taking apart, ... with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.	84	0	16
		1.OA.A.2	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g. by using objects, drawings, and equations with a symbol for the unkonwn number to represent the problem.	65	2	33
	Understand and apply properties of operations and the relationship between addition and subtraction	1.OA.B.3	Apply proprerties of operations as strategies to add and subtract.	26	54	20
		1.OA.B.4	Understand subtraction as an unknown-addend problem.	12	86	2
	Add and subtract within 20	1.OA.C.5	Relate counting to addition and subtraction (e.g. by counting on 2 to add 2).	78	0	22
		1.OA.C.5	Relate counting ... subtraction (e.g. b counting on 2. to add 2).	14	86	0
		1.OA.C.5	Relate counting to addition ... (e.g. by counting on 2 to add 2).	85	1	14
		1.OA.C.6	Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on ; making ten (elg. 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 - 4 = 13 3 - 1 = 10 - 1 = 9); using the relationship between addition and subtraction (e.g. knowing that 8 + 4 = 12, one knows 12 - 8 = 4); and creating equivalent but easier or known sums (e.g. adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	0	100	0
		1.OA.C.6	... Subtract within 20 ...	37	0	63
		1.OA.C.6	... Use strategies such as ... using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one know 12 - 8 = 4) ...	1	0	99
		1.OA.C.6	Add ... within 20 ...	66	0	34
	Work with addition and subtraction equations	1.OA.D.7	Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false.	25	0	75
		1.OA.D.8	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers.	80	0	20
		1.OA.D.8	Determine the unknown whole number in an addition ... equation relating to three whole numbers.	97	0	3

Number & Operations in Base 10	Extend the counting sequence	1.NBT.A.1	Count to 120, starting at any number less that 120. In this range, read and write numerals and represent a number of objects with a written numeral.	0	100	0
	Understand place value. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the	1.NBT.B.2a	10 can be thought of as a bundle of ten ones - called a "ten"	0	67	33
		1.NBT.B.2b	The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.	0	67	33
		1.NBT.B.2c	The numbers from 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two ,three, four, five, six, seven, eight, or nine tens (and 0 ones).	0	67	33
	Understand place value	1.NBT.B.3	Compare two two-digit numbers based on meaning of the tens and ones digits, recording the results of comparisons with the symbols >, = , and <.	67	1	32
	Use place value understanding and properties of operations to add and subtract	1.NBT.C.4	Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones, and ones,; and sometimes it is necessary to compose a ten.	11	82	8
		1.NBT.C.4	Add within 100, including adding a two-digit number and a one-digit number … using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction …	54	8	38
		1.NBT.C.5	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count, explain the reasoning used.	45	0	55
		1.NBT.C.6	Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; ...	45	0	55
Measurement and Data	Measure lengths indirectly and by iterative length units	1.MD.A.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object.	0	91	9
	Tell and write time	1.MD.B.3	Tell and write time in hours and half-hours using analog and digital clocks.	0	45	55
	Represent and interpret data	1.MD.C.4	Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.	1	13	86
Geometry	Reason with shapes and their attributes	1.G.A.1	Distinquish between defining attributes (e.g. triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size) …	66	0	34
		1.G.A.2	Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) … to create a composite shape …	1	0	99
		1.G.A.3	Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.	15	51	34

GRADE 2

GRADE 2						
COMMON CORE STATE STANDARDS FOR GRADE 2 ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD	CONTENTS OF STANDARD	P	A	NDK
Operations and Algebraic Thinking	Represent and solve problems involving addition and subtraction.	2.OA.A1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	0	95	5
		2.OA.A.1	Use … subtraction within 100 to solve one- …step word problems involving situations of … comparing ...	57	0	43
	Add & Subratct within 20.	2.OA.B.2	Fluently add and subtract within 20 using mental strategies …	5	64	30
		2.OA.B.2	Fluently … subtract within 20 using mental strategies…	81	0	19
		2.OA.B.2	Fluently add … within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.	90	0	10
	Work with equal groups of objects to gain foundations for mulitplication.	2.OA.C.3	Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equations to express an even number as a sum of two equal addends.	70	0	30
Numbers & Operations in Base 10	Understand place value. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones: e.g., equals 7 hundreds, 0 thens, and 6 ones. Understand the following as special cases:	2.NBT.A.1a	100 can be thought of as a bundle of ten tens - called a "hundred."	68	1	31
		2.NBT.A.1b	The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	68	1	31
	Understand place value.	2.NBT.A.2	Count within 1000; skip-count by 5s, 10s, and 100s.	0	98	2
		2.NBT.A.2	… skip-count by 5s, 10s, and 100s.	76	0	24
		2.NBT.A.3	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	69	26	5
		2.NBT.A.4	Compare two three-digit numbers based on meaning of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.	76	0	24
	Use place value understanding and properties of operations to add and subtract.	2.NBT.B.5	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	0	98	2
		2.NBT.B.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.	31	58	11
		2.NBT.B.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens,and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.	0	87	13
		2.NBT.B.8	Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a giving number 100-900.	69	7	24
		2.NBT.B.9	Explain why addition and subtraction strategies work, using place value and the properties of operations.	0	85	15

Measurement & Data	Measure & estimate lengths in standard units.	2.MD.A.1	Measure the length of an object by … using appropriate tools such as rulers …	0	60	40
		2.MD.A.1	Measure the length of an object by selecting and using appropriate tools such as rulers …	8	0	92
		2.MD.A.4	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.	9	0	91
	Relate addition and subtraction to length.	2.MD.B.5	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.	9	31	60
	Work with time and money.	2.MD.C.7	Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.	36	0	64
		2.MD.C.8	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately.	0	0	100
		2.MD.C.8	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ ... symbols appropriately.	50	0	50
	Represent and interpret data.	2.MD.D.9	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.	4	1	95
		2.MD.D.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.	36	12	51
		2.MD.D.10	Draw a picture graph … (with single-unit scale) to represent a data set with up to four categories….	60	0	40
Geometry	Reason with shapes and their attributes.	2.G.A.1	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	0	2	98
		2.G.A.2	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.	0	67	33
		2.G.A.3	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words, halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have a the same shape.	0	76	24

GRADE 3

COMMON CORE STATE STANDARDS FOR GRADE 3 ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD	CONTENTS OF STANDARD	P	A	NKD
Operations and Algebraic Thinking	Represent and solve problems involving multiplication and division.	3.OA.A.1	Interpret products of whole numbers, e.g., interpret 5 x 7 as the total number of objects in 5 groups of 7 objects each.	0	67	33
		3.OA.A.2	Interpret whole-number quotients of whole numbers, e.g., interpret 56 / 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.	0	54	46
		3.OA.A.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with asymbol for the unknown number to represent the problem.	0	0	100
		3.OA.A.3	Use…division within 100 to solve word problems in situations involving equal groups . . .	43	11	46
		3.OA.A.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	56	11	33
	Understand properties of multiplication and the relationship between	3.OA.B.5	Apply properties of operations as strategies to multiply and divide.	51	23	26
		3.OA.B.6	Understand division as an unknown-factor problem.	37	29	34
	Multiply and divide within 100.	3.OA.C.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 x 5 = 40, one knows 40 / 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	0	58	42
		3.OA.C.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 / 5 = 40, one knows 40 / 5 = 8) . . .	67	0	33
	Solve problems involving the four operations, and identity and explain patterns in arithmetic.	3.OA.D.8	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	15	0	85
		3.OA.D.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.	0	7	93
Numbers and Operations in Base Ten	Use place value understanding and properites of operations to perform multi-digit arithmetic.	3.NBT.A.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	48	0	52
		3.NBT.A.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	0	84	16
		3.NBT.A.3	Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 x 80, 5 x 60) using strategies based on place value and properties of operations.	0	55	45
Numbers and Operations-Fractions	Develop understanding of fractions as numbers.	3.NF.A.1	Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts: understand a fraction a/b as the quantity formed by a parts of size 1/b.	59	9	32
	Develop understanding of fractions as numbers. Understand a fraction as a number on the number line: represent fractions on a number line diagram.	3.NF.A.2a	Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.	1	6	93
		3.NF.A.2a	Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts …	5	0	95
		3.NF.A.2b	Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the restuling interval has size a/b and that its endpoint locates the number a/b on the number line.	5	0	95
	Develop understanding of fractions as numbers. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.	3.NF.A.3a	Understand two fractions as equivalent (equal) if they are the same size . . .	13	0	87
		3.NF.A.3b	. . . Explain why the fractions are equivalent, e.g., by using a visual fraction model.	13	0	87
		3.NF.A.3b	. . . Generate simple equivalent fractions, (e.g., 1/2 = 2/4, 4/6 = 2/3) . . .	0	0	100
		3.NF.A.3d	Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, <, and justify the conclusions, e.g., by using a visual fraction model.	0	0	100
		3.NF.A.3d	Compare two fractions with the same numerator or the same denominator … Record the results of comparisons with the symbol >, =, <, and justify the conclusions, e.g., by using a visual fraction model.	9	0	91

Measurement and Data	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	3.MD.A.1	. . . Measure time intervals in minutes . . .	0	36	64
		3.MD.A.1	Tell . . . Time to the nearest minute . . .	53	0	47
		3.MD.A.2	Measure and estimate liquid volumes and masses of objects using standard unit of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same unit, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	0	42	58
		3.MD.A.2	. . . Add, subtract, multiply, or divide to solve one-step work problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	20	0	80
	Represent and interpret data.	3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.	43	0	57
		3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units-whole numbers, halves, or quarters.	0	12	88
		3.MD.B.4	… Show the data by making a line plot, where the horizontal scale is marked off in appropriate units, whole numbers, halves, or quarters.	13	0	87
	Geometric measurement: understand concepts of area and relate area to multiplication and to addition. Recognize area as an attribute of plane figures and understand concepts of area measurement.	3.MD.C.5a	A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.	0	62	38
		3.MD.C.5b	A place figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.	63	0	37
	Geometic measurement: understand concepts of area and relate area to multiplication and to addition.	3.MD.C.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	61	1	39
	Geometric measurement: understand concepts of area and relate area to multiplication and to addtion. Relate area to the operations of multiplication and addition.	3.MD.C.7a	Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.	0	61	39
		3.MD.C.7b	Multiply side lengths to find areas of rectangles with whole-number products as rectangular areas in mathematical reasoning.	0	65	35
		3.MD.C.7d	Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	29	1	70
	Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	3.MD.D.8	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	37	0	63
Geometry	Reason with shapes and their attributes.	3.G.A.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., have four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	18	0	82
		3.G.A.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.	63	0	37

GRADE 4

COMMON CORE STATE STANDARDS FOR GRADE 4 ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD	CONTENTS OF STANDARD	P	A	NKD
Operations and Algebraic Thinking	Use the four operations with whole numbers to solve problems.	4.OA.A.1	Interpret a multiplication equation as a comparison, e.g., interpret 35=5x7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of muliplicative comparisons as multiplication equations.	28%	66%	6%
		4.OA.A.2	Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinquishing multiplicative comparion from additive comparison.	25%	61%	14%
		4.OA.A.3	Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, includng problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies inclucing rounding.	20%	27%	53%
	Gain familiarity with factors and multiples.	4.OA.B.4	…Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number…	81%	0%	19%
		4.OA.B.4	…Determine whether a given whole number in the range 1-100 is a prime or composite.	30%	0%	70%
		4.OA.B.4	Find all factor pairs for a whole number in the range 1-100…	62%	0%	38%
	Generate and analyze patterns.	4.OA.BC.5	Generate a number … pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.	3%	0%	97%
Numbers and Operations in Base Ten	Generalize place value understanding for multi-digit whole numbers.	4.NBT.A.1	Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.	12%	69%	19%
		4.NBT.A.2	Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meaning of the digits in each place, using >, =, and < symbols to record the results of comparisons.	0%	81%	19%
		4.NBT.A.2	Read and write multi-digit whole numbers using base-ten numerals...expanded form. Compare two multi-digit numbers based on meaning of the digits in each place, using >, =, and < symbols to record the results of comparisons.	81%	0%	19%
		4.NBT.A.3	Use place value understanding to round multi-digit whole numbers to any place.	50%	30%	21%
	Use place value understanding and properties of operations to perform multi-digit arithmetic.	4.NBT.B.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm.	0%	95%	5%
		4.NBT.B.4	Fluently...subtract multi-digit whole numbers using the standard algorithm.	55%	6%	39%
		4.NBT.B.4	Fluently add…multi-digit whole numbers using the standard algorithm.	79%	0%	21%
		4.NBT.B.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	0%	74%	26%
		4.NBT.B.5	…multiply two two-digit numbers…	25%	0%	75%
		4.NBT.B.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors…illustrate and explain the calcluation by using equations, rectangular arrays, and/or area models.	44%	0%	56%

Numbers and Operations - Fractions	Extend understanding of fractions equivalence and ordering.	4.NH.A.1	Explain why a fraction a/b is equivalent to a fraction (n x a)/n X b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.	32%	17%	51%
		4.NH.A.2	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	0%	39%	61%
		4.NH.A.2	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators...	32%	0%	68%
		4.NH.A.2	Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. … Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.	46%	0%	54%
	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. Understand a fraction a/b with a>1 as a sum of fractions 1/b.	4.NF.B3a	Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.	4%	35%	61%
		4.NF.B3b	Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation...	41%	0%	59%
		4.NF.B3c	Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.	19%	21%	61%
		4.NF.B3d	Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, …e.g. by using visual fraction models and equations to represent the problem.	0%	39%	61%
		4.NF.B3d	Solve word problems involving addition and subtraction of fractions referring to the same whole and having like deniminators…	68%	0%	32%
	Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. Apply and extend previous understandings of multiplication to multiply fractions by a whole number.	4.NF.B.4b	Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number.	4%	0%	96%
		4.NF.B.4c	Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.	0%	4%	96%
	Understand decimal notation for fractions, and compare decimal fractions.	4.NF.C.5	Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with repective denominators 10 and 100.	5%	28%	68%
		4.NF.C.6	Use decimal notation for fractions with denominators 10 or 100.	43%	0%	57%
		4.NF.C.7	Compare two decimals to hundreths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.	0%	42%	58%
		4.NF.C.7	Compare two decimals to hundredths by reasoning about their size…	79%	0%	21%

Measurement and Data	Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.	4.MD.A.1	Know relative sizes of measurement units within one system of units including km, m, cm; kg, g, lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.	1%	12%	87%
		4.MD.A.2	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.	1%	50%	50%
		4.MD.A.2	Use the four operations to solve word problems...including...problems that require expressing measurements given in a larger unit in terms of a smaller unit...	0%	0%	100%
		4.MD.A.2	Use the four operations to solve word problems involving…liquid volumes…[or] masses of objects…	48%	0%	52%
		4.MD.A.3	Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	1%	61%	39%
		4.MD.A.3	Apply the area…formulas for rectangles in real world and mathematical problems.	25%	1%	74%
	Represent and interpret data.	4.MD.B4	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.	2%	9%	89%
	Geometric measurement: understand concepts of angle and measure angles. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:	4.MD.C5a	An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.	39%	0%	61%
		4.MD.C5b	An angle that turns through n one-degree angles is said to have an angle measure of n degrees.	39%	0%	61%
	Geometric measurement: understand concepts of angle and measure angles.	4.MD.C.6	Measure angles in whole-number degrees using a protractor…	39%	0%	61%
		4.MD.C.7	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts the angle measure of the whole is the sum of the angle measure of the parts. Solve additon and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	13%	1%	86%
Geometry	Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	4.G.A.1	Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	0%	70%	30%
		4.G.A.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	0%	48%	52%
		4.G.A.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size...	15%	0%	85%
		4.G.A.3	Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	74%	0%	26%

GRADE 5

COMMON CORE STATE STANDARDS FOR GRADE 5 ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD	CONTENTS OF STANDARD	P	A	NKD
Operations and Algebraic Thinking	Write and interpret numerical expressions.	5.OA.A.1	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	25%	0%	59%
		5.OA.A.2	Write simple expressions that record calculations with numbers, and instrepret numberical expressions without evaluating them.	1%	17%	82%
	Analyze patterns and relationships.	5.OA.B.3	Generate two numerical patterns using two given rultes. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.	1%	38%	62%
Number and Operations in Base Ten	Understand the place value system.	5.NTB.A.1	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represnets in the place to its right and 1/10 of what it represents in the place to its left.	1%	0%	99%
		5.NTB.A.2	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	0%	15%	85%
	Understand the place value system. Read, write, and compare decimals to thousandths.	5.NTB.A.3a	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 x 100 + 4 x 10 + 7 x 1 = 3 x (1/10) + 9 x (1/100) + 2 x (1/1000).	68%	0%	32%
		5.NTB.A.3b	Fluently multiply multi-digit whole numbers using the standard algorithm.	67%	28%	5%
	Understand the place value system.	5.NTB.A.4	Use place value understanding to round decimals to any place.	17%	0%	83%
	Perform operations with multi-digit whole numbers and with decimals to hundredths.	5.NTB.B.5	Fluently multiply multi-digit whole numbers using the standard algorithm.	0%	83%	17%
		5.NTB.B.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	49%	18%	33%
		5.NTB.B.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division...	8%	1%	92%
		5.NTB.B.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	0%	61%	39%
		5.NTB.B.7	… Multiply … decimals to hundredths …	36%	0%	64%
		5.NTB.B.7	….divide decimals to hundredths using … stratiegies based on place value, properties of operations, and/or the relationship between addition and subtraction; …	24%	0%	76%
		5.NTB.B.7	Add …[and] subtract …decimals to hundredths …	41%	0%	59%

Number and Operations - Fractions	Use equivalent fractions as a strategy to add and subtract fractions.	5.NF.A.1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.	17%	0%	83%
		5.NF.A.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to repreesnt the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonablemess of answers.	17%	47%	35%
	Apply and extend previous understandings of multiplication and division to mulitply and divide fractions.	5.NF.B.3	Interpret a fraction as division of the numerator by the denominator (a/b = a .=.b) …	37%	2%	61%
	Apply and extend previous understandings of muliplication and division to multiply and divide fractions. Apply and extend previous understandings of mutiplication to multiply a fraction or whole number by a fraction.	5.NF.B.4a	Interpret the product (a/b) x q as a part of a partition of q into equal parts; equivalently, as the result of a sequence of operations a x q / b.	0%	25%	75%
		5.NF.B.4b	Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Mulitply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	0%	56%	44%
		5.NF.B.4b	… Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	27%	0%	73%
	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. Interpret multiplication as scaling (resizing), by:	5.NF.B.5a	Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated mulitplication.	19%	37%	44%
		5.NF.B.5b	Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 restults in a product smaller than the given number; and relating the principle of fraction equivalence a/b = (nxa)(nxb) to the effect of multiplying a/b by 1.	0%	56%	44%
		5.NF.B.5b	Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number … [and} why multiplying a given number by a fraction less than 1 results in a product smaller than the given number …	16%	0%	84%
	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	5.NF.B.6	Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	11%	45%	44%
	Apply and extend previous understandings of multiplication and division to multiply and divide fractions. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.	5.NF.B.7a	Interpret division of a unit fraction by a non-zero whole numbers, and compute such quotients.	4%	6%	90%
		5.NF.B.7b	Interpret division of a whole number by a unit fraction, and compute such quotients.	4%	6%	90%
		5.NF.B.7c	Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fraction, e.g., by using visual fraction models and equations to represent the problem.	0%	4%	96%
		5.NF.B.7c	Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions …	10%	0%	90%

Measurement and Data	Convert like measurement units within a given measurement system.	5.MD.A.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	6%	23%	71%
	Represent and interpret data.	5.MD.B.2	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.	18%	14%	68%
	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. Recognize volume as an attribute of solid figures and understand concepts of volume	5.MD.C.3a	A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.	0%	42%	58%
		5.MD.C.3b	A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.	0%	42%	58%
	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	5.MD.C.4	Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	0%	42%	58%
	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.	5.MD.C.5a	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g. to represent the associative property of multiplication.	0%	20%	80%
		5.MD.C.5a	Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes …	42%	1%	58%
		5.MD.C.5b	Apply the formula V = l x w x h and V = b x h for rectangular prisms to find volumes of right retangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.	1%	19%	80%
		5.MD.C.5c	Recognize volume as additive. Find volumes of solid figures composed of two-non-overlapping right retangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	12%	9%	80%
Geometry	Graph points on the coodinate plane to solve real-world and mathematical problems.	5.G.A.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coodinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).	0%	68%	32%
		5.G.A.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	0%	68%	32%
	Classify two-dimentional figures into categories based on their properties.	5.G.A.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.	0%	12%	88%
		5.G.A.4	Classify two-dimensional figures in a hierarchy based on properties.	12%	0%	88%

GRADE 6

COMMON CORE STATE STANDARDS FOR GRADE 6 ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD	CONTENTS OF STANDARD	P	A	NKD
Ratios and Proportional Relationships	Understand ratio concepts and use ratio reasoning to solve problems.	6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.	53%	0%	47%
		6.RP.A.2	Understand the concept of a unit rate a/b associated with a ratio a:b when b is not equal to 0, and use rate language in the context of a ratio relationship.	50%	0%	50%
	Understand ratio concepts and use ratio reasoning to solve problems. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent rations, tape diagrams, double number line diagrams, or equations.	6.RP.A.3a	Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables …	53%	0%	47%
		6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.	50%	0%	50%
		6.RP.A.3c	… Solve problems involving finding the whole, given a part and the percent.	10%	0%	90%
		6.RP.A.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity) …	20%	0%	80%
		6.RP.A.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.	6%	48%	46%

The Number System	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.	6.NS.A.1	Interpret and computer quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.	0%	28%	72%
		6.NS.A.1	… Compute quotients of fractions …	32%	0%	68%
	Compute fluently with multi-digit numbers and find common factors and multiples.	6.NS.B.2	Fluently divide multi-digit numbers using the standard algorithm.	70%	1%	29%
		6.NS.B.3	Fluently add, subtract, mulitply, and divide multi-digit decimals using the standard algorithm for each operation.	0%	60%	40%
		6.NS.B.3	Fluently … divide multi-digit decimals using the standard algorithm …	59%	0%	41%
		6.NS.B.3	Fluently … multiply … multi-digit decimals using the standard algorithm …	54%	0%	46%
		6.NS.B.4	… Use the distributive property to express a sum of two whole number 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.	53%	0%	47%
		6.NS.B.4	Find … the least common multiple of two whole numbers less than or equal to 12 …	27%	0%	73%
		6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 …	49%	0%	51%
	Apply and extend previous understandings of numbers to the system of rational numbers.	6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantitites in real-world contexts, explaining the meaning of 0 in each situation.	4%	59%	37%
	Apply and extend previous understanding of numbers to the system of rational numbers. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent poins on the line and in the plane with negative number coordinates.	6.NS.C.6a	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(3) = 3, and that 0 is its own opposite.	43%	20%	37%
		6.NS.C.6b	Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.	63%	0%	37%
		6.NS.C.6c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.	0%	63%	37%
		6.NS.C.6c	… Find and position pairs of integers and other rational numbers on a coordinate plane.	63%	0%	37%
	Apply and extend previous understandings of numbers to the system of rational numbers. Understand ordering and absolute value of rational numbers.	6.NS.C.7a	Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.	44%	20%	37%
		6.NS.C.7b	Write, interpret, and explain statements of order for rational numbers in real-world contexts.	53%	10%	37%
		6.NS.C.7c	Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as a magnitude for a positive or negative quantity in a real-world situation.	7%	0%	93%
		6.NS.C.7d	Distinguish comparisons of absolute value from statements about order.	7%	8%	85%
	Apply and extend previous understandings of arithmetic to algebraic expressions.	6.NS.C.8	Solve … mathematical problems by graphing points sin all four quadrants of the coordinate plane …	64%	0%	36%

Expressions and Equations	Apply and extend previous understandings of arithmetic to algebraic expressions.	6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.	56%	0%	44%
	Apply and extend previous understandings of arithmetic to algebraic expressions. Write, read, and evaluate expressions in which letters stand for numbers.	6.EE.A.2a	Write expressions that record operations with numbers and with letters standing for numbers.	41%	19%	40%
		6.EE.A.2b	Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.	44%	0%	56%
		6.EE.A.2c	… Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).	38%	0%	62%
		6.EE.A.2c	Evaluate expressions at specific values of their variables …	61%	0%	39%
	Apply and extend previous understandings of arithmetic to algebraic expressions.	6.EE.A.3	Apply the properties of operations to generate equivalent expressions.	0%	25%	75%
		6.EE.A.4	Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substiuted into them).	25%	0%	75%
	Reason about and solve one-variable equations and inequalities.	6.EE.B.5	Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	0%	51%	49%
		6.EE.B.5	… Use substitution to determine whether a given number in a specified set makes an … inequality true.	39%	0%	61%
		6.EE.B.5	… Use substitution to determine whether a given number in a specified set makes an equation true...	70%	1%	29%
		6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	44%	17%	39%
		6.EE.B.7	Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q, and x are all nonnegative rational numbers.	50%	0%	50%
		6.EE.B.8	… Represent solutions of such inequalities on number line diagrams.	7%	0%	93%
		6.EE.B.8	Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem …	38%	0%	62%
	Represent and analyze quantitative relationships between dependent and independent variables.	6.EE.C.9	… Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.	11%	0%	89%
		6.EE.C.9	… Write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable …	56%	0%	44%

Geometry	Solve real-world and mathematical problems involving area, surface area, and volume.	6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	0%	5%	95%
		6.G.A.1	Find the area of … polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.	5%	0%	95%
		6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge length of the prism. Apply the formula V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of soving real-world and mathematical problems.	0%	59%	41%
		6.G.A.2	Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths …	2%	1%	98%
		6.G.A.3	… Use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.	66%	0%	34%
		6.G.A.3	Draw polygons in the coordinate plane given coordinates for the vertices … Apply these techniques in the context of solving real-world and mathematical problems.	18%	0%	82%
		6.G.A.4	Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	0%	60%	40%
		6.G.A.4	… Use … nets to find the surface area of … figures …	3%	1%	96%

Statistics and Probability	Develop understanding of statistical variability.	6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	3%	7%	90%
		6.SP.A.3	Recognize that a measure of center for a numberical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	3%	8%	89%
	Summarize and describe distributions.	6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	0%	25%	75%
		6.SP.B.4	Display numerical data in plots on a number line, including … box plots.	1%	1%	99%
	Summarize numerical data sets in relation to their context, such as by:	6.SP.B.5c	Giving quantitative measure of center (median and/or mean) and variability (interquartile range and/or mean absolutes deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.	0%	10%	90%
		6.SP.B.5c	Giving quantitative measure of ... variability (interquartile range and/or mean absolutes deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.	10%	0%	90%

GRADE 7

COMMON CORE STATE STANDARDS FOR GRADE 7 ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD	CONTENTS OF STANDARD	P	A	NKD
Ratios and Proportional Relationships	Analyze proportional relationships and use them to solve real-world and mathematical problems.	7.RP.A.1	Compute unit rates associated with ratios or fractions …	59%	1%	41%
	Analyze proportional relationships and use them to solve real-world and mathematical problems. Recognize and represent proportional relationships between quantities.	7.RP.A.2a	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent rations in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	51%	0%	49%
		7.RP.A.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	51%	0%	49%
		7.RP.A.2c	Represent proportional relationships by equations.	1%	35%	63%
		7.RP.A.2d	Explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0,0) and (1,r) where r is the unit rate.	1%	37%	62%
	Analyze proportional relationships and use them to solve real-world and mathematical problems.	7.RP.A.3	Use proportional relationships to solve multistep ration and percent problems.	14%	64%	22%
The Number System	Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide reational numbers. Apply and extend previous understandings of addition and subtractions to add and subtract reational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.	7.NH.A.1b	Understand p + q as the number located a distance lql from p, in the positive or negative diretion repending on whether q is posititve or neagtive. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of reational numbers by describing real-world contexts.	0%	25%	75%
		7.NH.A.1c	Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	0%	28%	72%
		7.NH.A.1d	Apply properties of operations as strategies to add and subtract rational numbers.	24%	4%	72%
	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	7.NS.A.2a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leadning to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers, Interpret products of rational numbers by describing real-world contexts.	0%	33%	67%
		7.NS.A.2b	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then -(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts.	1%	30%	69%
		7.NS.A.2c	Apply properties of operations as stategies to multiply and divide rational numbers.	31%	2%	67%
		7.NS.A.2d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.	14%	0%	86%
	Apply and extend previous understandings of operations with fractions to add, subtract, multiply , and divide rational numbers.	7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.	0%	69%	31%
		7.NS.A.3	Solve … mathematical problems involving the four operations with rational numbers.	14%	1%	85%

Expressions and Equations	Use properties of operations to generate equivalent expressions.	7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	14%	18%	67%
		7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.	13%	27%	60%
	Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	0%	88%	12%
		7.EE.B.3	Solve multi-step … mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals) …	15%	2%	83%
		7.EE.B.3	Solve multi-step real-life … problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals) …	24%	0%	76%
	Solve real-life and mathematical problems using numerical and algebraic expressions and equations. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	7.EE.B.4a	Solve word problems leading to equations of the form $px + q = r$ and $p(x+q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.	2%	52%	46%
		7.EE.B.4b	Solve word problems leading to inequalities of the form $px + q > r$ and $p(x + q) < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.	0%	11%	89%
		7.EE.B.4b	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality …	3%	0%	97%

Geometry	Draw, construct, and describe geometrical figures and describe the relationships between them.	7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	13%	0%	87%
		7.G.A.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle or no triangle.	0%	4%	96%
	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems …	15%	0%	85%
		7.G.B.5	Know the formulas for the area and circumference of a circle and use them to solve problems …	18%	0%	82%
		7.G.B.6	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	3%	0%	97%
		7.G.B.6	Solve real-world and mathematical problems involving … surface area of … three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	5%	0%	95%
		7.G.B.6	Solve real-world and mathematical problems involving area … of two- … dimensional objects composed of triangles, quadrilaterals, [and] polygons …	14%	0%	86%

Statistics and Probability	Use random sampling to draw inferences about a population.	7.SP.A.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population.	10%	0%	90%
		7.SP.A.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest …	24%	0%	76%
	Draw informal comparative inferences about two populations.	7.SP.B.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	9%	0%	91%
		7.SP.B.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	9%	0%	91%
	Investigate chance processes and develop, use, and evaluate probability models.	7.SP.C 5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likley, and a probability near 1 indicates a likely event.	31%	0%	69%
		7.SP.C 6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.	1%	10%	89%
	Investigate chance processes and develop, use, and evaluate probability models. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.	7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.	52%	1%	48%
		7.SP.C.7b	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.	12%	1%	87%
	Investigate chance processes and develop, use and evaluate probablity models. Find probabilites of compound events using organized lists, tables, tree diagrams, and simulation.	7.SP.C.8a	Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.	6%	0%	94%
		7.SP.C.8b	Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"). Identify the outcomes in the sample space which compose the event.	0%	6%	94%
		7.SP.C.8b	Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams …	16%	0%	84%
		7.SP.C.8c	… Use a simulation to generate frequencies for compound events.	6%	0%	94%

GRADE 8

COMMON CORE STATE STANDARDS FOR GRADE 8 ASSESSED IN iREADY				PERCENT		
DOMAIN	SUB-DOMAIN	STANDARD	CONTENTS OF STANDARD	P	A	NKD
The Number System	Know that there are numbers that are not rational, and approximate them by rational numbers.	8.NS.A.1	Know that numbers that are not rational are called irrational …	21%	0%	79%
		8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers ...	21%	0%	79%
Expressions and Equations	Work with radicals and integer exponents.	8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numberical expressions.	10%	0%	90%
		8.EE.A.2	Use square root and cube root symbols to represent soluctions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that the square root of 2 is irrational.	18%	0%	82%
		8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 … to express how many times as much one is than the other.	26%	0%	74%
		8.EE.A.4	Perofrm operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	0%	26%	74%
	Understand the connections between proportional relationships, lines, and linear equations.	8.EE.B.5	… Compare two different proportional relationships represented in different ways.	32%	0%	68%
		8.EE.B.5	… Interpret … the unit rate as the slope of the graph …	40%	0%	60%
		8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.	9%	2%	90%
	Analyze and solve linear equations and pairs of simultaneous linear equations. Solve linear equations in one variable.	8.EE.C.7a	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a or a = b results (where a and b are different numbers).	19%	0%	81%
		8.EE.C.7b	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributuve property and collection like terms.	22%	0%	78%
	Analyze and solve linear equations and pairs of cimulataneous linear equations. Analyze and solve pairs of simultaneous linear equations.	8.EE.C.8a	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	14%	15%	71%
		8.EE.C.8b	Solve systems of two linear equations intwo variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.	1%	29%	71%
		8.EE.C.8b	Solve systems of two linear equations in two variables algebraically …	25%	0%	75%
		8.EE.C.8c	Solve … mathematical problems leading to two linear equations in two variables.	25%	0%	75%
		8.EE.C.8c	Solve real-world … problems leading to two linear equations in two variables.	29%	0%	71%

Functions	Define, evaluate, and compare functions.	8.F.A.1	Understand that a function is a rule that assigns to each input exactly one output …	28%	0%	72%
		8.F.A.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numberically in tables, or by verbal descriptions).	13%	0%	87%
		8.F.A.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.	31%	0%	69%
	Use functions to model relationships between quantities.	8.F.B.4	… Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph …	14%	0%	86%
		8.F.B.4	… Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	25%	0%	75%
		8.F.B.4	Construct a function to model a linear relationship between two quantities …	39%	0%	61%
		8.F.B.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualititative features of a function that has been described verbally.	39%	0%	61%
Geometry	Understand congruence and simliarity using physical models, transparencies, or geometry software.Verify experimentally the properties of rotations, reflections, and translations:	8.G.A.1a	Verify experimentally the properties of rotations, reflections, and translations: Lines are taken to lines, and line segments to line segments of the same length.	54%	0%	46%
		8.G.A.1b	Verify experimentally the properties of rotations, reflections, and translations: Angles are taken to angles of the same measure.	54%	0%	46%
		8.G.A.1c	Verify experimentally the properties of rotations, reflections, and translations: Parallel lines are taken to parallel lines.	54%	0%	46%
	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations: given two congruent figures, describe a sequence that exhibits the congruence between them.	8.G.A.2	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations: given two congruent figures, describe a sequence that exhibits the congruence between them.	16%	0%	84%
		8.G.A.3	Describe the effect of dilations translations, rotations, and reflections on two-dimensional figures using coordinates.	54%	0%	46%
		8.G.A.4	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, relections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	21%	0%	79%
		8.G.A.5	… establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal….	9%	0%	91%
	Understand and apply the Pythagorean Theorem.	8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in tow … dimensions.	5%	0%	95%
		8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	1%	0%	99%
	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	8.G.C.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	4%	0%	96%

Statistics and Probability	Investigate patterns of association in bivariate data.	8.SP.A.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	20%	0%	80%
		8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.	14%	0%	86%
		8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	10%	0%	90%
		8.SP.A.4	… Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects …	25%	0%	75%

Appendix B: Explanation of Terms Used

No.	***Term***	***Explanation***
1	AP	Approaching Proficient – the level inferring partial mastery of the standard
2	CCSS	Common Core State Standards http://www.corestandards.org/Math/Practice/
3	ESSA	Every Student Succeeds Act https://www.ed.gov/essa?src=ft
4	i-Ready	Computer-based adaptive assessment in ELA & Math https://www.curriculumassociates.com/products/iready/diagnostic-instruction.aspx
5	NKD	No Knowledge Discerned – the level inferring that the student has not learned or has possible not been introduce to the standard
6	P	Proficient – the level inferring mastery of the standard
7	SAU	School Administrative Unit
8	SBAC	Smarter Balanced Assessment Consortium https://www.education.nh.gov/instruction/assessment/sbac/index.htm
9	Tiers 1, 2, and 3	Levels of Instruction Intensity Tier 1 – Full classroom instruction Tier 2 – In-classroom small group intervention Tier 3 – Pull-out targeted intervention
10	W.I.N.	"What I Need" student self-directed time

Appendix C: List of Standards Explored for Use by the Committee

1. The Common Core State Standards (CCSS)

   These standards may be found at http://www.corestandards.org/Math/ .

2. The National Council of Teachers of Mathematics (NCTM)

   This organization has adopted the CCSS as its standards. Their website provides comments on this choice at https://www.nctm.org/ccssm/ .

3. The International Baccalaureate Diploma

   Information about this international diploma granting organization can be found at https://www.ibo.org/ .