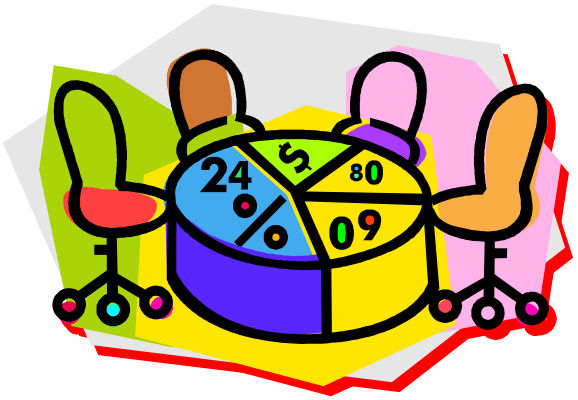
Formative Assessment Probes and Interventions

A Companion Tool for Math Trailblazers

Grade 3

2010–2011



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A Case for Formative Assessment

Delaware has adopted the definition of ***Response to Intervention*** as published by the National Association of State Directors of Special Education (2005):

> *"RTI is the practice of providing high-quality instruction and intervention matched to student need, monitoring progress frequently to make decisions about change in instruction or goals and applying child response data to important educational decisions. RTI should be applied to decisions in general, remedial and special education, creating a well-integrated system of instruction/intervention guided by child outcome data."*

Delaware's three-tiered RTI model is an efficient and effective model that emphasizes high-quality differentiated instruction based on meeting the needs of each student using data collected during formative assessment, diagnostic assessment, and summative assessment.

Successful implementation of ***Response to Intervention*** requires Delaware educators to:

1. Believe that you can effectively teach all students.
2. Use a research-based, scientifically validated core curriculum with fidelity.
3. Use assessment data to inform your instructional decisions.
4. Use a problem-solving method to make decisions within a multi-tier model of service delivery.
5. Use research-based, scientifically validated interventions matched to student need.

In response to these five principles, the Delaware mathematics community designed the ***Response to Intervention*** project. Formative assessment is the cornerstone of the Delaware ***RTI*** model based on the strongest possible research-based evidence connecting the use of diagnostic assessment and descriptive feedback to improved student achievement (Black, P., & Wiliam, D., 1998; and Crooks, 1988). We adopted the Chief Council of State School Officers' definition and five critical attributes of formative assessment listed below.

> Formative assessment is a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes.

Effective use of formative assessment requires attention to the following attributes:

- *Learning Progressions***:** Learning progressions contain clearly articulated sub-goals of the ultimate learning goal.
- *Learning Goals:* Learning goals and criteria for success are clearly identified and communicated to students.
- *Descriptive Feedback:* Students receive evidence-based feedback linked to the intended instructional outcomes and criteria for success.
- *Self- and Peer-Assessment:* Substantial student self- and peer-assessment are important for providing students an opportunity to think meta-cognitively about their learning.

- *Collaboration:* Practitioners establish and support a classroom culture in which teachers and students are partners in learning.

(Developed and approved by the CCSSO Formative Assessment Advisory Group and Formative Assessment for Teachers and Students (FAST) SCASS, October 2006)

These formative assessment principles have been used to build curriculum-based templates that guide teachers through the process of identifying learning gaps and implementing interventions. The work is remedial in nature and designed to be integrated with acceleration strategies. We invite you to join this stage of development.

Formative Assessment: Delaware's Vision of Response to Intervention

As much as possible, as we wrote this document, we tried to imagine what this kind of implementation of Response to Intervention would look like in classrooms. We tried to imagine formative assessment in all of its messiness, as well as its potential, in order to create a document that would provide practical support to teachers as well as vision.

Delaware's RTI program is designed to occur within the classroom setting, using the curriculum materials that districts are already using. Teachers are supposed to analyze student work on pages that are part of the lessons themselves, and then use class time to intervene with students in need of Tier 1 intervention. While this may sound simple in conception, it is actually very complex and calls upon teachers to be experts in management, assessment, planning, and teaching.

Classroom Management and Classroom Culture

Tier 1 of RTI may require teachers to carefully observe students as they work, ask "in the moment" questions, and carry out interventions with individual, pairs, or small groups of students during class time. For this to be accomplished they need to establish a classroom culture which will allow this. Students need to learn to:

- Work productively by themselves and with others.
- Get, share, and return the materials they need.
- Ask and receive help from other students when the teacher is unavailable.
- Find something else productive to do when they are finished or stuck.

For help establishing such a culture, we recommend these resources:

- "Building the MTB Classroom," Section 10 of the *Math Trailblazers Implementation Guide 3rd Edition.* This section focuses on establishing a flexible and challenging learning environment for all students. Strategies include addressing classroom culture, effectively grouping students, managing manipulatives, and pacing instruction.
- *The First Six Weeks of School* by Paula Denton and Roxann Kriete.
- Getting Metacognition Out of the Closet (http://investigations.terc.edu/library/implementing/qa-1ed/metacognition.cfm)

Assessment

In order to gain as much information about students as possible, teachers need to assess their students in many ways. Teachers need to:

1. Observe students as they work and take notes in an organized way.
2. Carefully analyze student work on the formative assessment checkpoints after class.
3. Think about student understanding and misunderstanding not just in terms of "getting it" or "not getting it," but in specific language that describes what the student does or does not understand. In analyzing student work as part of this project, we found that most student mistakes or difficulties fell into one of these categories:

a. Lack of conceptual understanding;
b. Inefficient strategy;
c. Misusing or not using an important mathematical tool or representation;
d. Difficulty with verbal or written communication;
e. No connection to prior knowledge.

Recommended resources:

- "Assessment," Section 8 of the *Math Trailblazers Implementation Guide 3rd Edition*. This section details the philosophy, goals, and components as well as a description of how to do observational assessment.
- The "ongoing assessment" section of each lesson in the curriculum.
- "Math Facts and Whole Number Operations," Section 6 of the T*Math Trailblazers Implementation Guide 3rd Edition*.
- How Do I Organize My Observations? (http://investigations.terc.edu/library/implementing/qa-1ed/organize_observations.cfm)

Planning

In order to create lessons and interventions that help all students learn, teachers need to carefully plan their lessons. While management of materials and students is extremely important, **it is also extremely important that teachers plan the mathematical focus of their lessons**. For every activity, class discussion, or intervention, teachers need to figure out ahead of time what mathematical skills, concepts, or strategies they are trying to develop in their students. Much of this information can be gathered from

- Reading the "Background Information" section in each unit of the *Math Trailblazers Implementation Guide 3rd Edition*.
- Reading the lessons carefully.
- Doing the math ahead of time and anticipating student responses.
- Reading the "Lesson Overview" and the "At-A Glance" in each lesson of *Math Trailblazers Implementation Guide 3rd Edition*.

Class discussions are often not planned carefully ahead of time, and the students who are most affected by this lack of planning tend to be struggling students. Class discussions that are carefully focused, follow clear trains of thought, and draw clear connections among different strategies or ideas will extend the learning of all students in important ways.

Recommended resources for planning class discussions are:

- How Can I Help Special Needs Students Feel Included in Math Discussions? (http://investigations.terc.edu/library/implementing/qa-1ed/special_needs_class_disc.cfm)
- "Inclusive Math Communities" (http://investigations.terc.edu/library/implementing/qa-1ed/inclusive_communities.cfm)

- "Meeting Individual Needs," Section 11 of the *Math Trailblazers Teacher Implementation Guide 3rd Edition*. This section specifically focuses on the needs of the English Language Learner, special education students, and talented and gifted students.
- "Language," Section 12 of the *Math Trailblazers Teacher Implementation Guide 3rd Edition*. This section focuses on the use of language and gives strategies for working with reading comprehension, writing, and discourse in a math classroom.

Likewise, when teachers are intervening with students, they need to carefully think about the primary goal(s) for their intervention. Not all interventions are designed for the same purpose. Some are designed to help the student who is lagging behind in conceptual understanding of a topic. Others are written to improve computation, communication, representation, and connections.

- **Conceptual Leap** – This type of intervention is designed to prompt students to develop or clarify a particular concept or generalization. For example, a second-grade teacher might design an intervention to prompt a student to develop a generalization about breaking 2-digit numbers into 10s and 1s. Or, a teacher may need to diagnose where the child is in a specific learning trajectory and use an intervention based on the child's concept knowledge.
- **Computation Efficiency** – This type of intervention is designed to help students understand and use more efficient computation strategies. For example, a third-grade teacher might design an intervention to prompt students who are drawing pictures to solve multiplication problems, to begin using skip counting instead. A primary teacher might look at a student who is counting all and design an intervention for counting on.
- **Use of Tools or Models** – This type of intervention is designed to help students learn to use a particular tool or model to solve problems. Students in need of this intervention may not understand how a model relates to the mathematics. A fourth-grade teacher might design an intervention to help students understand and begin to use an array model to solve multiplication problems with 2-digit numbers. A primary teacher may design an intervention to help students make sense of a tens frame.
- **Communication** – This category includes both interventions designed to help students read and understand what a problem is asking and interventions designed to help students clearly communicate their thinking both verbally and in writing. It also includes carefully structuring a lesson so that vocabulary that is unknown (like campfire) does not get in the way of solving a problem. A fifth-grade teacher might design an intervention to help students read and make sense of multi-step word problems. Another fifth-grade teacher might design an intervention to help students record their work on multi-step word problems in a way that was clear and concise.
- **Prior Knowledge or Experiences** – This category of intervention is designed to prompt students to make connections among work they did earlier in the year or in a previous year and a current mathematical concept or task. For example, a fourth-grade teacher might design an intervention in which students divided a paper brownie into fractional parts and labeled the parts as they had in third grade. The purpose of this intervention would be to remind students of what they did know about fractions in order to prepare them for the fourth-grade fraction tasks.

Teaching

In thinking about the teaching of interventions, we asked ourselves two basic questions:

- When would interventions happen?
- What would interventions look like?

Teachers who have a 15-minute class time for doing Daily Practice Problems (DPPs) have utilized this time to bring a small group together. Other teachers have started a lesson with the whole class and find time to pull a small group together while the rest of the class is working in small groups. Some schools are finding daily "intervention" time and sharing that time between English language arts and mathematics. While some students are receiving Tier 2 intervention outside of class, others can receive Tier 1 intervention or extension activities.

What the teaching of interventions should look like was a broader question for us. Most of the interventions we wrote are written as small-group activities, facilitated by the teacher, and can be implemented as such. However, we are aware that teachers may not always be available to lead small-group lessons, and sometimes the number of students needing an intervention might be more than a "small group." We also recognize that teachers may also not find it beneficial to gather the same students for small-group lessons too frequently. We do not want these students to become stigmatized in the eyes of their peers or themselves, and we do not want these students to become overly dependent upon adult help. We imagined that most interventions could be accomplished in one of four forms, with different forms being preferable under different circumstances. The four forms are:

- **Small-group lessons with the teacher** – This form is suggested most frequently in our intervention probes. In this form of intervention, the teacher meets target group of students for 10 to 25 minutes during the regular math class to provide interventions.
- **Strategic partnering of students** – In this form of intervention, a teacher carefully chooses particular students to collaborate as partners based on the belief that in working together one or both children will help the other child develop a particular skill or understanding. For example, a teacher might choose to have a student who had difficulty using a number line to solve subtraction problems work with a student who is able to use a number line to solve subtraction problems with the goal that the student who is having difficulty using the number line will learn from the other child. We recommend that teachers who use strategic partnering tell students in clear, but tactful language, what they hope the students will each contribute to and gain from the partnership. Strategic partnering could be especially helpful for students who lack vocabulary or background knowledge.
- **Whole-class interventions** – In this form of intervention, a teacher may modify a task for the whole class or plan a whole-class discussion in a particular way, based upon information learned from analyzing student work. For example, a teacher who realized that many students in her class have difficulty with the initial tasks in the fourth-grade fraction unit might revisit a third-grade fraction lesson with her whole class in order to activate the prior knowledge of all of the students in the class. Another teacher whose class was not clearly recording their work might take a lesson for addition strategies and focus on how each strategy could be recorded clearly.

- **Modification of tasks for particular students** – In this form of intervention, a teacher modifies a task or substitutes a different task for particular students based upon the learning goals for those students. For example, a third-grade teacher may have three students in her class who are just learning to add numbers by place. The teacher might give those three students the same word problems that she gives the other students in her class but changes the numbers in the word problems to make them 2-digit numbers instead of 3-digit numbers. That same teacher could also have the three students play a second-grade game during a Tier 1 math time as a way to improve their number sense and understanding of place value. This modification or substitution of a task is a good way to foster independence and perseverance among students who often ask for help. It can also be an effective homework strategy. By modifying a task or substituting a different task, a teacher can provide homework that can be done independently by the child and is focused on a targeted skill or concept.

We recommend the following resources for further ideas on implementing the types of interventions suggested above:

- "Meeting Individual Needs," Section 11 of the *Math Trailblazers Teacher Implementation Guide 3rd Edition*. This section specifically focuses on the needs of the English language learner, special education students, and talented and gifted students.
- "Strategies for Special Needs Students" (http://investigations.terc.edu/library/implementing/qa-1ed/special_needs_strategies.cfm)
- "How do I enrich math class to challenge gifted students?" (http://investigations.terc.edu/library/implementing/qa-led/enrich_for_gift_students.cfm)
- "Teaching ALL Math Trailblazers Students" a differentiation opportunity in each unit.

Progress Monitoring

Selected Daily Practice Problems (DPPs) from the *Math Trailblazers* curriculum will serve as Progress Monitors for your Tier 1 students. Good teaching in the regular classroom along with a system to track students periodically will help all students meet the standards in mathematics. Look over the packet of DPPs for your grade level along with the spreadsheet that matches your grade level DPPs with the big ideas tested in the Universal Screening Tool.

Formative assessment is used to monitor student achievement.

- It is <u>not graded</u> but instead used to provide information about how each student in your classroom is doing based on the standards. Imagine giving each of these DPPs and walking around the room as students are working on them. The best part is that all students are doing the DPPs as a matter of fact each day, so asking students to do DPPs as you watch them work is not a new idea and children will not feel as though they are being graded.
- The teacher has a rare opportunity to watch students do math and …
  - *ask them questions to clarify the problem,*
  - *stop them to redirect their thinking,* and
  - *probe the students who need additional help.*
- Then, by looking at the student work, the teacher can …
  - *make a plan to have some students work in small groups based on your observations,*
  - *make a plan for whole-group instruction,*
  - *look to future lessons and use this information to teach what the students need.*
- The teacher directions are in a separate packet from the student DPPs but include a picture of the DPP formative assessment as well as three components.
  - *Suggestions for Implementation*: This section has been included and derived from the work that classroom teachers in the pilot study compiled. Since there are no teacher directions for administering DPPs in the curriculum, we asked teachers what worked best and included their findings here.
  - *Interventions*: Again, the teachers in the pilot tested some interventions and found some to be very workable. The teachers decided whether the intervention was to be large group, small group, individual, or sometimes whole class.
  - *Looking Ahead to Assess Again*: Since the DPPs do spiral, the authors looked ahead in the packet and made it very clear when this same topic was assessed in the Probes. There are many other opportunities to assess these skills during the curriculum as well, but this document takes you to the next DPP probe.
- The Universal Screening Tool includes a spreadsheet that groups questions into categories based on Numeric Reasoning. We have also grouped these DPPs into the same categories and have included a spreadsheet that shows how the student progresses. Instead of looking at one DPP at a time, the teachers decided to look at many chances to keep track of student progress by topic.

- In each grade level, there are certain manipulatives that are standard for your grade level. In almost every case, students should be given access to manipulatives when solving these problems. A rule of thumb for using manipulatives: Make available to each student what is usually given during the learning of the skill.

Please direct your questions to

- Jan Parsons, University of Delaware, janpar@juno.com
- Crystal Lancour, Department of Education, clancour@doe.k12.de.us
- Diana Roscoe, Department of Education, droscoe@doe.k12.de.us

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A Special Thank You to the Teachers and Specialists of –

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Caesar Rodney School District
Cape Henlopen School District
Capital School District
Christina School District
Colonial School District
Indian River School District
Lake Forest School District
Laurel School District
Milford School District
Red Clay Consolidated School District
Seaford School District
Smyrna School District

Sincere thanks are also extended to the working group of mathematics educators who helped to shape, refine, and enhance the formative assessment probes to be a useful resource for Delaware teachers. Throughout the 2009–2010 school year, a consultant worked intensely with several schools during the pilot phase of this project. This dedicated group of professionals piloted the probes with their classes, participated in monthly professional learning communities throughout the year, provided student samples for analysis, and offered valuable insight to enhance the formative assessment probes and interventions.

Our Gratitude Extends to the Teachers and Specialists of –

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Welch Elementary School, Caesar Rodney
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The leadership team devoted a considerable amount of time and effort to the development of this document. Their invaluable contributions include countless hours of thoughtful planning, providing outstanding professional development, and providing support to teachers and schools with piloting this RtI project. The dedication and commitment to this vast and significant work demonstrates their passion and support for mathematics education!

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Sincerely,

Crystal Lancour & Diana Roscoe, Delaware Department of Education

3rd Grade DPP Probes

All Daily Practice Problems (DPPs) are reprinted with permission from the *Math Trailblazers 3rd Edition* (copyright 2008 by Kendall/Hunt Publishing Company), specifically the *Unit Resource Guides (URGs).*

DPP A – Quick Addition	**Unit 2**

A. 4 + 9 =

B. 40 + 90 =

C. 20 + 90 =

D. 20 + 30 =

E. 30 + 50 =

F. 40 + 60 =

G. 10 + 90 =

H. 60 + 80 =

I. 80 + 70 = Explain your strategy for Question I below.

.....

DPP K – Pumpkins in Wagons	**Unit 3**

This story problem was written by a third-grade student:

There are ten wagons and three pumpkins in each wagon. How many pumpkins are there? Solve the problem and show your work.

DPP B – Story Solving	**Unit 4**

Write a story and draw a picture about 3 x 8. Write a number sentence about your picture.

DPP P – Addition Practice	**Unit 4**

Solve each problem in two ways. Use base-ten shorthand or a shortcut method.

1st Way 65 + 35 =	1st Way 37 + 58 =	1st Way 49 + 22 =
2nd Way 65 + 35 =	2nd Way 37 + 58 =	2nd Way 49 + 22 =

DPP S – More Subtraction	**Unit 4**

Do these problems in your head.

A. 60 – 40 =

B. 60 – 20 =

C. 500 – 200 =

D. 80 – 60 =

E. 80 – 50 =

F. 80 – 30 =

G. 12 – 3 =

H. 120 – 30 =

I. 110 – 20 =

……

DPP F – More Comics	**Unit 5**

On an average day in the United States, 1096 copies of a certain comic book series are sold. Show this number with base-ten shorthand.

DPP N – Addition Practice	**Unit 5**

1st Way 60 + 42 =	1st Way 26 + 48 =	1st Way 58 + 33 =
2nd Way 60 + 42 =	2nd Way 26 + 48 =	2nd Way 58 + 33 =

DPP C – Subtraction: Using Doubles	**Unit 6**

Do these problems in your head.

A. 50 – 25 =

B. 51 – 25 =

C. 100 – 50 =

D. 100 – 48 =

E. 180 – 90 =

F. 160 – 80 =

G. Explain your strategy for Question D:

DPP J – Bicycle Riding	**Unit 6**

James likes to ride his bicycle. He rides two miles every day after school. He rides five miles on each of the weekend days.

- How far does he ride in one week? Show your work.

.....

DPP N – Adding Nine	**Unit 6**

Solve the following problems using a mental math strategy.

A. 14 + 9 =	B. 104 + 9 =	C. 41 + 9 =
D. 23 + 9 =	E. 32 + 9 =	F. 42 + 9 =
G. 77 + 9 =	H. 68 + 9 =	I. 95 + 9 =

Explain the strategy you used to solve the problems.

DPP P – Change for $1	**Unit 6**

How many ways can you make change for $1 using only nickels and dimes? Show your work.

DPP T – Time	**Unit 6**

How many minutes are in $1\frac{1}{2}$ hours? Show your work.

DPP B – Story Solving	**Unit 7**

8 x 4 = ? Write a story and draw a picture about 8 x 4. Write a number sentence on your picture.

DPP M – Shortcut Addition and Subtraction	**Unit 7**

Do the following problems using a shortcut method. You may use base-ten shorthand if you wish.

1. 241
   + 83

2. 517
   - 45

3. 579
   + 407

4. 405
   - 375

5. Explain a way to do Question 4 using mental math.

DPP V – Twins and Triplets	**Unit 7**

On an average day in America, 217 sets of twins and 5 sets of triplets are born. How many babies is this? Show your work.

DPP J – Base-Ten Pieces	**Unit 8**

What number is represented with each group of base-ten pieces?
First, draw each group of base-ten pieces.
Then, draw it using base-ten shorthand using the Fewest Pieces Rule.
Finally, write the number.

	Base-Ten Pieces	Base-Ten Pieces Using Fewest Pieces Rule	Number
4 flats 7 skinnies 12 bits			
9 flats 11 skinnies 4 bits			
12 skinnies 11 bits			

DPP K – Toy Car	**Unit 9**

A toy car balances nine 6-gram masses and three 5-gram masses. What is the mass of the car? Show your work.

.....

DPP A – Mental Arithmetic: Adding 99	**Unit 11**

Use mental math to solve these problems.

A. 131 + 99 =	B. 555 + 99 =	C. 97 + 99 =
D. 103 + 99 =	E. 355 + 99 =	F. 769 + 99 =
G. 327 + 99 =	H. 82 + 99 =	I. 777 + 99 =

Explain your strategy for solving these problems.

DPP I – Lizardland Picnic	**Unit 11**

At Lizardland, eight people can sit at a table in Picnic Park. If your class had a picnic there (including your teacher), how many tables would you need? Draw a picture to show your answer and write a number sentence.

……

DPP K – Cookies	**Unit 11**

At Max and Cora's cookie stand, one cookie costs 35 cents. How many different ways can they get paid exact change for one cookie using only nickels, dimes, and quarters? Show your work.

DPP P – How Much and How Many?	**Unit 11**

A. Moe spent 9 nickels and 7 dimes to buy ice cream. How much money did he spend? Show you found your answer.

B. Joe has 5 shirts. Each shirt has 3 pockets. How many pockets are on Joe's shirts? Write a number sentence.

C. Flo has 7 braids in her hair. Each braid has 5 beads. How many beads are in Flo's hair? Write a number sentence.

DPP H – Larry the Lizard Show	**Unit 12**

Larry went to see a Lizard show twice in one day. The theater can seat 300 people. 178 people attended the 10 a.m. show. 284 people attended the noon show.

A. How many more people attended the noon show than the 10 a.m. show? Show your work.

B. How many people attended the two shows? Show your work.

C. How many empty seats were there during the two shows? Show your work.

DPP J – More or Less Than 1½	**Unit 13**

I am $\frac{1}{2}$ more than $1\frac{1}{2}$. What number am I?

Explain how you know.

.....

DPP D – Multiples of 10 and 100	**Unit 14**

Use the patterns you found in your multiplication table for multiplying by 10 and 100 to do the following problems.

A. 2 x 9 = B. 2 x 90 = C. 2 x 900 =

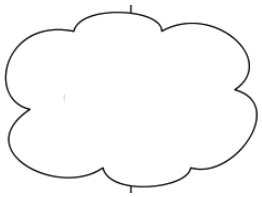
D. 9 x 7 = E. 9 x 70 = F. 9 x 700 =

G. 4 x 9 = H. 4 x 90 = I. 4 x 900 =

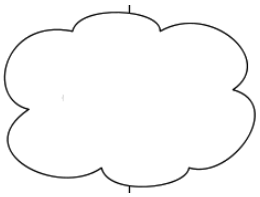
DPP N – Adding and Subtracting	**Unit 14**

Solve the following problems. First, estimate and put your estimate in the cloud next to the problem. Then, solve each problem using base-ten pieces or base-ten shorthand if it helps.

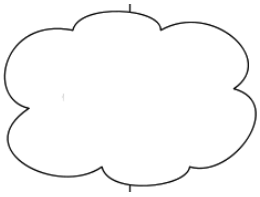
A. 137
+ 446



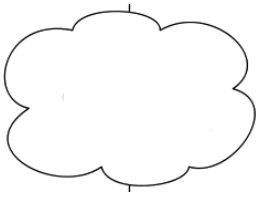
B. 439
- 176



C. 2348
+ 4769



D. 504
- 426



Explain your estimation strategy for Question C.

Explain how to do Question D using mental math.

DPP D – Walk-a-Thon	**Unit 16**

The following are the results of a walk-a-thon.

Second Grade
Room 100 $214
Room 101 $161

Third Grade
Room 200 $147
Room 201 $262

1. How much did the Second Grade raise? Show your work.

2. How much did the Third Grade raise? Show your work.

3. Which grade came close to the goal of $450? Show your work.

4. How much more did Room 201 raise than Room 200? Show your work.

DPP J – Mother's Helpers	**Unit 16**

1. After school, Jan helps her neighbor with her new baby and earns 2 dollars each day. How much does Jan earn if she helps for 4 days? 9 days? 7 days? 3 days? Show your work and write number sentences.

4 days?	9 days?
7 days?	3 days?

2. Tony helps by going to the store for the neighbor and earns 50 cents each time. How much will Tony earn if he goes to the store 4 times? 5 times? 8 times? 9 times? Show your work and write number sentences.

4 times?	5 times?
8 times?	9 times?

DPP J – Multiples of 10 and 100	**Unit 17**

1. Solve the following problems.

A. 3 x 4 = B. 3 x 40 = C. 3 x 400 =

D. 400 x 9 = E. 300 x 6 = F. 5 x 60 =

G. 5 x 59 = H. 4 x 40 = I. 4 x 39 =

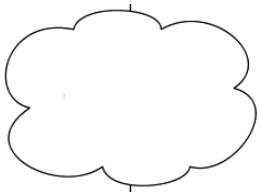
2. Choose one of the problems. Draw a picture and write a story about the problem.

DPP C – Addition and Subtraction Practice	**Unit 18**

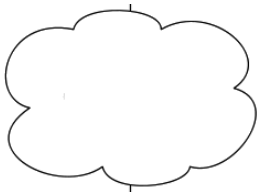
A. Predict which of the following problems will have the smallest answer (sum or difference).

Complete the following problems. First, estimate and put your estimate in the cloud next to the problem. Then, solve each problem using pencil and paper or mental math to find the answers.

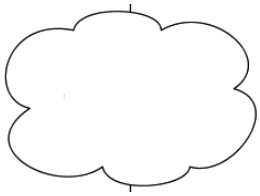
B. 750
<u>- 262</u>



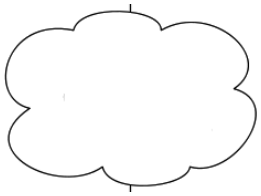
C. 689
<u>+ 851</u>



D. 148
<u>+ 198</u>



E. 9145
<u>- 8997</u>



DPP I – Lizardland	**Unit 19**

Lizardland hot dogs cost $1.50

1. Sam wants 2 hot dogs. What will this cost? Show your work.

2. Sam agrees to buy Adam 2 hot dogs. How much will 4 hot dogs cost? Show your work.

3. Time spent $12 trying to win the Lizard stuffed animal. How many hot dogs could he have bought with the $12? Show your work.

DPP L – Multiplication Story 38 x 4	**Unit 19**

Solve 38 x 4. Write a story and draw a picture to match your solution.

DPP O – Some More Sums	**Unit 19**

Add 27 to each of the numbers below.

65 189 2977

DPP L – Which Two Add Up?	**Unit 20**

39 276 149 57

A. Which two of these numbers should you add if you want an answer over 400? Show your work.

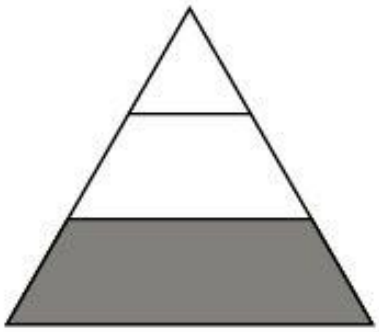
B. Which two of these numbers should you add if you want an answer less than 100? Show your work.

C. Which two of these numbers should you add if you want an answer close to 200? Show your work.

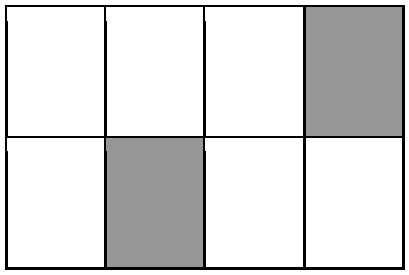
D. Which number when doubled will be close to 300? Show your work.

DPP P – Shaded Shapes	**Unit 20**

1. Is $\frac{1}{3}$ of the triangle shaded? Explain why or why not?



2. Is $\frac{1}{4}$ of the rectangle shaded? Explain why or why not



3rd Grade Math Trailblazers
Directions and Interventions

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DPP A – Quick Addition	Unit 2

A. 4 + 9 =

B. 40 + 90 =

C. 20 + 90 =

D. 20 + 30 =

E. 30 + 50 =

F. 40 + 60 =

G. 10 + 90 =

H. 60 + 80 =

I. 80 + 70 =

J. Explain your strategy for Question I.

Implementation Suggestions

- Students will show their understanding of adding groups of tens without adding them in columns. Adding 4 + 9 should be the pattern to solve for 4 tens + 9 tens.
- Start this assessment by asking students to give a strategy for adding 50 + 60. Make sure that someone gives the strategy: 5 + 6 = 11 so 50 + 60 = 11 tens or 110. Also, model the problem with 5 tens and 6 tens so that it looks like 11 tens. Then, trade the 11 tens for a hundred and 1 ten left over in base ten pieces. A third strategy would be 50 + 60 is 50 + 50 + 10 that is recomposed to (50 + 50) + 10 = 110.
- With this introduction, send the third graders to work independently to complete the DPP. Provide base ten materials. Observe students and discourage students to merely add as an algorithm.

Interventions

- Students who only describe 80 + 70 as 150 with no explanation need to review ways to explain. 80 + 70 can be decomposed as 80 + 20 + 50 and then recomposed to (80 + 20) + 50 = 150. Another good explanation is 8 tens + 7 tens is 15 tens or 150.
- Practice combining groups of tens using the facts of adding ones. If 4 + 7 = 11 then 40 + 70 = 110.

Follow-Up DPP

- Look ahead to Unit 4 – DPP S, to see the next time this skill is checked.

DPP K – Pumpkins in Wagons	Unit 3

This story problem was written by a third-grade student:

There are ten wagons and three pumpkins in each wagon. How many pumpkins are there? Solve the problem and show your work.

Implementation Suggestions

- This assessment allows students to solve a multiplication story with pictures and repeated addition. Read the problem aloud and remind students that drawing a picture and writing a number sentence are good strategies to use when solving problems. This problem does require students to think about "groups of" instead of joining or separating. This answer does need to be labeled. Assisting students to think about two variables is important in multiplication. Up to this point usually there was one variable, pumpkins OR wagons, but in this scenario we are keeping track of pumpkins AND wagons, and we have to know when we finish that the answer is pumpkins!
- 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 can be solved by grouping the 3s and computing 9 + 9 + 9 + 3 by adding 9 + 9 = 18 and counting on. Counting by 3s is a good strategy. Counting all of the pumpkins on the picture is also a reasonable strategy.

Interventions

- Allow students to use counters to model the problem before drawing the picture.
- Spend some time on showing the difference between finding 3 groups of 10 and 10 groups of 3. This is especially important because, although students need to discern that these are different models, solving for 10 groups of three can be solved using 3 tens much easier. Students need to be given the skill of the commutative property.
- Use the language 10 groups of 3 with your students.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 4 – DPP B.

DPP B – Story Solving	Unit 4

Write a story and draw a picture about 3 x 8. Write a number sentence about your picture.

Implementation Suggestions

- In this assessment, the student reverses the process from 3K. This time the student writes a story about 3 groups of 8 and shows that he/she can connect the number sentence to a model and a story. Some students may benefit from solving the problem with counters and then write a story. Some students may benefit from first drawing a picture and then writing a story. Observe your students and make those suggestions. In all cases, students will solve 3 x 8 by wither counting all, or using a known fact like 2 x 8 is 16 and 8 more gives me 24, or the known fact 3 x 8 is 24. Ask students how they solved for 24.

Interventions

- This assessment does ask for 3 groups of 8. If a student solves for 8 groups of 3 with the story, picture, or number sentence, have a discussion about the difference between 8 groups of 3 and 3 groups of 8. Promote students reversing the factors to solve a problem but writing the story to match the number sentence.
- Use the language 3 groups of 8 with your students.

Follow-Up DPP

- The next assessment like this is Unit 7 – DPP B.

DPP P – Addition Practice	Unit 4

Solve each problem in two ways. Use base-ten shorthand, or a short cut method.

1st Way 65 + 35 =	1st Way 37 + 58 =	1st Way 49 + 22 =
2nd Way 65 + 35 =	2nd Way 37 + 58 =	3rd Way 49 + 22 =

Implementation Suggestions

- These problems were written horizontally so that students could decide what strategy to use. Research tells us that problems written vertically really push students to use the algorithm and nothing else. We should see students using a variety of strategies: Base ten showing the regrouping, an algorithm that might include adding the tens and then the ones and then putting the partial sums together, or the traditional algorithm. Students who are using tallies should be encouraged to use a different way on the second problem.

Interventions

- There are three errors that might occur:
  - The student gets two different answers with the two ways and does not try to fix at least one.
  - The student uses the same strategy twice. He/she adds x + y and then adds y + x. Happily, he/she does know that this will work but discourage this approach.
  - The student solves the problem correctly and then only shows the answer in base ten. Drawing 37 + 58 with base ten and then drawing the answer (95) in base ten does not count as using base ten as a strategy. The regrouping must be shown.
- For each error, push the student to self-correct or hold a small group to help him find his error and correct it.

Follow-Up DPP

- See Unit 5 – DPP N as the next opportunity to check on improvement.

DPP S – More Subtraction	Unit 4

Do these problems in your head.

A. 60 – 40 = B. 60 – 20 =

C. 500 – 200 = D. 80 – 60 =

E. 80 – 50 = F. 80 – 30 =

G. 12 – 3 = H. 120 – 30 =

I. 110 – 20 =

Implementation Suggestions

- In DPP 2A, this skill was checked with addition. Now we are asking students to subtract multiples of 10 and 100 and use a pattern to solve these with ease. 60 – 40 should be a known fact. Knowing 6 – 4 allows a student to then use 60 – 40 and 600 – 400 as known facts.
- For students who start writing the problems vertically, please have them stop and attempt to solve them with mental math. Take time to ask students how they are solving the problems. There may be students who will use 80 – 60 to solve 80 – 50. Have a discussion after the DPP is completed to talk about that strategy.

Interventions

- Allow some students to act out the problems with skinnies or flats. Use the notation: 8 skinnies – 6 skinnies = 2 skinnies or 8 flats – 6 flats = 2 flats
- Have students write problems where the answer is 20 OR 200. See how many different problems can share that answer. Then move to 30 OR 300. Look for patterns.
- To differentiate this problem, ask students to write a number sentence with a problem on each side. Example: 60 – 40 = 80 – 60 – make a contest to see how many different examples they can write.

Follow-Up DPP

- The next DPPs that assess this skill are Unit 6 – DPP C and Unit 7 – DPP M.

DPP F – More Comics	Unit 5

On an average day in the United States, 1096 copies of a certain comic book series are sold. Show this number with base-ten shorthand.

Implementation Suggestions

- This assessment asks students to write 1096 in base ten. For most students, do NOT read the problem. (For students with reading disabilities, read as much as they need.) You may tell them about the problem but do not read the number. Part of this assessment is asking a student to read a number in the thousands, with a zero place holder and write the number correctly.
- Observe students and provide some with base ten pieces and a base ten mat. Some students will do better if they model the number first and then draw it.
- Take time to ask students to read the number from the numeral and the base ten.

Interventions

- Give more practice to students who get confused by a zero place holder or students who draw the number correctly but cannot read it.
- Use examples like: 1067, 2045, 2408, 1240. Students could easily do more than one example during this assessment.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 8 – DPP J.

DPP N – Addition Practice	Unit 5

1st Way 60 + 42 =	1st Way 26 + 48 =	1st Way 58 + 33 =
2nd Way 60 + 42 =	2nd Way 26 + 48 =	2nd Way 58 + 33 =

Implementation Suggestions

- These problems were written horizontally so that students could decide what strategy to use. Research tells us that problems written vertically really push students to use the algorithm and nothing else. We should see students using a variety of strategies: Base ten showing the regrouping, an algorithm that might include adding the tens and then the ones and then putting the partial sums together, or the traditional algorithm. Students who are using tallies should be encouraged to use a different way on the second problem.

Interventions

- There are three errors that might occur:
  - The student gets two different answers with the two ways and does not try to fix at least one.
  - The student uses the same strategy twice. He/she adds x + y and then adds y + x. Happily, he/she does know that this will work but discourage this approach.
  - The student solves the problem correctly and then only shows the answer in base ten. Drawing 60 + 42 with base ten and then drawing the answer (102) in base ten does not count as using base ten as a strategy. The regrouping must be shown.
- For each error, push the student to self-correct or hold a small group to help him find his error and correct it.

Follow-Up DPP

DPP C – Subtraction: Using Doubles	Unit 6

Do these problems in your head.

A. 50 – 25 =

B. 51 – 25 =

C. 100 – 50 =

D. 100 – 48 =

E. 180 – 90 =

F. 160 – 80 =

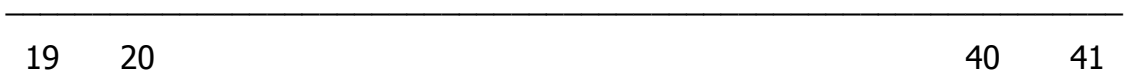
G. Explain your strategy for Question D.

Implementation Suggestions

- This assessment gives students an opportunity to use doubles to subtract instead of using an algorithm. It might be necessary to review the use of doubles by showing students an example. 40 -20 = ? 40 – 19 = ? and 41 – 19 = ?. Give students a chance to work with a partner and talk about solutions to the example, giving time for some students to share their strategy.
- Since 20 + 20 = 40, then 40 – 20 = 20.
- 40 – 19 = 21 because we took ONE less away from 40.
- 41 – 19 = 22 because we took ONE less away from ONE more to start with.
- Allow students to look at the 200 chart as they solve the problems.

Interventions

- Students may enjoy writing some questions that use doubles and differences close to doubles.
- Students may draw an open number line to solve the problems.



- A student knows that 40 – 20 = 20, so looking at the number line helps students solve the other two examples.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 7 – DPP M.

DPP J – Bicycle Riding	Unit 6

James likes to ride his bicycle. He rides two miles every day after school. He rides five miles on each of the weekend day.

- How far does he ride in one week? Show your work.

Implementation Suggestions

- This problem gives students a chance to show understanding of a multi-step problem that may or may not include multiplication strategies. Read the problem aloud to all students. Remind them to draw a picture and write a number sentence to show your work. You might give a calendar to students so that they have a structure to follow to solve the problem.

Interventions

- Students may need to retell the problem to the teacher. By the student doing the talking, he/she can hear what the problem is asking and can rethink what is happening.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 7 – DPP V.

DPP N – Adding Nine	Unit 6

Solve the following problems using a mental math strategy.

A. 14 + 9 =	B. 104 + 9 =	C. 41 + 9 =
D. 23 + 9 =	E. 32 + 9 =	F. 42 + 9 =
G. 77 + 9 =	H. 68 + 9 =	I. 95 + 9 =

Explain the strategy you used to solve the problems.

Implementation Suggestions

- In unit 2, students were taught the strategy to add 9 by adding 10 and subtracting 1. Students who have practiced this skill will be able to solve the problems using the strategy. Students who need to learn this strategy should be brought into a small group. Learning +9 strategy will improve mental math strategies for + 99 , or + 19 , or + 8. All sums close to the next decade or century can be done with mental math.
- Discourage students to use an algorithm to solve. Getting the correct answers is NOT the goal of this DPP.

Interventions

- Return to the 200 chart to practice + 9 or + 10 or + 11.
- Use base ten materials to model 14 + 9. Place 14 on the base ten board and then instead of counting out 9 more, show a skinnie and say, “Oh I wish I could add 9 a different way. Look, here is nine with one bit left over. I wonder if I add a skinnie and take away a bit, would I get the same answer.” Then do both exchanges and show 14 + 9 = 23 is the same as 14 + 10 – 1 = 23.

Follow-Up DPP

- The next DPP like this is Unit 11 – DPP A.

DPP P – Change for $1	Unit 6

How many ways can you make change for $1 using only nickels and dimes? Show your work.

Implementation Suggestions

- Although this question asks, "How many ways?", the intent is for a student to show ways to make $1 with nickels and dimes. To be absolutely correct, we are asking for ways to use nickels and/or dimes. Third graders will easily find a way to use all dimes (10 dimes) and perhaps all nickels (20 nickels). Combining groups of dimes and nickels might be somewhat harder.
- Students may independently draw the pictures of combinations of dimes and nickels. Look for students who also use values to represent the coins or symbols like D and N to represent the coins.
- The most abstract representation is using a T-chart with either symbols or coins or numbers showing the combinations.

Dimes	Nickels	Dimes	Nickels
10	0	DDDDDDDDDD	
9	2	DDDDDDDDD	NN
8	4	DDDDDDDD	NNNN
7	6	DDDDDDD	NNNNNN
6	8	DDDDDD	NNNNNNNN
5	10	DDDDD	NNNNNNNNNN
4	12	DDDD	NNNNNNNNNNNN
3	14	DDD	NNNNNNNNNNNNNN
2	16	DD	NNNNNNNNNNNNNNNN
1	18	D	NNNNNNNNNNNNNNNNNN
0	20		NNNNNNNNNNNNNNNNNNNN

- As students are making their combinations, urge them to make more. Their lists may not be organized, but together you can make an organized list with symbols for coins and with numbers. When you see a student who has started his combinations NOT knowing that a nickel is 5 cents and a dime is 10 cents, please correct that misinformation. The coin names and coin values and pictures should be on the math word wall.

Interventions

- Have bags of coins for students to use before they try to represent the combinations on paper.
- Pay attention to Unit 2 – DPPs B, H, and V. Although these are not part of our formative assessment, they are places where students have used T-charts to show combinations of coins. Provide 2 column data table for students to use to write their combinations.

Follow-Up DPP

- This is tested again in Unit 11 – DPP K.

DPP T – Time	Unit 6

1. How many minutes are in $1\frac{1}{2}$ hours? Show your work.

Implementation Suggestions

- There is no problem with reading this DPP and having a discussion about how many minutes in an hour. The conversation would be something like this.
- Teacher reads the problem and then asks, "What do we need to know to solve this problem?" Students answer, "We need to know how many minutes in an hour." Teacher asks, "Talk with your tables and see if we can answer that question." After someone answers 60 minutes, ask, "How can we figure out how many minutes are in an hour." Students talk at tables and then report that counting by 5s around the clock ends at 60. OR, every number on the clock is worth 5 minutes.
- Then have students work alone to show the answer to the DPP.

Interventions

- Clocks can be used for small group to discuss hours and half hours.

Follow-Up DPP

- Unit 13 – DPP J, is the next DPP that asks students about halves.

DPP B – Story Solving	Unit 7

A. 8 X 4 = ? Write a story and draw a picture about 8 X 4. Write a number sentence on your picture.

Implementation Suggestions

- In this assessment, the student reverses the process from Unit 3 – DPP K. This time the student writes a story about 8 groups of 4 and shows that he/she can connect the number sentence to a model and a story. Some students may benefit from solving the problem with counters and then writing a story. Some students may benefit from first drawing a picture and then writing a story. Observe your students and make those suggestions. In all cases, students will solve 8 x 4 by either counting all or using a known fact like 8 x 2 is 16 and 16 more gives me 32, or the known fact 8 x 4 is 32. Ask students how they solved for 32.

Interventions

- This assessment does ask for 8 groups of 4. If a student solves for 4 groups of 8 with the story, picture, or number sentence, have a discussion about the difference between 8 groups of 4 and 4 groups of 8. Promote students reversing the factors to solve a problem but writing the story to match the number sentence.
- Use the language 8 groups of 4 with your students.
- Look at the work from 4B to see improvement in this skill.

Follow-Up DPP

- Unit 11 – DPP P, is an assessment that reverses this operation and has students solve word problems using multiplication.

DPP M – Shortcut Addition and Subtraction	Unit 7

Do the following problems using a shortcut method. You may use base-ten shorthand if you wish.

1. 241 + 83

2. 517 - 45

3. 579 + 407

4. 405 - 375

5. Explain a way to do Question 4 using mental math.

Implementation Suggestions

- During this DPP, students are expected to make decisions about how to solve addition and subtraction problems with regrouping. You may make the decision for some students to draw the base ten shorthand first and then show the shortcut method. You may even want some students to use the base ten materials before drawing the shorthand.
- All students should show a mental math strategy for number 4. Students in third grade often use the algorithm before they look at the numbers in the problem. Question 4 may be solved more efficiently with mental math rather than doing the regrouping. The discussion following this DPP might include sharing other mental math problems:
  - 105 – 65 = (from 65 to 75 is 10, from 75 to 100 is 25, and there are 5 more past 100. 10 + 25 + 5 = 40)
  - 210 – 189 = (from 189 - 200 is 11, from 200 to 210 is 10. 11 + 10 = 21)
  - 1001 – 988 = (from 988 to 990 is 2, from 990 to 1000 is 10, and one more past 1000. 2 + 10 + 1 = 13)

Interventions

- 105–- 65 = (from 65 to 75 is 10, from 75 to 100 is 25, and there are 5 more past 100. 10 + 25 + 5 = 40)
- 210 – 189= (from 189 - 200 is 11, from 200 to 210 is 10. 11 + 10 = 21.)
- 1001 – 988 = (from 988 to 990 is 2, from 990 to 1000 is 10, and one more past 1000. 2 + 10 + 1 = 13)

Follow-Up DPP

- The next DPP that assesses this skill is Unit 14, – DPP N.

DPP V – Twins and Triplets	Unit 7

On an average day in America, 217 sets of twins and 5 sets of triplets are born. How many babies is this? Show your work.

Implementation Suggestions

- This assessment asks students to do a multi-step problem. Review the words twins and triplets to make sure that all students can define them. Students may be able to use multiplication to solve for 5 sets of triplets but may use repeated addition to solve for 217 twins. Even though this is 217 sets of 2 it should be solved with 217 + 217. This problem could be solved with a picture, but that is very inefficient. Students in third grade should be going directly to the number sentences that will help them solve this problem.
- Redirect students who do not know how to start by asking them to retell the problem or writing what facts they know. Writing 217 twins and 5 triplets would be a good way to start.

Interventions

- This assessment acts like putting together 7 quarters and 6 dimes, or eight, 3-pound weights and five, 10-pounds weights. In each instance, the student has to find totals of groups of and then sum both subtotals.
- Have students practice solving problems that are multi-step.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 9 – DPP K.

DPP J – Base Ten Pieces	Unit 8

What number is represented with each group of base-ten pieces?
First, draw each group of base-ten pieces.
Then, draw it using base-ten shorthand using the Fewest Pieces Rule.
Finally, write the number.

	Base-Ten Pieces	Base-Ten Pieces using Fewest Pieces Rule	Number
4 flats 7 skinnies 12 bits			
9 flats 11 skinnies 4 bits			
12 skinnies 11 bits			

Implementation Suggestions

- Here is an opportunity for students to revisit representing base ten pieces and matching the pieces with the numbers. In each case, the student must exchange and make trades in order to write the number to match the fewest pieces.
- It is alarming if students simply write 4712, 9114, and 1211 without showing the regrouping.
- The teacher may direct students to build the number with base ten pieces, then trade for fewest pieces rule, and then write the number. These same students should return to paper and pencil and draw the original pieces and then make trades using shorthand to show the number with fewest pieces.

Interventions

- Students who need to return to the pieces to complete this assessment need to practice using base ten shorthand without using the manipulatives, gradually. Practice drawing numbers that need no regrouping and then some that need regrouping in ONLY one place.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 11 – DPP A.

DPP K – Toy Car	Unit 9

A toy car balances nine 6-gram masses and three 5-gram masses. What is the mass of the car? Show your work.

Implementation Suggestions

- This assessment asks students to do a multi-step problem. Review the words gram and masses and allow students to use them as manipulatives, if necessary. Students may be able to use multiplication or repeated addition to solve for nine, 6-gram masses and three, 5-gram masses. This problem could be solved with a picture, but that is somewhat inefficient. Students in third grade should be going directly to the number sentences that will help them solve this problem.
  (9 x 6) + (3 x 5) = OR
  6 + 6 + 6 + 6 + 6 + 6 + 6 + 6 + 6 + 5 + 5 + 5 =
- Third graders can solve 9 groups of 6 with 6 groups of 9 even though it does not match the problem because a third grader knows that 6 x 9 = 9 x 6.
- Redirect students who do not know how to start by asking them to retell the problem or writing what facts they know.

Interventions

- Not every student will write multiplication number sentences. Your small group may take on the issue of pushing students who write repeated addition to using multiplication.

Follow-Up DPP

- Unit 11 – DPP P, is the next DPP that promotes multi-step problem.

DPP A – Mental Arithmetic: Adding 99	Unit 11

Use mental math to solve these problems.

A. 131 + 99 =	B. 555 + 99 =	C. 97 + 99 =
D. 103 + 99 =	E. 355 + 99 =	F. 769 + 99 =
G. 327 + 99 =	H. 82 + 99 =	I. 777 + 99 =

Explain your strategy for solving these problems.

Implementation Suggestions

- This DPP asks students to use mental math to add 99 to many different addends. Discourage students from using an algorithm. For students who do this with ease, ask them to repeat the assignment by adding 999.

Interventions

- Pull a small group to build understanding with base ten. Imagine adding a flat and removing a bit as a way to model +99. Do some problems with base ten manipulatives and record the answers. Ask the students if there is a pattern. Note that some students see this pattern as ONE more hundred and ONE less bit.
- There may some students who would benefit by thinking adding 99 cents is like adding a dollar and subtracting 1 penny.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 11 – DPP I.

DPP I – Lizardland Picnic	Unit 11

At Lizardland, eight people can sit at a table in Picnic Park. If your class had a picnic there (including your teacher), how many tables would you need? Draw a picture to show your answer and write a number sentence.

Implementation Suggestions

- This assessment clearly asks students to draw a picture to represent this problem. Many students will solve this "division" problem by counting by ones and placing the number of students and the teacher in groups of 8. Counting the tables is the answer.
- The confusion happens when the students do not fill tables completely. Another difficulty occurs when the student is asked to write a number sentence. If there are 24 people, the number sentence might be 8+ 8 + 8 = 24, but the answer is 3 tables, NOT 24 people.
- Some students will write 24 divided by 8 is 3 OR 3 tables x 8 = 24.

Interventions

- Give counters to some students so that they might model the problem before drawing it. This may also push the student from counting by ones.

Follow-Up DPP

DPP K – Cookies	Unit 11

At Max and Cora's cookie stand, one cookie costs 35 cents. How many different ways can they get paid exact change for one cookie using only nickels, dimes, and quarters? Show your work.

Implementation Suggestions

- Read the problem aloud and provide coins and data tables. If students start without a table, provide a data table and suggest that generating a systematic list might make it possible to find more ways.
- Give some students an incentive to find ALL the ways.

1st Table			2nd Table		
Quarters	Dimes	Nickels	Quarters	Dimes	Nickels
1	1	0	25	10	0
1	0	2	25	0	10
0	3	1	0	30	5
0	2	3	0	20	15
0	1	5	0	10	25
0	0	7	0	0	35

- Some students use a table and still draw all of the coins instead of using numbers to show the number of coins.
- Some students write the value of the coins in each column (see second table).

Interventions

- Students who have difficulty finding at least four ways to make 35 cents should be pulled into a small group to tackle this problem and similar ones together.
- (The three easy ones are Q + D, 3D + N, and 7N. Finding the fourth one requires trading 1 dime for 2 nickels.)

Follow-Up DPP

DPP P – How Much and How Many?	Unit 11

A. Moe spent 9 nickels and 7 dimes to buy ice cream. How much money did he spend? Show you found your answer.

B. Joe has 5 shirts. Each shirt has 3 pockets. How many pockets are on Joe's shirts? Write a number sentence.

C. Flo has 7 braids in her hair. Each braid has 5 beads. How many beads are in Flo's hair? Write a number sentence.

Implementation Suggestions

- This assessment requires students to use multiplication pictures and/or number sentences to solve 3 problems. The first problem is much like 9K, a multi-step problem. The other two only require one operation. Observe students who are still using repeated addition instead of multiplication. Notice which students are using skip counting as a strategy. Third graders are working towards mastery of multiplication facts.

Interventions

- Continue to provide students who are not using multiplication chances to see how a multiplication sentence can be derived from a repeated addition number sentence.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 16 – DPP J.

DPP H – Larry the Lizard Show	Unit 12

Larry went to see a Lizard show twice in one day. The theater can seat 300 people. 178 people attended the 10 A.M. show. 284 people attended the noon show.

A. How many more people attended the noon show than the 10 A.M. show? Show your work.

B. How many people attended the two shows? Show your work.

C. How many empty seats were there during the two shows? Show your work.

Implementation Suggestions

- This assessment allows teachers to discover if students can use addition and subtraction to solve different kinds of problems. "How many more" can be solved with adding on or subtraction. "How many were left" can be solved by finding the difference for both shows and then summing them or finding the difference of the sum of the shows and 600 seats.
- Knowing when to use addition and subtraction is a necessary goal for third graders. Reread the problems and allow some students to retell the stories and visualize what is happening.

Interventions

- Students who are not using logical choices to make decisions about when to use addition or subtraction need to be given practice using adding and subtracting for different kinds of problems.
- Students with computation errors may be able to self-correct. Pinpoint their error of subtraction with regrouping or adding on to solve the problem.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 16 – DPP D.

DPP J – More or Less Than 1½	Unit 13

I am $\frac{1}{2}$ more than $1\frac{1}{2}$. What number am I?
Explain how you know.

Implementation Suggestions

- This very pointed assessment will give the teacher information about the students' ability to count by halves or put halves together to make a whole. Remind students to draw a picture or write a number sentence to show their work.

Interventions

- Some students may benefit from counting by halves on a ruler or number line. Another practical application is to think about listing shoe sizes. And, a third way to think about this problem is to model whole and half cookies. This is a growth pattern and quite visual.

Fraction	Cookies
1	
1 1/2	
2	
2 1/2	
3	

Follow-Up DPP

- The next DPP that assesses this skill is Unit 19 – DPP I.

DPP D – Multiples of 10 and 100	Unit 14

Use the patterns you found in your multiplication table for multiplying by 10 and 100 to do the following problems.

A. 2 X 9 =	B. 2 X 90 =	C. 2 X 900 =
D. 9 X 7 =	E. 9 X 70 =	F. 9 X 700 =
G. 4 X 9 =	H. 4 X 90 =	I. 4 X 900 =

Implementation Suggestions

- Teachers will gain insight into how students think about powers of ten when using this assessment. What looks at first glance to be a recall DPP, is really a fundamental idea about multiplication with multiples of tens and hundreds.
- Start this DPP with a preview. Ask what is 2 x 6 and what is 2 x 60? How do you know?
- Allow students time to process the question with table groups. Then elicit from the group different strategies.
  - 2 x 60 is the same thing as 2 x 6 x 10. If you know 2 x 6, you can make it ten times bigger.
  - 2 x 60 is the same thing as 2 groups of 60 or 60 + 60.
  - 2 x 60 is the same thing as 6 tens + 6 tens or 12 tens. 12 tens can be regrouped as 1 hundred and 2 tens
  - Just multiply 2 x 6 and add a zero.
- The first three examples show understanding of the power of ten. The strategies keep place value in mind. The fourth example, a very normal trick that we teach students, is not keeping place value intact. A student who only has this last strategy may not remember it and then may not be able to recreate the procedure. The students who understand the first three strategies can use this conceptual understanding and replicate it.

Interventions

- Play a game where partners each have spinners labeled 0 – 9 (or ten-sided die). Both partners spin and together give the product.
- 9 x 5 = 45
- Then the teacher spins a spinner divided in half. (One side says x 10 and the other says x 100.) The pair with the correct response using their product and the new multiplier (either x 10 or x 100) gets 2 points. Students must write a number sentence and an explanation.
- 9 x 5 x 10 = 45 x 10, 45 x 10 is like 45 skinnies or 4 flats and 5 skinnies or 450.
- Provide skinnies and flats for groups who need to see the number increase by a power of ten.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 17 – DPP J.

DPP N – Adding and Subtracting	Unit 14

Solve the following problems. First, estimate and put your estimate in the cloud next to the problem. Then, solve each problem using base-ten pieces or base-ten shorthand if it helps.

A. 137 + 446

B. 439 - 176

C. 2348 + 4769

D. 504 - 426

Explain your estimation strategy for Question C.

Explain how to do Question D using mental math.

Implementation Suggestions

- Students should first solve all four problems with estimation, showing their strategy in the cloud (examples).
- A. 100 + 450 = 550
- B. 400 – 200 = 200
- C. 2000 + 5000 = 7000
- D. 500 – 425 = 75
- Notice that students who might be struggling with regrouping may subtract B and get 343. Students should be able to look at the cloud and then know that there is an error. Share with the class how the clouds will help.
- For estimating C, the explanation might include “front end” or friendly numbers. For explaining how to do D with mental math may include adding on:
- From 426 to 430 is 4.
- From 430 to 500 is 70.
- From 500 to 504 is 4.
- The jumps on the number line are 4 + 70 + 4 or 78.

Interventions

- Observe and make notes about students’ abilities to regroup with addition and subtraction as well as use mental math in estimating and strategies to solve problems.
- Give practice for those who are not succeeding.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 18 – DPP C.

DPP D – Walk-a-Thon	Unit 16

The following are the results of a walk-a-thon.

Second Grade	Third Grade
Room 100 $214	Room 200 $147
Room 101 $161	Room 201 $262

1. How much did the Second Grade raise? Show your work.
2. How much did the Third Grade raise? Show your work.
3. Which grade came close to the goal of $450? Show your work.
4. How much more did Room 201 raise than Room 200? Show your work.

Implementation Suggestions

- Start a discussion with, "What do you know about a Walk-a-Thon?" Allow time for students to talk in their table groups and share, "Students collect money for a good cause by walking a certain distance."
- Then assign students to look at the data tables in the DPP and read all of the questions.
- Give students some time to work while you observe how students use information to answer questions. Questions 1 and 2 are join questions. Questions 3 and 4 are compare questions. It is important that students make decisions about what operation to use independently.
- Compare problems can be solved with subtraction or missing addend.

Interventions

- Students are given a number line divided into 100s. The student first places a counter or an x on both numbers that need to be compared.
- Then, he/she systematically counts on in chunks starting at 147 and "hopping" to 262.
- From 147 to 150 is 3.
- From 150 to 250 is 100.
- From 250 to 262 is 12.
- The total of the jumps is 3 + 100 + 12 or 115.
- This is what students did on the 200 chart in 2nd grade.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 18 – DPP C.

DPP J – Mother's Helpers	Unit 16

1. After school, Jan helps her neighbor with her new baby and earns 2 dollars each day. How much does Jan earn if she helps for 4 days? 9 days? 7 days? 3 days? Show your work and write number sentences.

4 days?	9 days?
7 days?	3 days?

2. Tony helps by going to the store for the neighbor and earn 50 cents each time. How much will Tony earn if he goes to the store 4 times? 5 times? 8 times? 9 times? Show your work and write number sentences.

4 times?	5 times?
8 times?	9 times?

Implementation Suggestions

- Students may use known facts to solve for the four problems in number one. They may also see doubling as a good strategy. Read the problems aloud and allow students to work independently. For question 2, students may use what they know about multiplying with multiples of 10 to solve the problems. OR, they might think of 50 cents as ½ of a dollar and combine halves to solve the problem. Observe and make sure that students are writing number sentences.

Interventions

- For students who do not have known facts, they will have to rely on using count-bys. Demonstrating count-bys in a table of values might be another way to assure that students work somewhat more efficiently.

Days	1	2	3	4	5	6	7	8
Money	2	4	6	8	10	12	14	16

Trips	1	2	3	4	5	6	7	8
Money	$.50	$1.00	$1.50	$2.00	$2.50	$3.00	$3.50	$4.00
Dollars	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4

- By making tables of values, students may see a relationship between the 2 variables.
- Look ahead to 19I to see another problem that can be solved with ratio tables.

Follow-Up DPP

- The next DPP that assesses this skill is Unit 19 – DPP I.

DPP J – Multiples of 10 and 100	Unit 17

1. Solve the following problems.

A. 3 X 4 =	B. 3 X 40 =	C. 3 X 400 =
D. 400 X 9 =	E. 300 X 6 =	F. 5 X 60 =
G. 5 X 59 =	H. 4 X 40 =	I. 4 X 39 =

2. Choose one of the problems. Draw a picture and write a story about the problem.

Implementation Suggestions

- This assessment follows DPP 14 D and checks on understanding of powers of ten with multiplication. The teacher may assign different problems to different students. G and I are the most complex. B, C, D, E, F, and H match the notion of multiplication by a multiple of 10 or 100. Provide centimeter square paper for students so they can model the problem. The story should be realistic and should be a product that makes sense.

Interventions

- For students who cannot write a realistic problem, pull that small group and brainstorm, "What comes in 40s?" Be ready to give the example. "My family was taking three suitcases on our vacation. Each one weighs 40 pounds. How many pounds of luggage are we taking on our vacation?" The small group might make up a list of other measurements that might work to write about, e.g., money, grams, inches, liters, etc.

Follow-Up DPP

- Look at Unit 19 – DPP L, as your next time to assess understanding of multiplication.

DPP C – Addition and Subtraction Practice	Unit 18

A. Predict which of the following problems will have the smallest answer (sum or difference).

Complete the following problems. First, estimate and put your estimate in the cloud next to the problem. Then, solve each problem using pencil and paper or mental math to find the answers.

B. 750 − 262

C. 689 + 851

D. 148 + 198

E. 9145 − 8997

Implementation Suggestions

- Before starting the prediction part A, have the students fill in the clouds with their estimates. Then, each student can make their prediction and complete the actual answers as well.
- Examples:
  - 750-250 = 500
  - 700 + 850 = 1550
  - 150 + 200 = 350
  - 9000 - 9000 = 0
- The actual answers can be found with more than one strategy. Students may have mental math ways for each problem or use more traditional regrouping strategies.
  - 750 - 250 - 12 = 488
  - 600 + 800 + 130 + 10 = 1540
  - 146 + 200 = 346 (subtract 2 from 148 and add 2 to 198)
  - 145 + 3 = 148 (counting on)

Interventions

- Share great estimates and computation strategies with students who are not adept at doing either or both.

Follow-Up DPP

DPP I – Lizardland	Unit 19

Lizardland hot dogs cost $1.50

1. Sam wants 2 hot dogs. What will this cost? Show your work.

2. Sam agrees to buy Adam 2 hot dogs. How much will 4 hot dogs cost? Show your work.

3. Time spent $12 trying to win the Lizard stuffed animal. How many hot dogs could he have bought with the $12? Show your work.

Implementation Suggestions

- Students will show ways to combine groups of $1.50 to solve for buying hotdogs.
- Making a table of values for groups of $1.50 might be a strategy for solving the problems.

Hot dogs	1	2	3	4	5	6	7	8
Cost	$1.50	$3.00	$4.50	$6.00	$7.50	$9.00	$10.50	$12.00

- These ratios show yet another way to solve.
  - 1: $1.50 :: 2: $3.00, then use 2/3 as the ratio.
- Drawing pictures and writing number sentences are also acceptable strategies.

Interventions

- These problems can be solved with ratios or multiplication and division. Show students how solving with ratios makes problems quite easy to solve.

Follow-Up DPP

DPP L – Multiplication Story 38 x 4	Unit 19

Solve 38 X 4. Write a story and draw a picture to match your solution.

Implementation Suggestions

- All students are now asked to write a story about a multiplication problem that is 1 digit times 2 digits. In DPP 17J, some students practiced this skill. Others benefited from brainstorming ideas for writing this type of problem.
- Allow time for students to think and write an interesting problem. Remind students that story problems are not solved in the story. However, asking the students to also solve 38 x 4 would be beneficial.

Interventions

- Look at the finished products and allow time for students to rewrite their stories. Read a few nicely stated problems and then have students read their problems aloud. Self-correction may be possible when the student hears his own words.

Follow-Up DPP

DPP O – Some More Sums	Unit 19

Add 27 to each of the numbers below.

65 189 2977

Implementation Suggestions

- Allow students to solve these problems with any strategy. Check for accuracy.
- Using an algorithm is acceptable.
- Adding 30 and subtracting 3 is also an efficient strategy.
- Adding tens first and ones next is also acceptable.

Interventions

- Students who cannot solve for 27 more need more practice.
- Teachers may choose to pull groups of students who cannot add + 9 or + 19 or + 29 to practice those mental math strategies.

Follow-Up DPP

DPP L – Which Two Add Up?	Unit 20

39 276 149 57

1. Which two of these numbers should you add:

   A. If you want an answer over 400? Show your work.

   B. If you want an answer less than 100? Show your work.

   C. If you want an answer close to 200? Show your work.

2. Which number when doubled will be close to 300? Show your work.

Implementation Suggestions

- These questions should all be read aloud before students begin. Remind students that they may only choose the numbers in the box. They might use the numbers more than once. Remind students to show their work for each question. Use words or number sentences.
- Observe as students solve the problems.
- Look for students who make their own estimation clouds before finding the numbers.

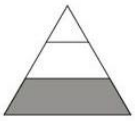
Interventions

- Students who find exact answers need to practice how to use estimation to solve these kind of questions.

Follow-Up DPP

DPP P – Shaded Shapes	Unit 20

1. Is $\frac{1}{3}$ of the triangle shaded? Explain why or why not?



2. Is $\frac{1}{4}$ of the rectangle shaded? Explain why or why not.

Implementation Suggestions

- This assessment helps a teacher discover if students understand that fractions are made by partitioning equal parts. The second question asks the student to identify a fraction equivalent to 1/4. Both of these ideas are important to assess.

Interventions

- Use the geoboards to make models of fractions and equivalent fractions.
- Return to paper folding and make models of ½ with equivalent fractions by folding. Fold the paper into halves, color half. Then fold again and again. Open paper and see 8 equal parts with 4 shaded.

- This model shows 1/2 and 4/8.

Follow-Up DPP