



Example Item 4A.1a (Grade 3)

Primary Target 4A (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D), Tertiary Target 4D, Quaternary Target 4F

Eva has 2 quarters, 4 dimes, and 6 nickels. She wants to buy a different gift for each of her 3 friends.

Click on the gifts in the table to show 3 gifts that Eva could buy.

Gift	Cost
Balloon	60 ¢
Eraser	35 ¢
Gumball	25 ¢
Kazoo	75 ¢
Mood ring	50 ¢
Pencil	35 ¢
Sticker	20 ¢

Rubric: (1 point) The student is able to identify three items whose total cost is less than \$1 and 20¢. (e.g., Mood ring, pencil, and sticker).

Response Type: Hot Spot

Commentary: The item aligns to 4F because it requires that students identify the total amount of money that Eva has as a key quantity in solving the problem, and relate it to the prices of different items. Complexity of this item can be decreased by directly giving the total amount of money. If this is done, the alignment to 4F should be removed. The item can be varied by specifying that she wants to give the same gift to each of her friends, turning it into a multiplication problem. Complexity and grade level can be increased by increasing the amount of money she has, the prices of the objects, or the number of friends, so that 3-digit addition or multiplication is required. For larger numbers, other contexts might make more sense.



Example Item 4A.1b (Grade 4)

Primary Target 4A (Content Domain NBT), Secondary Target 1A (CCSS 4.OA.B), Tertiary Target 4B, Quaternary Target 4D

A bag of 5 apples at the grocery store has a mass of 825 grams. The largest apple has a mass of 185 grams.



What is a reasonable estimate for the mass, in grams, of the smallest apple in the bag? Select Yes for each reasonable mass and No for each mass that is **not** reasonable.

	Yes	No
50 grams		
100 grams		
150 grams		
200 grams		

Rubric: (1 point) The student selects numbers that are reasonable estimates for the mass of the smallest apple. The student could select just 150 since an argument can be made that if the apples are fairly similar in size, then 150 is the only reasonable estimate, but if they vary a lot, then 100 would be reasonable as well. 200 would not be possible as that is larger than the largest apple, and 50 is not possible because that would require at least one other apple to be 197 grams. (There are three correct response patterns: {100}, {150}, or {100, 150}).

Response Type: Matching Table



Example Item 4A.1c (Grade 5)

Primary Target 4A (Content Domain MD, NBT), Secondary Target 1E (CCSS 4.MD.A, 4.NBT.B), Tertiary Target 4B, Quaternary Target 4F

How many minutes are in 1 day?

[Click here for more information if you need it]

Interaction: If the student clicks for more information, they get the following conversion data⁵:

- There are 60 seconds in 1 minute
- There are 60 minutes in 1 hour
- There are 24 hours in 1 day
- There are 7 days in 1 week
- There are 52 weeks in 1 year

Rubric: (1 point) The student enters the correct number of minutes (1440).

Response Type: Equation/Numeric (label the response box with minutes)

Commentary: This item requires students to recognize which quantities are of interest (minutes, hours, and days) and then identify the relationship between them. Identifying these different quantities and mapping their relationships draws on the skill set identified in Target 4F.

Example Item 4A.1d (Grade 5)

Primary Target 4A (Content Domain NBT), Secondary Target 1E (CCSS 5.NBT.B), Tertiary Target 4B, Quaternary Target 4D

A parking meter accepts nickels, dimes, and quarters. It holds up to 1500 coins.

Estimate the value of the coins, in dollars, in the meter when it is full.

Rubric: (1 point) The student enters a reasonable estimate (a multiple of 5 between 75 and 375).

Response Type: Equation/Numeric

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⁵ The ability to pull up information interactively is not currently available, but part of the plan for enhancements to the item-authoring system in 2017.





Example Item 4A.1e (Grade 5)

Primary Target 4A (Content Domain NF), Secondary Target 1I (CCSS 5.MD.C), Tertiary Target 4F

Gina is making cookies. The last three steps used to make the cookies are shown.

Step 5: Roll the dough into balls that are $\frac{1}{2}$ -inch wide.

Step 6: Place the balls on a baking tray 2 inches apart.

Step 7: Bake for 12 minutes.

This recipe makes 18-24 cookies

Gina plans to

• give cookies to 9 people;

- give each person 3 cookies; and
- have no extra cookies remaining.

Which action will help Gina get closest to the exact number of cookies she needs?

- A. Place the cookies 3 inches apart.
- B. Bake the cookies for only 10 minutes.
- C. Roll the cookies slightly larger than $\frac{1}{2}$ -inch wide.
- D. Roll the cookies slightly smaller than $\frac{1}{2}$ -inch wide.

Rubric: (1 point) The student correctly determines which action will help Gina get closest to the exact number of cookies (D).

Response Type: Multiple Choice, single correct response



Example Item 4A.1f (Grade 3)

Primary Target 4A (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D), Tertiary Target 4F, Quaternary Target 1D (CCSS 3.MD.A)

Jenny went to the store to buy 15 bottles of water.

• The bags at the store can each hold 6 kilograms.

• The bottles of water each weigh 2 kilograms.

• Jenny bought 15 bottles of water.

What is the fewest number of bags that Jenny needs to hold all 15 water bottles?

Rubric: (1 point) The student enters the smallest number of bags needed (5).

Response Type: Equation/Numeric

Example Item 4F.1a (Grade 3)

Primary Target 4A (Content Domain MD), Secondary Target 1G (CCSS 3.MD.1), Tertiary Target 4F

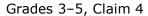
The table shows the start and end times for runners in a race.

Racing Times				
Runner	Start Time	End Time		
Mike	12:03 p.m.	12:26 p.m.		
Ann	12:10 p.m.	12:17 p.m.		
John	12:13 p.m.	12:19 p.m.		
Patty	12:16 p.m.	12:25 p.m.		

What is the difference, in minutes, between Patty's start time and Mike's start time?

Rubric: (1 point) The student enters the correct difference (13).

Response Type: Equation/Numeric





Target 4B: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem.

Items that require the student to make decisions about the solution path needed to solve a problem are aligned with Target 4B. Note that Target 4B is never the primary target for an item, but is frequently a Tertiary or Quaternary Target for an item with primary alignment to other targets; see, for example, items in Task Models for 4A, 4C, and 4E.

General Task Model Expectations for Target 4B

- The student is presented with a multi-step problem with little or no scaffolding, or
- The student must make estimates or choose between different reasonable assumptions in order to solve the problem.

Target 4B is assessed in conjunction with Target 4A, 4C, and 4E.

Target 4C: State logical assumptions being used.

Task Model 4C.1

Task Expectations:

- The student is presented with a problem arising in everyday life, society, or the workplace. The student either
 - o identifies information or assumptions needed to solve the problem or
 - o provides a reasoned estimate of a quantity needed to solve the problem.

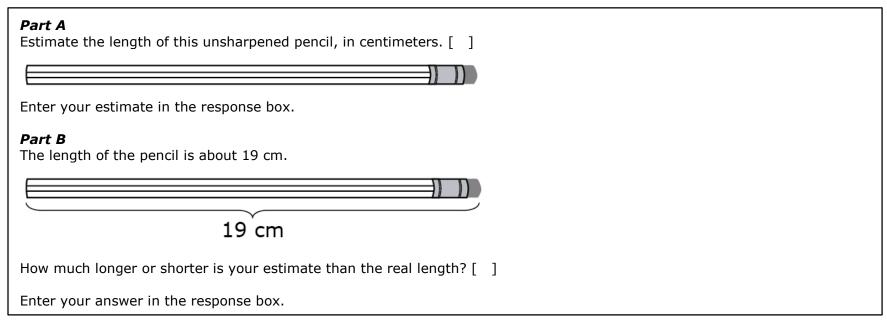
It is not necessary that a student constructs a complete solution to the problem for this target.

- Tasks in this model generally have either more information than is needed solve the problem (and students must choose) or not enough information (and students must make a reasoned estimate).
- The student is often required to draw upon knowledge from different domains, including knowledge from earlier gradelevels.
- Tasks for this target may also assess Target 4B or 4D.
- Tasks have DOK Level 1 or 2



Example Item 4C.1a (Grade 3)

Primary Target 4C (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D, 2.MD.A), Tertiary Target 4D, Quaternary Target 4E



Interaction: The student must enter an estimate for the length of the pencil before seeing the actual length and cannot change it once the actual length is shown. The student's estimate does not factor into the score he or she receives.

Rubric: (1 point) The student finds the difference between their estimate, a, and the actual length of the pencil (|19-a|).

Response Type: Equation/Numeric

Note: Functionality for this item type does not currently exist, but is planned for future enhancements.

Commentary: This item type is new and may be unfamiliar to item writers and is designed to activate a particular practice which is important in mathematical modeling. Students are often required to make an estimate as one of the logical assumptions on which they will base a mathematical model. In grades 3-5, students are learning how to make reasoned estimates by first developing the habit of making their best estimate (without penalty) and then reflecting on the accuracy of their estimate. The difference between items in this task model and Task Model 4E.3 is that the emphasis here is on making and reflecting on the accuracy of the estimate and the emphasis in Task Model 4E.3 is on making and revising the estimate.



Example Item 4C.1b (Grade 5)

Primary Target 4C (Content Domain NF), Secondary Target 1H (CCSS 4.NBT.A), Tertiary Target 4D, Quaternary Target 4E

Part A

A liter is more than a cup. Estimate the number of liters in a cup. You can use the picture to help you make an estimate.



Enter your estimate, in liters, in the response box. []

Part B

There are about 0.24 liters in one cup. How much greater or less than your estimate is the real amount?

Enter the difference in the response box. []

Interaction: The student must select an estimate for the number of liters in a cup before seeing the actual value and cannot change it once the actual value is shown. The students' estimate does not factor into the score he or she receives.

Rubric: (1 point) The student finds the difference between their estimate, a, and the actual number of liters (|19-a|).

Response Type: Equation/Numeric



Example Item 4C.1c (Grade 4)

Primary Target 4C (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A), Tertiary Target 4B, Quaternary Target 4F

Sarah is helping her dad make cookies for her class using a recipe they found online. Her dad asks, "Do you think one batch of cookies will be enough?" Select **all** of the information they need to answer the question.

A. The amount of flour in the recipe.

B. The number of cookies in one batch.

C. The number of students in the class.

D. The temperature of the oven for baking the cookies.

E. The number of cookies you can fit onto a cookie sheet.

Rubric: (1 point) The student selects the correct pieces of information (B and C).

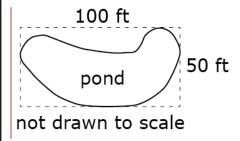
Response Type: Multiple Choice, multiple correct response



Example Item 4C.1d (Grade 4)

Primary Target 4C (Content Domain MD), Secondary Target 1I (CCSS 4.MD.3), Tertiary Target 4B, Quaternary Target 4D

Liam uses string to form a rectangle with length 100 feet and width 50 feet to estimate the area of a small pond.



Enter an estimate for the area of the pond in square feet in the response box. []

Select a statement that supports your estimate:

- A. The area of the rectangle is bigger than the area of the pond.
- B. The area of the rectangle is smaller than the area of the pond.
- C. The distance around the rectangle is bigger than the distance around the pond.
- D. The distance around the rectangle is smaller than the distance around the pond.

Rubric: (1 point) The student enters a reasonable estimate and selects the supporting reason (a number between 2500 and 5000; A).

Response Type: Equation/Numeric; Multiple Choice, single correct response⁶

Note: Currently can be formatted as a Drag and Drop and Hot Spot.

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⁶ This combination of item types is currently not supported, but is planned for future enhancements to the item-authoring tool.



Target 4D: Interpret results in the context of a situation.

Target 4D identifies a key step in the modeling cycle, and is thus present in the majority of modeling problems that require students to find a numerical answer. Note that in Grades 3-5, Target 4D is never the primary target for an item, but is frequently a Tertiary or Quaternary Target for an item with primary alignment to other targets; see, for example, items in Task Models for 4A, 4C, and 4E. In later grades, students interpret more complex mathematical objects (like equations and graphs) in more sophisticated contexts.

General Task Model Expectations for Target 4D

• The student must solve a problem that results in a numerical answer and interpret the number in the context of the problem.

In Grades 3-5, Target 4D is assessed in conjunction with Target 4A, 4C, and 4E.

Target 4E: Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon.

General Task Model Expectations for Target 4E

- The student is presented with a problem arising in everyday life, society, or the workplace. The student either
 - o chooses between competing mathematical models to solve the problem (which may depend on different interpretations of the problem), or
 - o evaluates a partial or complete (possibly incorrect) solution to the problem, or
 - \circ constructs a mathematical model to solve the problem

It is not necessary that a student constructs a complete solution to the problem for this target.

- Tasks in this model can also assess Target 4B (Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem). Thus some tasks should plausibly entail a chain of reasoning to complete the task (not just a single step). For example, it might be necessary for the student to construct a two-step arithmetic expression to evaluate a model or solution, or to try out a geometric shape and then perform a calculation to see if it satisfies the requirements.
- The student is often required to draw upon knowledge from different domains, including knowledge from earlier gradelevels.
- Tasks have DOK Level 2, 3, or 4

Smarter Balanced Assessment Consortium

Grades 3-5, Claim 4

Task Model 4E.1

Task Expectations:

- Students construct a geometric figure, a numerical expression, or a numerical equation that models a given problem.
- Students may or may not perform a multi-step numerical calculation to verify that the model solves the problem.
- The operations to be performed should not be explicitly given, but should be inferred from the situation.
- Students are expected to reason autonomously from a context to the figure, expression, or equation.
- Difficulty and grade level maybe be varied by varying the types of numbers used (whole numbers, fractions, decimals), the complexity of the geometric figure (square, rectangle, triangle, polygon), the complexity of the numerical expression or equation (number of steps to build it up), whether or not it is required to perform a numerical calculation to complete the task.

Example Item 4E.1a (Grade 3)

Primary Target 4E (Content Domain OA), Secondary Target 1A (CCSS 3.OA.A), Tertiary Target 4F

Tina has 4 packs of gum. Each pack has the same number of pieces of gum. Altogether there are 60 pieces of gum.

Part A

Make an equation to find the number of pieces of gum in each pack. Use n for the number of pieces in each pack.

Part B

How many pieces of gum are in each pack?

Rubric: (2 points) One point for a correct answer to each part. For Part A, the student enters a correct equation (e.g., $n=60 \div 4$, $4 \times n = 60$, $4 = 60 \div n$). For Part B, the student enters the correct number (15).

Response Type: Equation/Numeric (2 response boxes; label them *Part A* and *Part B*)



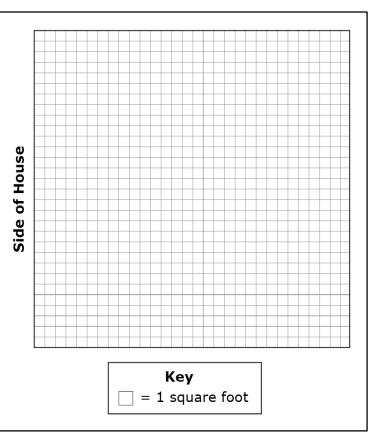
Example Item 4E.1b (Grade 4)

Primary Target 4E (Content Domain MD), Secondary Target 1I (CCSS 4.MD.3), Tertiary Target 4F

Tyra wants to enclose a section of her lawn for her dog to be able to have an outdoor play area. She knows that if she uses the side of her house as one side of the play area, her dog will have a larger outdoor play area. Tyra's plan for the play area includes the following:

- It will be in the shape of a rectangle.
- The side of the house will be used as one side of the rectangular area.
- She will use exactly 24 feet of fence material to enclose the play area.
- The length and width of the enclosure will be a whole number of feet.
- She wants the play area to be greater than 60 square feet.

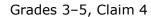
Use the Connect Line tool to create a rectangular play area that meets Tyra's plan.



Rubric: (2 points) The student is able to construct a 4 by 16, 5 by 14, 6 by 12, 7 by 10, or 8 by 8 rectangle using the side of the house for the longer side.

(1 point) Partial credit is possible for constructing a rectangle that uses exactly 24 feet of fencing, but doesn't reflect using the side of the house as one of the sides, nor the area being greater than 60 square feet (e.g., 1 by 11, 2 by 10, 3 by 9, 4 by 8, 5 by 7, or 6 by 6).

Response Type: Graphing





Example Item 4E.1c (Grade 5)

Primary Target 4E (Content Domain OA), Secondary Target 1A (CCSS 5.NBT.B), Tertiary Target 4F

A school spends \$2.40 on every lunch it serves in the cafeteria and \$0.30 for each carton of milk.

250 people at the school get a lunch each day

• 120 people take a carton of milk

Create an expression using this information that shows how much the school spends altogether on lunches and milk each day.

Rubric: (1 point). Student constructs a correct numerical expression (250 x $2.40 + 120 \times 0.30$ or its equivalent).

Response Type: Equation/Numeric

An alternate (easier) version of the problem above:

A school spends \$2.40 on every lunch it serves in the cafeteria and \$0.30 for each carton of milk.

- 250 people at the school get a lunch each day
- 120 people take a carton of milk

Which expression represents the amount of money the school spends altogether on lunches and milk each day?

- A. $250 \times 2.40 + 120 \times 0.30$
- B. $250 \times 0.30 + 120 \times 2.40$
- C. $250 \times (2.40 + 0.30)$
- D. $120 \times (2.40 + 0.30)$

Rubric: (1 point). Student selects the correct numerical expression (A).

Response Type: Multiple Choice, multiple correct response



Task Model 4E.2

Task Expectations:

- Students choose between two or more different models to solve a given problem, between two or more problems that fit a given model, or between two or more different solutions to a given problem.
- Different models or solutions can depend on different (possibly incorrect) interpretations of the problem, but do not have to.

Example Item 4E.2a (Grade 3)

Primary Target 4E (Content Domain OA), Secondary Target 1D (CCSS 3.OA.D), Tertiary Target 4B

A large water jug holds 24 liters of water. Nan uses it for her animals.

- Nan fills her animals' water dish 2 times each day.
- She puts the same amount of water in the dish every time.
- She uses all of the water in 3 days.

Which equation can be solved to find the number of liters of water (n) she puts in the dish each time?

A.
$$3 \times 2 + n = 24$$

B.
$$3 + 2 + n = 24$$

C.
$$3 + 2 \times n = 24$$

D.
$$3 \times 2 \times n = 24$$

Rubric: (1 point) The student selects the correct equation (D).

Response Type: Multiple Choice, single correct response



Example Item 4E.2b (Grade 3)

Primary Target 4E (Content Domain OA), Secondary Target 1D (CCSS 3.OA.8), Tertiary Target 4B, Quaternary Target 4F

There are 123 girls and 135 boys in the third grade at a school. Today there are 9 third grade students absent.

Which equation can be used to find the total number of third grade students (s) in school today?

A. 123 + 135 = s

B. 135 - 9 = s

C. 123 + 135 + 9 = s

D. 123 + 135 - 9 = s

Rubric: (1 point) The student selects the correct equation (D).

Response Type: Multiple Choice, single correct response

Example Item 4E.2c (Grade 4)

Primary Target 4E (Content Domain OA), Secondary Target 1A (CCSS 4.OA.1), Tertiary Target 4B, Quaternary Target 4D

Which situation is represented by the equation $4 \times 3 = \square$?

- A. A kitten weighs 4 pounds. A puppy weighs 3 times as much as the kitten. How much does the puppy weigh?
- B. A kitten weighs 4 pounds. A puppy weighs 3 pounds more than the kitten. How much do they weigh altogether?
- C. A kitten weighs 4 pounds. A puppy weighs 3 pounds more than the kitten. How much does the puppy weigh?
- D. A kitten weighs 4 pounds. A puppy weighs 3 times as much as the kitten. How much do they weigh altogether?

Rubric: (1 point) The student correctly identifies the context that represents the multiplication equation as a multiplicative comparison (A).

Response Type: Multiple Choice, single correct response



Example Item 4E.2d (Grade 5)

Primary Target 4E (Content Domain NBT), Secondary Target 1 (CCSS 5.NBT.B), Tertiary Target 4D, Quaternary Target 4F

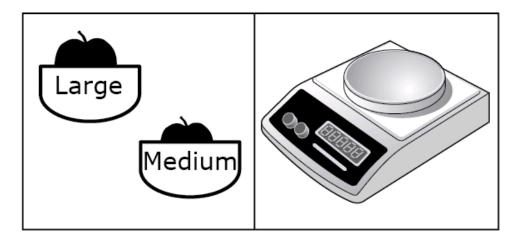
Molly and Sam need about 2 pounds of apples for a pie. Medium apples cost \$0.45 each. Large apples cost \$0.65 each.

Molly says: "Let's buy the medium apples, they are less expensive."

Sam says: "I think it's less expensive to buy large apples. They are more expensive but we won't have to buy as many of them."

Analyze both approaches. You can use the scale to weigh the apples.

Use the drop down menus to complete each statement.



Statement A:

Molly and Sam would need [1, 2, 3, 4, 5, 6, 7, 8] medium apples or [1, 2, 3, 4, 5, 6, 7, 8] large apples for the pie.

Statement B:

The number of medium apples that would be needed cost [more, less] than the number of large apples that would be needed. So [Molly, Sam] is correct.

Interaction: The student can drag apples one at a time onto the scale from bins labeled "Large" or "Medium" to get the weight in pounds, to the nearest $\frac{1}{8}$ pound. The scale should give weights as mixed numbers, in eighths of a pound. 6 medium apples should weight $2\frac{1}{8}$ pounds, 4 large apples should weigh $2\frac{1}{4}$ pounds. Reducing the number of apples by one should give a weight which is less than 2 pounds and not as not close to 2 pounds (e.g. $1\frac{3}{4}$ for 5 medium apples and $1\frac{5}{8}$ for 3 large apples).



Rubric: (2 points) The student selects the correct numbers and words in all of the drop-down menus (6, 4, more, Sam)

(1 point) Student identifies the correct number of each size of apple needed but does not compare their costs correctly or identify the right reasoning, or the numbers of apples are different but their cost is correctly compared and the correct conclusion is made about who is correct in their reasoning based on the numbers the student chose.

Response Type: Drop-Down Menu⁷

⁷Drop-Down Menu response type is not currently available, but is a planned enhancement to the test-authoring tool by 2017.

Smarter Balanced Assessment Consortium

Grades 3-5, Claim 4

Task Model 4E.3

Task Expectations:

• The student makes estimates to solve a problem and then has a chance to improve the estimates.

Example Item 4E.3a (Grade 5)

Primary Target 4E (Content Domain OA), Secondary Target 1A (CCSS 4.OA.A), Tertiary Target 4B, Quaternary Target 4D

Lilian wants to estimate the number of marbles in a glass jar that has a mass of 2.3 kilograms when it is full.

Part A:

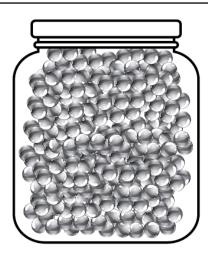
Make an estimate for the mass of a single marble, in grams. Enter your estimate in the response box. []

Make an estimate for the mass of the jar, in grams.

Enter your estimate in the response box. []

Estimate the number of marbles in the jar based on the assumptions you made.

Enter your estimate in the response box. []



Part B:

The jar has a mass of about 500 grams and there are about 600 marbles in the jar. Which of the following estimates is closest to the actual mass of a single marble?

- A. 2 grams
- B. 20 grams
- C. 200 grams
- D. 1200 grams

Interaction: The student enters values for the mass of a single marble and the mass of the jar. The student's choices do not factor into the score he or she receives as long as the estimate for the number of marbles is consistent with those estimates. The student has to make those estimates before moving on to Part B.



Rubric: (2 points) The student estimates the mass of a single marble m and the mass of the jar b, and makes an estimate of the number of marbles in the jar that is consistent with the initial estimates [e.g., (2300-b)/m +/-50, rounded to a whole number] and then selects the best estimate from the choices given (A).

(1 point) The student makes an estimate for the number of marbles that is consistent with his/her estimated masses in Part A or selects the best estimate from the choices given in Part B.

Response Type: Equation/Numeric and Multiple Choice, single correct response

Note: Functionality for this item type does not currently exist.

Commentary: This item type is new and may be unfamiliar to item writers and is designed to activate a particular practice which is important in mathematical modeling. In grades 3-5, students are learning how to make reasoned estimates by first developing the habit of making their best estimate (without penalty) and then revising their estimate when more information is known. The difference between items in this task model and Task Model 4C.1 is that the emphasis here is on making and revising the estimate and the emphasis in Task Model 4C.1 is on making and reflecting on the accuracy of the estimate.



Target 4F: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).

Target 4F identifies a key step in the modeling cycle, and is thus present in the majority of modeling problems.

Task Model 4F.1

Task Model Expectations

- Students are presented with a mathematical problem in a real-world context where the quantities of interest are not named explicitly, are named but represented in different ways, or the relationship between the quantities is not immediately clear.
- The student is asked to solve a problem that may require the integration of concepts and skills from multiple domains.

Example Item 4F.1a (Grade 3)

Primary Target 4F (Content Domain MD), Secondary Target 1G (CCSS 3.MD.1), Tertiary Target 4A

The table shows the start and end times for runners in a race.

Racing Times				
Runner	Start Time	End Time		
Mike	12:03 p.m.	12:26 p.m.		
Ann	12:10 p.m.	12:17 p.m.		
John	12:13 p.m.	12:19 p.m.		
Patty	12:16 p.m.	12:25 p.m.		

What is the difference, in minutes, between Patty's start time and Mike's start time?

Rubric: (1 point) The student enters the correct difference (13).

Response Type: Equation/Numeric (label the response box with minutes)