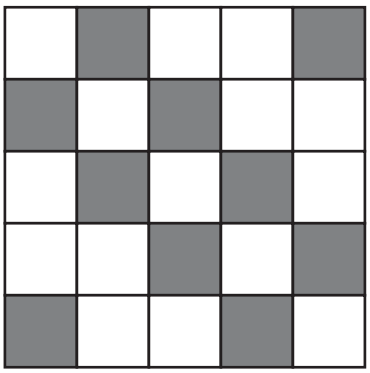
Tennessee Comprehensive Assessment Program / Mathematics

TCAP/CRA 2012-2013

Task 4: Courtyard Task
Full Scoring Guide

Task 4. Courtyard Task

The courtyard at Desmond's school is tiled in white and gray stones, as shown in the diagram below.



Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

REVIEW YOUR WORK IF YOU HAVE TIME.

4. Courtyard Task Scoring Guide

The CCSS for Mathematical Content (2 points)

6.RP.1 The student uses ratios and/or ratio language to describe the ratio of gray stones to total stones in the courtyard. _____

6.RP.3 The student demonstrates that the ratio of gray stones in the patio to the total number of stones is equal to $\frac{2}{5}$ in any of the following ways: _____

- by indicating that each row or column in the figure has 5 stones and 2 of them are gray.
- by scaling $\frac{10}{25}$ down, e.g., $\frac{10 \div 5}{25 \div 5} = \frac{2}{5}$.
- by using a proportion or proportional reasoning, e.g., $\frac{10 \text{ gray stones}}{25 \text{ total stones}} = \frac{x \text{ gray stones}}{5 \text{ total stones}}$.

Or, the student demonstrates that a ratio of $\frac{2}{5}$ is equivalent to 40%, indicating that percent means "out of 100" in any of the following ways:

- by scaling in fraction form, e.g., $\frac{2}{5}$ or $\frac{10}{25}$ up to $\frac{?}{100} = \frac{40}{100}$ and observing that is equal to 40%.
- by observing that 40% is equal to $\frac{40}{100}$ and scaling this ratio down to $\frac{2}{5}$ or $\frac{10}{25}$.
- by reasoning visually from the figure, e.g., the courtyard has 25 stones so iterating the courtyard 4 times will yield 100 stones. Since each courtyard would have 10 gray stones, the total number of gray stones would be 40, or 40 out of 100, and that makes 40% of the stones gray.
- by dividing, e.g., $2 \div 5 = 0.4 = \frac{40}{100} = 40\%$.
- by using ratios or proportions, e.g., $\frac{10}{25} = \frac{x}{100}$, to determine 40%.

Total Content Points _____

The CCSS for Mathematical Practice (4 points)

MP1 The student completes the task, using the diagram, equations, or words to show that both $\frac{2}{5}$ and 40% represent the ratio of gray stones to total stones in the courtyard. _____

(MP1: Make sense of problems and persevere in solving them.)

MP3 The student cites evidence coherently, and explains that both $\frac{2}{5}$ and 40% represent the ratio of gray stones to total stones in the courtyard. _____

(MP3: Construct viable arguments and critique the reasoning of others.)

MP6 The student accurately refers to the diagram and/or the context of the problem, writes correct equations or words to describe the visual pattern, and provides labels as needed. _____

(MP6: Attend to precision.)

MP7 The student's work indicates that the student understands the multiplicative relationship that is implied by a ratio and equivalent ratios. _____

(MP7: Look for and make use of structure.)

Total Practice Points _____

Total Awarded Points _____

The CCSS for Mathematical Content Addressed in This Task

Understand ratio concepts and use ratio reasoning to solve problems.

6.RP.1 Understand the concept of ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*

6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

The CCSS for Mathematical Practice*

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

*Gray text indicates Mathematical Practices that are not addressed in this task.

Students' responses to a mathematical task provide evidence of what they understand and are able to do in relation to the standards and practices. Across tasks, this cumulative evidence shows students' understanding and abilities within a domain. When students do not respond completely to all parts of a task, they provide insufficient evidence of their mathematical understanding and abilities and therefore do not fully demonstrate the expectations of the standards and practices aligned with that task.

Task 4. Courtyard Task

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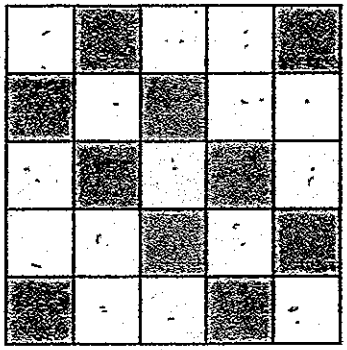

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

25

10 to 25 $\frac{10}{25} \div \frac{5}{5} = \frac{2}{5}$

yes, he is correct

$\frac{10}{25} = 0.4 \times 100 = 40\%$

STOP

REVIEW YOUR WORK IF YOU HAVE TIME.

Litho#: 6377

Guide 1 Litho 6377

Total Content Points: 2 (6.RP.1, 6.RP.3)

Total Practice Points: 4 (MP1, MP3, MP6, MP7)

This student demonstrates full understanding of ratio concepts. The student uses the ratios 10 to 25 and $\frac{10}{25}$ (6.RP.1) to scale the ratio down to $\frac{2}{5}$, and then translate the ratio to 40% (6.RP.3). The student's agreement with Desmond is supported by logical steps starting from the ratio of gray stones to total stones (MP1, MP3). The student accurately describes the visual pattern (MP6), and indicates the multiplicative relationship implied by a ratio by scaling $\frac{10}{25}$ down to $\frac{2}{5}$ (MP7).

Total Awarded Points: 6 out of 6

Task 4. Courtyard Task

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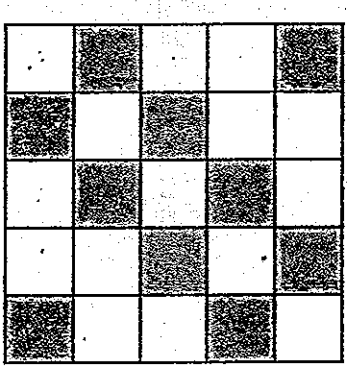

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

25 tiles
10 gray
40 × 25 = 10 tiles

10/25 = 2/5 I agree there are 25 tiles in all with 10 gray ones. When simplified it is 2/5 = 40%. I found this by counting overall tiles and grey ones.

REVIEW YOUR WORK IF YOU HAVE TIME.

Guide 2 Litho 6349

Total Content Points: 2 (6 RP.1, 6.RP3)

Total Practice Points: 4 (MP1, MP3, MP6, MP7)

This student demonstrates an understanding of ratio concepts. The student identifies the ratio as $\frac{10}{25}$ (6.RP.1), scales the fraction down to $\frac{2}{5}$, and demonstrates that the ratio of gray stones to total stones is equal to both $\frac{2}{5}$ and 40% (6.RP.3). The student uses equations and words to show and explain that both $\frac{2}{5}$ and 40% represent the ratio of gray stones to total stones, completing the task (MP1, MP3). The equations and explanations used are clear and correct (MP6). Stating that "$\frac{2}{5}$ = 40%" and "$\frac{10}{25}$ = $\frac{2}{5}$" shows the student has an understanding of the multiplicative relationship that is implied by a ratio and by equivalent ratios (MP7).

Total Awarded Points: 6 out of 6

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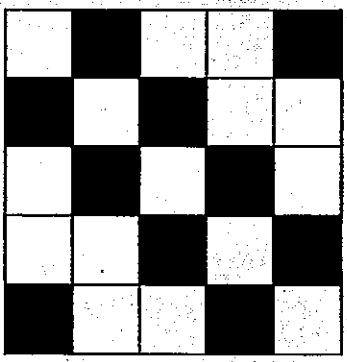

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

5:2 40% 25 15 10 $\frac{10}{25}$ $\frac{2}{5}$

I agree with Desmond. There are ten gray stones out of twenty-five stones. That makes the fraction $\frac{10\text{-gray stones}}{25\text{-total stones}}$ 40% of twenty-five is ten. So for, he got the percentages correct. Next, simplify raw fraction. $\frac{10}{25}$ simplified is $\frac{2}{5}$ or 5:2. Desmond is correct.

STOP

REVIEW YOUR WORK IF YOU HAVE TIME.

Guide 3 Litho 6227

Total Content Points: 2 (6.RP.1, 6.RP.3)

Total Practice Points: 3 (MP1, MP3, MP7)

This student demonstrates an understanding of ratio concepts, and uses $\frac{10}{25}$ to respond to the question (6.RP.1). The student also demonstrates that the ratio of gray stones to total stones is equivalent to $\frac{2}{5}$ ("$\frac{10}{25}$ simplified is $\frac{2}{5}$") (6.RP.3). The student makes sense of and completes the task by showing that both $\frac{2}{5}$ and 40% represent the ratio of gray stones to total stones (MP1). Noting that $\frac{10}{25}$ simplified is $\frac{2}{5}$ and that 40% of 25 equals 10 stones creates a viable argument supporting the student's claim (MP3). The student incorrectly refers to the ratio as "5:2" instead of 2:5 to describe the ratio of gray stones to total stones, which indicates a lack of attention to precision (no credit for MP6). By simplifying the ratio $\frac{10}{25}$ to $\frac{2}{5}$, the student does indicate an understanding of the multiplicative relationship implied by a ratio (MP7).

Total Awarded Points: 5 out of 6

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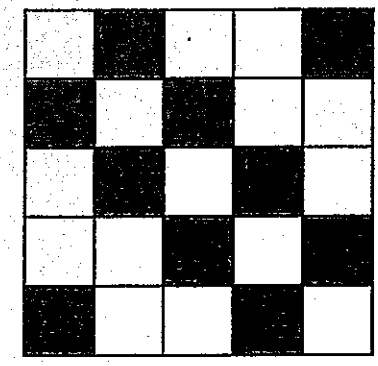

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

$\frac{10 \div 5}{25 \div 5} = \frac{2}{5}$

$5\overline{)20}$ 40%

I agree, there are 10 gray stones and 25 white stones. So it would be $\frac{10}{25}$ when you simplify you get $\frac{2}{5}$. When you divide 5 by 2 to find your percent and add a 0 you get 40%. So I agree.

REVIEW YOUR WORK IF YOU HAVE TIME.

Litho#: 6417

Guide 4 Litho 6417

Total Content Points: 2 (6.RP.1, 6.RP.3)

Total Practice Points: 3 (MP1, MP3, MP7)

This student demonstrates an understanding of ratio concepts and uses the ratio $\frac{10}{25}$ to respond to the task (6.RP.1). The student demonstrates that the ratio of gray stones to the total number of stones is equivalent to both $\frac{2}{5}$ and 40% (6.RP.3). The student completes the task and uses equations and words to explain that both $\frac{2}{5}$ and 40% represent the ratio of gray stones to total stones (MP1 and MP3). The student does not write completely correct equations to describe the visual pattern, stating "divide 5 by 2," when 2 should be divided by 5. This incorrect statement indicates a lack of attention to precision (no credit for MP6). The work shown indicates that the student understands the multiplicative relationship implied by the equivalent ratios $\frac{10}{25}$, $\frac{2}{5}$, and 40% (MP7).

Total Awarded Points: 5 out of 6

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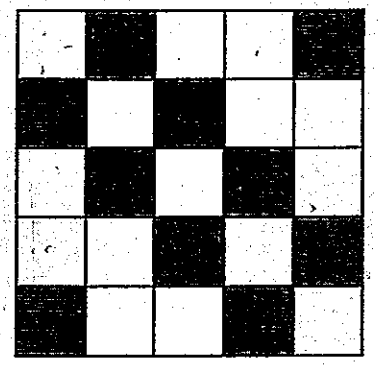

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

I agree with Desmond b/c If you do 10÷25 you get 0.4 which is 40%.

$$25\overline{)10.0} \quad 0.4$$

$0.4 = 40\%$

REVIEW YOUR WORK IF YOU HAVE TIME.

Litho#: 6405

Guide 5 Litho 6405

Total Content Points: 2 (6.RP.1, 6.RP.3)

Total Practice Points: 1 (MP6)

The response demonstrates an understanding of ratio concepts, illustrated by the expression 10 ÷ 25 used to find the percent of gray stones (6.RP.1). The student shows that the ratio of gray stones in the patio to the total number of stones is equal to 40% (6.RP.3). There is a lack of diagrams, equations, or words to show or explain that both $\frac{2}{5}$ and 40% represent the ratio of gray stones to total stones (no credit for MP1, no credit for MP3). The student does provide correct and complete work showing the ratio of gray to total stones by dividing the number of gray stones by the total number of stones to find an answer of 40%, which is the correct ratio of gray stones to total stones (MP6). More work or explanation would be necessary to clearly demonstrate an understanding of the multiplicative relationship that is implied by a ratio and equivalent ratios (no credit for MP7).

Total Awarded Points: 3 out of 6

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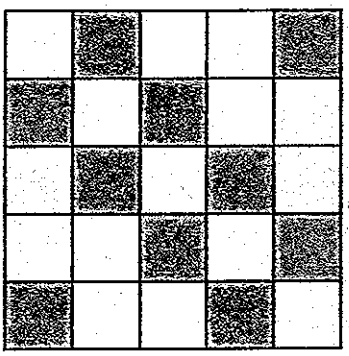

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

Well we know that the courtyard equalls 100% so I diced to make the fraction she got to 100% so I agree with her.

$$\frac{2}{5} \times \frac{20}{20} = \frac{40}{100} = 40\%$$

REVIEW YOUR WORK IF YOU HAVE TIME.

Guide 6 Litho 6347

Total Content Points: 1 (6.RP.3)

Total Practice Points: 2 (MP6, MP7)

This student does not use ratio language to describe the ratio of gray stones to total stones (no credit for 6.RP.1). It does demonstrate that a ratio of $\frac{2}{5}$ is equivalent to 40% by scaling up (6.RP.3). The student does not use equations or words to show and explain that both $\frac{2}{5}$ and 40% represent the ratio of gray stones to total stones (no credit for MP1, no credit for MP3). The response accurately refers to the context of the problem by describing the visual pattern, using the fraction $\frac{2}{5}$ in responding to the task, and using a correct equation (MP6). The scaling up indicates that the student understands the multiplicative relationship that is implied by a ratio and equivalent ratios (MP7).

Total Awarded Points: 3 out of 6

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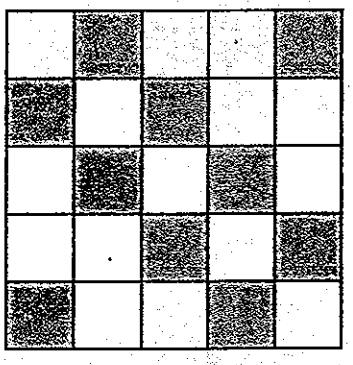

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

Yes, because 40% x 25 = 10 gray stones and 60% x 25 = 15 white block and 10 + 15 = 25 block, gray and white

REVIEW YOUR WORK IF YOU HAVE TIME.

Guide 7 Litho 6305

Total Content Points: 1 (6.RP.3)

Total Practice Points: 1 (MP6)

This response does not include ratio language to describe the ratio of gray stones to total stones (no credit for 6.RP.1). The student does demonstrate that the ratio of gray stones to the total number of stones is 40% by multiplying 40% by the total number of stones to find the number of gray stones (6.RP.3). The task is not completed, as the student does not show that the fraction $\frac{2}{5}$ describes the ratio of gray stones to total stones (no credit for MP1, no credit for MP3). The equation "40% $\times$ 25 = 10 gray stones" is correctly calculated and accurately refers to the context of the problem (MP6). The response does not demonstrate a clear understanding of the multiplicative relationship implied by either a ratio or equivalent ratios (no credit for MP7).

Total Points Awarded: 2 out of 6

Task 4. Courtyard Task

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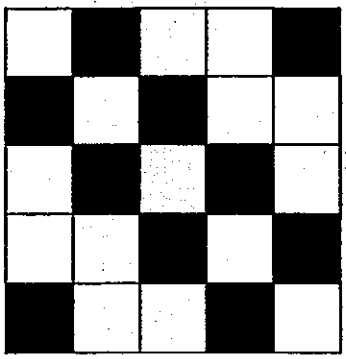

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

yes I agree because if you count all of them it is 25 then their is 10 gray blocks so it is $\frac{10}{25}$ simplyfy that and you get $\frac{2}{5}$

STOP

REVIEW YOUR WORK IF YOU HAVE TIME.

Litho#: 6287

Guide 8 Litho 6287

Total Content Points: 2 (6.RP.1, 6.RP.3)

Total Practice Points: 0

This response contains ratios and ratio language ($\frac{10}{25}$) describing the number of gray stones and total stones (6.RP.1). The student also shows that the ratio of gray stones to the total number of stones can be simplified from $\frac{10}{25}$ to $\frac{2}{5}$ (6.RP.3). The student does not use diagrams, equations, or words to show that 40% can be used to represent the ratio of gray stones to total stones (no credit for MP1, no credit for MP3). The student does not use a correct equation to describe the visual pattern, indicating a lack of attention to precision in the explanation given (no credit for MP6). The student does not demonstrate mathematical reasoning showing an understanding of the multiplicative relationship that is implied by a ratio or by equivalent ratios (no credit for MP7).

Total Awarded Points: 2 out of 6

Task 4. Courtyard Task

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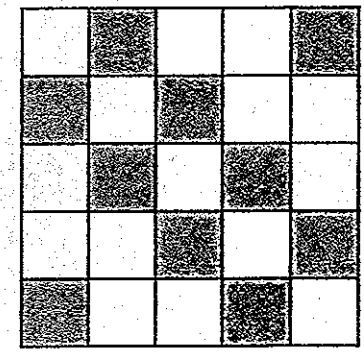

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

25b 10s $\frac{10 \div 5 = 2}{25 \div 5 = 5}$

10 of 25

~~I~~ ~~do~~ ~~agree~~ $\frac{2}{5}$ is a representation but 40% is not. So I believe Desmond is halfway correct

REVIEW YOUR WORK IF YOU HAVE TIME.

Litho#: 6385

Guide 9 Litho 6385

Total Content Points: 1 (6.RP.1)

Total Practice Points: 0

This student uses the ratio $\frac{10}{25}$ to describe the ratio of gray stones to total stones in the problem (6.RP.1). The student demonstrates that the ratio of gray stones to total stones is equal to $\frac{2}{5}$, but states that 40% is not equivalent, which indicates a lack of understanding of ratios and percentages (no credit for 6.RP.3). The student does not use equations or words to show or explain that both $\frac{2}{5}$ and 40% represent the ratio of gray stones to total stones, demonstrating a lack of making sense of the task (no credit for MP1). The explanation provided is not viable, as the student states that $\frac{2}{5}$ and 40% are not equivalent (no credit for MP3). The explanation that 40% is not a representation of gray stones to total stones is not accurate (no credit for MP6), and it indicates a lack of understanding of the multiplicative relationship implied by a ratio (no credit for MP7).

Total Awarded Points: 1 out of 6

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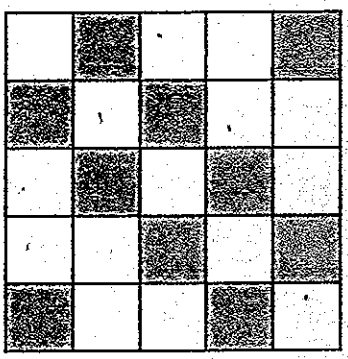

Desmond says that both $\frac{2}{5}$ and 40% can be used to represent the ratio of gray stones to total stones in the courtyard. Use the diagram, equations, or words to explain why you agree or disagree with Desmond.

I don't agree because there are 10 colored and 14 not colored. They don't equal the same as $\frac{2}{5}$ and 40%

REVIEW YOUR WORK IF YOU HAVE TIME.

Guide 10 Litho 6315

Total Content Points: 0

Total Practice Points: 0

This response does not include ratio language (no credit for 6.RP.1). The student does not show that the ratio of gray stones to total stones is equal to $\frac{2}{5}$ (no credit for 6.RP.3), or that $\frac{2}{5}$ and 40% represent the ratio of gray to total stones by diagrams, equations, or words; no evidence is shown to support the student's claim (no credit for MP1, no credit for MP3). The student states an incorrect number of white stones from the figure shown, demonstrating a lack of precision in his work (no credit for MP6), and the work and explanation shown are insufficient to demonstrate understanding of the multiplicative relationship implied by a ratio or by equivalent ratios (no credit for MP7).

Total Awarded Points: 0 out of 6