

Ohio's State Tests

ITEM RELEASE

SPRING 2016

**GRADE 5
MATHEMATICS**

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Content Summary and Answer Key

Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
1	Multiple Choice	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret $3/4$ as the result of dividing 3 by 4, noting that $3/4$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $3/4$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie? (5.NF.3)	B	1 point
2	Multi-Select Item	Apply and extend previous understandings of multiplication and division to multiply and divide fractions.	Interpret multiplication as scaling (resizing). a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. (5.NF.5a)	C, D	1 point

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Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
3	Multiple Choice	Write and interpret numerical expressions.	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product. (5.OA.2)	B	1 point
4	Multiple Choice	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	Recognize volume as an attribute of solid figures and understand concepts of volume measurement. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. (5.MD.3b)	C	1 point
5	Multi-Select Item	Classify two-dimensional figures into categories based on their properties.	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles. (5.G.3)	A, B, D	1 point

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Content Summary and Answer Key

Question No.	Item Type	Content Cluster	Content Standard	Answer Key	Points
6	Equation Item	Understand the place value system.	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. (5.NBT.1)	---	1 point
7	Equation Item	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.	Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft, and improvised units. (5.MD.4)	---	1 point

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Question 1

Question and Scoring Guidelines

Question 1

A fraction is shown.

$$\frac{15}{7}$$

Which expression is equivalent to this fraction?

- Ⓐ $15 - 7$
- Ⓑ $15 \div 7$
- Ⓒ $7 - 15$
- Ⓓ $7 \div 15$

Points Possible: 1

Content Cluster: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Content Standard: Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. For example, interpret $3/4$ as the result of dividing 3 by 4, noting that $3/4$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $3/4$. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie? (5.NF.3)

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have interpreted the fraction bar as meaning subtraction.

Rationale for Option B: **Key** – The student correctly interpreted the fraction as division of 15 by 7.

Rationale for Option C: This is incorrect. The student may have interpreted the fraction bar as meaning subtraction and swapped the numerator and denominator.

Rationale for Option D: This is incorrect. The student may have swapped the numerator and denominator.

Sample Response: 1 point

A fraction is shown.

$$\frac{15}{7}$$

Which expression is equivalent to this fraction?

☐ A $15 - 7$

☒ B $15 \div 7$

☐ C $7 - 15$

☐ D $7 \div 15$

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Question 2

Question and Scoring Guidelines

Question 2

Select all the expressions that have a value less than 3153.

☐ $3153 \times \frac{2}{1}$

☐ $3153 \times \frac{4}{1}$

☐ $3153 \times \frac{1}{4}$

☐ $3153 \times \frac{1}{2}$

☐ $3153 \times \frac{3}{2}$

Points Possible: 1

Content Cluster: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Content Standard: Interpret multiplication as scaling (resizing).

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. (5.NF.5a)

Scoring Guidelines

Rationale for First Option: This is incorrect. The student may have confused multiplying by 2 with multiplying by $\frac{1}{2}$.

Rationale for Second Option: This is incorrect. The student may have confused multiplying by 4 with multiplying by $\frac{1}{4}$.

Rationale for Third Option: **Key** – The student correctly understood that this product would be a quarter of the value of the multiplier.

Rationale for Fourth Option: **Key** – The student correctly understood that this product would be half of the value of the multiplier.

Rationale for Fifth Option: This is incorrect. The student may have halved the value of the multiplier instead of increasing the value one and one half times.

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Question 2

Sample Responses

Sample Response: 1 point

Select all the expressions that have a value less than 3153.

☐ $3153 \times \frac{2}{1}$

☐ $3153 \times \frac{4}{1}$

☒ $3153 \times \frac{1}{4}$

☒ $3153 \times \frac{1}{2}$

☐ $3153 \times \frac{3}{2}$

Notes on Scoring

This response earns full credit (1 point) because the student correctly selected all of the expressions that have a value less than 3,153.

- The student selected all of the expressions that multiply 3,153 by a value less than 1. Any number multiplied by a value less than 1 will produce a smaller quantity.

Sample Response: 0 points

Select all the expressions that have a value less than 3153.

☒ $3153 \times \frac{2}{1}$

☐ $3153 \times \frac{4}{1}$

☐ $3153 \times \frac{1}{4}$

☐ $3153 \times \frac{1}{2}$

☒ $3153 \times \frac{3}{2}$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the expressions that have a value less than 3,153.

- The student selected two expressions that multiply 3,153 by a value greater than 1. When 3,153 is multiplied by a value greater than 1, it will produce a larger quantity.

Sample Response: 0 points

Select all the expressions that have a value less than 3153.

☐ $3153 \times \frac{2}{1}$

☒ $3153 \times \frac{4}{1}$

☒ $3153 \times \frac{1}{4}$

☒ $3153 \times \frac{1}{2}$

☐ $3153 \times \frac{3}{2}$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the expressions that have a value less than 3,153.

- The student selected an expression that multiplies 3,153 by a value greater than 1. When 3,153 is multiplied by a value greater than 1, it will produce a larger quantity.

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Question 3

Question and Scoring Guidelines

Question 3

An expression is shown.

$$3 + \frac{1}{2} \times (2 \times 50)$$

Which statement describes the expression?

- Ⓐ Add 3 and $\frac{1}{2}$, then multiply by the product of 2 and 50.
- Ⓑ Multiply 2 by 50, then multiply by $\frac{1}{2}$, then add 3.
- Ⓒ Add $\frac{1}{2}$ and 2, then multiply by 50, then add 3.
- Ⓓ Multiply 2 by 50, then add 3, then multiply by $\frac{1}{2}$.

Points Possible: 1

Content Cluster: Write and interpret numerical expressions.

Content Standard: Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation "add 8 and 7, then multiply by 2" as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product. (5.OA.2)

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have performed the operations from left to right.

Rationale for Option B: **Key** – The student correctly identified the description that fits the expression.

Rationale for Option C: This is incorrect. The student may have confused multiplication with addition close to parenthesis.

Rationale for Option D: This is incorrect. The student may have reversed the multiplication and addition in the expression.

Sample Response: 1 point

An expression is shown.

$$3 + \frac{1}{2} \times (2 \times 50)$$

Which statement describes the expression?

- ☐ Ⓐ Add 3 and $\frac{1}{2}$, then multiply by the product of 2 and 50.
- ☒ Ⓑ Multiply 2 by 50, then multiply by $\frac{1}{2}$, then add 3.
- ☐ Ⓒ Add $\frac{1}{2}$ and 2, then multiply by 50, then add 3.
- ☐ Ⓓ Multiply 2 by 50, then add 3, then multiply by $\frac{1}{2}$.

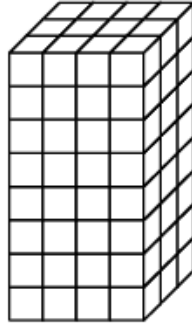
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Question 4

Question and Scoring Guidelines

Question 4

A rectangular prism is shown.



Which measure can be found by counting all of the cubes in this prism?

- ☐ (A) length
- ☐ (B) height
- ☐ (C) volume
- ☐ (D) surface area

Points Possible: 1

Content Cluster: Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Content Standard: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
(5.MD.3b)

Scoring Guidelines

Rationale for Option A: This is incorrect. The student may have thought the question was asking about length.

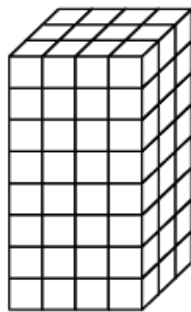
Rationale for Option B: This is incorrect. The student may have focused on a single dimension.

Rationale for Option C: **Key** – The student correctly determined that volume is the measure.

Rationale for Option D: This is incorrect. The student may have been thinking only of the faces of the prism.

Sample Response: 1 point

A rectangular prism is shown.



Which measure can be found by counting all of the cubes in this prism?

- ☐ (A) length
- ☐ (B) height
- ☒ (C) volume
- ☐ (D) surface area

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Question 5

Question and Scoring Guidelines

Question 5

Select all the properties that all trapezoids and squares share.

- ☐ have 4 sides
- ☐ have 4 angles
- ☐ have 2 acute angles
- ☐ at least 1 pair of parallel sides
- ☐ only 1 pair of equal length sides

Points Possible: 1

Content Cluster: Classify two-dimensional figures into categories based on their properties.

Content Standard: Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
(5.G.3)

Scoring Guidelines

Rationale for First Option: **Key** – The student correctly noted that both shapes are quadrilaterals and therefore must have four sides.

Rationale for Second Option: **Key** – The student correctly noted that both shapes are quadrilaterals and therefore must have four angles.

Rationale for Third Option: This is incorrect. The student may have correctly noted that trapezoids can have two acute angles, but forgot that squares must have four right angles.

Rationale for Fourth Option: **Key** – The student correctly remembered that both shapes must have at least one pair of parallel sides.

Rationale for Fifth Option: This is incorrect. The student may not have remembered that squares must have two pairs of equal length sides.

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Question 5

Sample Responses

Sample Response: 1 point

Select all the properties that all trapezoids and squares share.

- ☒ have 4 sides
- ☒ have 4 angles
- ☐ have 2 acute angles
- ☒ at least 1 pair of parallel sides
- ☐ only 1 pair of equal length sides

Notes on Scoring

This response earns full credit (1 point) because the student correctly selected all of the properties that trapezoids and squares share.

Sample Response: 0 points

Select all the properties that all trapezoids and squares share.

- ☒ have 4 sides
- ☐ have 4 angles
- ☒ have 2 acute angles
- ☐ at least 1 pair of parallel sides
- ☒ only 1 pair of equal length sides

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the properties that trapezoids and squares share.

- Squares do not have 2 acute angles. Squares have 4 right angles.
- Squares contain more than 1 pair of equal side lengths. All 4 sides of a square are equal.
- Not all trapezoids have 2 acute angles. A right trapezoid (shown below) contains only 1 acute angle.



Sample Response: 0 points

Select all the properties that all trapezoids and squares share.

- ☒ have 4 sides
- ☒ have 4 angles
- ☒ have 2 acute angles
- ☐ at least 1 pair of parallel sides
- ☐ only 1 pair of equal length sides

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the properties that trapezoids and squares share.

- Squares do not have 2 acute angles. Squares have 4 right angles.

Sample Response: 0 points

Select all the properties that all trapezoids and squares share.

- ☐ have 4 sides
- ☒ have 4 angles
- ☐ have 2 acute angles
- ☒ at least 1 pair of parallel sides
- ☐ only 1 pair of equal length sides

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly select all of the properties that trapezoids and squares share.

- The student selected only two properties that all trapezoids and squares share. The student did not select the third property that trapezoids and squares share: that all trapezoids and squares have 4 sides.

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Question 6

Question and Scoring Guidelines

Question 6

How many times greater is the value of 0.02 than the value of 0.002?

← → ↶ ↷ ✕

1	2	3
4	5	6
7	8	9
0	.	$\frac{\Box}{\Box}$

Points Possible: 1

Content Cluster: Understand the place value system.

Content Standard: Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.
(5.NBT.1)

Scoring Guidelines

Exemplar Response

- 10

Other Correct Responses

- Any equivalent value.

For this item, a full-credit response includes:

- The correct product (1 point).

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Question 6

Sample Responses

Sample Response: 1 point

How many times greater is the value of 0.02 than the value of 0.002?

10

← → ↶ ↷ ✕

1	2	3
4	5	6
7	8	9
0	.	$\frac{\Box}{\Box}$

Notes on Scoring

This response earns full credit (1 point) because the student correctly identified how many times greater the value of 0.02 is than the value of 0.002.

Sample Response: 0 points

How many times greater is the value of 0.02 than the value of 0.002?

100

← → ↶ ↷ ✕

1	2	3
4	5	6
7	8	9
0	.	$\frac{\Box}{\Box}$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify how many times greater the value of 0.02 is than the value of 0.002.

- The student did not recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right.

Sample Response: 0 points

How many times greater is the value of 0.02 than the value of 0.002?

20

← → ↶ ↷ ✕

1	2	3
4	5	6
7	8	9
0	.	$\frac{\Box}{\Box}$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify how many times greater the value of 0.02 is than the value of 0.002.

- The student did not recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right.

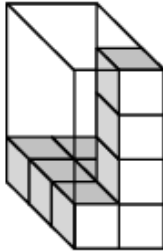
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Question 7

Question and Scoring Guidelines

Question 7

Kiyah places some unit cubes inside a box as shown.



The volume of each cube is 1 cubic centimeter.

What is the total volume of the box, in cubic centimeters?

← → ↶ ↷ ✕

1	2	3
4	5	6
7	8	9
0	.	$\frac{\Box}{\Box}$

Points Possible: 1

Content Cluster: Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Content Standard: Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft, and improvised units. (5.MD.4)

Scoring Guidelines

Exemplar Response

- 24

Other Correct Responses

- Any equivalent value.

For this item, a full-credit response includes:

- The correct total volume of the rectangular prism (1 point).

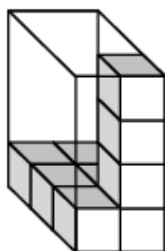
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Question 7

Sample Responses

Sample Response: 1 point

Kiyah places some unit cubes inside a box as shown.



The volume of each cube is 1 cubic centimeter.

What is the total volume of the box, in cubic centimeters?

24

← → ↶ ↷ ✕

1	2	3
4	5	6
7	8	9
0	.	$\frac{\Box}{\Box}$

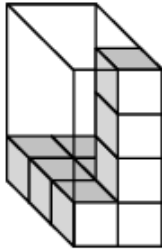
Notes on Scoring

This response earns full credit (1 point) because the student correctly identified the volume of the rectangular prism by counting the unit cubes needed to fill the box. The student may have also used the areas of the layers to find the total volume.

$$\begin{aligned}12 + 12 &= 24 \\8 + 8 + 8 &= 24 \\6 + 6 + 6 + 6 &= 24\end{aligned}$$

Sample Response: 0 points

Kiyah places some unit cubes inside a box as shown.



The volume of each cube is 1 cubic centimeter.

What is the total volume of the box, in cubic centimeters?

16

←	→	↶	↷	✖
1	2	3		
4	5	6		
7	8	9		
0	.	$\frac{\Box}{\Box}$		

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify the volume of the rectangular prism by counting the unit cubes needed to fill the box.

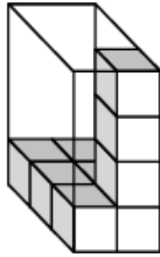
- The student may have incorrectly counted the cubes to find a length of 2 instead of 3 and used the areas of those layers to find the total volume.

$$8 + 8 = 16$$

$$4 + 4 + 4 + 4 = 16$$

Sample Response: 0 points

Kiyah places some unit cubes inside a box as shown.



The volume of each cube is 1 cubic centimeter.

What is the total volume of the box, in cubic centimeters?

20



1	2	3
4	5	6
7	8	9
0	.	$\frac{\Box}{\Box}$

Notes on Scoring

This response earns no credit (0 points) because the student did not correctly identify the volume of the rectangular prism by counting the unit cubes needed to fill the box.

- The student may have incorrectly counted the cubes to find a height of 5 instead of 4 and used the areas of those layers to find the total volume.
- The student may have incorrectly counted the cubes to find a length of 2 instead of 3 and used the areas of those layers to find the total volume.

$$10 + 10 = 20$$

$$5 + 5 + 5 + 5 = 20$$

$$4 + 4 + 4 + 4 + 4 = 20$$

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