



RELEASED ITEMS

**MATHEMATICS
GRADE 6**

Fall 2008

**MICHIGAN STATE BOARD OF EDUCATION
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PART 1

DIRECTIONS

This test has two parts. You may **NOT** use a calculator on Part 1. You may use open space in this test booklet for scratch paper. No additional paper may be used.

Part 1 has only multiple-choice questions. You must choose the *best* answer from among four answer choices.

- Use only a No. 2 pencil to mark your answer in your **Answer Document**.
- If you erase an answer, be sure to erase it completely.
- If you skip a question, be sure to mark the answer to the next question in the correct place in your **Answer Document**.

Sample Multiple-Choice Question:

Marty wants to put 75 CDs into cases. Each case holds exactly 8 CDs. What is the *least* number of cases that Marty will need to hold all his CDs?

- A 8
- B 9
- C 10
- D 11

For this sample question, the correct answer is **C**. Circle **C** is filled in on the sample question in your **Answer Document**.

You will have at least 35 minutes to finish Part 1 of this test. You will be given additional time if necessary.

Once you have reached the word **STOP** in your test booklet, do **NOT** go on to the next page.

If you finish early, you may check your work in Part 1 of the test **ONLY**. Do **NOT** look at questions in Part 2 of the test.

- 1 Understand the meaning of division of whole numbers
- A incorrect remainder
 - B incorrect remainder
 - C correct
 - D not candidate as remainder
- 2 Which of the following has a value equal to 32 divided by 10?
- A $\frac{10}{32}$
 - B $2\frac{3}{10}$
 - C $\frac{32}{10}$
 - D $10\frac{2}{3}$
- 3 Know division of whole numbers in form $a = bq + r$
- A correct
 - B incorrect number sentence
 - C incorrect number sentence
 - D incorrect number sentence

- 4 Which of the following shows why the equation below is true?

$$47 \div 6 = 7 \text{ R}5$$

- A $5 \cdot 6 + 7 = 47$
- B $5 \cdot 7 + 6 = 47$
- C $6 \cdot 5 + 7 = 47$
- D $7 \cdot 6 + 5 = 47$
- 5 Multiply a multi-digit number by a two-digit number
- A correct
- B incorrect number sentence
- C incorrect number sentence
- D incorrect number sentence

- 6 Multiply
$$\begin{array}{r} 609 \\ \times 87 \\ \hline \end{array}$$

- A 9,075
- B 9,135
- C 52,923
- D 52,983

7 Divide up to a four-digit number by a two-digit number

- A incorrect quotient
- B incorrect quotient
- C correct
- D incorrect quotient

8 Divide $9,768 \div 24$

- A 42 R20
- B 47
- C 400 R18
- D 407

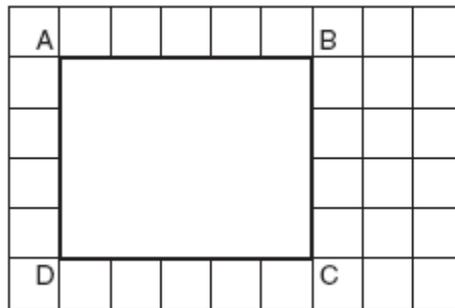
9 Understand the relative magnitude base-10 system

- A place value error
- B incorrect value
- C correct
- D incorrect value

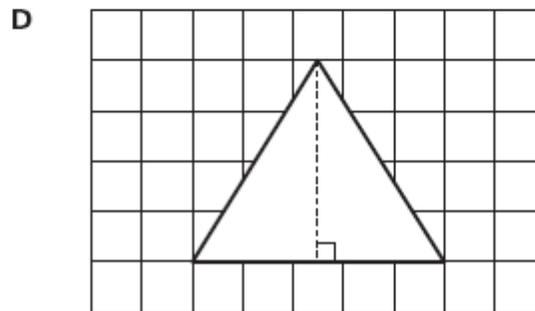
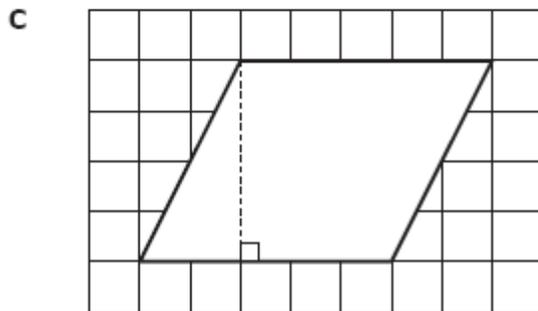
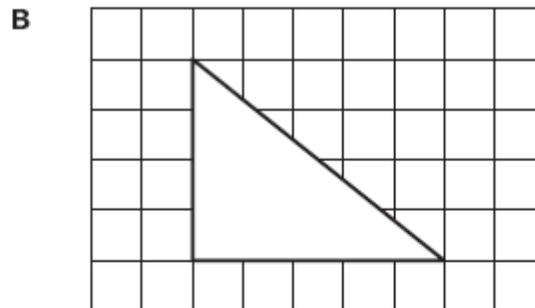
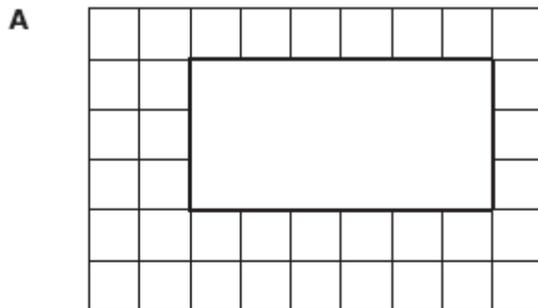
- 10 What is one way to represent the value of the digit 3 in the number 573.64?
- A three tenths
 - B thirty tenths
 - C three hundreds
 - D thirty ones
- 11 Write statements involving + and - of fractions
- A correct
 - B subtraction
 - C multiplication
 - D division
- 12 Gupta put sugar in glasses of iced tea for his mother and himself. He put $\frac{1}{4}$ teaspoon of sugar in his glass and $\frac{1}{8}$ teaspoon of sugar in his mother's glass. Which expression is equivalent to the total amount of sugar Gupta put in the glasses?
- A $\frac{1}{8} \div \frac{1}{4}$
 - B $\frac{1}{8} \times \frac{1}{4}$
 - C $\frac{1}{4} - \frac{1}{8}$
 - D $\frac{1}{4} + \frac{1}{8}$

- 13** Convert measurements within a given system
- A** incorrect conversion
 - B** correct
 - C** incorrect conversion
 - D** incorrect conversion
- 14** Which is equivalent to 5.4 kilograms?
- A** 54 grams
 - B** 540 grams
 - C** 5,400 grams
 - D** 54,000 grams
- 15** Show relationships between areas of polygons
- A** correct
 - B** area of triangle is 4 times area of rectangle
 - C** area of triangle is 2 times area of rectangle
 - D** area of triangle is one-fourth times area of rectangle

16 In the models below, each small grid square represents 1 square unit.



Which of the shapes below has the same area as rectangle ABCD?



- 17 Trent's tire store has 96 tires. A set contains 4 tires. Which expression represents the *greatest* number of complete sets of tires that Trent can sell?
- A $96 \div 4$
 - B $96 + 4$
 - C $96 \cdot 4$
 - D $96 - 4$
- 18 Multiply 5.70×100
- A 0.0570
 - B 57.0
 - C 570.0
 - D 5,700.0
- 19 Multiply 57×0.03
- A 0.171
 - B 1.71
 - C 17.1
 - D 171.0
- 20 There are 100 cm in 1 meter. What is one way to determine the number of cubic centimeters in 1 cubic meter?
- A multiply 100 by 100
 - B multiply 100 by 100 by 100
 - C add $100 + 100$
 - D add $100 + 100 + 100$

PART 2

DIRECTIONS

You will now begin Part 2 of this test. You may use a calculator on this part of the test, and you may use open space in this test booklet for scratch paper. No additional paper may be used.

This part of the test has both multiple-choice questions and a constructed-response question.

Multiple-choice questions will require you to choose the *best* answer from among four answer choices.

- Use only a No. 2 pencil to mark your answer in your **Answer Document**.
- If you erase an answer, be sure to erase it completely.
- If you skip a question, be sure to mark the answer to the next question in the correct place in your **Answer Document**.

Sample Multiple-Choice Question:

Marty wants to put 75 CDs into cases. Each case holds exactly 8 CDs. What is the *least* number of cases that Marty will need to hold all his CDs?

- A 8
- B 9
- C 10
- D 11

For this sample question, the correct answer is **C**. Circle **C** is filled in on the sample question in your **Answer Document**.

You will have at least 50 minutes to finish Part 2 of this test. You will be given additional time if needed.

Once you have reached the word **STOP** in your test booklet, do **NOT** go on to the next page.

If you finish early, you may check your work in Part 2 of the test **ONLY**. Do **NOT** look at questions in Part 1 of the test.

- 21 Solve problems involving \times and \div of whole numbers
- A incorrect product
 - B incorrect product
 - C correct
 - D incorrect product
- 22 José saves exactly \$3 each week. What is the *least* number of weeks it will take José to save \$29?
- A 9
 - B 10
 - C 26
 - D 32
- 23 Understand percentages as parts out of 100
- A place value error
 - B complement with place value error
 - C correct
 - D complement
- 24 Marissa said 90% of the 50 students in a school performance wore white shirts. What was the total number of students in the performance who wore white shirts?
- A 100
 - B 50
 - C 45
 - D 25

25 Solve applied problems using fractions & decimals

- A incorrect product
- B correct
- C subtracted instead of multiplied
- D added instead of multiplied

26 While shopping, Maria puts the following items, with their actual prices shown, in her grocery cart. She keeps track of the total she will spend by rounding the cost of each item to the nearest dollar.

Items	Actual Price
Juice	\$3.21
Bread	\$0.89
Butter	\$1.90
Apples	\$0.75
Chips	\$2.54

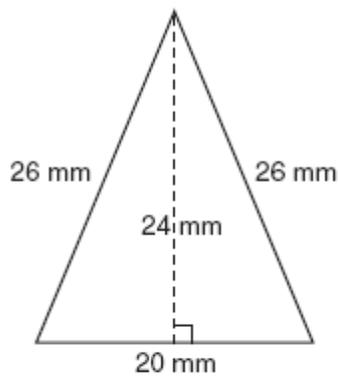
Which is *closest* to the amount Maria will spend on the items she put in her grocery cart?

- A \$ 6.00
 - B \$ 8.00
 - C \$10.00
 - D \$11.00
- 27 Express fractions and decimals as percentages
- A incorrect conversion
 - B incorrect conversion
 - C correct
 - D incorrect conversion

- 28 In a class of 25 students, 10 ran a race in nine minutes or less. What percent of the students ran the race in nine minutes or less?
- A 5%
 - B 10%
 - C 25%
 - D 40%

- 29 Know how to use the area formula of a triangle
- A incorrect variable
 - B incorrect variable
 - C correct
 - D incorrect variable

- 30 What is the area of the triangle below?



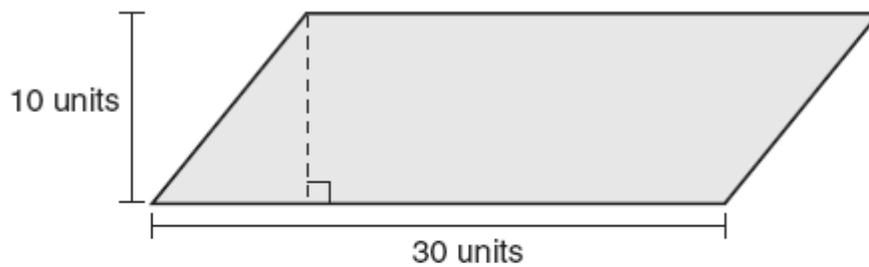
$$\left(A = \frac{1}{2}bh \right)$$

- A 192 mm²
- B 240 mm²
- C 260 mm²
- D 312 mm²

31 Know how to use area formula for a parallelogram

- A added instead of multiplied
- B measure for perimeter
- C area of triangle
- D correct

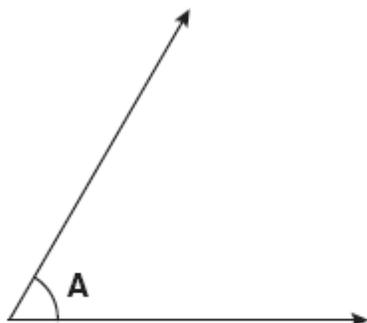
32 What is the area of the parallelogram below?



$$(A = bh)$$

- A 40 square units
 - B 80 square units
 - C 150 square units
 - D 300 square units
- 33 Measure angles with a protractor and classify
- A incorrect type of angle
 - B correct
 - C incorrect type of angle
 - D incorrect type of angle

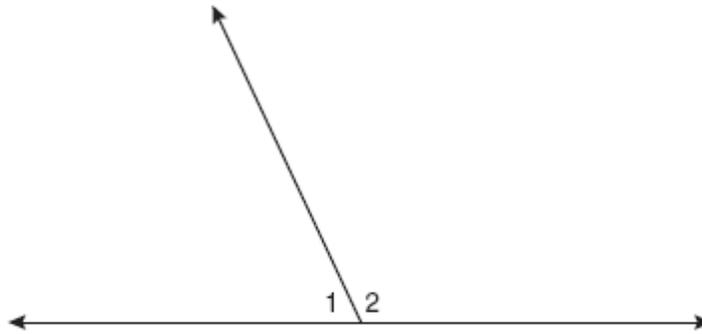
- 34 Which is closest to the degree measure of $\angle A$ shown below?



- A** 45°
B 60°
C 120°
D 135°
- 35 Know straight angle and angles surrounding a point
- A** supplementary angle
B other angle shown
C other angle shown
D correct

36 Using the diagram below, which is closest to the value of the expression below?

$$m\angle 1 + m\angle 2$$



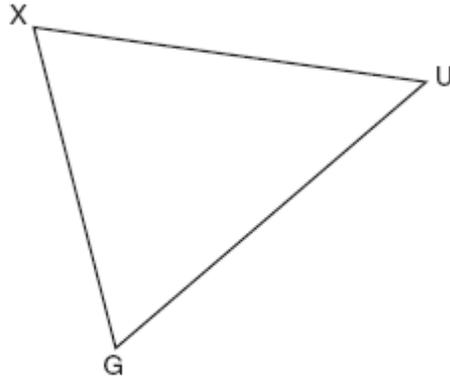
- A 90°
- B 100°
- C 180°
- D 360°

37 Know interior angles of a triangle & quadrilateral

- A correct
- B incorrect angle
- C other angle shown
- D other angle shown

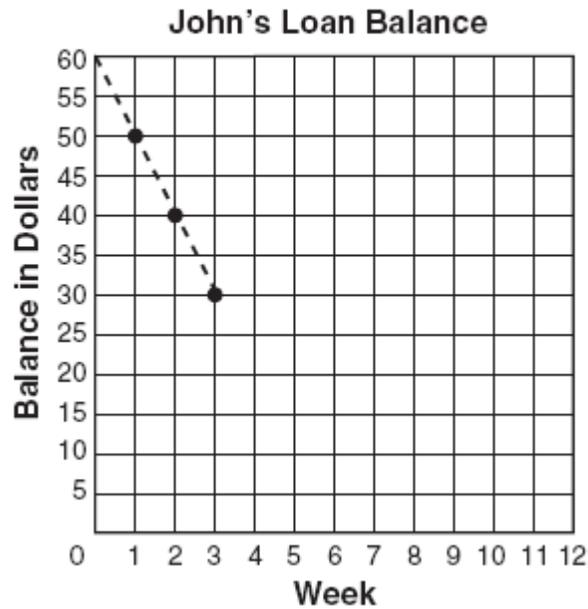
- 38 For triangle GXU, what is the value of the following expression?

$$m\angle G + m\angle X + m\angle U$$



- A 360°
B 180°
C 100°
D 90°
- 39 Read and interpret line graphs, and solve problems
- A incorrect interpretation of line graph
B incorrect interpretation of line graph
C incorrect interpretation of line graph
D correct

- 40 John is graphing his loan balance for the loan his brother gave him. He pays his brother the same amount of money on the first day of each week as shown in the graph below.



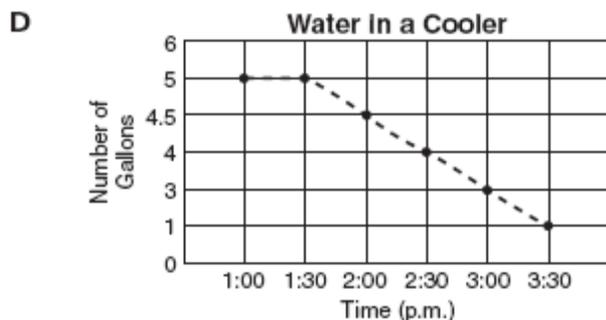
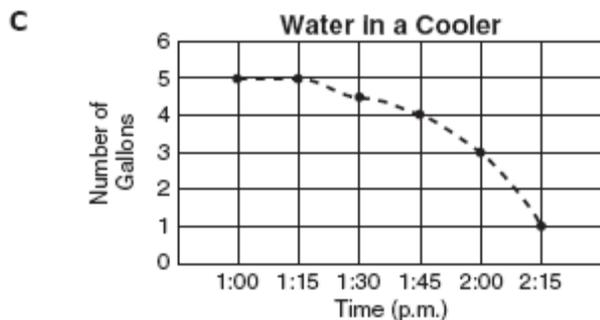
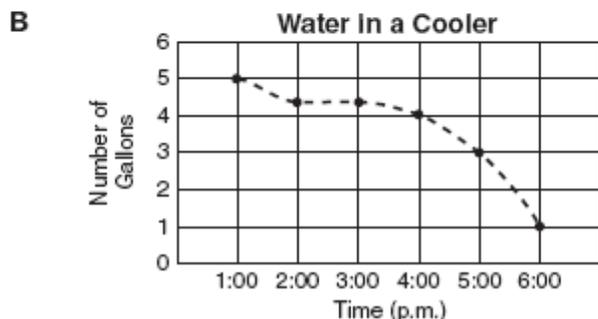
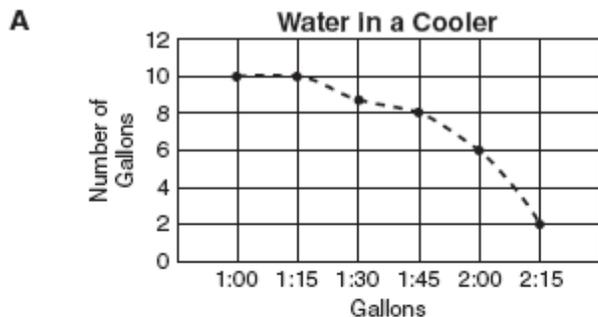
What will be the first week that John's balance will be \$0?

- A 10
 - B 8
 - C 6
 - D 4
- 41 Construct line graphs from tables of data
- A incorrect table
 - B correct
 - C incorrect table
 - D incorrect table

- 42 The amount of water in a water cooler at different times during a baseball game is shown in the table below.

Time (p.m.)	1:00	1:15	1:30	1:45	2:00	2:15
Number of Gallons	5	5	4.5	4	3	1

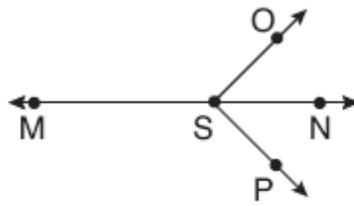
Which graph *best* represents the data in the table?



- 43 Given set of data, find & interpret mean, mode
- A mean
 - B correct
 - C range
 - D maximum
- 44 What is the mean for this set of data?
- 12, 9, 16, 17, 9, 10, 11
- A 9
 - B 11
 - C 12
 - D 17
- 45 For every 6 boys in Mrs. Getty's class, there are 7 girls. Which shows three correct ways to express the ratio of boys to girls?
- A $\frac{7}{6}$; 7:6; 7 to 6
 - B $\frac{6}{13}$; 6:13; 6 to 13
 - C $\frac{6}{7}$; 6:7; 6 to 7
 - D $\frac{13}{6}$; 13:6; 13 to 6

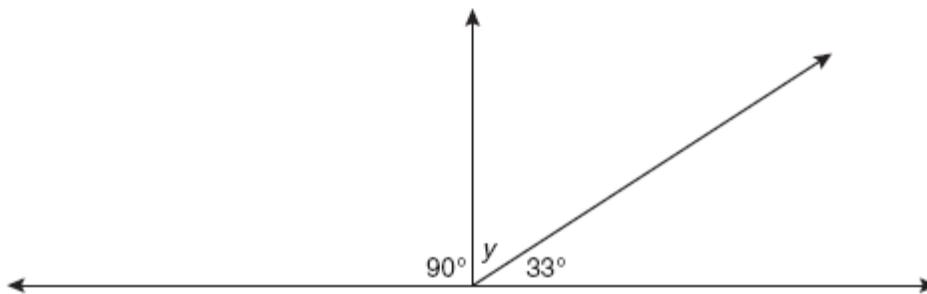
- 46 Denise found the volume of a cylinder that had a height of 12 centimeters. Which unit should she use to express the volume of the cylinder?
- A cm
 - B cm^2
 - C cm^3
 - D cm^4
- 47 Jeff had to rotate a picture $\frac{1}{2}$ turn to show to his friend. Exactly how many degrees did Jeff rotate the picture?
- A 90°
 - B 180°
 - C 270°
 - D 360°
- 48 Joe wants the mean of his 5 test scores to be 90. Below are his scores on the first four tests.
- 92, 86, 95, 83
- What score does Joe need on the fifth test to get a mean of exactly 90?
- A 88
 - B 90
 - C 92
 - D 94

- 49 In the diagram below \overline{MN} intersects $\angle OSP$ at point S.



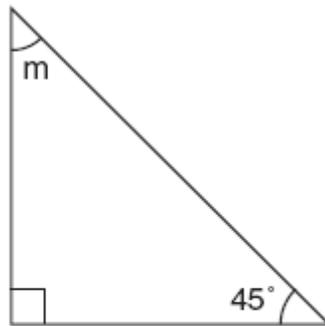
Which angles when combined have the same degree measure as a straight angle?

- A $\angle OSN$ and $\angle NSP$
 - B $\angle OSM$ and $\angle PSM$
 - C $\angle OSN$ and $\angle OSM$
 - D $\angle NSM$ and $\angle NSO$
- 50 In the diagram below, what is the measure of $\angle y$?

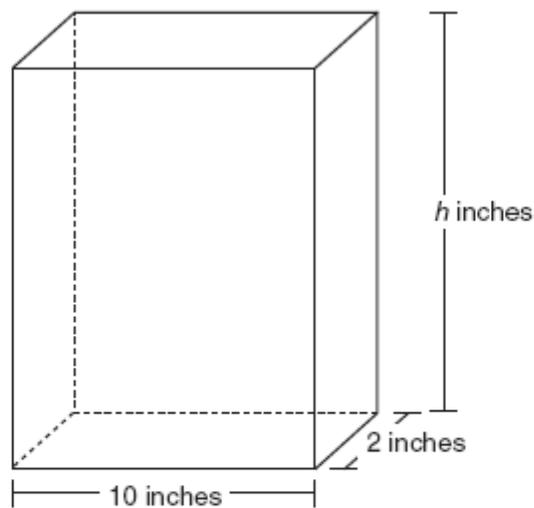


- A 33°
- B 57°
- C 90°
- D 180°

- 51 What is the measure of $\angle m$ in the right isosceles triangle shown below?



- A 35°
 - B 45°
 - C 90°
 - D 180°
- 52 If the volume of the rectangular prism-shaped box below is 280 cubic inches, what is its height?



- A 12 inches
- B 14 inches
- C 28 inches
- D 140 inches

53 A bottle is filled with 1 liter of lemonade. Which measurement is equivalent to 1 liter?

A 0.001 milliliter

B 0.01 milliliter

C 1,000.0 milliliters

D 10,000.0 milliliters

54 Subtract $\frac{2}{3} - \frac{1}{4}$

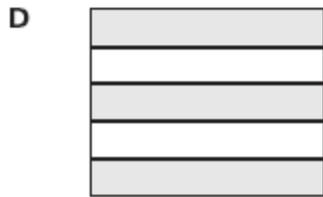
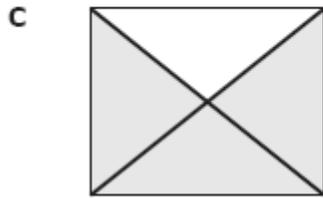
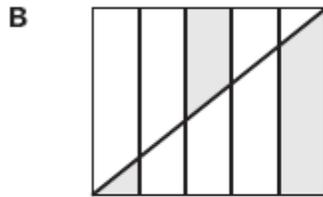
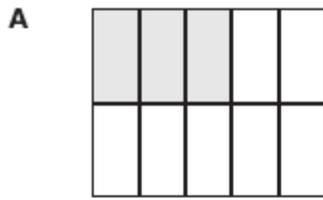
A $\frac{1}{1}$

B $\frac{5}{12}$

C $\frac{1}{4}$

D $\frac{1}{12}$

55 Which shape below appears to be exactly $\frac{3}{5}$ shaded?



56 Which of the following is equivalent to $\frac{3}{5}$?

A $\frac{5}{3}$

B $\frac{13}{15}$

C $\frac{5}{10}$

D $\frac{15}{25}$

58 For which number is $2^4 \times 3$ the prime factorization?

- A 48
- B 36
- C 24
- D 18

59 Divide $\frac{1}{4} \div 2$

- A $\frac{1}{8}$
- B $\frac{2}{4}$
- C 2
- D 8

- 60 After a concert, a white cake, a chocolate cake, and a strawberry cake were served. The following shows how much of each of these same-sized cakes was eaten.

- $\frac{5}{8}$ of the white cake
- $\frac{7}{8}$ of the chocolate cake
- $\frac{1}{4}$ of the strawberry cake

What was the total amount of cake eaten?

- A $1\frac{3}{4}$ cakes
- B $1\frac{5}{8}$ cakes
- C $1\frac{3}{8}$ cakes
- D $\frac{13}{20}$ cake
- 61 What value of m makes the equation below true?

$$\frac{1}{6} + m = \frac{3}{4}$$

- A 1
- B $\frac{4}{12}$
- C $\frac{7}{12}$
- D $\frac{4}{10}$

Scoring Key: Part 1

Item No.	Correct Answer	GLCE	Type	Description
1	C	N.MR.05.01	Core	Understand the meaning of division of whole numbers
2	C	N.MR.05.01	Core	Understand the meaning of division of whole numbers
3	A	N.MR.05.02	Core	Know division of whole numbers in form $a = bq + r$
4	D	N.MR.05.02	Core	Know division of whole numbers in form $a = bq + r$
5	A	N.FL.05.04	Core	Multiply a multi-digit number by a two-digit number
6	D	N.FL.05.04	Core	Multiply a multi-digit number by a two-digit number
7	C	N.FL.05.06	Core	Divide up to a 4-digit number by a two-digit number
8	D	N.FL.05.06	Core	Divide up to a 4-digit number by a two-digit number
9	C	N.ME.05.08	Core	Understand the relative magnitude base-10 system
10	B	N.ME.05.08	Core	Understand the relative magnitude base-10 system
11	A	N.FL.05.18	Core	Write statements involving + and - of fractions
12	D	N.FL.05.18	Core	Write statements involving + and - of fractions
13	B	M.UN.05.04	Core	Convert measurements within a given system
14	C	M.UN.05.04	Core	Convert measurements within a given system
15	A	M.PS.05.05	Core	Show relationships between areas of polygons
16	C	M.PS.05.05	Core	Show relationships between areas of polygons
17	A	N.MR.05.03	Extended	Write mathematical statements involving division
18	C	N.MR.05.15	Extended	\times a whole number by powers of 10, identify patterns
19	B	N.MR.05.17	Extended	Multiply decimals to 100ths by whole numbers
20	B	M.UN.05.03	Extended	Compare relative sizes of cubic measures

Scoring Key: Part 2

Item No.	Correct Answer	GLCE	Type	Description
21	C	N.FL.05.05	Core	Solve problems involving \times and \div of whole numbers
22	B	N.FL.05.05	Core	Solve problems involving \times and \div of whole numbers
23	C	N.ME.05.09	Core	Understand percentages as parts out of 100
24	C	N.ME.05.09	Core	Understand percentages as parts out of 100
25	B	N.FL.05.20	Core	Solve applied problems using fractions & decimals
26	C	N.FL.05.20	Core	Solve applied problems using fractions & decimals
27	C	N.MR.05.22	Core	Express fractions and decimals as percentages
28	D	N.MR.05.22	Core	Express fractions and decimals as percentages
29	C	M.TE.05.06	Core	Know how to use the area formula of a triangle
30	B	M.TE.05.06	Core	Know how to use the area formula of a triangle
31	D	M.TE.05.07	Core	Know how to use area formula for a parallelogram
32	D	M.TE.05.07	Core	Know how to use area formula for a parallelogram
33	B	G.GS.05.02	Core	Measure angles with a protractor and classify
34	B	G.GS.05.02	Core	Measure angles with a protractor and classify
35	D	G.GS.05.05	Core	Know straight angle and angles surrounding a point
36	C	G.GS.05.05	Core	Know straight angle and angles surrounding a point
37	A	G.GS.05.06	Core	Know interior angles of a triangle & quadrilateral
38	B	G.GS.05.06	Core	Know interior angles of a triangle & quadrilateral
39	D	D.RE.05.01	Core	Read and interpret line graphs, and solve problems
40	C	D.RE.05.01	Core	Read and interpret line graphs, and solve problems
41	B	D.RE.05.02	Core	Construct line graphs from tables of data
42	C	D.RE.05.02	Core	Construct line graphs from tables of data
43	B	D.AN.05.03	Core	Given set of data, find & interpret mean, mode
44	C	D.AN.05.03	Core	Given set of data, find & interpret mean, mode
45	C	N.ME.05.23	Extended	Express ratios in the forms a to b , $a:b$, a/b
46	C	M.UN.05.02	Extended	Know the units of measure of volume
47	B	G.TR.05.01	Extended	Associate an angle with a certain amount of turning
48	D	D.AN.05.04	Future	Solve multi-step problems involving means
49	C	G.GS.05.03	Future	Identify angles on a straight line & vertical angles
50	B	G.GS.05.04	Future	Find unknown angles in problems
51	B	G.GS.05.07	Future	Find unknowns using properties of triangles, quads.
52	B	M.PS.05.10	Future	Solve volume problems of rectangular prisms
53	C	M.UN.05.01	Future	Know equivalence of 1 liter, 1000 ml and 1000 cc
54	B	N.FL.05.14	Future	Add and subtract fractions with unlike denominators
55	D	N.ME.05.10	Future	Understand & show fractions as a statement of \div
56	D	N.ME.05.11	Future	Compare two fractions using common denominators
57	D	N.ME.05.12	Future	Multiply two unit fractions using area model
58	A	N.MR.05.07	Future	Find prime factorization of $\#$ s, show exponentially
59	A	N.MR.05.13	Future	Divide using fractions and whole numbers
60	A	N.MR.05.19	Future	Solve contextual problems involving $+/-$ fractions
61	C	N.MR.05.21	Future	Solve for the unknown in equations with fractions