Name _____

Minnesota Comprehensive Assessments-Series III

Mathematics Item Sampler
Grade 7

ITEM SAMPLERS ARE NOT SECURE TEST MATERIALS. THIS ITEM SAMPLER TEST BOOK MAY BE COPIED OR DUPLICATED.

Minnesota Department of
Education

Grade 7 Formula Sheet

You may use the following formulas to solve problems on this test.

Formulas	Variables
$A = \pi r^2$	A = area r = radius
$C = \pi d$	C = circumference d = diameter
$SA = ph + 2B$	B = area of base h = height p = perimeter SA = surface area
$V = Bh$	B = area of base h = height V = volume

Mathematics Test
General Directions

- This test contains four segments.
- You may write in this test book as scratch paper. Grid paper is also provided at the back of the test book.
- You will find a formula sheet at the beginning of this test book. You may tear it out of your test book to use while taking the test.
- For each question, choose the answer you think is best.
- Look at the samples that show how to answer the questions.

Sample Question Answered in Test Book:

$20 - 8 =$

A. 8
B. 10
C. 12
D. 16

Sample Question Answered in Test Book:

$4 - 12 = -8$

- You **may not** use a calculator for Segment 1.
- You **may** use a calculator for Segments 2, 3, and 4.
- When you finish a segment of the test, stop and check your answers. Then use the sticker given to you to seal it. Once you seal a segment, you cannot go back to it. Each segment must be sealed before you move on to the next segment.

STOP

Put sticker here

Segment 1

You will be told when to begin this segment.

You **MAY NOT** use a calculator for this segment.

Mathematics Test — Segment 1

Please write your answer in the space below the question. You may use the digits: 0-9 and the symbols: slash for a fraction bar (/), a decimal (.) and a negative sign (-).

1. Simplify.

$$3(2.25)^2$$

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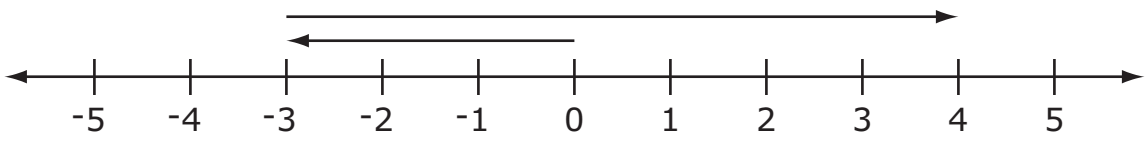
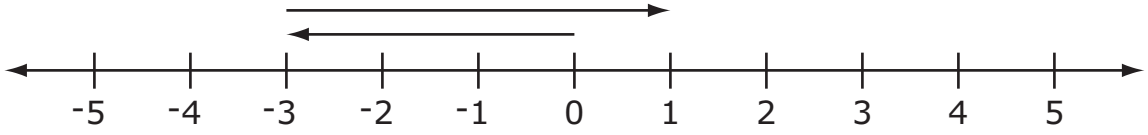
2. Which shows a model of $-3+4$?

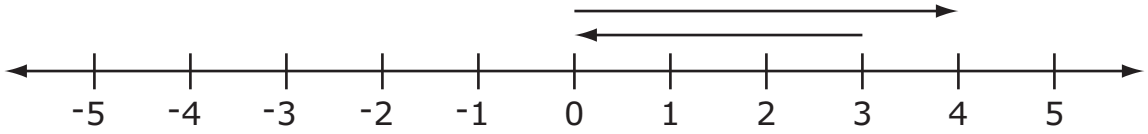
A.



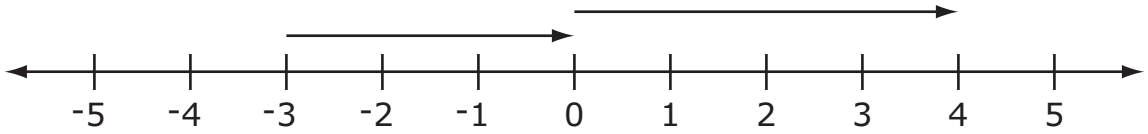
B.



C.



D.



Go on to the next page.

3. Which describes $|k|$ on a number line?

A. The opposite of k

B. The same value as k

C. A value between k and $-k$

D. A distance k units from 0

---

4. Which represents a proportional relationship?

A. $np = 5$

B. $n = 2$

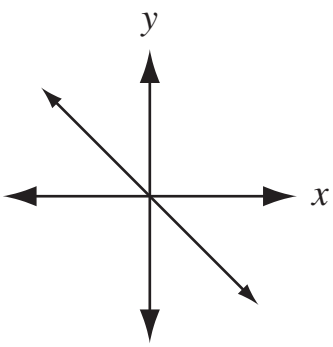
C. $n = \frac{4}{p}$

D. $\frac{n}{p} = 3$

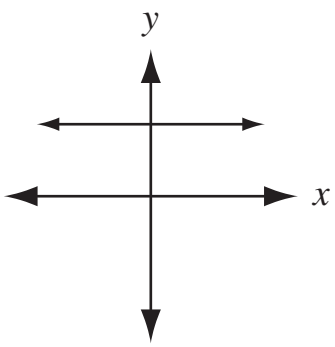
1

5. Which represents a proportional relationship?

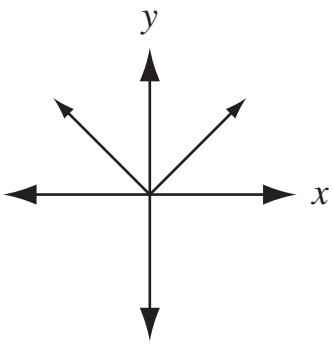
A.



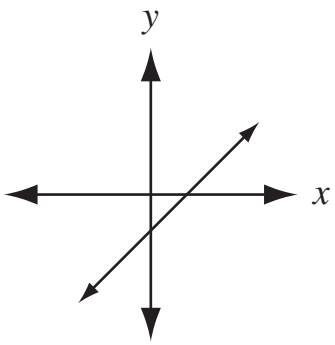
B.



C.



D.



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6. $\triangle EFG$ is similar to $\triangle JKL$ and $\triangle JKL$ is similar to $\triangle QRS$. Which statement must be true?

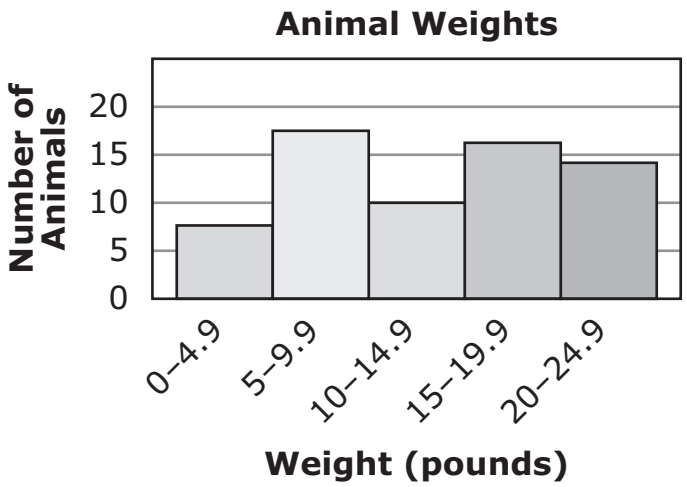
A. $\triangle EFG$ is congruent to $\triangle QRS$.

B. $\triangle EFG$ is similar to $\triangle QRS$.

C. $\triangle EFG$ is a reflection of $\triangle QRS$.

D. There is no relationship between $\triangle EFG$ and $\triangle QRS$.

7. A veterinarian recorded the weights of animals in a histogram.



Which question can be answered using the information from the histogram?

A. How many animals weigh 4.9 pounds?

B. How many animals weigh between 5 and 10 pounds?

C. How many animals weigh less than 8 pounds?

D. How many animals weigh at least 15 pounds?

Put sticker here

This is the end of Segment 1.

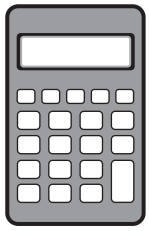
Check your work. Then seal this segment.

Put sticker here

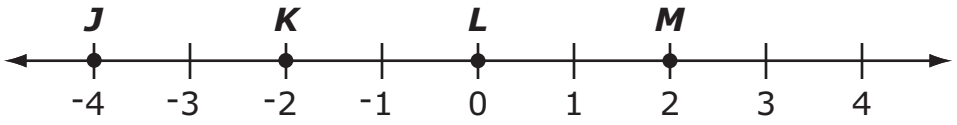
Segment 2

You will be told when to begin this segment.

You **MAY** use a calculator for this segment.



8. Four points are graphed on a line.



Which point is located at the opposite of −2?

A. Point *J*
B. Point *K*
C. Point *L*
D. Point *M*

2

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9. Which statement is true?

A. $0.75 < 0.75^2$

B. $-\frac{3}{8} < -0.38$

C. $\frac{46}{25} > 1\frac{5}{6}$

D. $-2\frac{3}{5} > 1.5$

10. Jeremy can plant 10 trees in 4 hours. How many trees can he plant in 10 hours?

A. 16
B. 25
C. 40
D. 100

---

11. On Mondays, Jayda runs between 2 and 5 miles. On Tuesdays, she runs 3 times as far as she runs on the previous Monday. Which inequality can be used to find x, the distance Jayda could run on a Tuesday?

A. $2 < 3x < 5$

B. $2 < 3x > 5$

C. $2 < \frac{x}{3} < 5$

D. $2 < \frac{x}{3} > 5$

2

Please write your answer in the space below the question. You may use the digits: 0-9 and the symbols: slash for a fraction bar (/), a decimal (.) and a negative sign (-).

12. What is the value of $4t^2 + 6r - tr$ when $t = -3$ and $r = 5$?

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13. The equation $y = 12x + 60$ can be used to estimate y, the height of a tree in centimeters x months after it is planted. When a tree is 150 cm tall, how long ago was the tree planted?

2

A. 7.5 months
B. 10.8 months
C. 17.5 months
D. 78.0 months

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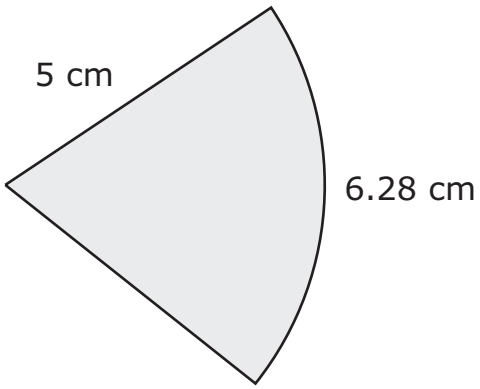
14. A sector of a circle is shown.



What is the area of the sector? (Use 3.14 for π.)

A. 12.5 cm^2
B. 15.7 cm^2
C. 31.4 cm^2
D. 78.5 cm^2

15. A map uses the scale 1.5 cm = 25 mi. Two cities are 190 miles apart.

How far apart are the cities on the map?

A. 0.21 cm
B. 11.4 cm
C. 2,917 cm
D. 6,563 cm

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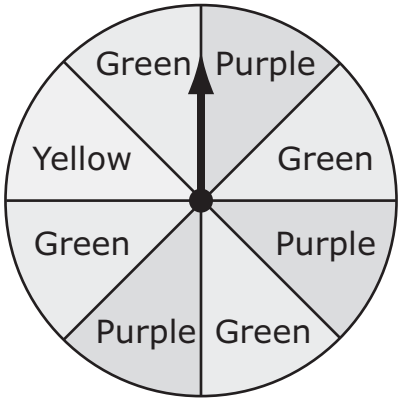
16. A spinner is divided into 8 equal sections. Lara spins the spinner 120 times. It lands on purple 30 times.



How many more times does Lara need to spin the spinner and have it land on purple for the relative frequency to equal the theoretical probability?

A. 15
B. 24
C. 45
D. 54

17. An equation is shown.

$$n = 1 \div 17$$

Which describes n?

A. Integer
B. Irrational
C. Rational
D. Whole

2

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18. Which is equivalent to $5\frac{2}{15}$?

A. $5.1\overline{3}$
B. $5.\overline{13}$
C. 5.13
D. $5.\overline{3}$

---

19. Nora is running a race that is 26.2 miles. She is running at a speed of 8 miles per hour. She has completed $\frac{3}{4}$ of the race. How much longer will it take Nora to finish the race?

A. 0.82 hour
B. 2.46 hours
C. 3.28 hours
D. 6.55 hours

20. The table shows the cost of different numbers of boxes of cookies.

Selling Cookies

Boxes of Cookies	Cost (dollars)
5	11.25
7	15.75
11	24.75

What is the cost to buy 15 boxes of cookies?

A. $33.75
B. $36.00
C. $40.50
D. $51.75

2

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21. Simplify.

$$8-2(n+4)(-3)^2$$

A. $-2n-9$

B. $-18n$

C. $-18n-64$

D. $36n-216$

22. The equation $3c = 4s$ gives the relationship between c, the weight of clay, and s, the weight of sand in a mixture. There are 6.25 pounds of clay in the mixture. What is the weight of the sand?

A. 4.69 pounds
B. 8.88 pounds
C. 18.75 pounds
D. 75.00 pounds

2

23. A cylinder has a height of x inches. The diameter of the base is also x inches. Which gives the volume of the cylinder?

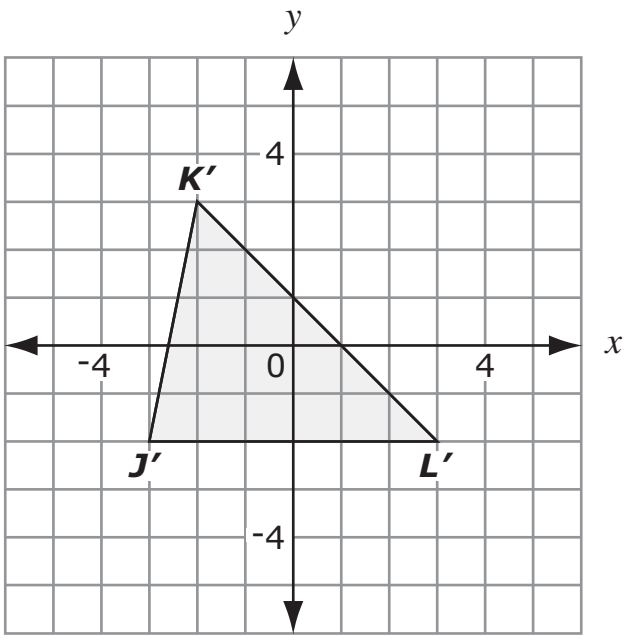
A. $2\pi x^2$

B. $\frac{1}{4}\pi x^3$

C. $\frac{1}{2}\pi x^3$

D. πx^3

24. The translation $(x, y) \rightarrow (x - 4, y + 5)$ was used to move $\triangle JKL$ to $\triangle J'K'L'$. $\triangle J'K'L'$ is shown on the grid.



What are the coordinates of point K?

A. $(-6, 8)$

B. $(-4, 5)$

C. $(-2, 3)$

D. $(2, -2)$

2

25. The number of students of each age on a bus is shown in the table.

Ages of Students

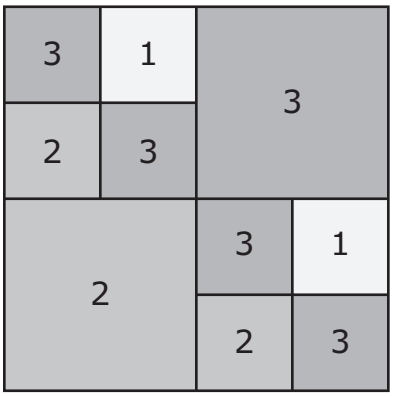
Age (years)	Number of Students
13	2
14	10
15	5
16	18
17	24

2

What is the median age of the students?

A. 10 years
B. 14 years
C. 15 years
D. 16 years

26. Leon uses squares to make a board. He randomly throws a stone onto the board.



What is the probability the stone lands on a space marked 3?

A. $\frac{1}{10}$

B. $\frac{1}{4}$

C. $\frac{1}{3}$

D. $\frac{1}{2}$

2

Put sticker here

This is the end of Segment 2.

Check your work. Then seal this segment.

Minnesota Department of Education

MCA Item Sampler Teacher's Guide

mde.testing@state.mn.us

An Introduction to the MCA

The Minnesota Comprehensive Assessments are reading, mathematics and science tests that help schools and districts measure student progress toward the state's academic standards. The grades 3–8 mathematics assessments became operational in 2011 as the Minnesota Comprehensive Assessments-Series III (MCA-III) and are aligned to the 2007 Minnesota Academic Standards. In 2012, the science assessments became operational as the Minnesota Comprehensive Assessments-Series III (MCA-III) and are aligned to the 2009 Minnesota Academic Standards. In 2013, the grades 3-8 and 10 reading assessments are aligned to the 2010 Minnesota Academic Standards as the Minnesota Comprehensive Assessments-Series III (MCA-III). In 2014, the grade 11 mathematics assessment is aligned to the 2007 Minnesota Academic Standards as the Minnesota Comprehensive Assessments-Series III (MCA-III).

The Purpose of the MCA Item Samplers

An item sampler is not a complete test. It contains a smaller number of the items that students will see on a full-length test in the spring. The MCA Item Samplers were developed to familiarize students and teachers with the format of the MCA and the kinds of items that will appear on them.

This MCA Item Sampler is not a real test. It should not be used to predict how well students will do on the tests. However, students may feel more comfortable with the tests if they have reviewed the Item Samplers prior to the test.

How the MCA Item Samplers Were Created

The Item Samplers mirror the format of the MCA. The student directions, segment layouts, and answer sheet each reflect the way the test will look in the spring, except that the Item Sampler is shorter than the actual test. As with all MCAs, the reading passages and the math and reading questions have been thoroughly reviewed by Minnesota teachers prior to testing. Minnesota students have answered these questions on previous tests.

The distribution of question types and their aligned content selected for the Item Sampler generally reflects a range of items from each strand in the Minnesota Academic Standards. Whenever possible, the Item Samplers have the following designs:

Math:

- Two segments
  - Segment One does not allow a student to use a calculator.
  - The actual MCA has four segments
- Approximately twenty-four multiple-choice items

The Contents of This Teacher's Guide

The Answer Key identifies the answers and solutions to the questions. It also identifies the strand/sub-strand/benchmark from the Minnesota Academic Standards for the question.

State Standards & Test Specifications

The Item Samplers are primarily intended to familiarize teachers and students with the **format** of the MCA. The best preparation for the **content** of the MCA is done as a part of your curriculum planning. When doing that, reference the Minnesota Academic Standards and the test specifications for the MCA. For further questions about the MCAs, email us at mde.testing@state.mn.us.

Grade 7 Teacher's Guide

Mathematics MCA Item Sampler Answer Key
Grade 7 Math

Item #	Correct Answer	Item Type	Strand	Standard	Benchmark
1	Grid	GR	1	2	01
2	B	MC	1	2	02
3	D	MC	1	2	06
4	D	MC	2	1	01
5	A	MC	2	1	02
6	B	MC	3	2	01
7	D	MC	4	2	01
8	D	MC	1	1	03
9	C	MC	1	1	04
10	B	MC	1	2	05
11	C	MC	2	2	04
12	Grid	GR	2	3	02
13	A	MC	2	4	01
14	B	MC	3	1	01
15	B	MC	3	2	03
16	B	MC	4	3	03
17	C	MC	1	1	02
18	A	MC	1	1	05
19	A	MC	1	2	04
20	A	MC	2	2	02
21	C	MC	2	3	01
22	A	MC	2	4	02
23	B	MC	3	1	02
24	D	MC	3	2	04
25	D	MC	4	1	01
26	D	MC	4	3	02

Item # — The number of the question in the Item Sampler.

Correct Answer — Answers to multiple-choice questions are listed.

Item Type — Multiple Choice **(MC)** and Gridded Response **(GR)**

Strand — In mathematics, the MCA-III measures four strands:

1. Number and Operation
2. Algebra
3. Geometry and Measurement
4. Data Analysis and Probability

Standard — Each strand has one or more standards

Benchmark — Each standard has one or more benchmarks. See the Academic Standards or test specification for further explanation of each benchmark.