Name _____

Minnesota Comprehensive Assessments-Series III

Mathematics Item Sampler Grade 8

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

Minnesota Department of Education

Grade 8 Formula Sheet

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

Pythagorean theorem	$a^2 + b^2 = c^2$		
Distance formula	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$		
Slope of a line	$m = \frac{y_2 - y_1}{x_2 - x_1}$		
Slope-intercept form	y = mx + b		
Point-slope form	$y - y_1 = m(x - x_1)$		
Standard form	Ax + By = C		
Arithmetic sequence	f(x) = mx + b		
Geometric sequence	$f(x) = a(b)^{X}$		

Mathematics Test — Segment 1

- 1. Which expression results in a rational number?
 - **A.** $1.5 + \sqrt{1.5}$
 - **B.** $12 \sqrt{12}$
 - **C.** $\frac{3}{4} \cdot \sqrt{\frac{3}{4}}$
 - **D.** $25 \div \sqrt{25}$

2. Simplify.

$$(4x)^2 - 4x^3$$

- **A.** x^{-1} **B.** $12x^{-1}$ **C.** $16x^2 - 4x^3$ **D.** $16x^2 - 64x^3$
- 3. Simplify.

$$\frac{1.2 \times 10^{-6}}{4.8 \times 10^{4}}$$

- **A.** 2.5×10^{-2}
- **B.** 2.5×10^{-9}
- **C.** 2.5×10^{-10}
- **D.** 2.5×10^{-11}

4. Which table of values does not represent a function?



- **5.** The number of cakes needed for a party, *c*, is dependent upon the number of guests at the party, *g*. Which equation shows the number of cakes as a function of the number of guests?
 - **A.** $f(c) = \frac{g}{12}$
 - **B.** $f(g) = \frac{g}{12}$
 - **C.** $f(c) = \frac{c}{12}$
 - **D.** $f(g) = \frac{c}{12}$

1



Which situation is represented by the graph?

- **A.** It costs \$2 per hour to rent a bike for 10 hours.
- **B.** It costs \$60 to rent a boat for 8 hours.
- **C.** It costs \$5 per hour to rent ice skates.
- **D.** It costs \$40 to rent a snowboard.

- **7.** Ann sells bracelets for \$4 each and necklaces for \$8 each. Which inequality shows *x*, the number of bracelets, and *y*, the number of necklaces Ann must sell to make at least \$100?
 - **A.** $4x + 8y \le 100$
 - **B.** $4x + 8y \ge 100$
 - **C.** $8x + 4y \le 100$
 - **D.** $8x + 4y \ge 100$

- **8.** A rectangle is drawn on a coordinate grid. The equation for 1 side of the rectangle is 3x 2y = 12. Which could be an equation for another side of the rectangle?
 - **A.** $y = \frac{3}{2}x + 5$
 - **B.** y = 3x + 12
 - **C.** $y = -\frac{3}{2}x 12$
 - **D.** y = 2x 5

1

Mathematics Test — Segment 2

- 9. Which sequence is arithmetic?
 - A. 4 8 16 32 64
 B. 11 12 14 17 21
 C. 28 15 2 -11 -24
 D. 30 -25 20 -15 10

2

10. Jayda makes a graph to show the weight of a jar when it contains different numbers of marbles.



What does the y-intercept represent?

- A. The weight of each marble
- **B.** The weight of the jar by itself
- C. The number of marbles when the weight is 0 grams
- **D.** The number of marbles when the weight is 10 grams

11. An equation is shown.



When *p* is increased by 2, how much does *m* increase?

- **A.** 2
- **B.** 4
- **C.** 7
- **D.** 8

12. A sequence is shown.

1.5 4.5 13.5 40.5

What is the seventh term in the sequence?

- **A.** 121.5
- **B.** 364.5
- **C.** 1,093.5
- **D.** 3,280.5

13. Which property is used in the equation mg + mh = m(g + h)?

- **A.** Associative
- B. Commutative
- C. Distributive
- **D.** Identity

14. Which is the equation of the same line as y = 3x - 8?

- **A.** 3x 2y = 8
- **B.** -3x 2y = -8
- **C.** 6x y = 16
- **D.** 6x 2y = 16

Please fill in the grid with your answer to question 15 on page 2 of your answer document.

15. An equation is shown.

$$|2x-4| = 6$$

The equation has 2 solutions. One solution is x = 5. What is the other solution?

16. Lisa has 5 more green marbles than blue marbles. She has a total of 40 green and blue marbles. Which system of equations represents this situation if *x* is the number of green marbles and *y* is the number of blue marbles?

A.
$$\begin{cases} y = x + 5 \\ x + y = 40 \end{cases}$$
B.
$$\begin{cases} x = y + 5 \\ x + y = 40 \end{cases}$$

C.
$$\begin{cases} y = x + 5 \\ y = x + 40 \end{cases}$$
D.
$$\begin{cases} x = y + 5 \\ x = y + 40 \end{cases}$$

ITEM SAMPLER. MAY BE DUPLICATED.



2

17. What is the distance between (4, 7) and (-3, 9) on a coordinate grid?

- **A.** $\sqrt{5}$
- **B.** √45
- **C.** $\sqrt{53}$
- **D.** $\sqrt{305}$

18. Which function forms a geometric sequence when x = 1, 2, 3,?

- **A.** f(x) = x + 2
- **B.** $f(x) = x^2$
- **C.** $f(x) = x^2 + 2$
- **D.** $f(x) = 2^{x}$

19. A sequence is shown.

-1 -7 -13 -19 -25

What is the function rule for the sequence?

- **A.** f(x) = x 6
- **B.** f(x) = -6x
- **C.** f(x) = 5x 6
- **D.** f(x) = -6x + 5



- **A.** -27
- **B.** -9
- **C.** 9
- **D.** 27

21. Leon plants 3 rows of tomatoes with *n* plants in each row. He also plants 1 row of beans with 5 plants in the row. Which equation can be used to find *t*, the total number of plants Leon planted?

- **A.** t = n + 8 **B.** t = 3n + 1
- **C.** t = 3n + 5
- **D.** t = 5n + 3

- **22.** What is the value of p when 2p+10=24?
 - **A.** *p* = 7
 - **B.** *p* = 12
 - **C.** *p* = 17
 - **D.** *p* = 28

23. A number line is shown.



Which equation has the solution shown on the number line?

- **A.** -4 > x > -2 **B.** 4 < -2x < 8**C.** 4 > -2x > 8
- **D.** -4 < 2x < -8

Please fill in the grid with your answer to question 24 on page 2 of your answer document.

24. A triangle is shown.



What is AC?





What is the equation of a line that is perpendicular to the line shown and goes through the point (3, -1)?

- **A.** $y = -\frac{4}{3}x 5$ **B.** $y = -\frac{4}{3}x + 3$ **C.** $y = \frac{4}{3}x - 5$
- **D.** $y = \frac{4}{3}x + 3$

2

ITEM SAMPLER. MAY BE DUPLICATED.





Which statement is true about the scatterplot?

- **A.** All Ferris wheels built before 1980 must have been less than 60 meters high.
- **B.** Based on the line of best fit, Ferris wheel heights increase about 25 meters every 10 years.
- **C.** Each Ferris wheel is taller than all Ferris wheels that were built earlier.
- **D.** Each year, more Ferris wheels were built than the year before.

2

Grade 8 Teacher's Guide

Mathematics MCA Item Sampler Answer Key Grade 8 Math

Item #	Correct Answer	ltem Type	Strand	Standard	Benchmark
1	D	MC	1	1	01
2	С	MC	1	1	04
3	D	MC	1	1	05
4	С	MC	2	1	01
5	В	MC	2	1	02
6	С	MC	2	2	01
7	В	MC	2	4	04
8	А	MC	3	2	02
9	С	MC	2	1	04
10	В	MC	2	2	02
11	D	MC	2	2	03
12	С	MC	2	2	05
13	С	MC	2	3	02
14	D	MC	2	4	03
15	Grid	GR	2	4	06
16	В	MC	2	4	07
17	С	MC	3	1	02
18	D	MC	2	1	05
19	D	MC	2	2	04
20	В	MC	2	3	01
21	С	MC	2	4	01
22	А	MC	2	4	02
23	В	MC	2	4	05
24	Grid	GR	3	1	01
25	В	MC	3	2	03
26	В	MC	4	1	02