

Minnesota MCA Grade 8 Math Practice

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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	$f(x) = a(b)^x$

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.

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.





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?

A.

x	y
-1	0
0	0
1	2

B.

x	y
-1	-2
0	0
1	2

C.

x	y
-1	-2
0	0
0	2

D.

x	y
-1	-1
0	0
1	1

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. $f(g) = \frac{g}{12}$

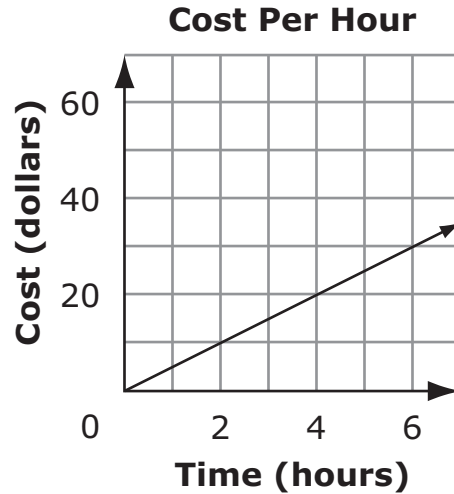
C. $f(c) = \frac{c}{12}$

D. $f(g) = \frac{c}{12}$



1

6. A graph is shown.



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. $4x + 8y \leq 100$
 - B. $4x + 8y \geq 100$
 - C. $8x + 4y \leq 100$
 - D. $8x + 4y \geq 100$



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. $y = 2x - 5$



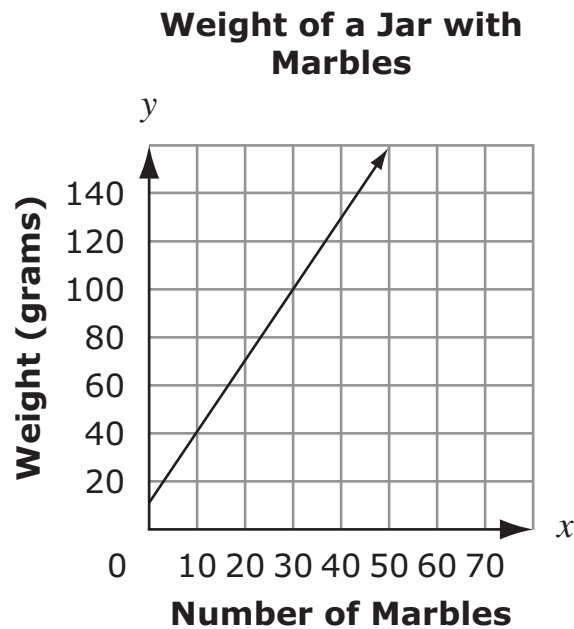
Mathematics Test — Segment 2

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.

$$m = 4p + 3$$

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

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

2

-
- 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.** $6x - 2y = 16$

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 (-).

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



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

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

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

- 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.

$-1 \quad -7 \quad -13 \quad -19 \quad -25 \quad \dots$

What is the function rule for the sequence?

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



20. What is the value of $-3|-2x - y|$ when $x = -4$ and $y = 5$?

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

2

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?

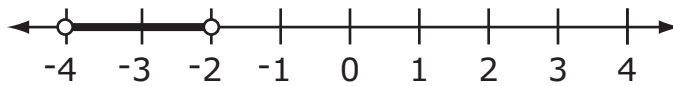
- A.** $t = n + 8$
 - B.** $t = 3n + 1$
 - C.** $t = 3n + 5$
 - D.** $t = 5n + 3$
-

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.



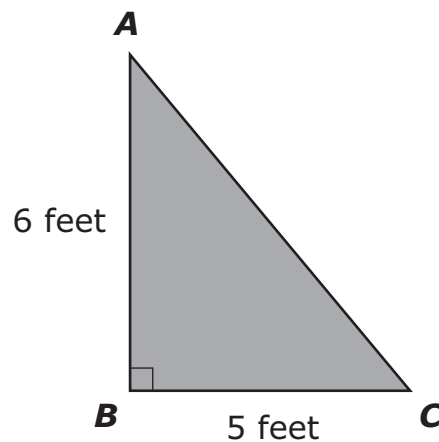
Which equation has the solution shown on the number line?

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

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 (-).

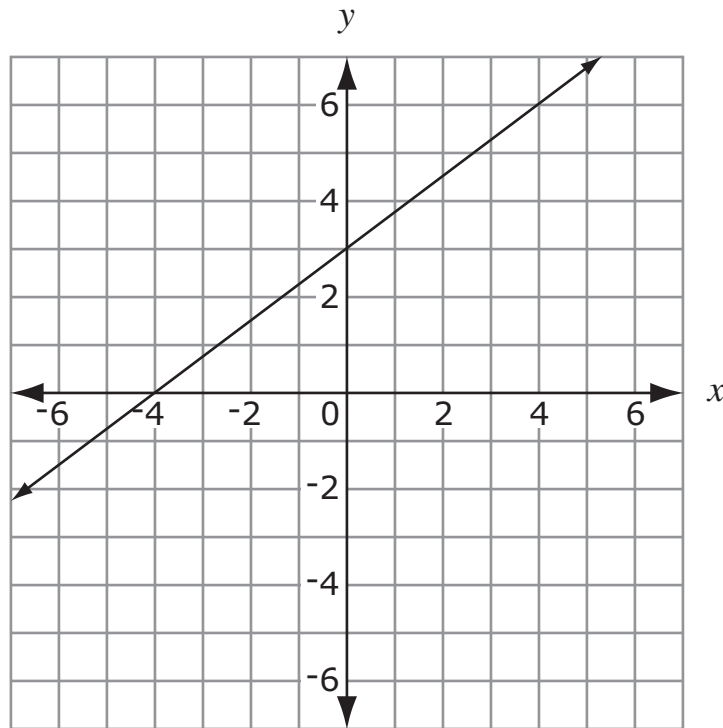
24. A triangle is shown.



What is AC?



25. The graph of a line is shown.

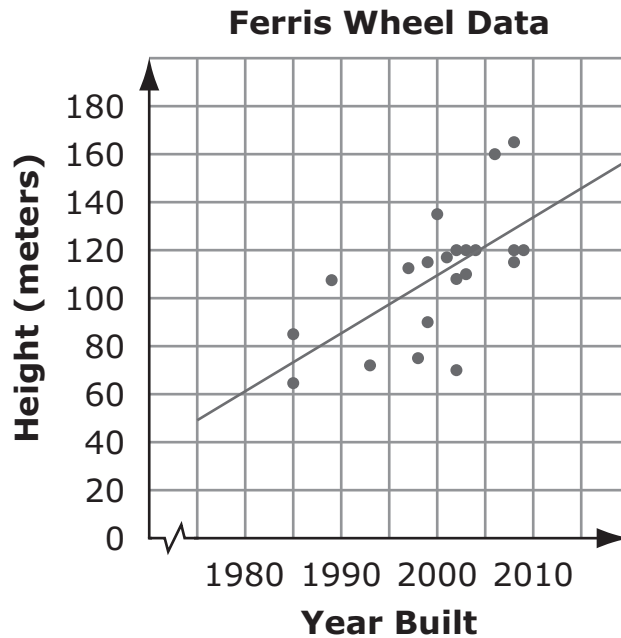


What is the equation of a line that is perpendicular to the line shown and goes through the point $(3, -1)$?

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

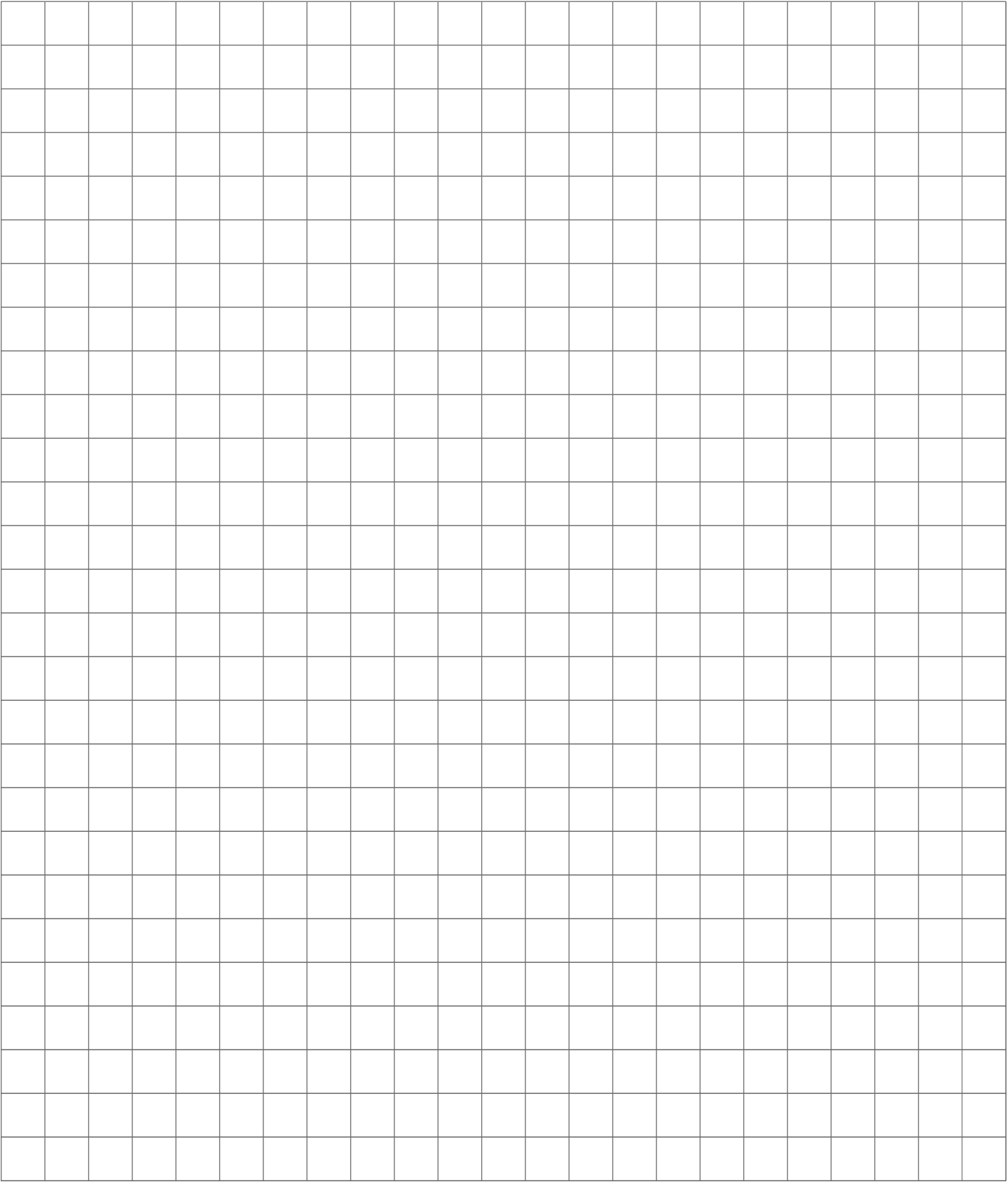


- 26.** The scatterplot shows the heights of Ferris wheels and the years they were built.



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.



Grade 8 Teacher's Guide

Mathematics MCA Item Sampler Answer Key Grade 8 Math

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

Grade 8 Teacher's Guide

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.