

Released Form

Published August 2026

NC Math 3

North Carolina End-of-Course Assessment



Public Schools of North Carolina

Department of Public Instruction | State Board of Education

Division of Accountability Services/North Carolina Testing Program

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1 Which expression is equivalent to $x^2 - 100y^2$?

A $(x - 50y)(x - 50y)$

B $(x - 50y)(x + 50y)$

C $(x - 10y)(x - 10y)$

D $(x - 10y)(x + 10y)$

2 Two functions are shown.

$$f(x) = \frac{50}{3x + 5}$$

$$g(x) = \frac{20}{x - 3}$$

For what value of x does $f(x) = g(x)$?

A -25

B -24

C -0.8

D -0.7



- 3 A function is shown.

$$f(x) = \frac{5x + 20}{x^2 + x - 12}$$

At which positive x -value is the function discontinuous?

- A $x = 2$
- B $x = 3$
- C $x = 4$
- D $x = 6$

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Question 4 requires you to write your answer in the boxes. Write only one number or symbol in each box.

4 A function is shown.

$$f(x) = \begin{cases} 2x + 7 & \text{for } x < 3 \\ \frac{15}{x} & \text{for } x \geq 3 \end{cases}$$

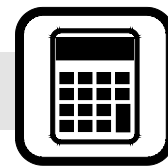
What is the value of $f(3) + f(-2)$?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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- 5 This is a copy of an online technology-enhanced item.

The function $f(x) = \frac{1}{x}$ was translated 1 unit up and 2 units to the left, resulting in the function g .

Place (click and drag) one option from each of the lists below into its corresponding box to create the function g .

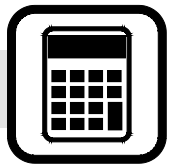
$$g(x) = \overset{1}{\boxed{}} + \overset{2}{\boxed{}}$$

1

-2
-1
1
2

2

$\frac{1}{x-2}$
$\frac{1}{x-1}$
$\frac{1}{x+1}$
$\frac{1}{x+2}$



6 Which expression is equivalent to $(10x^2 + 38x - 8) \div (2x + 8)$, if $x \neq -4$?

- A $5x - 3$
- B $5x - 1$
- C $5x + 1$
- D $5x + 2$

7 Which choice is a point of discontinuity on the graph of $f(x) = \frac{7}{12x^2 + 2x - 30}$?

- A $x = -6$
- B $x = -\frac{10}{3}$
- C $x = -\frac{5}{3}$
- D $x = -\frac{3}{2}$

8 An equation is shown.

$$3 = 6^{4x - 1}$$

To the nearest ten-thousandth, what is the value of x ?

- A 0.4033
- B 0.3965
- C 0.3253
- D 0.1747



Question 9 requires you to write your answer in the boxes. Write only one number or symbol in each box.

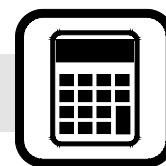
- 9 A function is shown.

$$P(x) = -30x^3 - 63x^2 + 12$$

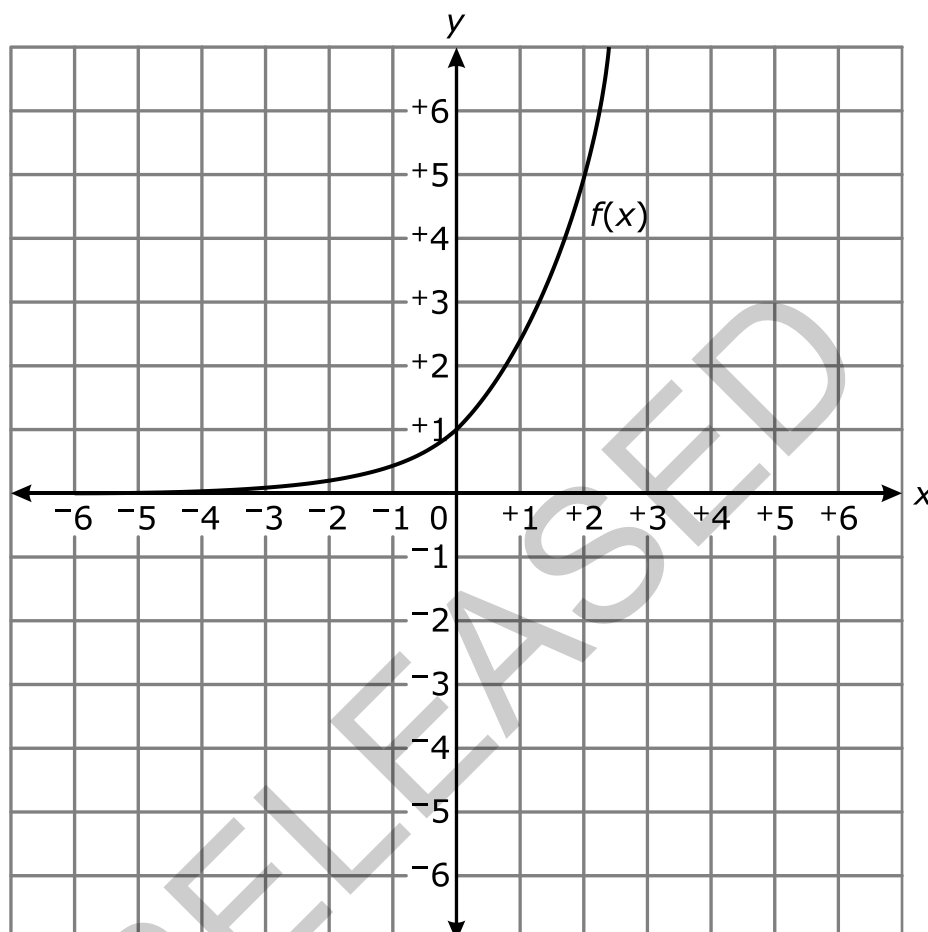
The function has zeros f , g , and h . What is the value of $f + g + h$?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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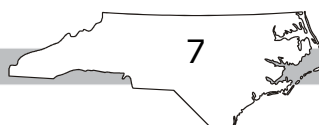


- 10 The graph of a function is shown.

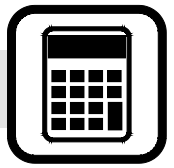


Which function is shown in the graph?

- A $f(x) = 5^{0.5x}$
- B $f(x) = \frac{1}{5}^{5x}$
- C $f(x) = \frac{1}{2}^{5x}$
- D $f(x) = 2^{\frac{1}{5}x}$



Go to the next page.



- 11 If $f(x) = 2x^2 - 11x + 15$ and $f(3) = 0$, which statement is true?
- A $2x + 12$ is a factor of $f(x)$.
 - B $2x - 12$ is a factor of $f(x)$.
 - C $2x + 5$ is a factor of $f(x)$.
 - D $2x - 5$ is a factor of $f(x)$.
- 12 Mindy can do a certain project for her biology class in 9 hours. When Mindy and Larry work together on the project, it takes them 5 hours to complete. How long would it take Larry to complete this project by himself?
- A 10 hours
 - B 10 hours and 30 minutes
 - C 11 hours and 15 minutes
 - D 11 hours and 45 minutes
- 13 Which choice is equivalent to $\frac{x-2}{x+2} - \frac{x+2}{x-2}$?
- A 0
 - B 1
 - C $\frac{-8x+8}{x^2-4}$
 - D $\frac{-8x}{x^2-4}$



Questions 14 and 15 require you to write your answers in the boxes. Write only one number or symbol in each box.

- 14 An equation is shown.

$$6^{(2x+3)} = 14$$

What is the value, to the nearest hundredth, of x ?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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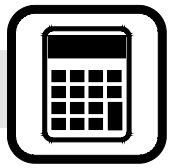
- 15 What is the solution to the equation $\frac{x}{x-2} + \frac{1}{x-4} = \frac{2}{x^2 - 6x + 8}$?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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- 16 A person's score on a standardized test can be given by $Z(x) = \frac{x - 250}{40}$, where x is the person's actual score on the test. Which function is the inverse of $Z(x)$?

A $Z^{-1}(x) = 40x + 250$

B $Z^{-1}(x) = 40x - 250$

C $Z^{-1}(x) = \frac{x - 40}{250}$

D $Z^{-1}(x) = \frac{x + 40}{250}$

- 17 A park has a circular path as described.

- The outer edge of the path has a diameter of 180 meters.
- The inner edge of the path has a diameter of 160 meters.

What is the area, in square meters, of the path?

A 100π

B 400π

C $1,700\pi$

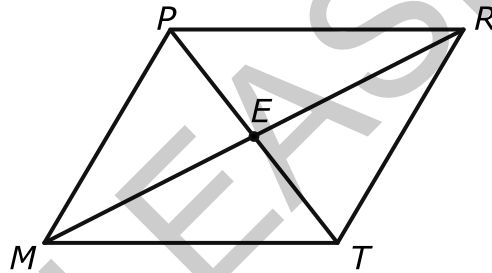
D $6,800\pi$



- 18 Paula painted the front side of a sign that was in the shape of a regular hexagon. Each edge of the sign measures 9 inches. The paint she used cost a total of \$14.50. **Approximately** how much did she spend on paint per square inch?

A \$0.03
 B \$0.07
 C \$0.14
 D \$0.24

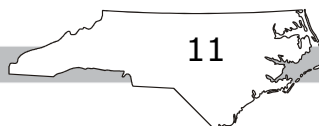
- 19 Rhombus $MPRT$ is shown. Point E is where the diagonals intersect.



The distance from M to E is 8 units. The distance from P to E is 6 units.

What is the measure of the perimeter of $MPRT$?

A 24 units
 B 28 units
 C 32 units
 D 40 units

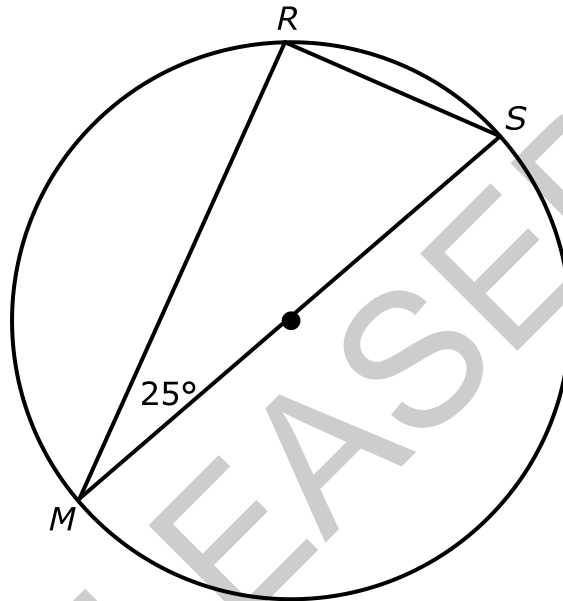


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Questions 20 and 21 require you to write your answers in the boxes. Write only one number or symbol in each box.

20 A diagram is shown.



What is the measure of minor arc MR , in degrees?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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- 21 The equation of a circle is shown.

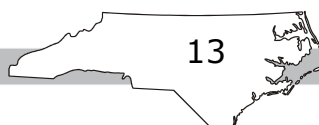
$$x^2 + y^2 - 8x + 6y + 9 = 0$$

What is the length, in units, of the radius?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

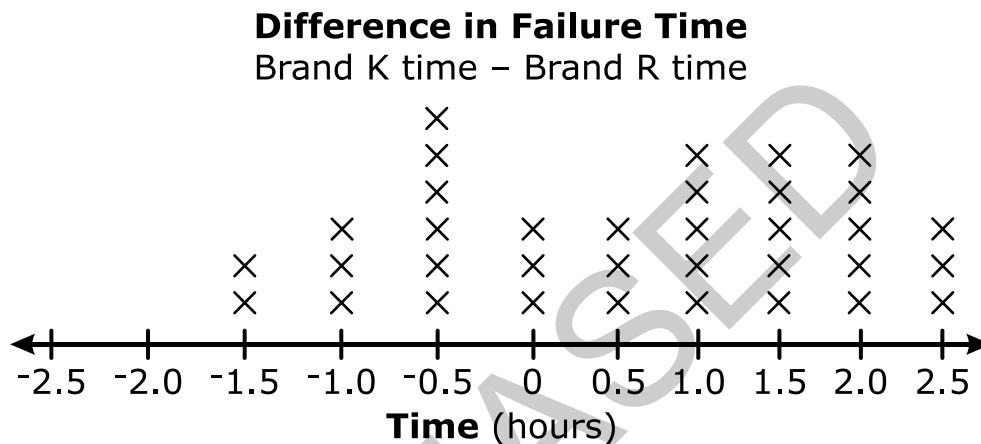
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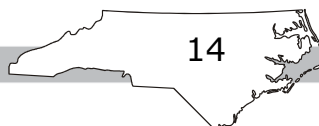


- 22 A company is determining which brand, Brand K or Brand R, of lightbulbs to use. The company conducts tests by pairing a lightbulb from each brand, measuring the time the lightbulbs take to burn out from continuous use, and recording the Brand K time minus the Brand R time. The results of the 35 tests are shown in the chart.



Which statement is valid?

- A The company should choose Brand R bulbs. The difference that occurred most often is -0.5 hour, which favors Brand R.
- B The company should choose Brand K bulbs. Brand K bulbs had a higher average time before burning out than Brand R.
- C The company can pick either Brand K or Brand R. Sometimes Brand K lasted longer and sometimes Brand R lasted longer.
- D The company should conduct the test again because the sample averages had variation.



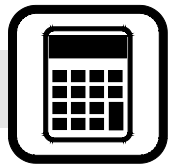


- 23 This is a copy of an online technology-enhanced item.

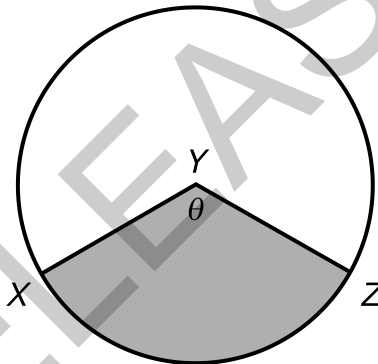
A survey of 500 people in a town found that 55% of the people are in favor of building a new school.

Place (click and drag) the description of the population and the sample into the appropriate column in the table.

Population	Sample
all of the people that live in the town	the 225 people that oppose the new school
the 275 people that are in favor of the new school	the 500 people that were surveyed



- 24 The expression $75(1.025)^t$ can be used to determine the value of an investment after t years. The interest on the investment is being compounded yearly. Which statement is true?
- A The initial value of the investment is \$75.
 - B The initial value of the investment is \$25.
 - C The interest rate on the investment is 0.75%.
 - D The interest rate on the investment is 0.25%.
- 25 The circumference of circle Y is 12π cm, and the length of arc XZ is 4π cm.



What is the measure of $\angle XYZ$?

- A $\frac{\pi}{3}$ radians
- B $\frac{2\pi}{3}$ radians
- C 3π radians
- D 8π radians



Questions 26 and 27 require you to write your answers in the boxes. Write only one number or symbol in each box.

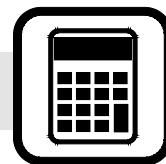
26 Richard and Stanley each drink a cup of coffee every morning.

- Stanley spends \$3.50 at a store on his way to work.
- Richard bought a coffee maker for \$119 and spends \$0.40 on supplies to make a cup of coffee each morning.

How many days will it take for Richard's average cost per cup, including the coffee maker, to be less than Stanley's?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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- 27 An equation is shown.

$$0.36 = \frac{x + 3}{2x - 1}$$

What is the value of x ?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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- 28 The function $f(x)$ is defined as $f(x) = x^3 + 3x^2 + kx - 10$, where k is an integer. If $(x - 1)$ is a factor of the polynomial, what is the value of k ?

A 9
B 6
C -1
D -8

- 29 A piecewise function is shown.

$$f(x) = \begin{cases} 3x^2 + 4 & \text{for } x < -3 \\ \frac{3x + 1}{x} & \text{for } x \geq -3 \end{cases}$$

What is the value of $f(-3)$?

A -32
B $-\frac{10}{3}$
C $\frac{8}{3}$
D 31



30 This is a copy of an online technology-enhanced item.

A function is shown below.

$$f(x) = x^3 + 5x^2 - 9x - 45$$

Select (click) the **two** statements that are true.

☐

As x approaches negative infinity, y approaches negative infinity.

☐

As x approaches positive infinity, y approaches negative infinity.

☐

The function is decreasing where x is less than -4.07 , and where x is greater than 0.74 .

☐

The function has a relative maximum at about $(-4.07, 7.04)$.



31 Which equation describes the graph that is produced by moving $y = |x|$ to the right 3 units and down 2 units?

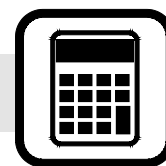
A $y = |x + 3| - 2$

B $y = |x + 3| + 2$

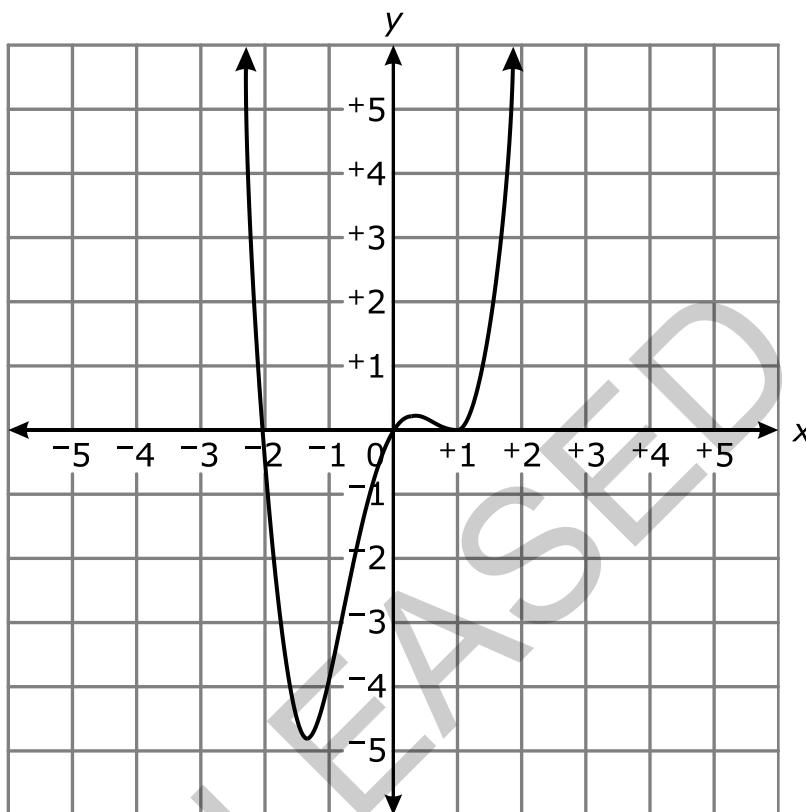
C $y = |x - 3| - 2$

D $y = |x - 3| + 2$

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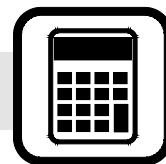


32 A graph is shown.



Which function is graphed?

- A $f(x) = x^4 + 3x^2 - 2x$
- B $f(x) = x^4 - 3x^3 + 4x$
- C $f(x) = x^4 + 3x^3 - 4x$
- D $f(x) = x^4 - 3x^2 + 2x$



Questions 33 and 34 require you to write your answers in the boxes. Write only one number or symbol in each box.

33 An equation is shown.

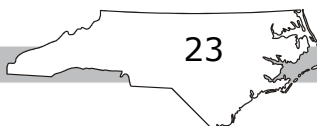
$$3(x + 1) = 7$$

What is the value, to the nearest hundredth, of x ?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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- 34 Two functions are shown.

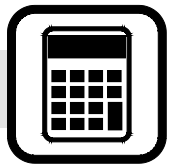
$$h(x) = \frac{x + 1}{x - 3}$$

$$k(x) = -x^2 - 2x + 24$$

What is the y -value, to the nearest hundredth, of the point where the graph of $h(x)$ intersects the graph of $k(x)$?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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35 Which expression is equivalent to $\frac{4x^3 - 2x^2 + 10}{x + 4}$?

A $4x + 44 + \frac{66}{x + 4}$

B $4x^2 - 18x + 72 - \frac{278}{x + 4}$

C $4x - 18 + \frac{82}{x + 4}$

D $4x^2 + 14x + 56 + \frac{254}{x + 4}$

36 Which expression is equivalent to $\frac{11x + 6}{6x + 18} - \left(\frac{2}{2x + 6} + \frac{5x}{3x + 9} \right)$?

A $\frac{x}{6x + 18}$

B $\frac{6x + 4}{x + 3}$

C $\frac{x + 12}{6x + 18}$

D $\frac{7x + 4}{2x + 6}$

37 Which function has the **greatest** rate of change over the interval $8 \leq x \leq 12$?

A $g(x) = 5x + 12$

B $m(x) = x^2 + 6x + 5$

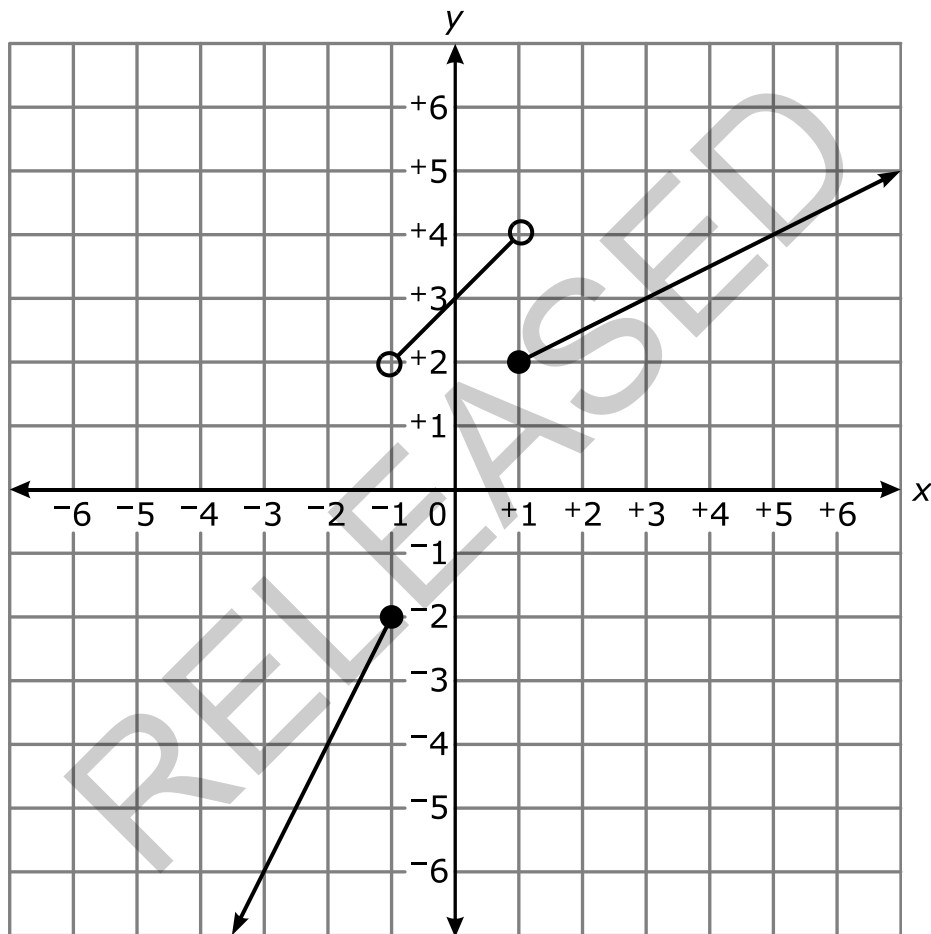
C $r(x) = 3x^3 + 16x - 9$

D $t(x) = 2^x$



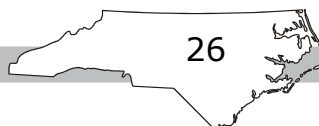
Question 38 requires you to write your answer in the boxes. Write only one number or symbol in each box.

38 This shows the graph of $f(x)$.

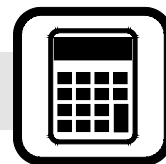


What is the value of $f(-1) + 2f(0) - f(5)$?

Grid and instructions are on the following page.



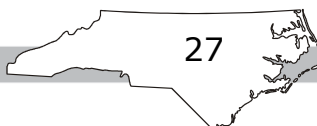
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Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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- 39 Which quartic function has zeros at -6 and 2.5 , and a double zero at 1 ?
- A $g(x) = 2x^4 - 13x^3 - 2x^2 + 43x + 30$
- B $g(x) = -2x^4 - 3x^3 + 42x^2 - 67x + 30$
- C $g(x) = 5x^4 - 22x^3 - 47x^2 - 8x + 12$
- D $g(x) = -5x^4 - 18x^3 + 63x^2 - 52x + 12$
- 40 Carla is making an open-top box using a 16-foot-by-10-foot rectangular piece of cardboard. She will cut congruent squares of length x from each corner of the piece of cardboard to make the box. Which equation can be used to determine the volume, v , of the box?
- A $v = 160 - 4x^2$
- B $v = x^3 - 26x^2 + 160x$
- C $v = x^3 - 52x^2 + 160x$
- D $v = 4x^3 - 52x^2 + 160x$
- 41 A population, p , triples in number every year. Which expression **best** represents the population after w weeks?
- (Note: There are 52 weeks in a year.)
- A $p \cdot 1.0214^w$
- B $p \cdot 1.0577^w$
- C $3p \cdot 1.0214^w$
- D $3p \cdot 1.0577^w$



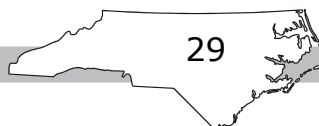
Questions 42 and 43 require you to write your answers in the boxes. Write only one number or symbol in each box.

- 42 The function $h(x) = x^3 + bx^2 - 3x + 90$ has $(x - 5)$ as a factor and a zero at $x = 6$. What is the value of the constant b ?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

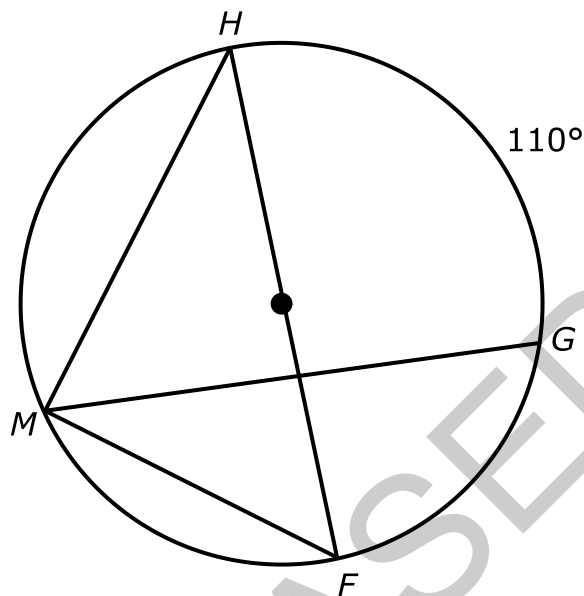
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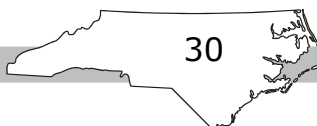
- 43 A figure is shown.



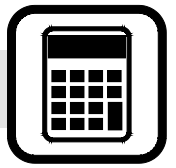
What is the measure of $\angle GMF$, in degrees?

Only 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -, and / are allowed in your answer. Mixed numbers are entered by adding a space after the whole number. Spaces are only allowed between whole numbers and fractions.

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44 This is a copy of an online technology-enhanced item.

Select (click) the **two** options that would result in a random sample of the intended population.

☐

surveying 20 random players on the football team about students' opinions on renovating the school football stadium

☐

surveying all of the juniors in a school about the favorite after-school activity of all students in the school

☐

surveying every third student on an alphabetical list about students' opinions on the quality of food in the cafeteria

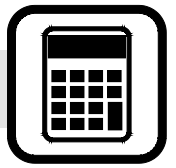
☐

surveying four students selected with a random number generator from each homeroom about the best day to have an assembly

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45 The endpoints of a diameter of a circle are located at $(-1, 1)$ and $(3, 1)$. Which is an equation of the circle?

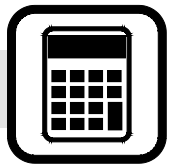
- A $x^2 + y^2 + 4x = 0$
- B $x^2 + y^2 + 4x - 12 = 0$
- C $x^2 + y^2 - 2x - 2y - 2 = 0$
- D $x^2 + y^2 - 2x - 2y - 14 = 0$

46 Point E is the circumcenter of $\triangle MRS$.

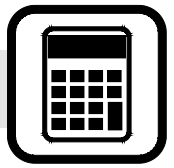
- K is the midpoint of $\overline{MR}$.
- The measure of $\overline{MK}$ is 8 units.
- The measure of $\overline{RE}$ is 10 units.
- $\overline{EK}$ measures $(2x - 10)$ units.

What is the value of x ?

- A 6
- B 8
- C 10
- D 12



- 47 A circle has a diameter of 16 meters. An arc on that circle has a length of 4 meters. What is the **approximate** measure of the central angle that corresponds to the arc?
- A 29°
- B 45°
- C 58°
- D 90°
- 48 The volume of a cube was tripled by increasing the side length. By what factor did the side length increase?
- A $\frac{1}{3}$
- B 3
- C $\sqrt{3}$
- D $\sqrt[3]{3}$



49 Rectangle $URST$ has diagonals RT and SU that intersect at point Z .

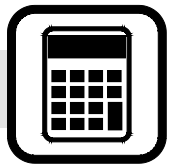
- The measure of segment RT equals $5x + 8$.
- The measure of segment RZ equals $4x + 1$.

What is the distance from point U to point Z ?

- A 2 units
- B 4 units
- C 9 units
- D 18 units

50 A school wants to find out which new lunch choice its students would prefer. Which procedure is **most likely** to obtain a statistically unbiased sample?

- A surveying a random sample of students from a list of all students
- B inviting all students to indicate their choice with a text message
- C placing suggestion boxes at random locations in the school
- D assembling a group with one male and one female student from each grade and recording the preferences of these students

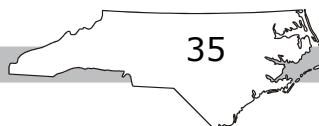


This is the end of the Mathematics test.

Directions:

- 1. Look back over your answers for the calculator active questions only.**
- 2. Make sure all your answers are entered appropriately in your book.**
- 3. Put all of your papers inside your test book and close your test book.**
- 4. Place your calculator on top of the test book.**
- 5. Stay quietly in your seat until your teacher tells you that testing is finished.**
- 6. Remember, teachers are not allowed to discuss questions from the test with you, and you are not allowed to discuss with others any of the test questions or information contained within the test.**

RELEASED



NC MATH 3 RELEASED FORM

NC Math 3 Released Form 2026 Answer Key

Table 1

Question Number	Question Type ¹	Key	DOK ²	Standard
1	MC	D	1	A-SSE.2
2	MC	A	1	A-REI.11
3	MC	B	2	F-IF.4
4	GR	8	1	F-IF.2
5	TD	See Table 2	2	F-BF.3
6	MC	B	1	A-APR.6
7	MC	C	2	F-IF.7
8	MC	A	2	F-LE.4
9	GR	-2.1	1	F-IF.7
10	MC	A	2	F-BF.1.a
11	MC	D	2	A-APR.2
12	MC	C	2	A-CED.1
13	MC	D	2	A-APR.7.a
14	GR	-0.76	2	F-LE.4
15	GR	-1	2	A-REI.2
16	MC	A	2	F-BF.4.c
17	MC	C	2	G-MG.1

NC MATH 3 RELEASED FORM

Question Number	Question Type	Key	DOK ²	Standard
18	MC	B	2	G-MG.1
19	MC	D	2	G-CO.14
20	GR	130	2	G-C.2
21	GR	4	2	G-GPE.1
22	MC	B	2	S-IC.5
23	DD	See Table 2	1	S-IC.1
24	MC	A	1	A-SSE.1.a
25	MC	B	2	F-TF.1
26	GR	39	3	A-CED.1
27	GR	-12	1	A-REI.2
28	MC	B	2	A-APR.2
29	MC	C	1	F-IF.2
30	MS	See Table 2	1	F-IF.7
31	MC	C	1	F-BF.3
32	MC	D	2	F-BF.1.a
33	GR	0.77	2	F-LE.4
34	GR	0.55	2	A-REI.11
35	MC	B	2	A-APR.6
36	MC	A	2	A-APR.7.a
37	MC	D	1	F-LE.3
38	GR	0	2	F-IF.2
39	MC	B	2	F-BF.1.a

NC MATH 3 RELEASED FORM

Question Number	Question Type	Key	DOK ²	Standard
40	MC	D	2	A-CED.2
41	MC	A	3	A-SSE.3
42	GR	-8	2	A-APR.3
43	GR	35	2	G-C.2
44	MS	See Table 2	2	S-IC.1
45	MC	C	2	G-GPE.1
46	MC	B	2	G-CO.14
47	MC	A	1	G-C.5
48	MC	D	3	G-GMD.3
49	MC	C	2	G-CO.14
50	MC	A	3	S-IC.3

¹Question Type:

MC = multiple choice
 DD = drag and drop
 GR = gridded response
 MS = multiselect
 TD = targeted drop

²DOK:

1 = Recall
 2 = Skill/Concept
 3 = Strategic Thinking

NC MATH 3 RELEASED FORM

Table 2

Question	Technology Enhanced Item Solution
5	$1, \frac{1}{x+2}$
23	all of the people that live in the town, the 500 people that were surveyed
30	As x approaches negative infinity, y approaches negative infinity. The function has a relative maximum at about $(-4.07, 7.04)$
44	surveying every third student on an alphabetical list about students' opinions on the quality of food in the cafeteria surveying four students selected with a random number generator from each homeroom about the best day to have an assembly

