

TEST NAME: Math Algebra 2 FAIM 2016 Form 2-A

TEST ID: 1549494

GRADE: Ninth Grade - Twelfth Grade

SUBJECT: Mathematics

TEST CATEGORY: State Interim Assessment

Student:

Class:

Date:

1. The value of Amy's car depreciated each year. The expression $k(0.88)^t$ represents the value of Amy's car after t years. What is the rate of depreciation?
 - A. 0.12%
 - B. 0.88%
 - C. 12%
 - D. 88%

2. A magazine news editor wants to determine the proportion of the magazine's subscribers who favor paying for improved public bus service through an increase in a property tax.

Which technique would likely provide the most accurate, impartial random sample?

 - A. The magazine sends survey postcards to 500 subscribers at random.
 - B. A reporter interviews 500 people walking along the street near the magazine offices.
 - C. Readers are asked to email the magazine and express their preference; 500 responses are selected at random.
 - D. The editor selects 500 phone numbers at random from phone books covering the magazine's distribution area; each number is called and the respondents are asked their preference.

3. What is the simplest form for the following sum?

$$(2 + 5i) + (i^2 + 6i)$$

A. $-2 + 37i$

B. $1 + 11i$

C. $2 + 12i$

D. $3 + 11i$

4. When the polynomial $3x^2 + 2x + 2$ is divided by $(x - 1)$, the remainder is 7. What would be the constant of the polynomial need to be in order for it to be divisible by $(x - 1)$?

5. The table below shows the corn production of four corn-producing countries of the world and their individual populations.

FOUR CORN-PRODUCING COUNTRIES		
Country	Annual Corn Production (thousands of metric tons)	Population
United States	272,400	310,000,000
China	200,000	1,340,000,000
Brazil	70,000	193,000,000
Mexico	28,000	108,000,000

A reporter analyzes these data and comes to the following conclusion: Brazil produces about 3 times the amount of corn per person per year as Mexico produces.

Which statement **best** describes why the reporter's conclusion is correct or incorrect?

- A. The reporter is correct because Brazil produces about 3 tons of corn per person per year.
 - B. The reporter is correct because Brazil produces about 3 times as much corn as Mexico produces per year.
 - C. The reporter is incorrect because Brazil only produces about 40% more corn per person per year than Mexico produces.
 - D. The reporter is incorrect because Mexico produces about 1 more ton of corn per person per year than Brazil produces.
6. Andy calculates that out of the 100 students that signed up for a charity walk, 60 are juniors, 40 are boys, and 35 are girls who are juniors. What is the probability that a student chosen randomly from the group is either a junior or a girl?
7. A number of high school students were asked to choose their preferred after-school activity. Twenty-five percent of the students chose both football and baseball, and 42% of the students chose only football. What percent of the students who chose football also chose baseball as their preferred after-school activity? Round your answer to the nearest whole percent.

8. Three students are to be selected to serve on a school advisory panel from a class of 35 students. Which student advisory panel would yield data that is **most likely** to be representative of the entire class?
- A. The first three names on the class roll
 - B. The first three students who volunteer
 - C. The first three students who show up for class tomorrow
 - D. The first three names chosen from all student names placed in a hat
9. The time a boat on a river takes to travel a certain distance depends on the speed of the boat in still water and the speed of the current. The function given below represents the time taken by the boat to travel a distance of 60 miles, where 17 is the speed of the boat in still water and r is the average speed of the current, both in miles per hour.

$$T(r) = \frac{60}{17 - r}$$

Positive values of r represent the speed of the current when the boat is going against the current, while negative values of r represent the speed of the current when the boat is going with the current.

Part A. Find the domain of the function. Write your answer in interval notation.

Part B. Interpret the domain in terms of the context. Include in your answer an explanation for any domain values that are undefined.

Use words and/or numbers to show your work.

10. When $x \geq 1$, what is $\left(\sqrt[4]{x^2 - 2x + 1}\right)^2$ written in the most simple form of the expression?

11. Which expression is equivalent to

$$(2x)^{\frac{1}{2}} \cdot (2x)^{\frac{1}{3}}?$$

A. $\sqrt[6]{2x}$

B. $\sqrt[6]{4x^2}$

C. $\sqrt[6]{32x^5}$

D. $2x \cdot \sqrt[6]{16x^4}$

12. Ceri buys books for \$1.50 each, and she sells them for \$10.48 each at a local book fair. Ceri also buys magazines for \$1.05 each, and she sells them at the fair for \$5.55 each.

During the fair, Ceri sells 37 items for a profit of \$233.70. (Profit for each item is the selling price minus the buying price.) How many books does Ceri sell?

13. During low tide, the height of a wave is 2 meters above sea level. During high tide, 6 hours later, the height of the wave is 8 meters above sea level. Assuming a 12-hour cycle, what trigonometric function, using degrees, models the height of the wave, $h(x)$, in terms of time, x , in hours. (Assume that time is 0 at low tide.)

14. Which of these expressions is equivalent to $\frac{2x^4 + 3x^3 + 5x - 1}{x^2 - 2x + 2}$?

A. $2x^2 + 7x + 10 + \frac{11x - 21}{x^2 - 2x + 2}$

B. $2x^2 - x + 4 + \frac{-5x + 7}{x^2 - 2x + 2}$

C. $2x^2 + 7x + 10 - \frac{11x - 21}{x^2 - 2x + 2}$

D. $2x^2 + 7 + \frac{-15x - 15}{x^2 - 2x + 2}$

15. Which of these is **true** for the inverse of the function $f(x) = (x + 1)^2$ on the domain $x \leq -1$?
- A. $f^{-1}(x) = \sqrt{x} - 1$
- B. $f^{-1}(x) = -\sqrt{x} - 1$
- C. $f^{-1}(x) = \sqrt{x - 1}$
- D. $f^{-1}(x) = -\sqrt{x - 1}$
16. The function $f(x) = x^2 + 5$ is translated 3 units right and 1 unit up. Write the resulting function, g .
17. Look at the expression below.
- $$(a + bi)^2$$
- If $a = b = 8$, which statement is **true** about the expression?
- A. The expression has no imaginary part.
- B. The expression has no real part.
- C. The expression is $64 + 64i$
- D. The expression is $8 + 8i$
18. The length of the arc made by a pendulum as it swings freely decreases after every swing. The arc lengths, in millimeters, after the first 3 swings of a certain pendulum are shown below.
- 729, 243, 81 ...

Write an explicit expression that describes the arc length of the pendulum, in millimeters, after n swings.

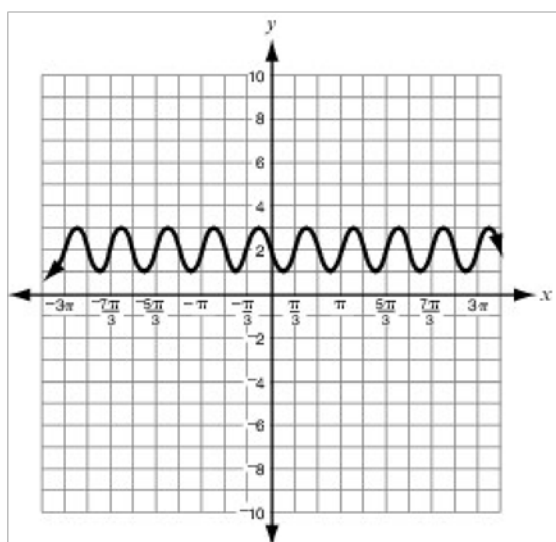
19. If $(a^2 - 1)^2 = a^4 + 1 + k$, what is the value of k ?

- A. $-a^2$
- B. a^2
- C. $2a^2$
- D. $-2a^2$

20. What is the solution of the equation

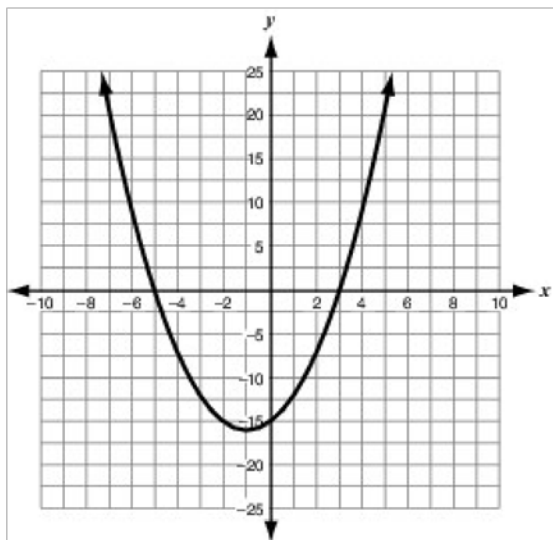
$$\sqrt{3x + 4} = 4?$$

21. A sinusoidal function is graphed on the coordinate plane below.



What is the period of this graph?

22. Use the graph below to answer the question.



Which equation **best** represents the graph?

- A. $(x - 3)(x + 5) = y$
- B. $(x - 3)(x - 5) = y$
- C. $(x + 3)(x + 5) = y$
- D. $(x + 3)(x - 5) = y$

23. During a math test, Charlie is given the equation $4x^2 - 9x + 18 = 0$ and asked to find its discriminant.

Part A. What is the discriminant of the equation? What does this discriminant tell Charlie about the nature of the solutions to the equation?

Part B. Once he finds the discriminant, Charlie is asked to solve the equation. What are the solutions to the equation?

Part C. After solving this equation, Charlie is given a new quadratic equation with real coefficients and is asked to solve it. He determines that there are two solutions, one real root and one imaginary root. Are Charlie's solutions correct? Please explain your answer.

Use words, numbers, and/or pictures to show your work.