

PREALGEBRA – MID-ATLANTIC

You have 60 minutes to complete the following 30 multiple-choice questions. Choices A through D are answer choices for every problem. Choice E stands for “none of these answers,” or NOTA. Scoring is as follows: 5 points for a correct answer, 1 point if left unanswered, and 0 points for an incorrect response. Units are assumed. Diagrams not to scale.

1) While Packing for a trip to the Mid-Atlantic one must plan wisely on what kind of outfit to bring. In anticipation of it being cold, Eric packs 3 tassel hats, 4 sweaters, 2 pairs of pants, 5 pair of socks and 2 pairs of shoes. Given this how many different combinations of outfits can Jack wear on the trip?

- A. 8 B. 16 C. 120 D. 240 E. NOTA

2) Harold moves in with his Auntie in New York City and is excited because this year he'll get to see the ball drop on New Year's Day. He arrives early on a Wednesday. If New Year's Day is 37 days away from the day Harold arrived. What day is New Year's Day on?

- A. Friday B. Saturday C. Sunday D. Thursday E. NOTA

3) Lindsay and Vera have lost each other in the hustle and bustle of the New York City streets. Lindsay is on a point (3,7) on the coordinate plane and Vera is at the point (-2,7) on the coordinate plane. What is the shortest distance between the two girls. They can only follow the streets, no diagonals.

- A. 4 Units B. 5 Units C. 12 Units D. 13 Units E. NOTA

4) Andrew estimates that the Liberty Bell will break in half if he were to hit it X times where X can be calculated by the expression $X = (12y - 42)[y - 2(14)]$, where y is the number of questions on this test. How many times does Andrew have to hit the Liberty Bell in order to break it in half?

- A. 318 B. 636 C. 678 D. 10,412 E. NOTA

5) Getting into the University of Pennsylvania is extremely hard. While touring the college campus, Brighten learns his chances of being accepted into the school is 10.57%. Let X be the decimal representation of Brighten's chance of getting accepted into the University of Pennsylvania. What digit is in the tenths place of X ?

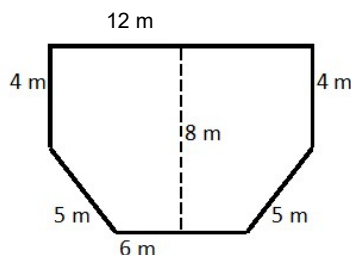
- A. 0 B. 1 C. 5 D. 7 E. NOTA

6. Bryan and Chris are big fans of physics. While visiting Washington D.C., they make a personal trip to the National Academy of Sciences. One of the most recognized scientists in all of history is Sir Isaac Newton. Newton's Second Law of Motion states that $F=ma$. Find a in terms of F and m .

- A. $a = \frac{F}{m}$ B. $a = \frac{m}{F}$ C. $a = F - m$ D. $a = F + m$ E. NOTA

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7. Bryan passes by the White House with his MAΘ club. While looking at the White House, he gets curious about the garden area enclosed by the fence. What is the area is enclosed by the solid fencing as shown below?



- A. 72 m^2 B. 76 m^2 C. 96 m^2 D. 240 m^2 E. NOTA

8. During one of the van rides, Kaitlyn gives this problem to try and stump Brighten : Suppose $A \# B = 2(A) + 2(B)$. Find $(6 \# (12 \# 13))$.

- A. 24 B. 48 C. 72 D. 112 E. NOTA

Questions 9 and 10 are all based on the same six boys: Chris, Brighten, Nathan, Rahul, Ben, and Bryan.

9. In Washington D.C., one can find many runners in the streets every morning. Nathan, Brighten, Rahul, Chris, Ben, and Bryan all meet one day to go on a morning run. In order to make things more fun, the boys decide to make it a race. In the race, Brighten came in first, Ben came in last, Bryan didn't finish third, Chris finished behind (though not necessarily directly behind) Bryan, Nathan finished fourth, Rahul finished before Nathan, and Bryan finished before Rahul. Which place did Chris come in?

- A. Not Enough Information B. 2nd C. 5th D. 6th E. NOTA

10. While freezing in the Adirondack Mountains, Joy dreams of visiting Disney. Joy learns that the EPCOT dome is made up of exactly 11,324 equilateral triangles with each having a perimeter of three feet. If the height of the triangles is \clubsuit feet, what is the area of all the triangles in the EPCOT dome? (Hint: The area of this triangle is side * height divided by 2)

- A. $\clubsuit \text{ ft}^2$ B. $5662\clubsuit \text{ ft}^2$ C. $11324\clubsuit \text{ ft}^2$ D. $16986\clubsuit \text{ ft}^2$ E. NOTA

11. Some Chiles MAΘ club alumni decide to visit the Horseshoe Casino in Baltimore, Maryland while the others stay at a hotel. While playing a few games a member rolls two standard 6-sided dice. Find the probability that the sum of the two face-up sides is a prime number.

- A. 0 B. $\frac{5}{12}$ C. $\frac{1}{2}$ D. $\frac{3}{4}$ E. NOTA

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12. Filippo's dream school is the Juilliard School of Music, located in New York City, New York. While taking a tour of the school, Filippo overhears a student playing "Clair de lune" on the piano for fun. "Clair de lune" has a time signature of $\frac{9}{8}$. Which of the following expresses $\frac{9}{8}$ in decimal form rounded to the nearest hundredth?

- A. 0.89 B. 0.98 C. 1.13 D. 1.25 E. NOTA

13. Rahul and Noah decide to play a game on their car ride. Noah chooses a license plate number and has to calculate the sum of the mean and median of its digits. Then Rahul chooses a license plate and has to calculate the sum of the mean and median of its digits. Whoever has the lower number wins! If Rahul's license plate number was 648213 and Noah's was 887139, then who won, and what was the winning number?

- A. Rahul, 7.5 B. Rahul, 13.5 C. Noah, 7.5 D. Noah, 13.5 E. NOTA

14. Andrew is a big fan of weird numbers. $45.\overline{678}$ is among these weird numbers of Andrew's imagination. Which of the following expressions show this number?

- A. $45 + \frac{2}{3} + \frac{8}{1000}$ B. $45 + \frac{67}{100} + \frac{8}{1000}$ C. $45 + \frac{678}{999}$
D. $45 + \frac{17}{25}$ E. NOTA

15. While travelling to New Jersey from New York City, the Alpha boys of Chiles MAΘ get into a heated argument about how fast they are going on the bus. If Princeton, New Jersey is 50 miles away from NYC, and it will take them 1 hour and 15 minutes to get there, how fast are they going in kilometers per hour? (Use the following conversion: 1 mile = 1.6km and give the answer to the nearest tenth).

- A. 80 B. 64 C. 20.8 D. 19.8 E. NOTA

16. Hershey's Chocolates traces its origins back to Pennsylvania. While on a tour Venkat and Jason each decide to purchase some expensive chocolate at the gift shop. The gift shop owner is very impressed with their national MAΘ shirts and tells them the chocolate is on him if they can solve this question.

$$[[2(98+75-2-8-9+4)]\div 2] - [(17+81+90+3\times 93+ 244)\div 4.5]$$

If they want free chocolate what would their answer be?

- A. -30 B. 0 C. 1 D. 2678.39 E. NOTA

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17. In Washington D.C., Michael wants to visit all the tourist attractions there are to offer. If the Lincoln Memorial is at the point (5,2), the Washington Monument is at the point (3,2), and the Capitol is at the point (3,9), what is the area of the triangle formed by these three points

- A. 2 unit B. 5 units C. 7 units D. 14 units E. NOTA

18. While crossing the George Washington Bridge Alex creates a challenge for himself to see how many problems he can solve on a Speed Math test before the car reaches the other side of the bridge. If the bridge is approximately one mile and the car is traveling at 20 mph. How many problems can Alex solve given that it takes him 30 seconds to solve one problem.

- A. 3 B. 12 C. 20 D. 180 E. NOTA

19. Jason is touring in Atlantic City and looking to gamble with his good friend and pal Rob. Every 2nd minute Jason spends gambling, he loses \$4. But every 40th minute, Rob hits it big and earns back \$95. After how many minutes have Jason and Rob won a combined \$120?

- A. 40 B. 120 C. 320 D. 480 E. NOTA

20. Alex always brings his classic phone charger on a road trip and has, not surprisingly, lost it. The phone charger is in the shape of a rectangle. The length in inches is equal to 2 times the width, and the width in inches is the 7th term of the sequence 1,1,2,3,5,_,_. Find the area of Alex's phone charger in square inches.

- A. 84.5 B. 162 C. 169 D. 338 E. NOTA

21. The Buffalo Bills are a professional football team in New York. They play National Football league in the Eastern Division. In each division there are 4 teams. How many different ways could the 4 teams in the Eastern Division play each other?

- A. 4 B. 6 C. 12 D. 24 E. NOTA

22. Jack decides to jump off Niagara Falls in a barrel and see how fast he can reach the bottom. If Niagara Falls is 274 feet deep and it takes him 3 minutes and 15 seconds to reach the bottom what was the average speed of Jack falling in feet per second to the closest tenth.

- A. 1.3 B. 1.4 C. 1.5 D. 1.6 E. NOTA

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23. Jason, Alex, David, Hayden, and Daniel are all hanging out in Atlantic City. Daniel and Hayden want to be rational people and go explore the Boardwalk. But the rest of the gang is very highly irrational and only want to stay in their hotel room and play Smash Brothers. Which of the following sets of numbers has two rational and three irrational numbers?.

A. $\sqrt{3}, 3, \sqrt{13}, \sqrt{16}, \frac{1}{3}$

B. $1, 45, 450, \sqrt{4}, 3$

C. $12\pi, \pi, 12, \frac{12}{12}, 2$

D. $\pi, \sqrt{3}, \sqrt{64}, \frac{12345678901}{421}, \sqrt{123}$ E. NOTA

24. New York Pizza is very good. The radius (R) in inches of each pizza ordered by the five boys is determined by the equation $R = 2x + 2$. The first boy ordered a pizza whose radius is found when $x = 0$. The second boy ordered a pizza whose radius is found when $x = 1$, the third boy when $x = 2$, fourth boy when $x = 3$, and the fifth boy when $x = 4$. What is the sum of the radii of all the pizza the boys ordered, in inches?

A. 10

B. 12

C. 20

D. 30

E. NOTA

25. Simplify. Assume x is a positive number.

$$\frac{(\sqrt{x} + x - |x|) + [(\sqrt{2 \cdot 2}) + (-\sqrt{x})]}{\left| \frac{64}{2^6} \cdot (-\sqrt{1}) \right|}$$

A. -2

B. $-\frac{x}{2}$

C. $\frac{x}{2}$

D. 2

E. NOTA

26. Mia is planning to make a trip to Baltimore on the fourth of July. She notices that her gas tank is only 34 liters full, and decides to fill it completely full (65 liters). If gasoline is 86% crude oil, and 14% other ingredients, how much crude oil will Mia add to her gas tank? All answers are to the nearest liter.

A. 27 Liters

B. 29 Liters

C. 40 Liters

D. 56 Liters

E. NOTA

27. Chris' dance moves can make up a maximum of $\frac{1}{3}$ the amount of fun the MAO kids are having in a room.

$\frac{1}{3}$ is which type of number?

A. Integer

B. Negative

C. Rational

D. Whole

E. NOTA

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28. Alex and Michael are struggling to find a restaurant in Princeton, New Jersey. Their current position is defined as (2,9) and the nearest restaurant's position is defined as (9,2). Which of the following is an equation of the line passing through these two points?

- A. $x + y = 11$ B. $x + y = -11$ C. $x + 7y = 13$ D. $x - 7y = 12$ E. NOTA

29. Major cities such as New York City are complex and difficult to navigate. Unfortunately, Vera gets lost in the city and has to travel to several places in order to get back to the Chiles MAO bus. She travels by car: 3 miles due north, then 4 miles due east, then 5 miles due north, then 12 miles due east, then 8 miles due north, and, finally, 15 miles due east in order to get back to the bus. What is the shortest distance, in miles, Vera is from her starting point once she stepped on the bus had she been able to fly like a bird instead of using the roads? (Assume all turns are exactly 90 degrees).

- A. $\sqrt{1217}$ B. 35 C. 47 D. 16^2 E. NOTA

30. Jaxon attends a New York Knicks professional basketball game. The Knicks have 5 starting players: Frank, Dennis, Julius, Evan, and Reggie. Reggie has more rebounds than Frank, Evan has the least amount of rebounds, Dennis does not have the most rebounds, and Julius has more rebounds than Frank but not Dennis. Who has the second most rebounds out of the team?

- A. Dennis B. Evan C. Julius D. Reggie E. NOTA