**Choose the letter of the correct answer. For all problems, E. NOTA means none of these answers.**

1. The Wow! Signal was a strong radio signal received from outer space by astronomers in Ohio on August 15, 1977. Forty years later, there is still no accepted explanation for it, making it the strongest candidate for an alien radio transmission ever detected. The signal had a frequency of about 1420 megahertz (abbreviated MHz). If 1 gigahertz is 1000 MHz, 1 MGz is 1000 kilohertz (kHz), 1 kHz is 1000 hertz (Hz), and 1 Hz is 100 centihertz (cHz), which of these is *not* equal to the frequency of the Wow! Signal?

**A. 1.42 gHz B. 1,420,000 kHz C. 14,200,000,000 Hz**

**D. 142,000,000,000 cHz E. NOTA**

2. FBI Special Agents Mulder and Scully are in Roswell, New Mexico decoding a mysterious alien message consisting of 168 words. Mulder can decode 19 words per minute, while Scully can decode 23 words per minute. If they work together, how long will it take the agents to finish decoding the message, assuming they start at the same time?

**A. 4 min. B. 5 min. C. 7 min. D. 8 min. E. NOTA**

3. The agents successfully decode the message and board a plane from Roswell to Quantico, Virginia (the location of the FBI Academy), to report their findings to Assistant Director Skinner. An hour into the flight, Mulder looks back at Roswell and sees a UFO taking off and following the plane. He uses his spooky math skills to determine that the UFO is flying 56% *faster*  than the plane, which is going at 250 mph. How fast is the UFO going in miles per hour?

**A. 140 B. 306 C. 390 D. 1400 E. NOTA**

4. Scully, ever skeptical of Mulder’s claims, takes a look and informs him that the “UFO” is actually a Frisbee. In fact, the Frisbee was thrown by Jo, who is trying to set a record for the farthest Frisbee pass ever recorded. For it to count as a pass, his teammate Fernando must catch it, but he’ll only do so if the weather is sunny—otherwise, he won’t be able to see. Richie the weatherman says there is a chance of rain, chance of snow, and chance of hail. The only other option is sunny. What is the likelihood Fernando catches the Frisbee and Jo sets the record?

**A. B. C. D. E. NOTA**

5. Scully looks down from the plane to the wheat fields of Oklahoma directly below her. Suddenly, she spots three crop circles of different sizes in the distance. (Crop circles are created by flattening the wheat in a perfect circle.) The ratio of the radius of the smallest circle to the radius of the middle circle is 1:4 and the ratio of the radius of the middle circle to the radius of the biggest circle is 4:6, what is the ratio of the radius of the smallest circle to the radius of the biggest circle?

**A. 1:6 B. 1:12 C. 1:16 D. 1:36 E. NOTA**  
6. Jennifer is convinced that there is a very shy alien living in her pool. She really wants to meet it and make friends, so every night she leaves a trail of 226 Reese’s Pieces from her pool to her living room window. Each morning she records how many have been eaten and then replaces them, so there are always 226 each night. She notices that the number of candies eaten each night increases according to the expression , where is the number of nights (so on the first night 22 are eaten, on the second night 39 are eaten, and so on). On which night will the alien eat all the candy and make it to Jennifer’s living room?

**A. 4 B. 5 C. 13 D. 14 E. NOTA**

7. One night, Jennifer hears something at the window! Excited to meet her alien, she opens the window, only to see Joanna, who has been eating the Reese’s Pieces as a snack while stargazing each night. Jennifer is disappointed but nonetheless strikes up a conversation with Joanna, who says, “The number of stars I have counted tonight is equal to .” How many stars has Joanna counted?

**A. 235 B. 464 C. 1072 D. 1195 E. NOTA**

8. Jennifer notices Joanna is wearing a tinfoil hat and asks why. Joanna explains that it protects her against government surveillance and alien mind control. Privately, Jennifer finds this to be a rather irrational thing to believe. Which of the following numbers is irrational?

**A.**   **B. C. D. -1 E. NOTA**

9. While visiting Area 51, Alanna stumbles upon a field full of cows. She believes they show evidence of extraterrestrial tampering, because they have really wonky bodies! The cows either have one, two, or three heads. In addition, they either have three or seven legs. Finally, the cows all have 13, 17, or 23 spots. How many different types of cows are there in the field if there is at least one of each combination?

**A. 8 B. 18 C. 33 D. 69 E. NOTA**  
10. When scientists search for planets outside of our solar system (“exoplanets”) that might hold life, they look at several factors. The exoplanet needs to be in the “Goldilocks zone” where it isn’t too close or too far from the star, so its temperature won’t be too extreme and there can be liquid water on its surface. It also needs to be made of rock or metal (instead of gas). The nearest exoplanet that meets these requirements is called Proxima Centauri b, which is 24,800,000,000,000 miles away. What is this distance expressed in scientific notation?

**A. 24,800,000,000,000 B. C.   
D. E. NOTA**  
11. Cherry, Grace, Jessica, Sruthika, and Tessa are the only people in line at the movie theater to get tickets for *Alien: Covenant*. Cherry stands next to Jessica to pinch her cheeks. Tessa, distracted because she is playing Banana Kong on her phone, is last in line. Jessica and Grace are conjoined and must be next to each other. Only *one* person can stand next to Sruthika and tolerate her terrible puns, and that person is not Cherry. Who is fourth in line?

**A. Cherry B. Grace C. Jessica D. Sruthika E. NOTA**

12. We don’t need to look to aliens to see some truly weird creatures—there are many right here on Earth! Thermophiles are organisms that flourish at very high temperatures—up to around 135°C. Starting from 0°C (32°F), for every increase of five degrees Celsius, there is an increase of nine degrees Fahrenheit. What is 120°C in degrees Fahrenheit?

**A. 75°F B. 107°F C. 243°F D. 275°F E. NOTA**

13. Cynthia and Alanna are lying on the beach at night on the lookout for UFOs. “I see one!” says Cynthia. “Where?” Alanna asks. “It’s flying on a path between the stars Altair and Vega,” Cynthia responds. If Altair is at the point (0, 6) and Vega is at (8, 5), what is the slope of the line between them?

**A. 8 B. C. D. -8 E. NOTA**

14. On the alien planet Snek, there are three forms of currency—bleps, blops, and blorps. One blep is worth 4 blops and 3 blops are worth 8 blorps. Julia wants to buy a Foos, which is 64 blorps, but she only has bleps. How many bleps does she need to buy the Foos?

**A. 3 B. 6 C. 12 D. 24 E. NOTA**

15. THE TRUTH IS OUT THERE. How many of the following statements are true?

I. is an example of the Associative Property.

II. is an example of the Distributive Property.

III. Subtraction is not commutative.

**A. 0 B. 1 C. 2 D. 3 E. NOTA**

16. Scientists say that a potential substitute for carbon on another planet could be silicon. Carbon has 12 protons while Silicon has 14 protons. If Blumtuck the Morgborg has 42 atoms of silicon in his body and Berg the Timon has 21 atoms of Carbon in his body, how many more protons does Blumtuck have than Berg?

**A. 252 B. 336 C. 588 D. 840 E. NOTA**

17. Tael’k has always wanted to vacation on Earth. He finally gets to go! Tael’k came to Earth on July 24, 2016. On his home planet, there are 180 days in a year. He left Earth on July 19, 2017. How many full years passed on his home planet?

**A. 1.11 B. 1.5 C. 1.98 D. 2 E. NOTA**

18. Son Hala travels the Universe with his friend Bob the Bear. Since Bob is a Bear, he must eat a lot and his favorite food is Salmon. Unfortunately, there are no salmon on Son Hala’s planet, only solman. Son Hala fishes for solman using his laser gun. He gives  to his friend Duke Pywalker and Bob eats  of what is left. Son Hala eats the rest. How much of the solman did Son Hala eat?

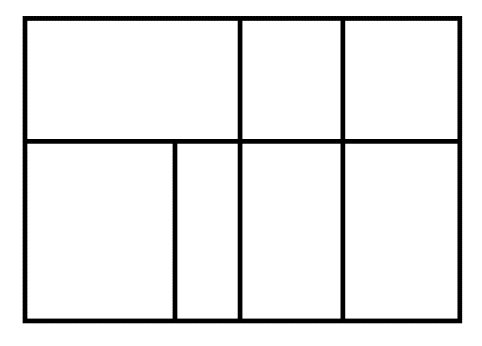
**A. B. C. D. E. NOTA**

19. Suppose

A@B = 2A – 4B and A#B = AB – 2A

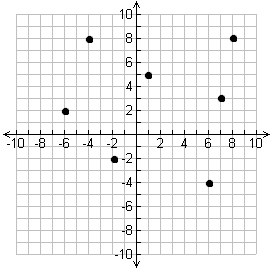
One of the first things that every president does when they reach the White House is read the classified documents on aliens. There are a lot! If there are classified documents on aliens, how many is this expressed numerically?

**A. 32 B. 48 C. 56 D. 64 E. NOTA**



20. The most beautiful art any Alien can make is crop circles. Horap is trying to make the most beautiful crop circle he can. The only problem is that he absolutely hates circles so he has decided to use his favorite shape, rectangles, instead. To maximize the number of rectangles in his artwork, he creates rectangles within rectangles! How many total, unique rectangles are in his crop rectangle?

**A. 15 B. 18 C. 21 D. 24 E. NOTA**



T

A

21. There are many aliens at Area 51 and they like to party! A green alien is trying to find his way to Area 51 and party with them. He has a map with 6 points, one of which is Area 51. He knows that Area 51 is on the line . Which point is Area 51?

O

N

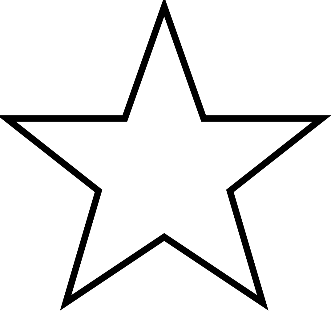
D

C

B

**A. A B. B C. C**

**D. D E. NOTA**

22. The green alien needs to ride his spaceship to the party, but first he must ensure that his spaceship has enough stardust to travel. He goes to the star station to pump his ship full of stardust. At the star station, you can pay with cash or with a math problem answer. Since the green alien is a genius, he decides to pay with a math problem answer. The attendant gives him a picture (that can be seen on the left) and asks for the number of edges plus the number of interior angles. What should the green alien say so he can get stardust?

**A. 10 B. 15 C. 20 D. 25 E. NOTA**

23. The green alien is riding his space ship at 30 sm/hr (space miles per hour), the space limit. The party he is going to is 45 space miles away. How long will it take him to get there?

**A. 30 mins B. 1.5 hrs C. 2.5 hrs D. 90 hrs E. NOTA**

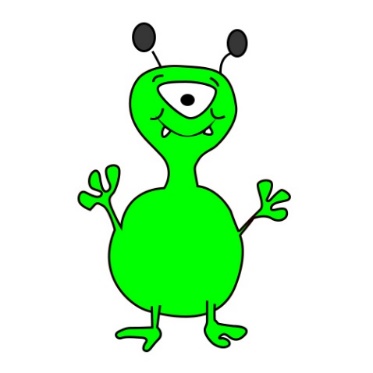
24. All polite guests should bring something when they go to someone’s area to party. The green alien is extremely polite so he decides to bring some Mars Bars to Area 51. He knows that he is partying with 21 other aliens, all of whom love Mars Bars. The Space Shop sells Mars Bars in 4 packs. How many 4-packs should he buy so that everyone at the party, including himself, can have an equal amount of Mars Bars?

**A. 111 B. 121 C. 132 D. 144 E. NOTA**

25. The green alien is so close to partying, but he has one more task. As all people know, only people who love systems of equations truly know how to party. The green alien must first prove his love of systems of equations by solving this one :

If the alien solves the system correctly, what is x + y?

**A. 2 B. 6 C. 8 D. Cannot be solved E. NOTA**



Look at how happy he is now that he can party!

26. Not all aliens are friendly! The worst of the evil aliens are the body snatchers. They like to inhibit human bodies and take over their mind! The first day, 1 human body has been taken over, the next day 2, the next day 4, the next day 8, and so on. How many human bodies were been taken over on the 9th day, if this pattern continues?

**A. 64 B. 128 C. 256 D. 512 E.NOTA**

27. The Alien Officers see a body that could have been taken over by an alien! Oops, it is just a wild Cynthia. But the officer is still unsure. The only way to distinguish between a human and an alien is by asking them to give the prime factorization of a number, as aliens are horrible with prime numbers. The officer orders Cynthia to give the prime factorization of 444, what should she say to prove she is human?

**A. B. C. D. E. NOTA**

28. The fastest way for aliens to travel is with the EggPod ™, which, oddly enough, is not egg shaped, but perfectly spherical. Caitlin, one of the most fashionable aliens around, decides that she will decorate her EggPod™ with a ribbon by looping it around the widest part of the pod and then securing it with a bow. She does not know the circumference of the widest area but knows the diameter is 8.4ft. She also knows it will take twice the length of the circumference to tie the most fashionable of bows. Using 3.14 as an approximation for , how much ribbon will she need in feet? Hint :

**A. 44.283 B. 53.847 C. 77.244 D. 83.294 E.NOTA**

29. Being one of the most fashionable aliens, Caitlin has very expensive taste. The ribbon that she wants costs $360. Luckily, there is a sale at the Meteor Market. For every additional arm an alien has above the average, they receive an extra 5 percent off. If the average alien has 4 arms and Caitlin has 8 pairs of arms, what is the price Caitlin actually pays? Aliens don’t pay tax.

**A. $72 B. $144 C. $216 D. $288 E. NOTA**

30. Garmar lives on the planet Tarbar. Tarbar is in the shape of a perfect cube with a side length of 200 miles. What is the volume of Tarbar in cubic miles?

**A. 80000000000 B. 8000000 C. 40000 D. 80 E.NOTA**