**INSTRUCTIONS : Choose the letter of the correct answer. In all cases, E) NOTA means “none of these answers”.**

1. Scooby and the gang have arrived at Chiles High School! They came to discover the millions of mysteries hidden among the crevices of the campus. First, they have to park their Mystery Machine in the massive parking lot. However, the Mystery Machine is very picky in where it can park, for it can only park in parking spaces with hexagonal numbers. If the parking spaces are numbered from 000-100, how many possible spaces can they park in?

**A) 6 B) 7 C) 8 D) 9 E) NOTA**

1. There are tales an infamous villain who calls himself the Freaky Friedlander! The group wants to find him. A prisoner of the Freaky Friedlander, Jessie the Cow, has escaped and offered to help! However, she doesn’t trust just anybody. In order to determine their trustworthiness, she gives them a riddle: how many distinct nondegenerate triangles with integer side lengths can be made if the sum of the lengths of the sides is 18?
2. **4 B) 5 C) 6 D) 7 E) NOTA**
3. Velma, Fred, and Daphne have located the Freaky Friedlander! They notice that the three of them form a triangle and the Freaky Friedlander is located inside the triangle such that he is the same distance away from each of them. What is the location of the Freaky Friedlander called relative to the triangle?
4. **centroid B) circumcenter C) incenter**

**D) orthocenter E) NOTA**

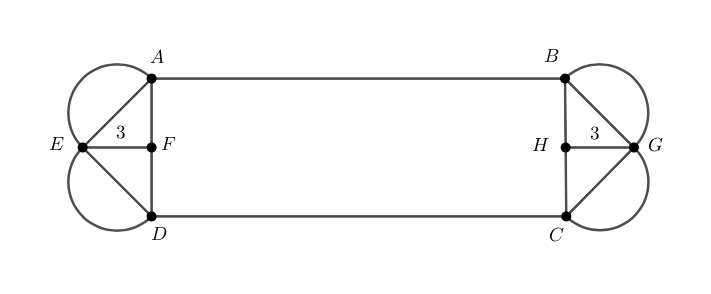
1. Consider question 3. Let represent the location of Velma, represent the location of Fred, and represent the location of Daphne. Let = 51 yds, = 24 yds, and = 45 yds. What is the distance, in feet, from the Freaky Friedlander to any of the three members?
2. **22.5 B) 25.5 C) 67.5 D) 76.5 E) NOTA**
3. Consider questions 3 and 4. The Freaky Friedlander is terrified of circles. He can only roam the area inside of the circle where the points , and are on the circle. In order to capture him, Velma, Fred, and Daphne all simultaneously walk straight towards him at a constant rate of 5 mph. After the three have walked for 309/44 seconds, assuming that he was not moved since they have started to walk, what area, in square feet, can The Freaky Friedlander roam?

**A) 256π B) 625π C)  D) not possible E) NOTA**

1. Scooby Dooby Doo, where are you? While trying to find the Freaky Friedlander, Shaggy lost his partner, Scooby Doo! The gang is trying to look for him, and of course, Scooby’s best friend, Shaggy, knows that he gets very hungry and is probably at his favorite restaurant, the Olive Garden. However, the friends have had a very long day solving mysteries and are very tired, so they must make a quick stop at the Gan River to rest up. If the gang is located on the point (-4, 3), the Gan River is located on the line , and the Olive Garden is located on the point (24, 28), what is the shortest distance they can travel to the Olive Garden if they must make a stop at the river? Assume all locations are mapped on the standard Cartesian plane.
2. ** B)  C) **

**D)**  **E) NOTA**

1. Thanks to Shaggy’s intuitive thinking, our gang has found Scooby Doo! To celebrate the reunion of his friends, Scooby feasts on his favorite snacks – Scooby Snacks! The shape of a Scooby Snack can be represented with a rectangle, two isosceles triangles, and four semicircles, as shown in the following diagram:



If , , , hexagon has an integer area, and the area of the shown side of a Scooby Snack is , what is the length of segment ?

**A)  B)  C)  D)  E) NOTA**

1. Oh no! Scooby Doo realizes that almost all of his Scooby Snacks were stolen from his Super-Secret-Safe! Being the horrible thief he is, crumb trails led all the way to the notorious Chiles High School villain, Vector Venkat! Vector Venkat offers to return the treats, but only if they solve the following problem:

Given triangle and angle bisector , where is on side , what is the value of such that , , and ?

**A) 20 B) 28 C) 40 D) 56 E) NOTA**

1. Vector Venkat got his inspiration to be a villain from his favorite character from Despicable Me – Vector. Coincidentally, his favorite quote from the movie is, “I go by Vector. It’s a mathematical term, represented by an arrow with both direction and magnitude!” In an attempt to escape the 5 friends, Vector Venkat runs on the ground for 10 meters and then flies 60° from the ground for 10 meters. In order to catch him, the gang needs to know his directions and magnitude. At what direction (angle from the ground) and what magnitude (distance) is Vector Venkat from where he originally started?
   1. **60° from the ground and meters from where he originally started.**
   2. **60° from the ground and meters from where he originally started.**
   3. **30° from the ground and 15 meters from where he originally started.**
   4. **30° from the ground and meters from where he originally started.**
   5. **NOTA**
2. After catching villains, Velma enjoys making observations of their unique qualities and features. Velma notices that the side of Vector Venkat’s head is shaped like the triangle . Given that each of the side lengths and the area of the triangle are integer values, given that , , and has an area of 114, what is measure of side length ?
   1. **35 B) 36 C) 37 D) 38 E) NOTA**
3. While Shaggy and Scooby Doo explore more of the campus, they run into Parul! However, when they met, Parul was in the middle of running away from the Big Scary Math Problem. Realizing the urgency of her situation, the two also flee from the problem. The three scaredy-cats are on points O, M, and G in the form of triangle OMG. the Big Scary Math Problem is located on the point where each of the altitudes of the triangle intersect. What is the point where the Big Scary Math Problem is located called?

**A) centroid B) circumcenter C) incenter**

**D) orthocenter E) NOTA**

1. When running from the problem, Shaggy is running north at 20 ft/sec and Scooby is running east at 40 ft/sec. If Shaggy started running from the problem at midnight and Scooby started running a minute and thirty seconds later, find the shortest distance, in yards, between the two at 12:02AM.
   1. ** B)  C) **

**D)  E) NOTA**

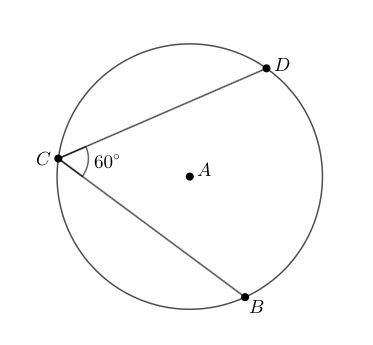
1. Parul, Scooby and Shaggy finally realize that they can’t run from their problem forever. However, they could make someone else solve it for them. You need to help them solve the Big Scary Math Problem before someone realizes how fast Scooby and Shaggy are and recruits them for cross country! (You might find it is not so scary at all if you know a certain formula.) The problem says: There is a mystery polyhedron with 20 vertices and 30 edges. What polyhedron is this?
   1. **tetrahedron B) octahedron C) icosahedron D) dodecahedron**

**E) NOTA**

1. After their 2 hour long escape from the Big Scary Math Problem (they should really join cross country), Parul, Scooby, and Shaggy decide to get some ice cream from Momma P’s Ice Cream Truck. While waiting in line for ice cream, Scooby thinks of a math problem: find the length of the median to the hypotenuse of a right triangle with side lengths 5, 12 and 13.
   1. **8.5 B) 8 C) 6.5 D) 5.5 E) NOTA**
2. After leaving it unattended, Shaggy’s strawberry ice cream cone has melted completely into liquid. The cone has a tiny leak at the bottom and drains the cone of its liquid ice cream at a rate of 5 cm3/min. The cone has an opening (base) with a radius of 6 cm, a height of 18 cm, and is initially filled to the rim. How long, in hours, does the liquid ice cream drain out of the cone until it has a depth of 3 cm?
   1. ** B)  C) 36π D) 43π E)NOTA**
3. After solving their big mysteries, the gang just wants to go have fun and see the rest of Leon County! When graphed on the Cartesian plane, Leon County is contained by the coordinates (0,0), (8,-1), (9,7), and (5,8). What is the area of Leon County?
   1. **25.5 B) 42 C) 51 D) 84 E) NOTA**
4. Velma wanted to go to SkyZone, but Meghana took her to SkateWorld instead, knowing that they would have a lot more fun by skating. Velma and Meghana skated in geometric shapes. First, Meghana skated a perfect circle with a radius of 10 feet, and then Velma skated in such a way that she made all the possible chords of length 5 on the circle. If Meghana skated to connect all the midpoints of the chords that Velma made, what figure would she end up making?
   1. **square B) semicircle C) grid of horizontal and vertical segments**

**D) circle E) NOTA**

1. Daphne and Enrie are trying to get to the bottom of a mystery: who is stealing the Smarties from the Freaky Friedlander’s lair? A note has been left in the empty Smarties container. It says, “My name starts with *n*th letter of the alphabet such that *n* is the positive difference of the number of diagonals in a nonagon and the complementary angle of ∠C. ∠C is the value of the angle on triangle ABC such that ∠A = 51° and ∠B = the sum of 59 and the sixth triangular number.” Can you solve the problem and tell us which of the following (if any) is the Smartie-napper is?
   1. **Jason B) Jessica C) Neha D) Venkat E) NOTA**
2. Ben is advising Fred in making a trap to capture the crook responsible for stealing Ms. McLeod’s special stamps. He tells Fred that he should make an equilateral triangle- shaped hole in the ground. The area of the triangle should be . Help Fred figure out the length of one of the sides of the triangle.
   1. **2 B)  C)  D)  E) NOTA**
3. Velma is reading history books in the library, and she comes across an interesting fact. How many books did Euclid’s Elements consist of? Hint: it is the same number as the distance between the points (3, 0, 3) and (9, 9, ).
   1. **13 B) 14 C) 169 D) 196 E) NOTA**
4. Ben has baked a cheesecake to celebrate the visit of the squad! Ben’s cheesecakes are the most famous of all of Tallahassee, so he is expecting a very large turnout to his celebration. What is the maximum number of slices that can be formed by dividing the circular cake with 26 straight cuts? (Assume that a cut goes through the whole cake.)
   1. **354 B) 350 C) 230 D) 225 E) NOTA**
5. Having made several new friends at Chiles High School, Scooby and the gang decide to have some fun with the students. While playing tag, Scooby Doo has tracked down Brandon to a circus tent and is chasing him around the perimeter of the tent. The tent is in the shape of a regular hexagon and has an area of 294√3 square meters. If the gang must run around the tent 10 times to catch them, how far did they run, in meters?
   1. **70 B) 140 C) 210 D) 840 E) NOTA**
6. Jason brings Shaggy to school and shows him the excitement of being a student! However, Shaggy quickly gets bored in English class and decides to do some math. He draws a very misshapen letter ‘A,’ represented as triangle ABC. In the triangle, an angle bisector is drawn from ∠B to point D on AC. If side AB = 4, side BC = 6, and the perimeter of the triangle is 17, find distance AD.
   1. **2.8 B) 4.2 C) 7 D) 13 E) NOTA**
7. James wants to bring Fred with him to explore the spooky circular closet in the Freaky Friedlander’s lair, equipped with only his trusty flashlight. The flashlight is placed at point C and shines within sector DCB, with ∠DCB = 60° and = 6. If Fred is afraid of the dark, what is the area that Fred can roam where the room is lit? (Hint : A is not necessarily the center of the circle.)



* 1. **18 B) C) 16 D) 18**

**E) NOTA**

1. Shaggy wants to take Scooby Doo on a nighttime walk through Tom Brown park, but Scooby is scared that there will be ghosts! In order to take his mind off his irrational fear, he thinks about a logic question: if the statement “If there is a ghost, then Scooby will be scared” (p -> q) is true, how many of the following statements must be true?

i. If Scooby is scared, then there is a ghost. (q -> p)

ii. If there is not a ghost, then Scooby will not be scared. (~p -> ~q)

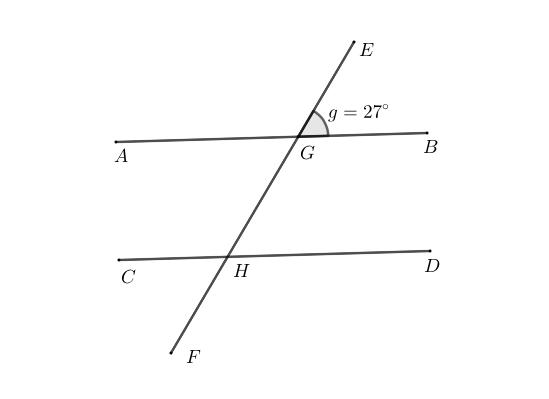
iii. If Scooby is not scared, then there is not ghost. (~q -> ~p)

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

1. While walking Scooby, Shaggy notices that the shape of the path is an ellipse. The path encompasses a grass area with an elliptical fountain with axes that are half the dimensions of those of the elliptical path. If the two axes of the elliptical path are 10 and 8, what is the area of the grass area inside the path but outside the fountain?
   1. **80π B) 40π C) 20π D) 15π E) NOTA**
2. Shaggy and Scooby Doo are lost (once again)! While trying to find them, Velma lost her glasses. She narrows down the section of where they could be to a triangular area with side lengths 4, 5, and 6. What is the area of this triangle?
   1. **B) 15 C) D) E) NOTA**
3. They gang finally found Shaggy and Scooby! However, the police have caught them for “lurking at the park late at night dressed as the characters from the cartoon, Scooby Doo.” In order to prove themselves as the real deal and get released, they must solve a math problem: triangle ABD shares a side with triangle BDC. ∠CBD is 60°, ∠BDC is 80°, ∠ABD is 63°, ∠BDA is 54°. Which side is the longest?
   1. **BD B) BC C) CD D) not enough information**

**E) NOTA**

1. Two parallel lines, AB CD, are intersected at point G and point H respectively by transversal FE. If the acute angle ∠EGB = 27°, then what is the complement of the supplement of  ∠GHC



* 1. **153° B) 90° C) 63° D) 27° E) NOTA**

1. What is the complement of the supplement of the interior angle of a regular decagon
   1. **36° B) 54° C) 126° D) 144° E) NOTA**