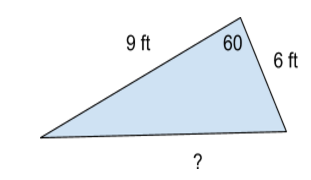
**Welcome to the 2016 Geometry Track and Field Mini Mu test. You will have one hour to complete this 30 question multiple-choice test. All correct answers will be accepted. Choices A through D are answer choices for every problem. Choice E) NOTA stands for “none of these answers”. Scoring is as follows: 5 points for a correct answer, 1 point if left unanswered, and 0 points for an incorrect response. Units within answer choices are assumed unless explicitly stated. Figures are not necessarily drawn to scale.**

1) Townsend is participating in the Hammer Throw event. His hammer is 3 feet long and is spun from the end of the handle three revolutions before it is launched. The hammer, after launch, travels at the speeds of 4 feet per second and hits the ground 6 seconds later. How far did the head of the hammer travel in feet during the time the hammer was set in motion?

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

2) On one peculiar occasion, Cayle decides to pole vault. As an extremely strange person, she takes an extremely strange trajectory. She launches herself 6 feet upwards, pivots midair, and then hits the ground after descending 9 ft. What is the ground distance Cayle travels in feet?

(Friendly hints : a2 = b2 + c2 - 2bc(cosA), cos60º = )



**A) B) C) D) 8 E) NOTA**

3) The discus throw event includes a netted area that marks the field. The net can best be represented as a cylinder of height 10 feet and a radius of 3 feet capped with a hemisphere of radius 3 feet. in , what is the volume of space this net encompasses?

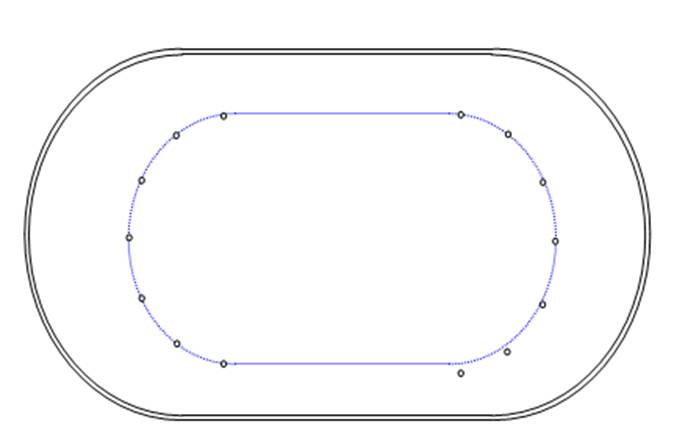
**A) B) C) D) E) NOTA**

4) A rectangle with length 6 and width 8 is inscribed in a circle. What is the area of the circle?

**A) 9π B) 16π C) 25π D) 48π E) NOTA**

5) Finish this analogy: Circumcenter is to perpendicular bisector as in-center is to **\_\_\_\_\_\_\_** .

**A) Altitude B) Centroid C) Median D) Orthocenter E) NOTA**



6) An oval track is constructed with straight-aways

and semicircular ends. If the distance between the

two straight-aways is 100 feet, how long does each

straight-away have to be for the length of the track

to be 1320 feet? Consider the middle lane only.

100 ft

**A) 660 - 50π B) 330 - 100π C) 660 - 100π**

**D) 330 - 50π E) NOTA**

7) In order to impress the ladies for his next track meet, Jaewon decides to go on a jog. He starts at the point (1, 1) and travels to these points in the following order: (5, 3), (5, -3), (-2, -3), (-2, 5), and finally goes back to the point (1, 1). Assuming he runs the shortest possible distance, what is the area that Jaewon’s running route encompasses?

**A) 32 B) 37 C) 38 D) 43 E) NOTA**

8) What is the distance between lines y = 2x + 5 and y = 2x + 10?

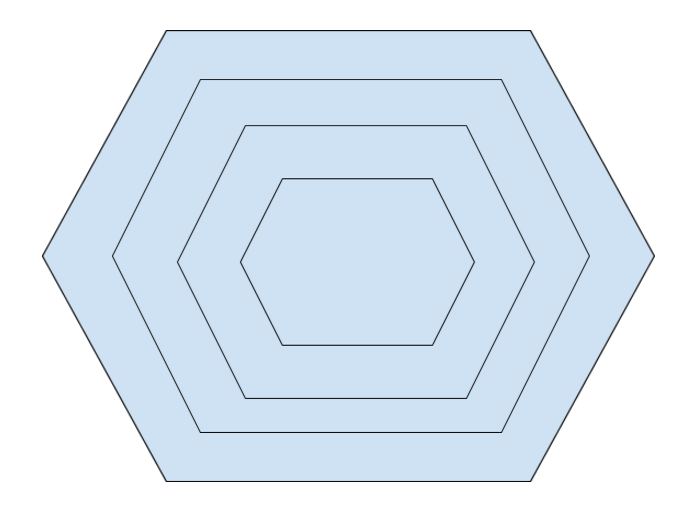
**A)  B)  C)  D) 5 E) NOTA**

9) Alex just finished the 5000 meter run and he is hungry. He eats an orange. How much does the surface area of a spherical orange increase when it is cut into two equal halves?

**A) 0% B) 25% C) 50% D) 100% E) NOTA**

10) As Alberic was warming up before the hurdle jump event, he notices the shadow casted by one of the hurdles. The hurdle is 3’ 3” high and casts a shadow 4’ 3” long. With this information, Alberic, who is 7’ 7”, calculated the length of his own shadow at that very time. What was the length Alberic obtained?

**A) 8’ 7” B) 9’ 7” C) 9’ 11” D) 10’ 11” E) NOTA**

****For questions 11-15, consider the following information: Because the Mathletes of Chiles Mu Alpha Theta are so hip, we do not have an elliptical track, rather we have a hexagonal one. The track is shown below. The four regular hexagons share a center and the side lengths of each hexagon form an arithmetic sequence. The smallest hexagon has a side length of 60 meters and the longest one has a side length of 72 meters.

11) How many diagonals does a convex hexagon have?

**A) 5 B) 9 C) 10 D) 18 E) NOTA**

12) If the length of one lane is determined by calculating the average of the perimeters of the two surrounding hexagons, then what is the length of lane 2 in meters?

**A) 396 B) 408 C) 420 D) 432 E) NOTA**

13) Given the width of the lanes are determined by the distance between the sides of the two surrounding hexagons, what is the width of a lane in meters?

**A) 2 B) C) 4 D) E) NOTA**

14) What is the ratio of the apothem of the innermost hexagon to the apothem of the outermost hexagon?

**A) 5 : 6 B) 5 : 12 C) 3 : 5 D) 1 : 2 E) NOTA**

15) Because the lengths of each lane vary on a track, runners in the outer lanes are given head starts to ensure a fair match. If the average running speed of an athlete is calculated to be 6 meters per second, then how many seconds head start must the runner in the outermost lane be given relative to the runner in the middle lane?

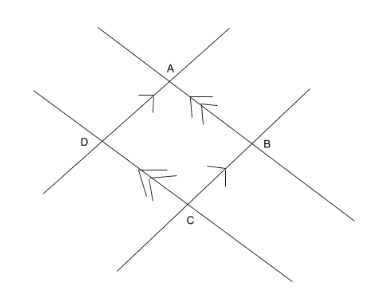
**A) 1 B) 2 C) 3 D) 4 E) NOTA**

16) Stories tell of a legendary figure known as Rabi Steaks. His mechanics are so great that during the discus throw event, his discus travels in the path of a figure 8. Unfortunately for him, because the discus traveled a net distance of 0, he loses the event. What is the value of ?

**A) 0 B) 1 C) 5 D) E) NOTA**

17) If a discus is a regular polygon with an exterior angle of , how many sides does this polygon have?

**A) 6 B) 12 C) 18 D) 24 E) NOTA**



18) During the discus throw event, Andrew studies a portion of the net (diagram to the right) that

protects the spectators. Andrew notices that and . If what is the complement of ?

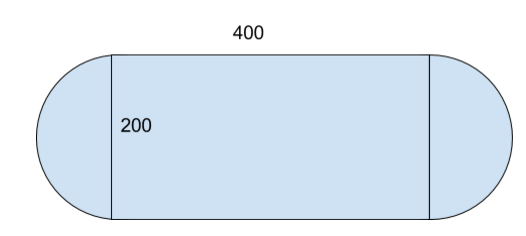
**A) B) C) D) 143 E) NOTA**

19) ABCD is a convex quadrilateral with AD = BC. P is a point inside ABCD such that

AP = BP = CP = DP. If mAPB = 20 and mCPD = 80, what is mBAD?

**A) 95 B) 100 C) 105 D) 130 E) NOTA**

20) Cynthia decides to play a game. A traditional track consists of a rectangle and two semi-circles, she can only travel 10 ft away from the perimeter of the field. She is also not allowed to be on the field at any given time. The rectangle has a length of 400 ft and a width of 200 ft. What is the area, in , of the space she can travel in?

****

10

10

**A) C) E) NOTA**

**B) D)**

21) Hayden dreams of standing on the 1st place podium every day. He notices that the podium is in the shape of a conical frustum with a base of radius of 7 in, another base radius of 11 in, and a height of 12 in. Hayden decides to find the volume of this figure. What is the volume Hayden calculates in cubic inches?

**A) 988 B) 1020 C) 1331 D) 2964 E) NOTA**

22) After Justin finally picks out the perfect javelin, he is ready for the event. As Justin tosses the javelin, he realizes that the angle of elevation that the trajectory of the javelin makes with the ground is . If the javelin travels 50 meters on this trajectory, then what is the ground distance the javelin travels in meters?

**A) 25 B) C) D) 50 E) NOTA**

23) The pentathlon is a Women-only event consisting of 60 meters hurdles, High Jump, Shot Put, Long Jump, and the 800 meters. A pentagon has as many sides as the number of events in the pentathlon. What is the value, in degrees, of the sum of all interior angles of a pentagon?

**A) 540 B) 720 C) 900 D) 1080 E) NOTA**

24) With his newly obtained shots, Jason decides to experiment. He locks himself in a completely empty room shaped as a rectangular prism and stands at a corner of the room. The room is 10 ft long, 12 ft wide, and 16 ft high. He then throws the shot in a random direction to see how good he is at shot put. Assuming that the shot travels in a straight line, what is the maximum distance the shot can travel, in feet, before hitting a wall?

**A) 20 B) C) D) E) NOTA**

25) Justin is running the marathon. On the road is an arrow indicating where he should run next. Given the perimeter of the symmetric shape (see below) is 50, find the area.



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

26) If two angles are obtuse, then both are not supplementary. This is the inverse of the converse of what conditional?

**A. If two angles are supplementary, then they are obtuse.**

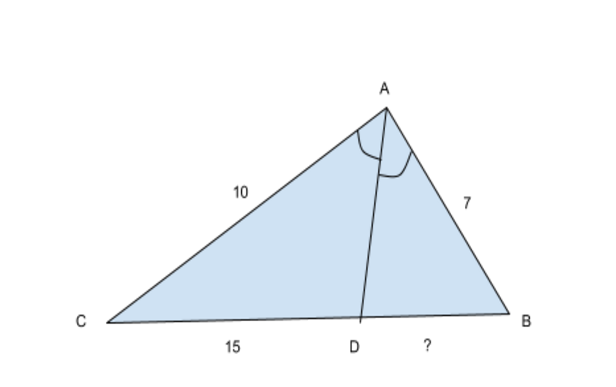
**B. If two angles are obtuse, then they are supplementary.**

**C. If two angles are supplementary, then both are not obtuse.**

**D. If two angles are not supplementary, then both are obtuse.**

**E. NOTA**

27) Once when Townsend practiced for the Hammer throw, he threw the hammer along . If is an angle bisector of , then what is the length of ?



**A) B) C) D) 14**

**E) NOTA**

28) Andrew is given the arduous task of boxing medals. He is given 1,600 gold medals, 1,800 silver medals, and an unlimited amount of boxes. Each gold medal has a diameter of 10 cm, each silver medal has a diameter of 4 cm, and each box has the dimensions of 40 cm by 40 cm. Andrew is extremely efficient and places the medals snugly together within the boxes. Assuming each box can only hold one layer of medals and nothing more, what is the minimum number of boxes Andrew needs to pack all of the medals given that the box is as tall as the medals are thick?

**A) 109 B) 112 C) 115 D) 118 E) NOTA**

29) Kevin uses a miniature sandpit to model the sandpit used in the long jump event. Kevin’s sandpit, which is filled to the brim with sand, is 20 ft long, 3 ft wide, and 8 ft high. Kevin takes a wooden block shaped like a square prism with a base of side length 2 ft and slams it down in the pit. After he removes the block, he realizes that the sand in the pit only stands at 7 ft. How many feet must the block have submerged under the surface of sand when Kevin slammed the block in the pit?

**A) 6 B) 6.5 C) 7 D) 7.5 E) NOTA**

30) Congratulations, you’re almost done! Just one more question. To celebrate we will pop conical party poppers. If these party poppers have diameters of 6 cm and heights of 4 cm, then what is the surface area of the poppers in ?

**A) B) 15 C) D) E) NOTA**