2015 Beacon Winner: Dr. Michael Brady

Literature and Performing Arts - Adolescents and College Students

Dr. Michael Brady is a mathematics and social studies teacher at Heritage Middle School in Thompson Station/Spring Hill Tennessee. He has recently moved to Franklin, Tennessee and is a member of the Nashville Scholars of the Three Pipe Problem.

He was selected for his work developing a Sherlockian curriculum relating it to the California High School Standards and then teaching adolescent youths in the California Prison System, Torch Middle School, Fullerton Community College, and Santa Ana Community College. Dr. Brady also used the Grenada Sherlock Holmes videos as a visual and performing arts component of the curriculum. When seeking copyright permission to use the videos Michael was honored by an encouraging letter by Jeremy Brett the actor who portrayed Sherlock Holmes in the Granada Television series. His students wrote to other Sherlockian groups and one point of debate was the Mathematical puzzle of the growth of the Oak Tree in *The Musgrave Ritual*. A sign that the students were involved in learning. During this time period Dr. Brady wrote several articles for a Sherlockian publication in Japan. His teaching technique, specifically the use of Sherlock Holmes and Math, was commented upon by a teacher in Europe who found success with the same technique. During this time period Michael belonged to the *Trained Cormorants of Long Beach.*

These students were not the "Typical" incarcerated teens. They were assigned to an Intensive Treatment Program (Psychological Disorders). From 2000 to 2007, Michael taught Math at Torch Middle School. This school is in an un-incorporated part of Los Angeles County and is predominately populated by Hispanics, immigrants, low-income houses and heavy in gang violence. But the students really tool to Sherlock. One year the students wrote their own Sherlock Holmes play! The play was called *"Sherlock Holmes' Wife"* and was performed for the school and district administration. This was a major accomplishment as many of the students were socially and academically challenged. This group also formed the *WAX Vestas of the Dartmoor Professor* (The Torches of Dr. Brady). Michael also used Sherlock Holmes to teach heights and similar angles. An End-Of-The-Year Math Project contained a Sherlock Holmes story, *The Case of The Missing Bridge*, written by Michael. The story emphasized Deduction and Problem Solving.

(PART OF THE 6TH GRADE END-OF-THE-YEAR MATH PROJECT)

THE CASE OF THE MISSING BRIDGE
BY THE
DARTMOOR PROFESSOR

(DR. MICHAEL J. BRADY, PSY.D.)

Sherlock Holmes and Doctor Watson were on the final leg of their six-hour hike from the wilderness railroad junction to their favorite camping spot where they were planning to enjoy a week of rest and fishing.

"Watson, our vacation begins just over this hill and across the river. I can't wait to set up camp and fish."

Both Holmes and Watson froze at the summit of the hill as they looked with disbelief at the burned out bridge that they were to cross to get to their campsite.

"I wonder what happened Holmes?"

"Well Watson. It is easy to say that it was an act of nature and not man that caused this fire."

"Holmes, how can you tell that from here? Shouldn't you be inspecting the path to the river to look for any types of tracks to determine if men were involved?"

"No need to Watson, the bridge, and the giant boulder and tree shell next to the bridge are telling me everything I need to know. Let's get closer to take a better look."

"You see Watson, the bridge lost in nature's game of where Lightening will strike. From the looks of it the lightening struck at the top of the shell, spiraled down until it hit the rock. When the lightening hit the rock it left a darkened crack in the rock and bounced off onto the bridge. You will notice, using your senses, that the wind blows in an eastwardly direction. This was good for the forested area to the west of us as it was spared the fire. I would rather see a bridge go up in flames than such a beautiful forest."

"But Holmes, our path across the river has been destroyed. It will take several days to get to our campsite if we have to travel fifteen miles upriver to the next bridge in order to cross the river."

"Watson, we have our bridge."

"Holmes, you have to be crazy. There is not any bridge in sight."

"Look around you Watson. Nature is providing us with the basic necessities. What nature lacks in her gift we have on our backs."

“Holmes, what are you talking about?”

“Watson, once again you see but you do not observe!”

“Look to the north, upriver. Look at the five majestic conifer trees bordering the river. Each one set a different distance from the river bank as if they were guarding the eastern front of the forest preserve. That is our gift from nature.”

“But Holmes, that does not answer how we are to cross the river.”

“Again, Watson…you see but you do not observe. One of those trees should be tall enough that when cut and felled it will cross the river and provide for us a bridge.”

“But how Holmes? How do we know which one?”

“We use the same principle that I told you about when you chronicled my success in *The Musgrave Ritual*.”

“I am lost Holmes, really lost now.”

“Watson, it is elementary. We must find the height of the tallest tree in order to select it as the one to give us passage across the river. Remember how I spoke of using my walking stick of six feet. That walking stick threw a shadow of nine feet. Then I calculated that a tree of sixty-four feet would throw a shadow of ninety-six feet. It is simple we use the same mathematical, logical, approach.”

“Holmes, we don’t have the necessary equipment and we don’t know the width of the river.”

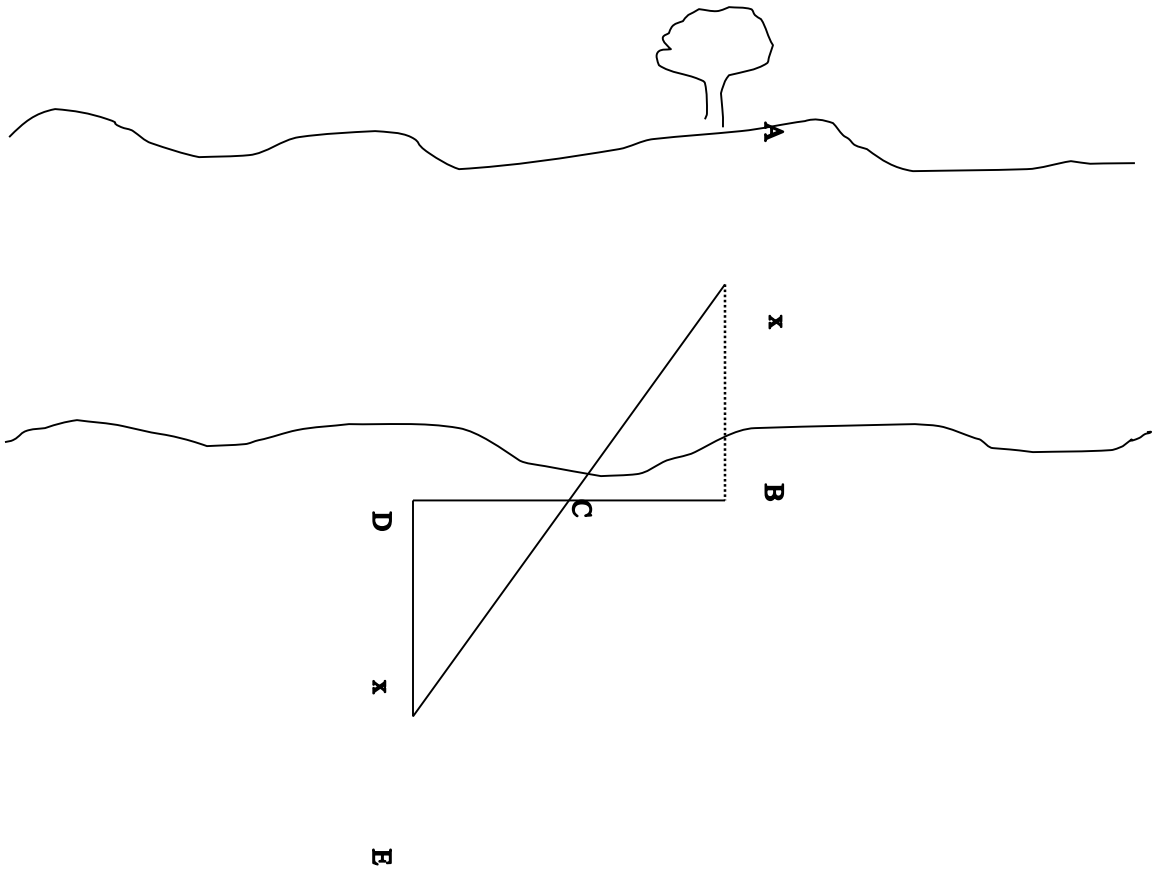
“Again Watson, you see but you do not observe. We have my walking stick, your valuable climbing rope, all two hundred feet that you have knotted every at every foot. And, we have our long handled axe.”

“But the river Holmes, the river! How wide is it?”

“Watson, I will calculate the width of the river as you calculate the heights of the trees. We both will be working with triangles and proportions.”

“Let me show you how I will do my calculations before I guide you onto your task. Give me you sketch pad.”

“Holmes quickly drew a sketch and showed it to Watson.”



“Watson, I have a lot to explain and I will do it step-by-step.”

“Do you see that large, majestic, tree on the other side of the river? I have selected that to be the landmark. That is point A. I am going to place one stick on this side of the riverbank, directly opposite our landmark. That stick is point B. I will next walk along the shore at a right angle to A and B. I can walk as far as I want to. But let’s say I walk 30 feet. At that point I will place another stick. That stick will be point C.”

“Watson, do you see the points of an imaginary triangle?”

“Yes Holmes, but the triangle is over water. It has no purpose!”

“Again…”

“I know, I see but I do not observe. Please go on Holmes.”

“That is my first triangle. Now I will create my second triangle, this one over land, and I will then tell you the width of the river. From point C I will walk another 30 feet and place another stick, known as point D. Now I have the bases for two triangles, each base being equal in length.”

“Holmes, I get it now! I see it….”
“You are going to walk away from the river, at a right angle. When you see points C and A line up you will stop and put another stick. That stick is point E. Holmes you have two equal triangles drawn!”

So now Watson you ARE seeing and observing. I congratulate you! What can you deduce from two equal triangles?”

“Holmes, the distance across the river, from point A to Point B is equal to the distance from point D and E!”

“Correct, Watson. Now, let me give you your directions.”

“First. I will hold my walking stick straight up. Please measure the distance of the shadow.”

“It is 9 feet Holmes.”

“So, a rod of 6 feet throws a shadow of 9 feet.”

“Just like *The Musgrave Ritual*, Holmes.”

“Exactly, now you must measure the shadows of the five trees. And using triangles and proportions determine the height of the trees. But looking at the lay of the land, and the situation, we have to bring in more data before we can calculate which tree is the one needed.”

“Holmes, Don’t I have to find a tree that meets your measurement of the river?”

“Again Watson, you see but you do not observe.”

“Watson, look at the trees. Each tree is a different distance from the riverbank and when you cut a tree down you usually leave 3-4 feet of tree standing…that becomes the stump. And then for safety you will want to add another three feet for the tree to overlap onto the shore. So Watson we need a tree that’s height is equal to the width of the river plus the distance away from the river, plus four feet of left-behind stump, plus two feet of overlap.”

Watson, listen carefully. As I measure the width of the river I want you do draw a chart accounting for everything I have told you. You will have 5 rows, one for each tree. The first column will be the width of the river, the second column will contain the distance from the riverbank, the third column will contain the number four for the four feet of stump left behind, the fourth column will contain the number four for the four feet of overlap. And the fifth column will be the total of columns one to four. The sixth column will contain the number six representing the height of the walking stick. The seventh column will contain the number nine, representing the shadow thrown by the walking stick. The eighth column will contain the length of the tree's shadow and the ninth column will contain the height of the tree based on the formula; Shadow of the Tree over the Shadow of the Walking Stick is equal to the Object Height over the Walking Stick Height"

"As I once told you, 'Not a Moment to waste….The Game is afoot!'"

Several moments later Holmes returned to an excited Watson who showed him the detailed chart.

"That looks excellent, Watson, now put the number 35 in the column where you have the width of the river. Good Job, come follow me and we will measure the shadows."

Tree	Width of River	Distance From River	Stump	Overlap	Total Feet Needed	Walking Stick	Stick Shadow	Tree Shadow	Tree Height
1	35		4	4		6	9		
2	35		4	4		6	9		
3	35		4	4		6	9		
4	35		4	4		6	9		
5	35		4	4		6	9		

"Okay Watson, let's start at the northern most tree and get the distance from the river to the tree. When you have the distance, yell it out for me. I will record everything."

When Watson finished yelling out the distances he went over to Holmes.

"So Holmes, what tree do we cut?"

"At the moment we won't cut anything. The heights need to be calculated based upon all the data presented. Watson, take the data and figure out which tree will be our bridge."

Tree	Width of River	Distance From River	Stump	Overlap River	Total Feet Needed	Walking Stick	Stick Shadow	Tree Shadow	Tree Height
1	35	12	4	4	55	6	9	69	
2	35	7	4	4	50	6	9	60	
3	35	10	4	4	53	6	9	72	
4	35	5	4	4	48	6	9	66	
5	35	15	4	4	58	6	9	90	

“Holmes, you are much better in doing this than I am. Remember you solved The Musgrave Ritual using the same approach. You should figure the problem out!”

“I already have Watson. But it would be unfair of me not to give you this opportunity to grow in the knowledge and wisdom of such a fine discipline as Mathematics. I’ll tell you this; if you are correct I will fell the tree, set up camp, and make the evening meal. That is a pretty good deal, Watson. Don’t you think?”

“It sure is Holmes, it sure is! But your proposal sounds as if I will have to do everything if I am wrong.”

“Then Watson, pray be precise. Calculate with accuracy and not a moment to waste.”

“And the answer is, Watson?”

Pictured below are a group of 6th graders calculating the heights of utility poles using length of shadows and proportions.

“Remember how I spoke of using my walking stick of six feet. That walking stick threw a shadow of nine feet. Then I calculated that a tree of sixty-four feet would throw a shadow of ninety-six feet. It is simple we use the same mathematical, logical, approach.”

The Musgrave Ritual