Theta Bowl solutions nationals 2014

Q1- (2,1) is the solution and since the slope of the line is 2/3, the slope of the perpendicular line is -3/2 so:







Q2-

. The conjugate axis has a length of “2b” and the foci are “c” units from the conjugate axis, therefore the area of the triangle is



Part B-

The length of the latus rectum is . The distance between the latus recti is 2c: 

Final answer: 

Q3- 









Q4-



Q5- Part A-call the pieces of AC, r and 5-r. Draw a segment from M to the tangent point along the hypotenuse. This creates to similar right triangles 



Draw picture:. Two right triangles are going to be set up to solve for the height. The two triangles are a 10, 8 and 6, where 6 is part of the height. The other triangle is 10, 6 and 8, where 8 is the other part of the height.

Total height =



Q6- 

Q7- 

Q8-

Q9-

The only positive integers in the union of these 3 inequalities are 4 and 5, so 4+5=9

Q10- Decagon has interior angles of 144 degrees, so exterior angle is 36 degrees. 180 minus two times 36 = 108







Q11-First notice A+D=0



Q12- A: 

B: Sketch the figure: Angle REK is equal to 150 degrees. Since the triangle formed in an isosceles triangle, the remaining two angles are each 15 degrees. Therefore angle RKE is 15 degrees.

C: Draw picture and you will see the answer is 5



Q13-

Q14.







Answers:

1. 13
2. 90
3. 6
4. 
5. 
6. -999
7. 4
8. 11
9. 9
10. 549
11. 0.5741
12. 420
13. 21
14. 