Freaky Friends

Finding Friends

Miley only has friends that are a fixed distance from her house. She is so supersticious that she won't talk to any one that lives closer than the given distance. She gets car sick if she has to drive any further. Miley is friends with Lindsay who lives exactly 3 miles east and four miles north of Miley's house. Assume Miley lives on the origin (0, 0). At what other locations, exactly the same number of miles form her house (crow's flight), can Miley potentially find a new friend?

1. Plot at least six other locations (order pairs) that are exactly the same distance as Lindsay is from Miley's house. How did you find these points?

2. How far is Lindsay from Miley? _____ miles

3. If the location of all of Miley's possible dates were plotted, what shape would be formed?

4. a) Write the equation of this shape: _____

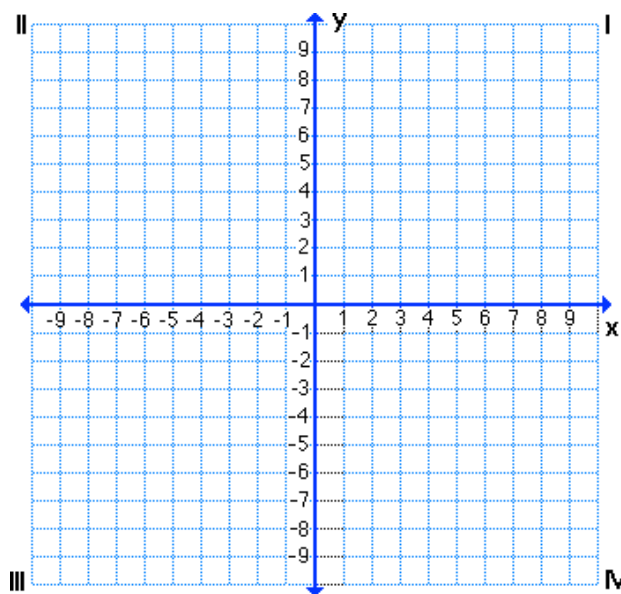   b) Your equation is based on what other formulas/principles that you might know?

5. Find the equation of this shape, for a radius of …

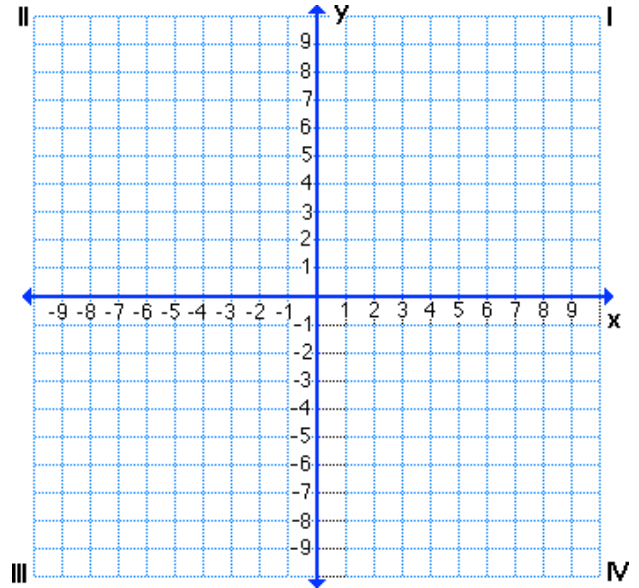   a) 2   b) 3   c) 7   d) r

Freaky Friends (cont'd)

Finding New Friends
*Britney is a friend of Miley. She lives at the location (-4, 3) and has the same distance restriction …
because she is just as interesting.*

6. Find an equation that will give the location of all of the people who are exactly that distance from
    Britney.

7. Write the equation of the circles for the given center and radius:

    a) C(2, 5), r = 7   b) C(-1, 7), r = 2   c) C(0, 3) r = 3

Finding Any Friends For Anybody

8. Write the equation of the circle that represents all the locations *(x, y)* that are *r* miles away from
    someone living at *(h, k)*.

Freaky Friends (cont'd)

Taking it to the Streets

In Miley's neighborhood there is a street named Main Street that runs north-south and is two miles east of Miley's house.

9. a) Plot Miley's house, her circle of friends and all the potential homes on Main Street. Rewrite the equation for Miley's circle of friends.
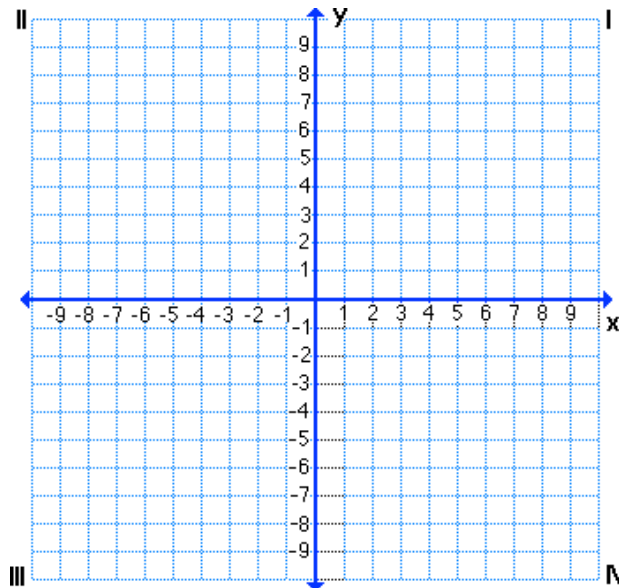
   b) What is the equation for the graph of Main Street?

   c) Use the two equations to find the locations of Miley's friends who can live on Main Street. Why are there two answers? Plot both location on the graph.

10. a) For which streets (equations) will Miley have only one friend? Graph each. Verify one.

   b) For which streets (values) will Miley not have any friends? Verify one of these.

Freaky Friends (cont'd)

In Britney's neighbor, there is an east-west street, called Central Ave, that is 4 miles south of her house.

11. a) Plot Britney's house, her circle of friends and all the potential homes on Central Ave. Rewrite the equation for Britney's circle of friends.
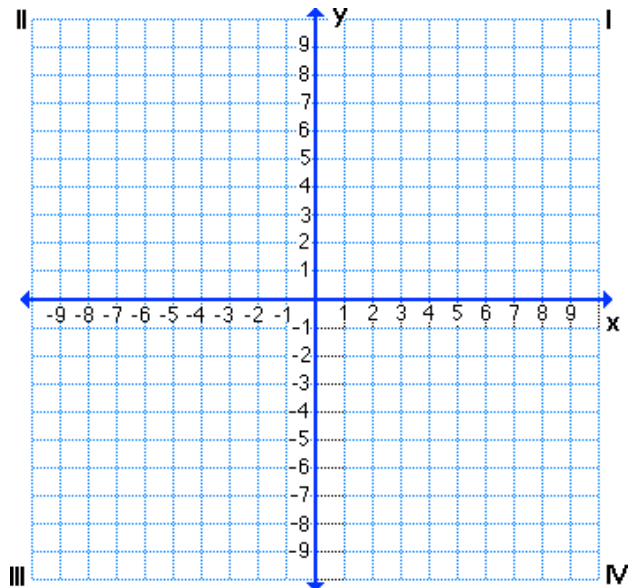
b) What is the equation for the graph of Central Ave?

c) Use the two equations to find the locations of Britney's friends who can live on Central Ave. Plot both location on the graph.

d) Algebraically and graphically determine the location of any of Britney's friends who live on Main St.

e) Algebraically and graphically determine the location of any of Britney's friends who live on Broadway, 6 miles south of her home.

Name _____

Freaky Friends (cont'd)

Assessment: Finding More New Friends

Paris lives at (5, -1). She wants to be friends only with those located 4 miles from home.

12. What equation would you use to find all of the potential friends for Paris?

13. a) Use this equation to find the locations of all friends who live on a north-south street that is two miles west of Paris' house.

   b) Use this equation to find the locations of all friends who live on an east-west street that is four miles south of Paris' house.
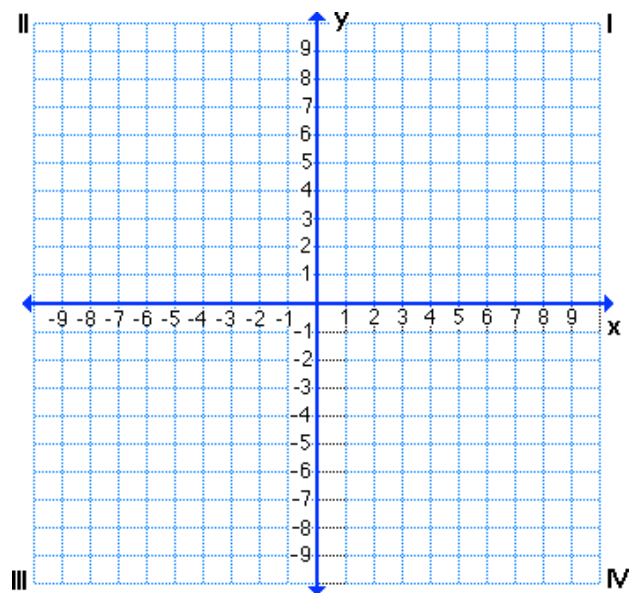
14. Is Lindsay (3, 4) a potential friend of Paris? Support your answer algebraically (below) as well as graphically (above).
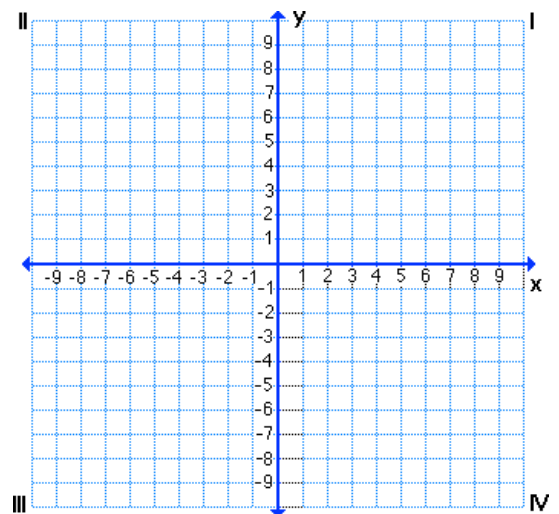
15. Write the equation of the circle with the given information

   a) Center: the origin
     Radius: 4

   b) Center: the origin
     Point on the circle: (6, 8)

   c) Center: (5, 2)
     Radius: 3

16. Graph the equation $(x - 4)^2 + y^2 = 9$

17. Determine whether or not (2, 3) is on the circle represented by the equation:

$$(x - 4)^2 + (y + 3)^2 = 16$$

Bonus: Write the equation of the circle with a center of (-2, 5) with point (1, 1) on the circle.