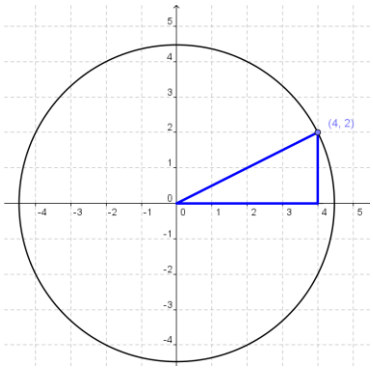
Student Activity on Circles with Centre (0,0) 3

Use in connection with the interactive file "Circles with Centre (0,0) 3" on the Student's CD.

To explore the relationship between the equation of a circle, the circle's radius, and points on the circle. Then draw (some) circles of the form $x^2+y^2=r^2$



The slider called "Step" is used to change the information on the screen.

To start set the slider to "Step = 1"

1. Change the radius using the Radius slider and drag the red dot around the circle.

When the radius of a circle is a whole number there are always (at least) how many points on the circle with whole number coordinates?_____

2. Move the "Step" slider to 2. Drag the blue dot. Write down the twelve points on the circle (that all have whole number coordinates)_____

_____

3. _____of the points are on the axes

4. _____of the points are on not on the axes

Let's look more closely at how we could have got the points that have whole number coordinates but are not on the axes.

5. Move the "Step" slider to 3. This is the circle that has centre (0,0) that passes through the point (4,2). By looking at where the circle crosses the axes can you write down an approximate answer for the radius?_____

6. Drag the slider called "Animation". What type of triangle can you see?_____

_____

7. What is the length of the base of the triangle?_____

8. What is the height of the triangle?_____

9. What theorem can we use when we have the lengths of two sides of a right angled triangle and need to work out the third side?_____

10. Work out the length of the radius_____

_____

_____

_____

11. Compare this to your approximation from earlier. Are they similar?_____

12. <u>On paper.</u> $(1)^2=1$, $(2)^2=4$, $(3)^2=9$. The numbers 1, 4 and 9 are all square numbers. Can you write down the first 10 square numbers?_____

_____

13. Can you think of two numbers which, when squared, and then added together add up to 13 i.e. $(\ )^2+(\ )^2=13$?_____

14. Move the "Step" slider to 4. Move the radius slider so that the radius is $\sqrt{13}$.

Move the point on the circle and find <u>all eight points</u> on the circle that have whole number coordinates._____

15. Choose any three points from the previous question and fill the coordinates into the following spaces and see if they satisfy the following equations.

$x^2 + y^2 = r^2$ $x^2 + y^2 = r^2$ $x^2 + y^2 = r^2$

$(\ )^2+(\ )^2= \sqrt{13}^{\ 2}$ $(\ )^2+(\ )^2= \sqrt{13}^{\ 2}$ $(\ )^2+(\ )^2= \sqrt{13}^{\ 2}$

$\quad + \quad = 13$ $\quad + \quad = 13$ $\quad + \quad = 13$

16. Write down the relationship between points on a circle and the circle's radius._____

_____

_____

17. Can you think of two numbers that when squared and then added together sum to 29 i.e. $(\ )^2+(\ )^2=29$?

18. Move the radius slider so that the radius is $\sqrt{29}$ and check to see if you were correct. Write down 8 points on the circle with radius $\sqrt{29}$._____

_____

19. Move the "Step" slider to 5. Change the radius of the circle and compare this to the equation of the circle. What is the relationship between the radius of the circle and the equation of the circle?_____

_____

_____

Answer the following by adjusting the radius slider:

20. If a circle with centre (0,0) has a radius of $\sqrt{17}$, what is its equation?_____

21. If a circle with centre (0,0) has a radius of $\sqrt{34}$, what is its equation?_____

22. If a circle with centre (0,0) has a radius of 4, what is its equation?_____

23. If the equation of a circle is $x^2+y^2=13$, what is the radius of the circle?_____

24. If the equation of a circle is $x^2+y^2=20$, what is the radius of the circle?_____

25. If the equation of a circle is $x^2+y^2=34$, what is the radius of the circle?_____

Move the "Step" slider along and complete the questions that are asked.

$x^2+y^2 = 1$, $x^2+y^2=4$, $x^2+y^2=9$, etc. are easy to draw because they have a whole number radius.

$x^2+y^2 = 2$, $x^2+y^2 = 5$, $x^2+y^2 = 8$, $x^2+y^2 = 10$, $x^2+y^2 = 13$, $x^2+y^2 = 17$, $x^2+y^2 = 18$, $x^2+y^2 = 20$ etc. are okay to draw because r^2 is the sum of two whole numbers squared.

26. $x^2+y^2 = 50$ is an interesting one because it's the first one that has two different pairs of square numbers that add together to get 50.

27. What square numbers add together to get 50? + = 50 + = 50

28. Fill in the brackets ( )^2+( )^2= 50 and ( )^2+( )^2= 50

29. $x^2+y^2 = 65$ is the next one of these.

30. What square numbers add together to get 65? + = 65 + = 65

31. Fill in the brackets ( )^2+( )^2= 65 and ( )^2+( )^2= 65

You could now try "Drawing Circles Quiz 2" which is also on this CD/Website