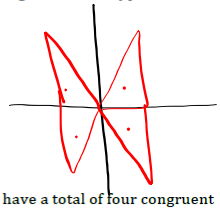
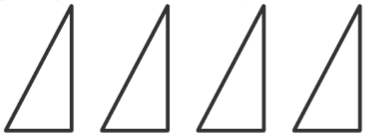
8.1 Circling Triangles (Or Triangulating Circles)

A Develop Understanding Task

Using the corner of a piece of colored paper and a ruler, cut a right triangle with a 6" hypotenuse, like so:



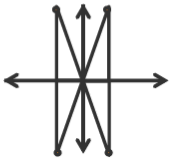
Use this triangle as a pattern to cut three more just like it, so that you have a total of four congruent triangles.

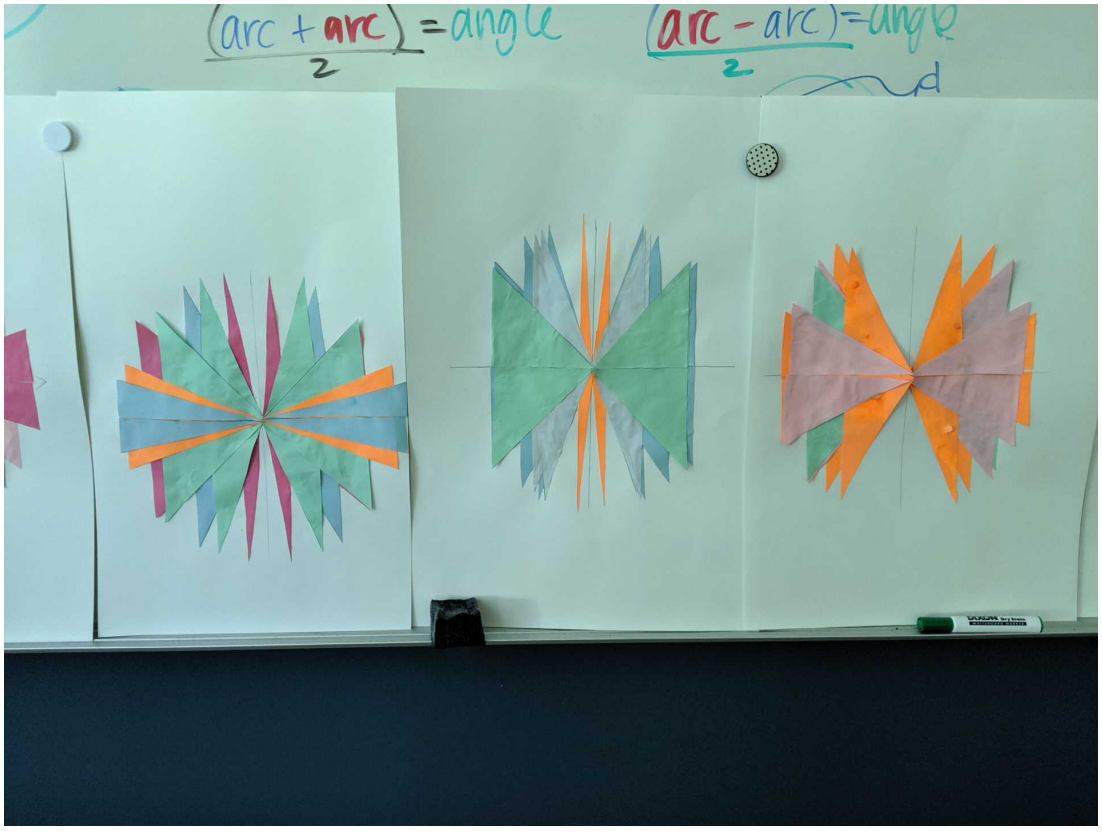


1. Choose one of the legs of the first triangle and label it x and label the other leg y. What is the relationship between the three sides of the triangle?

2. When you are told to do so, take your triangles up to the board and place each of them on the coordinate axis like this:

   Mark the point at the end of each hypotenuse with a pin.





3. What shape is formed by the pins after the class has posted all of their triangles? Why would this construction create this shape?

circle $r = 6$

4. What are the coordinates of the pin that you placed in:
   a. the first quadrant?
   b. the second quadrant?
   c. the third quadrant?
   d. the fourth quadrant?

$x^2 + y^2 = 6^2$ ✓

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

$(x+\_)^2 + (y+\_)^2 = r^2$

left down

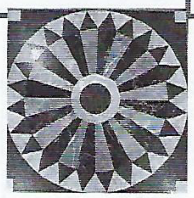
5. Now that the triangles have been placed on the coordinate plane, some of your triangles have sides that are of length $-x$ or $-y$. Is the relationship $x^2 + y^2 = 6^2$ still true for these triangles? Why or why not?

6. What would be the equation of the graph that is the set on all points that are 6" away from the origin?

7. Is the point (0, -6) on the graph? How about the point (3, 5.193)? How can you tell?

8. If the graph is translated 3 units to the right and 2 units up, what would be the equation of the new graph? Explain how you found the equation.

Name: Circles and Other Conics | 8.1



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Ready, Set, Go!

$(x+y)(x-y) = x^2 - y^2$

$(x-y)^2 = x^2 - 2xy + y^2$

$(x+y)^2 = x^2 + 2xy + y^2$

Ready

Topic: Special products and factors

Factor the following as the difference of 2 squares or as a perfect square trinomial. Do not factor if they are neither.

1. $25b^2 - 49y^2$

$(5b)^2 - (7y)^2$

$(5b+7y)(5b-7y)$

2. $100b^2 - 20b + 1$

$(10b)^2 \quad 1^2$

$(10b-1)(10b-1)$

3. $36b^2 + 30b + 25$

$(6b)^2 \quad 5^2$

Doesn't factor

$(6b+5)(6b+5)$ ✗

4. $x^2 + 6x - 9 - y^2$

$x(x+6) - (y^2+9)$

CAN'T FACTOR

5. $x^2 - 2xy + y^2 - 25$

$(x-y)^2 - 5^2$

$((x-y)+5)((x-y)-5)$

6. $a^2 + 2ab + b^2 + 4a + 4b + 4$

7. $x^2 + 2xy + 12x + y^2 + 12y + 36$

$(x^2 + 2xy + y^2) + 12x + 12y + 36$

$(x+y)^2 + 12(x+y) + 36$

$u^2 + 12u + 36 \quad 36 = 6 \times 6, \; 6+6=12$

$(u+6)^2 = ((x+y)+6)^2$

8. $x^2 + 2cx + 2dx + c^2 + 2cd + d^2$

Doesn't factor

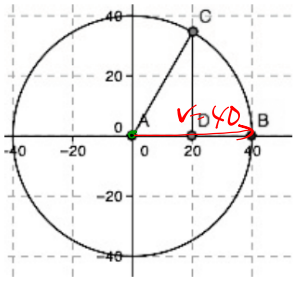
9. $144x^2 - 312xy + 169y^2$

SET

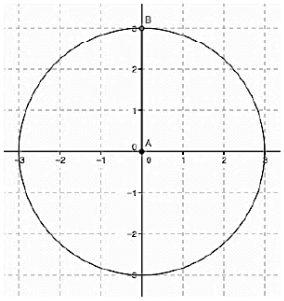
Topic: Writing the equations of circles

Write the equation of each circle centered at the origin.

10. $x^2+y^2=40^2$



11.



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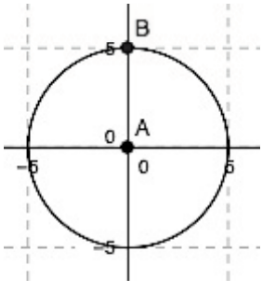

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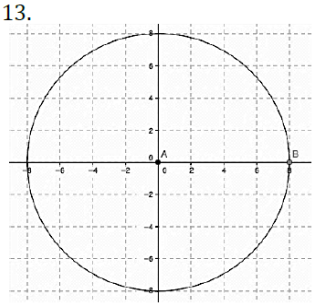

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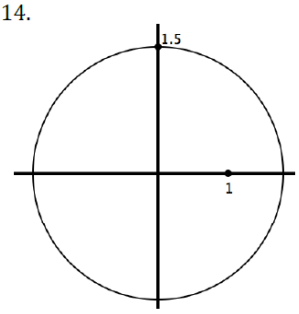

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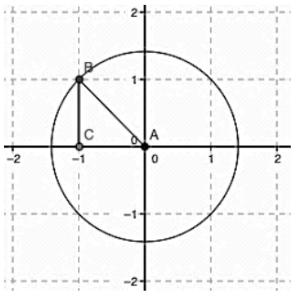

GO

Topic: Verifying Pythagorean triples

Identify which sets of numbers could be the sides of a right triangle. Show your work.

16. $\{9,12,15\}$

17. $\{9,10,\sqrt{19}\}$

$9^2+\sqrt{19}^2=10^2$

$81+19=100$

$100=100$

yes

18. $\{1,\sqrt{3},2\}$

19. $\{2,4,6\}$

20. $\{\sqrt{3},4,5\}$

21. $\{10,24,26\}$

22. $\{\sqrt{2},\sqrt{7},3\}$

23. $\{2\sqrt{2},5\sqrt{3},9\}$

24. $\{4ab^3\sqrt{10},6ab^3,14ab^3\}$

$(4\sqrt{10})^2+6^2=14^2$