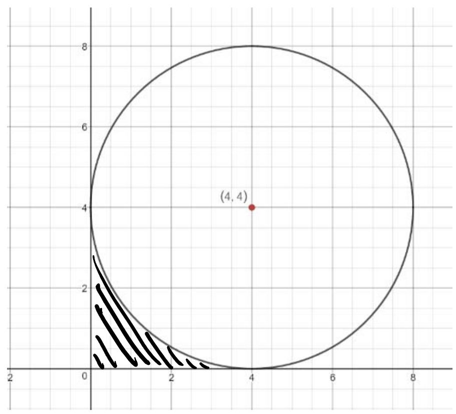
Geo H

13.7 Polygons on the coordinate plane

1. Find the area of the shaded region. The center of the circle, tangent to the axes, is (4,4).



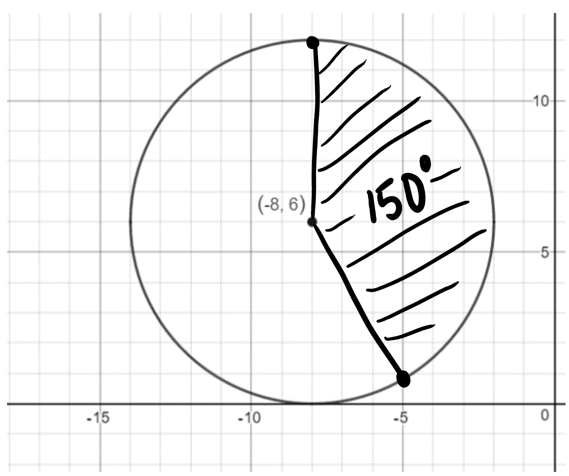
$r = 4$

$A = 16\pi$

Area of square $= 64$

shaded $= \dfrac{64 - 16\pi}{4} = 16 - 4\pi$

2. Find the area of the shaded sector. The center of the circle, tangent to the x-axis, is (-8,6).



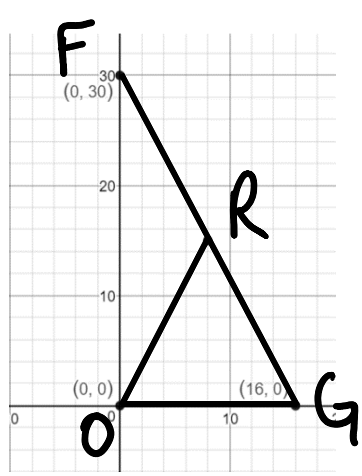
$r = 6$

$A = 36\pi$

Shaded $= \dfrac{150}{360} \cdot 36\pi$

$= 15\pi$

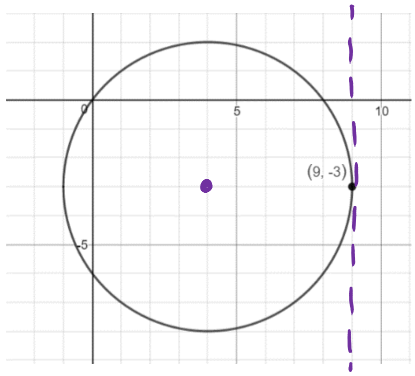
3. R is the midpoint of $\overline{FG}$. Find the length of OR.



$R = (8, 15)$

$OR = 17$

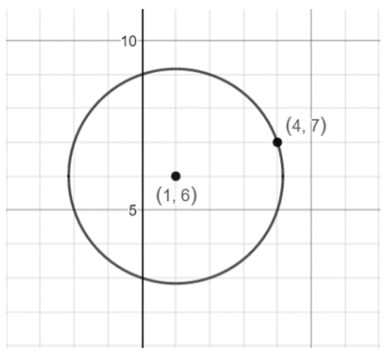
4. Find the equation of the line tangent to the circle at (9,-3).



vertical ⊥ to horizontal

$x = 9$

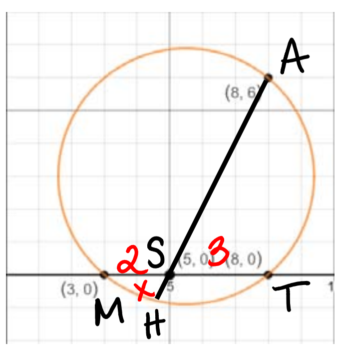
5. Find the equation of the line tangent to the circle at (4,7).



$m = \frac{7-6}{4-1} = \frac{1}{3}$

$y - 7 = -3(x-4)$

6. Find the length of SH.



$d_{\overline{SA}} = \sqrt{(8-5)^2+(6-0)^2}$

$= \sqrt{9+36}$

$= \sqrt{45}$

$= 3\sqrt{5}$

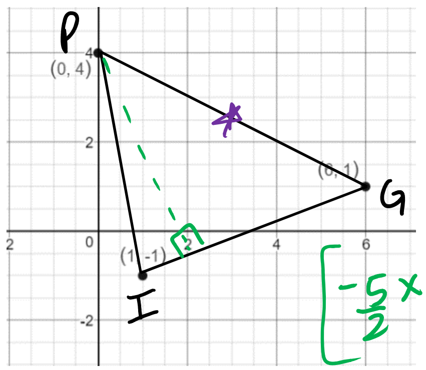
$2 \cdot 3 = 3\sqrt{5} \cdot x$

$x = \frac{6}{3\sqrt{5}} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

Power theorem 10.8

7. a. Find the length of the median to $\overline{PG}$.

b. Find the length of the altitude to $\overline{IG}$.



$$\text{midpt}_{\overline{PG}} = \left(\frac{0+6}{2}, \frac{4+1}{2}\right) = \left(3, \frac{5}{2}\right)$$

$$d_{\text{median}} = \sqrt{(3-1)^2 + \left(\frac{5}{2}+1\right)^2} = \sqrt{4 + \frac{49}{4}} = \sqrt{\frac{65}{4}} = \frac{\sqrt{65}}{2}$$

$$m_{\overline{IG}} = \frac{1+1}{6-1} = \frac{2}{5}$$

$$\begin{cases} y+1 = \frac{2}{5}(x-1) \\ y = -\frac{5}{2}x + 4 \end{cases}$$

$$\left[-\frac{5}{2}x + 4 + 1 = \frac{2}{5}(x-1)\right] \cdot 10$$

$$-25x + 50 = 4(x-1)$$

$$-25x + 50 = 4x - 4$$

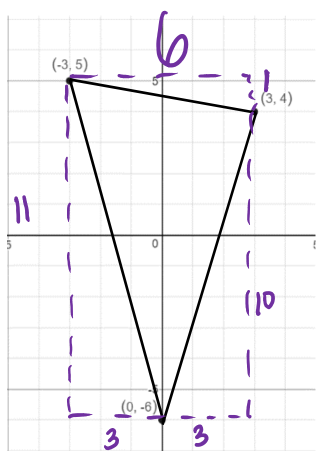
$$54 = 29x$$

$$x = \frac{54}{29}, \quad y = -\frac{19}{29}$$

$$d = \sqrt{\left(0 - \frac{54}{29}\right)^2 + \left(4 + \frac{19}{29}\right)^2} = \sqrt{\frac{729}{29}} = \frac{27\sqrt{29}}{29}$$

8. Find the area of the figure.

a.

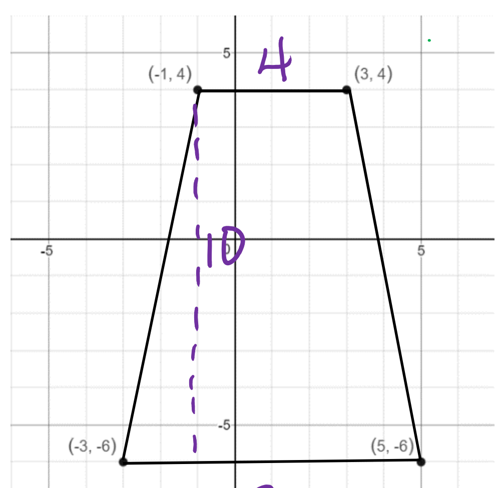


$$A = 6 \cdot 11 - \frac{1}{2} \cdot 1 \cdot 6 - \frac{1}{2} \cdot 3 \cdot 10 - \frac{1}{2} \cdot 3 \cdot 11$$

$$= 66 - 3 - 15 - 16.5$$

$$= 31.5$$

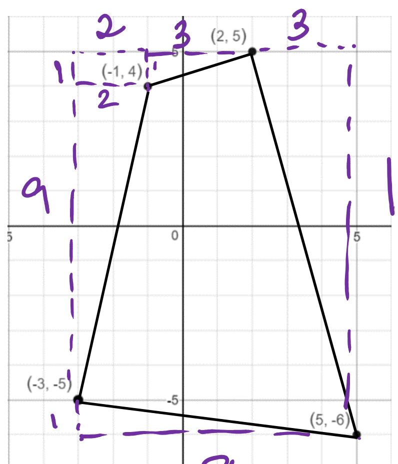
b.



$$A = \frac{1}{2} \cdot 10(4 + 8)$$

$$= 60$$

c.



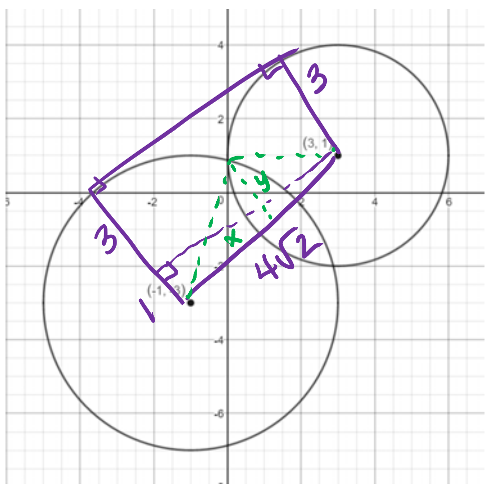
$$A = 8 \cdot 11 - \frac{1}{2} \cdot 3 \cdot 11 - \frac{1}{2} \cdot 3 \cdot 1 - 1 \cdot 2 - \frac{1}{2} \cdot 2 \cdot 9 - \frac{1}{2} \cdot 1 \cdot 8$$

$$= 88 - 16.5 - 1.5 - 2 - 9 - 4$$

$$= 5$$

9. a. Find the length of the common external tangent of the circles below.

b. Find the length of the distance between the intersections (you may round to the nearest hundredth).



$d_{\text{between centers}} = 4\sqrt{2}$

$x^2 + 1^2 = (4\sqrt{2})^2$

$x^2 = 16 \cdot 2 - 1$

$= 31$

$CET = \sqrt{31}$

$x^2 + y^2 = 4^2 \quad y^2 = 16 - x^2$

$(4\sqrt{2} - x)^2 + y^2 = 3^2$

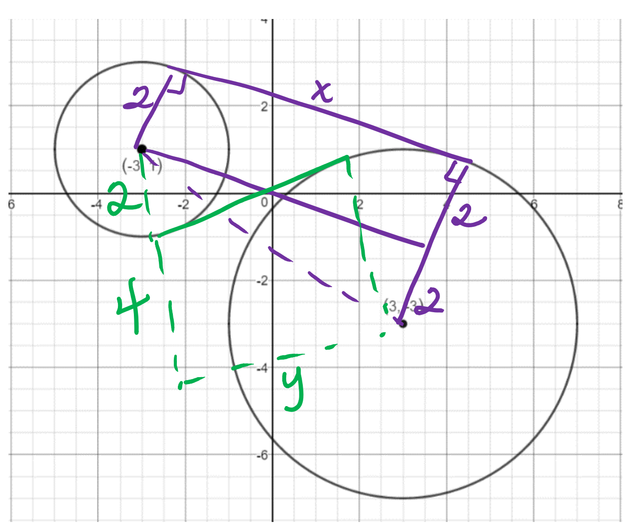
$32 - 8\sqrt{2}x + \cancel{x^2} + 16 - \cancel{x^2} = 9$

$-8\sqrt{2}x = -39$

$x = \dfrac{39}{8\sqrt{2}}$

dist $= 4.06$

10. Find the lengths of the common internal tangent and the common external tangent.



$d_{\text{between centers}} = \sqrt{(-3-3)^2 + (1 - -3)^2}$

$= \sqrt{36 + 16}$

$= \sqrt{52} = 2\sqrt{13}$

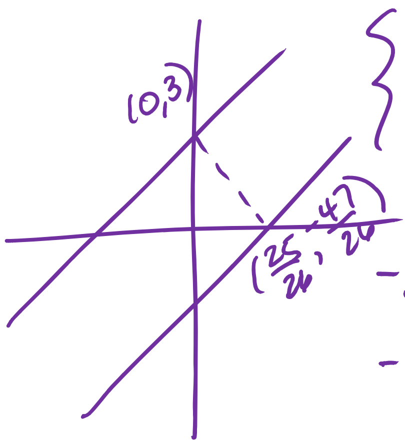
$x^2 + 2^2 = (2\sqrt{13})^2$

$CET = 4\sqrt{3}$

$y^2 + 6^2 = (2\sqrt{13})^2$

$CIT = 4$

11. Find the distance between $y = \frac{1}{5}x + 3$ and $y = \frac{1}{5}x - 2$.



$\begin{cases} y = -5x + 3 \\ y = \frac{1}{5}x - 2 \end{cases}$

$-5x + 3 = \frac{1}{5}x - 2$

$-25x + 15 = x - 10$

$25 = 26x$

$x = \frac{25}{26}, y = \frac{-47}{26}$

$d = \sqrt{\left(0 - \frac{25}{26}\right)^2 + \left(3 - \frac{-47}{26}\right)^2}$

$= \sqrt{\dfrac{625}{26}}$

$= \dfrac{25\sqrt{26}}{26}$