What You Will Learn

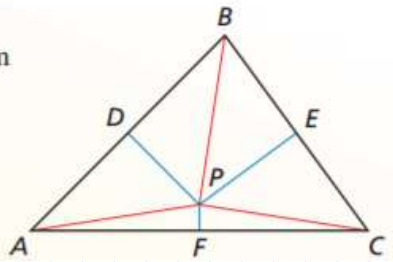
- Use and find the circumcenter of a triangle.

Theorem 6.5 Circumcenter Theorem

The circumcenter of a triangle is equidistant from the vertices of the triangle.

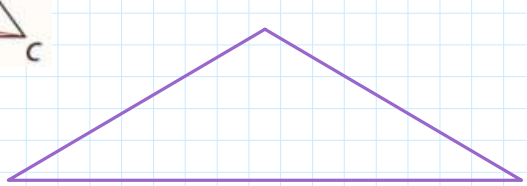
If $\overline{PD}$, $\overline{PE}$, and $\overline{PF}$ are perpendicular bisectors, then $PA = PB = PC$.

Proof p. 310

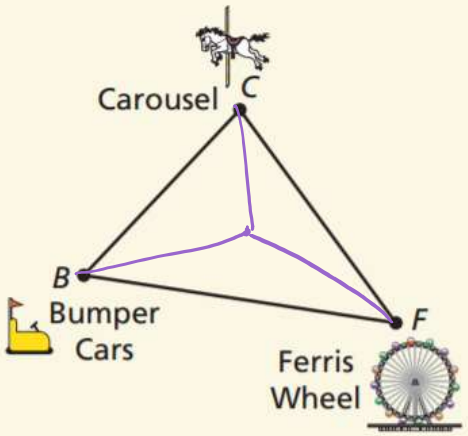


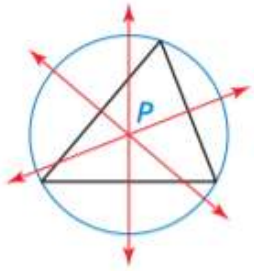
are equidistant to each corner.

created using ⊥ bisectors

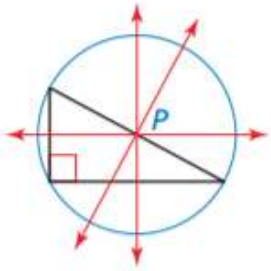


A carnival operator wants to locate a food stand so that it is the same distance from the carousel (C), the Ferris wheel (F), and the bumper cars (B). Find the location of the food stand (S).

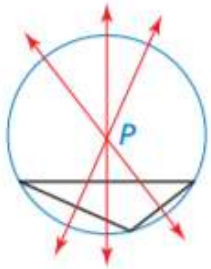




Acute triangle
P is inside triangle.



Right triangle
P is on triangle.



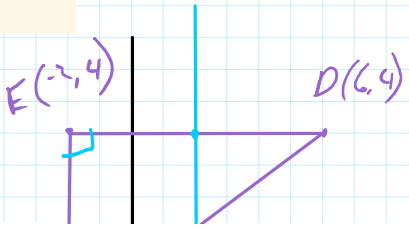
Obtuse triangle
P is outside triangle.

Find the coordinates of the circumcenter of $\triangle DEF$ with vertices $D(6, 4)$, $E(-2, 4)$, and $F(-2, -2)$.

$\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$ $\left(\frac{-2+6}{2}, \frac{-2+4}{2}\right)$

$\left(\frac{4}{2}, \frac{2}{2}\right)$

$y_2 - y_1$

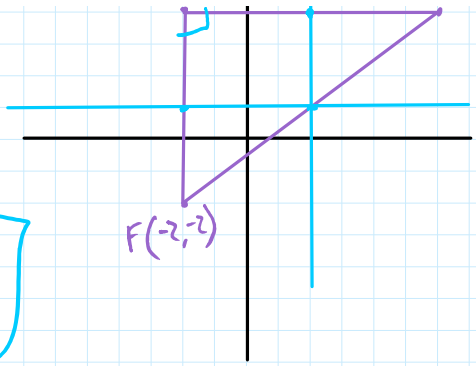


$\frac{y_2-y_1}{x_2-x_1}$

$\left(\frac{4}{2}, \frac{2}{2}\right)$

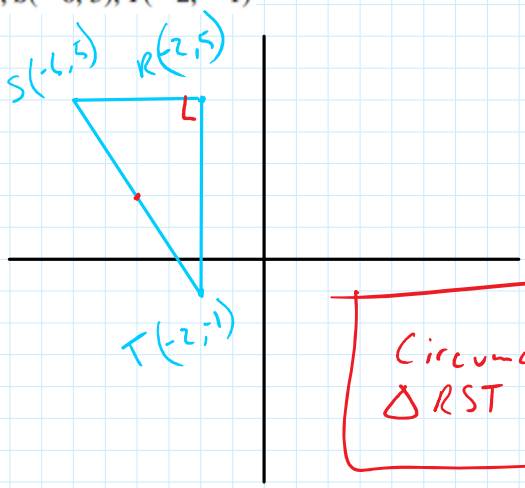
$(2,1)$

Circumcenter of $\triangle DEF$ $(2,1)$



Find the coordinates of the circumcenter of the triangle with the given vertices.

2. $R(-2, 5), S(-6, 5), T(-2, -1)$



$\left(\frac{-6+-2}{2}, \frac{5+-1}{2}\right)$

$\left(\frac{-8}{2}, \frac{4}{2}\right)$

$(-4,2)$

Circumcenter of $\triangle RST$ is $(-4,2)$

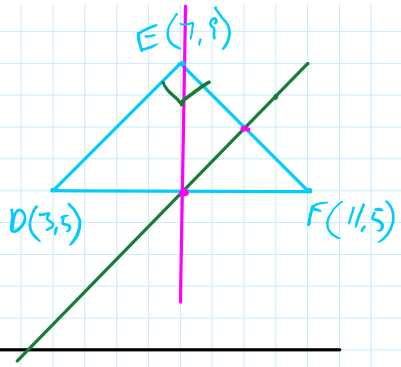
Find the coordinates of the circumcenter of the triangle with the given vertices.

D(3,5), E(7,9), F(11,5)

$\left(\frac{7+11}{2}, \frac{9+5}{2}\right)$

$\left(\frac{18}{2}, \frac{14}{2}\right)$

$(9,7)$



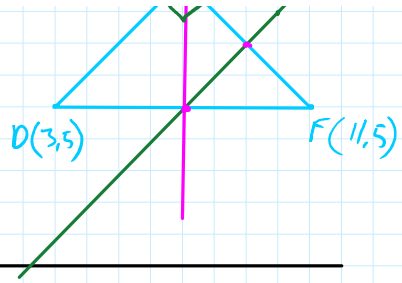
$\frac{y_2-y_1}{x_2-x_1}$ $\frac{9-5}{7-11} = \frac{4}{-4} = -1$

$\perp m = 1 = \frac{1}{1}$

$\left(\frac{7+11}{2}, \frac{9+5}{2}\right)$

$\left(\frac{18}{2}, \frac{14}{2}\right)$

$(9, 7)$



$\frac{y_2-y_1}{x_2-x_1}$ $\frac{9-5}{7-11} = \frac{4}{-4} = -1$

$\perp m = 1 = \frac{1}{1}$

Practice sec 6.2 **pg. 315: 3-10A**
