Lesson 6.2 Perpendicular and Angle Bisectors – Points of Concurrency

Tuesday, February 1, 2022 6:18 PM

Pear Deck Lesson
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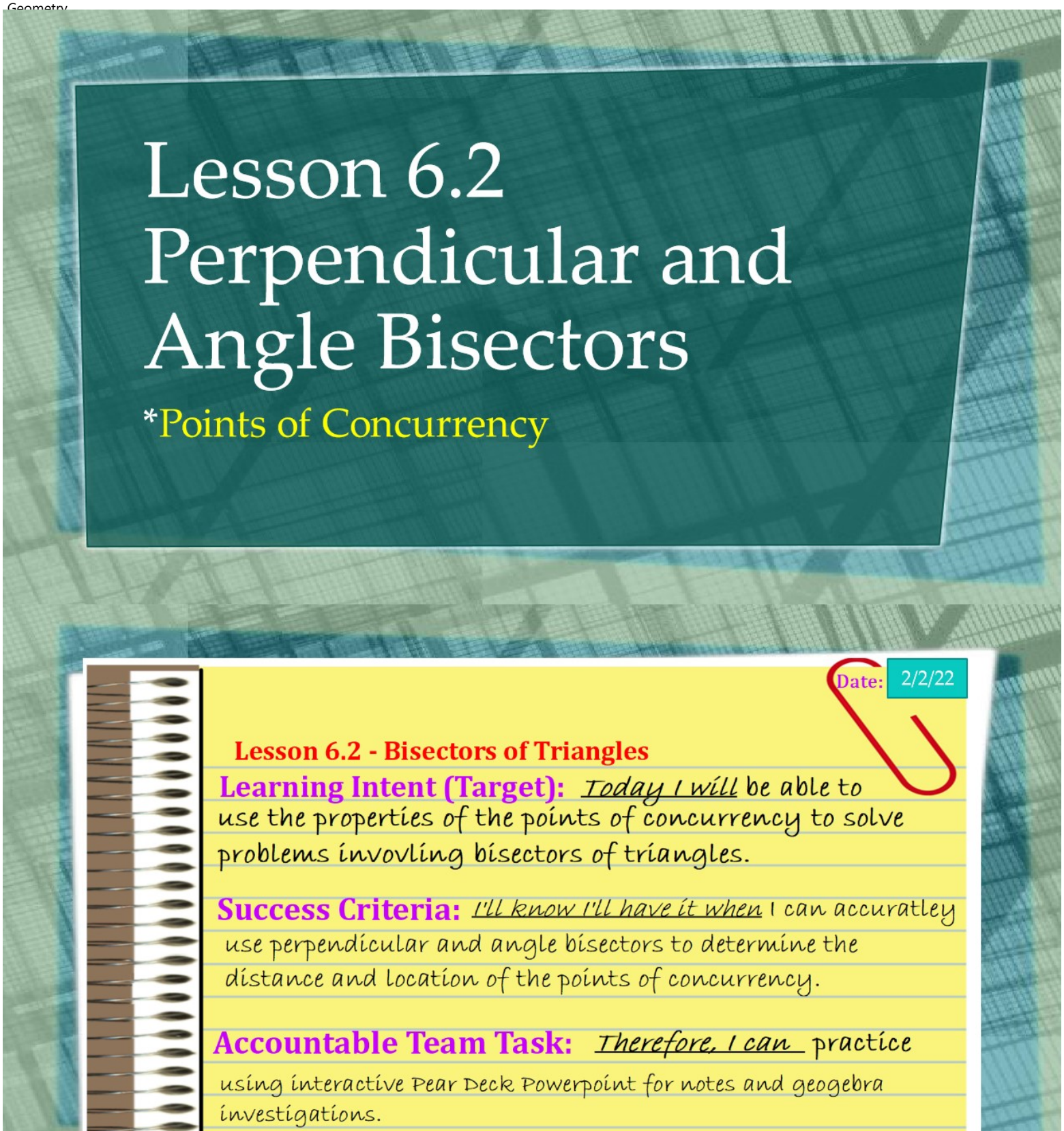
Lesson 6.2
Geometry

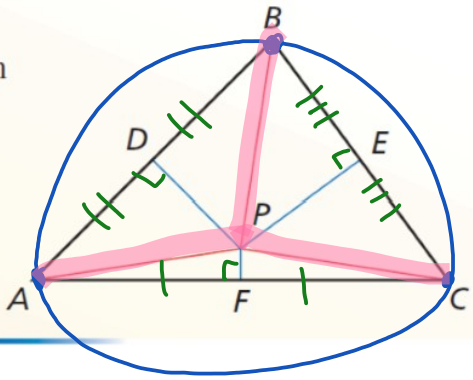


Theorem 6.5 Circumcenter Theorem

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



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Find the coordinates of the circumcenter of $\triangle ABC$ with vertices $A(0, 3)$, $B(0, -1)$, and $C(6, -1)$.

Right Triangle
On the Midpoint of Hypotenuse

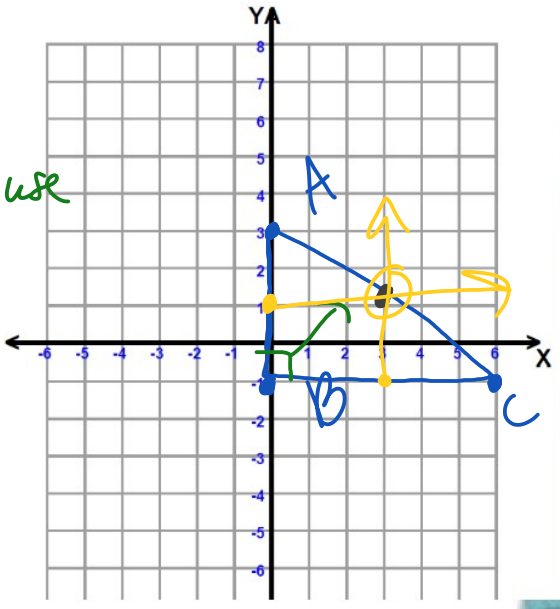
x_1, y_1 x_2, y_2

$\frac{0+6}{2}, \frac{3+-1}{2}$

$\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}$

$\frac{6}{2}, \frac{2}{2}$

$(3, 1)$



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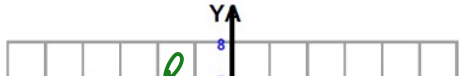
Find the coordinates of the circumcenter of the triangle with the given vertices.

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

x_1, y_1 x_2, y_2

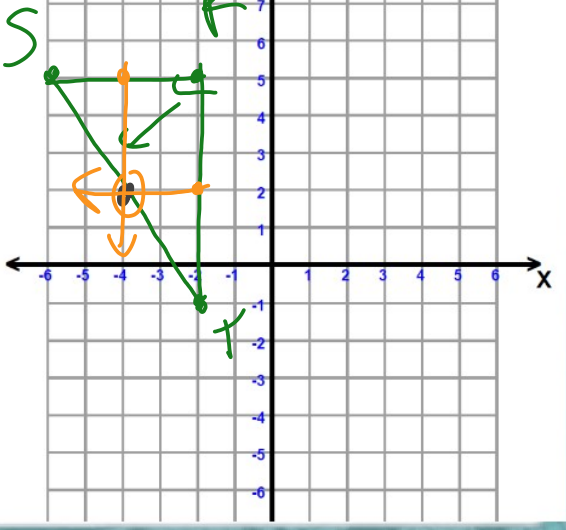


2. $X(-2, 5)$, $S(-6, 5)$, $T(-2, -1)$

Midpoint $\frac{x_1 + x_2}{2}$ $\frac{-6 + -2}{2}$ $\frac{-8}{2}$

Hypotenuse $\frac{y_1 + y_2}{2}$ $\frac{5 + -1}{2}$ $\frac{4}{2}$

$(-4, 2)$



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

3. ~~$W(-1, 4)$, $X(1, 4)$, $Y(1, -6)$~~

$(-8, 2)$ A

$(-8, 8)$ B

$(-4, 6)$ C

$(-7, 5)$

Midpoint $\frac{x_1 + x_2}{2}$, $\frac{y_1 + y_2}{2}$

$\frac{-8 + -4}{2}$ $\frac{8 + 6}{2}$

$\frac{-12}{2}$ $\frac{14}{2}$

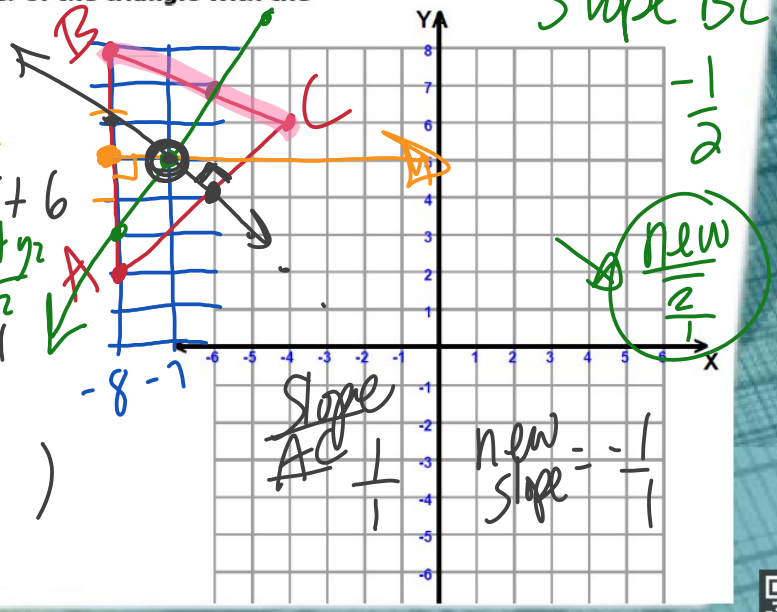
$(-6, 7)$

Slope BC $\frac{-1}{2}$

new slope $\frac{2}{1}$

Slope AC $\frac{1}{1}$

new slope $= -\frac{1}{1}$



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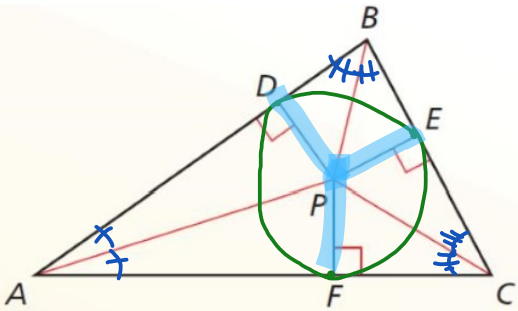
Theorem 6.6 Incenter Theorem

The incenter of a triangle is equidistant from the sides of the triangle.

If $\overline{AP}$, $\overline{BP}$, and $\overline{CP}$ are angle bisectors of $\triangle ABC$, then $PD = PE = PF$.

Proof Ex. 38, p. 317



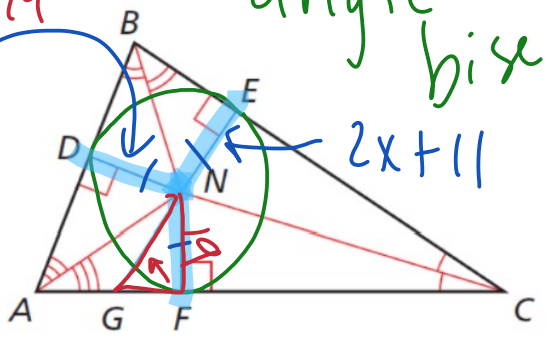
incenter

angle bisectors

In the figure shown, $ND = 5x - 1$ and $NE = 2x + 11$.

a. Find NF.

b. Can NG be equal to 18? Explain your reasoning.



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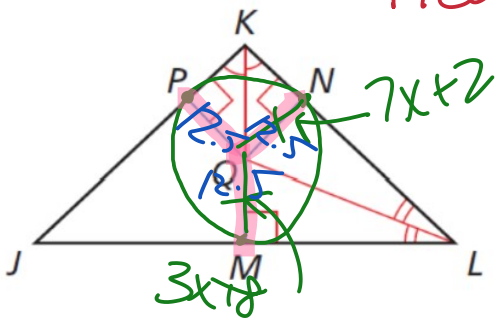
4. In the figure shown, $QM = 3x + 8$ and $QN = 7x + 2$. Find QP.

angle bisectors

incenter



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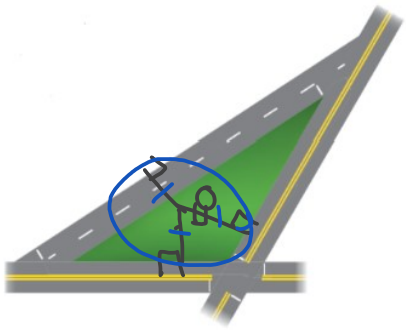
A city wants to place a lamppost on the boulevard shown so that the lamppost is the same distance from all three streets. Should the location of the lamppost be at the *circumcenter* or *incenter* of the triangular boulevard? Explain.



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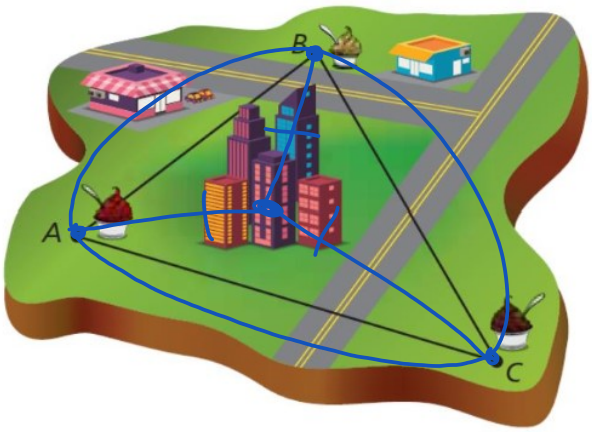
Three snack carts sell frozen yogurt from points A, B, and C outside a city. Each of the three carts is the same distance from the frozen yogurt distributor.

Circumcenter



Which point of concurrency would be used to determine the location?

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