

## 2019 AIME I #3

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In  $\triangle PQR$ ,  $PR = 15$ ,  $QR = 20$ , and  $PQ = 25$ . Points  $A$  and  $B$  lie on  $\overline{PQ}$ , points  $C$  and  $D$  lie on  $\overline{QR}$ , and points  $E$  and  $F$  lie on  $\overline{PR}$ , with  $PA = QB = QC = RD = RE = PF = 5$ . Find the area of hexagon  $ABCDEF$ .

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We compute the area of each of the triangles that are cut off. If  $\theta$  is the included angle, then the area is  $\frac{25}{2} \sin \theta$ . So the area of the hexagon is

$$150 - \frac{25}{2} (\sin P + \sin Q + \sin R) = 150 - \frac{25}{2} \left( \frac{4}{5} + \frac{3}{5} + 1 \right) = \boxed{120}$$

as desired. ■