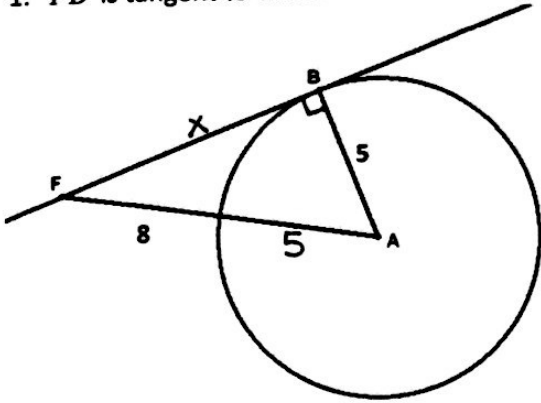


1. \overline{FB} is tangent to circle A. Find FB .

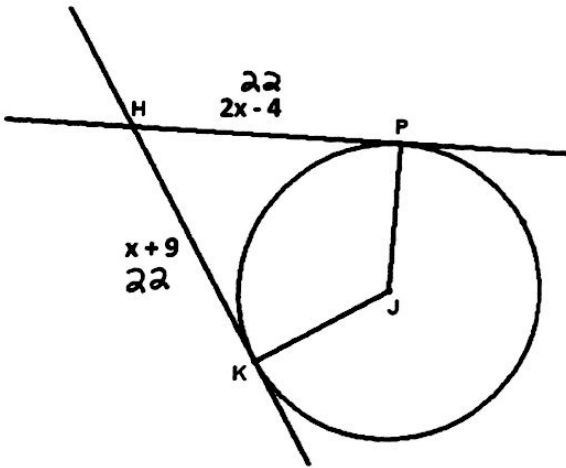


$$x^2 + 5^2 = 13^2$$

$$x = 12$$

$$FB = 12$$

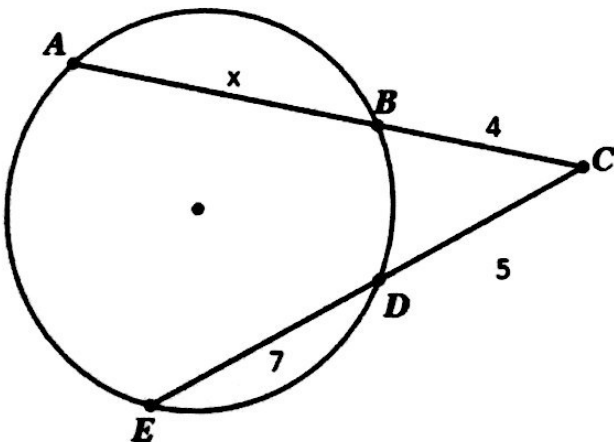
2. \overline{HP} and \overline{HK} are tangent to circle J. Solve for x .



$$2x - 4 = x + 9$$

$$x = 13$$

3. $x = \underline{11}$ $AC = \underline{15}$



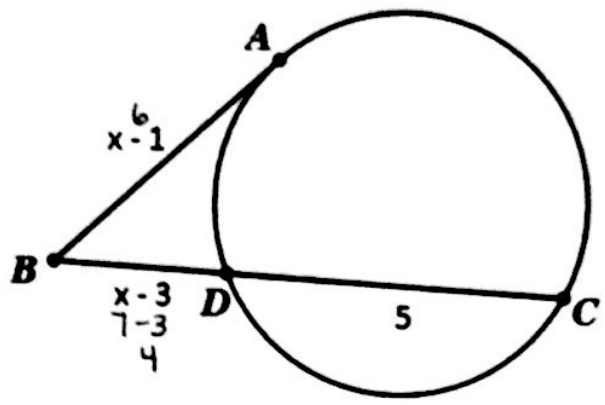
$$4(4 + x) = 5(12)$$

$$16 + 4x = 60$$

$$4x = 44$$

$$x = 11$$

4. $x = \underline{7}$ $BC = \underline{9}$

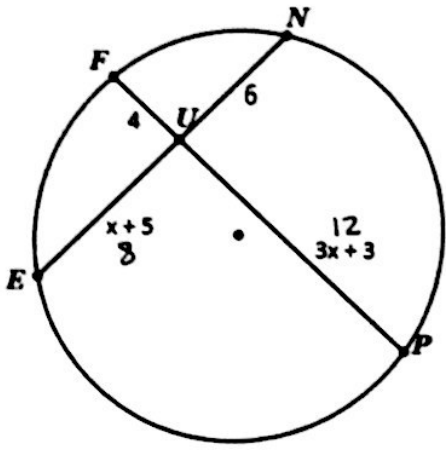


$$(x-1)^2 = (x-3)(x+2)$$

$$x^2 - 2x + 1 = x^2 - x - 6$$

$$7 = x$$

5. $x = \underline{3}$ $EN = \underline{14}$ $UP = \underline{12}$



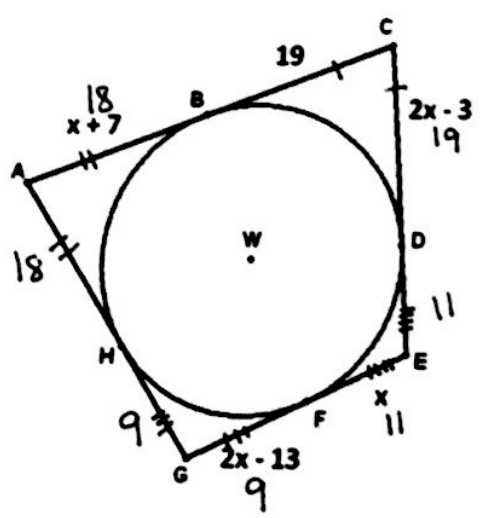
$$4(3x+3) = 6(x+5)$$

$$12x + 12 = 6x + 30$$

$$6x = 18$$

$$x = 3$$

6. Circle W is inscribed in quadrilateral ACEG. Determine the perimeter of the quadrilateral.



$$2x - 3 = 19$$

$$2x = 22$$

$$x = 11$$

$$P = 38 + 36 + 18 + 22 = \boxed{114}$$