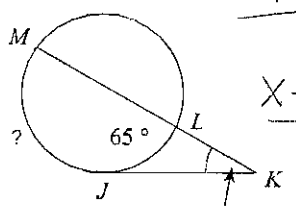
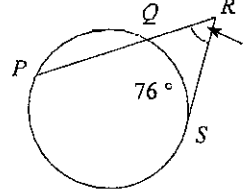
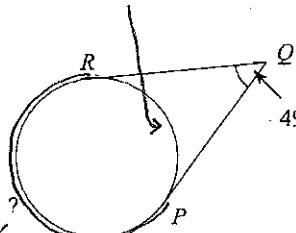


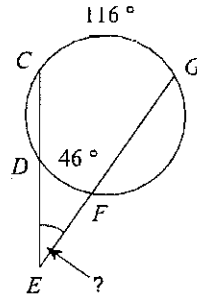
Vertex Outside

Find the measure of the arc or angle indicated. Assume that lines which appear tangent are tangent.

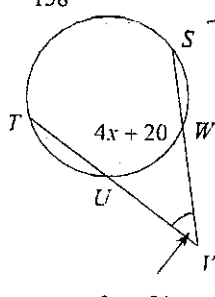
1)  $\frac{LA-SA}{2} = \text{Angle}$
 $\frac{x-65}{2} = \frac{30}{1}$
 $60 = x - 65$
 $+65 \quad +65$
 $125^\circ = x$

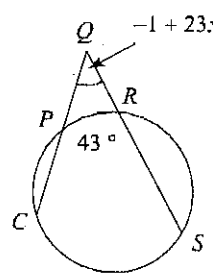
2)  $\frac{LA-SA}{2} = \text{Angle}$
 $\frac{190-76}{2} = x$
 $\frac{114}{2} = x$
 $x = 57^\circ$

3)  $\frac{LA-SA}{2} = \text{Angle}$
 $\frac{x - (360-x)}{2} = 49$
 $\frac{2x - 360}{2} = 49$
 $98 = 2x - 360$
 $+360 \quad +360$
 $458 = 2x$
 $x = 229^\circ$

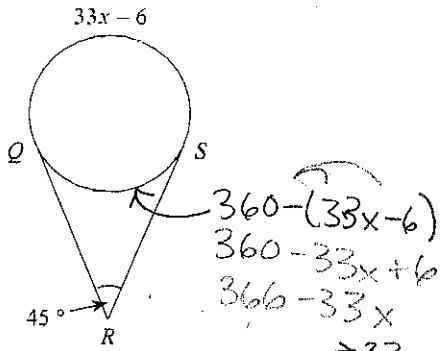
4)  $\frac{LA-SA}{2} = \text{Angle}$
 $\frac{116-46}{2} = x$
 $\frac{70}{2} = x$
 $x = 35^\circ$

Solve for x. Assume that lines which appear tangent are tangent.

5)  $\frac{158 - (4x+20)}{2} = 2x+21$
 $\frac{158-4x-20}{2} = 2x+21$
 $\frac{138-4x}{2} = 2x+21$
 $2(2x+21) = 138-4x$
 $4x+42 = 138-4x$
 $+4x \quad +4x$
 $8x+42 = 138$
 $-42 \quad -42$
 $8x = 96$
 $x = 12$

6)  $\frac{LA-SA}{2} = \text{Angle}$
 $\frac{67x-1-43}{2} = \frac{-1+23x}{1}$
 $\frac{67x-44}{2} = -1+23x$
 $67x-44 = 2(-1+23x)$
 $67x-44 = -2+46x$
 $-46x \quad -46x$
 $21x-44 = -2$
 $+44 \quad +44$
 $21x = 42$
 $x = 2$

7)



$$\frac{LA-SA}{2} = \text{Angle}$$

$$\frac{33x-6 - (366-33x)}{2} = 45^\circ$$

$$\frac{33x-6-366+33x}{2} = 45$$

$$\frac{66x-372}{2} = 45$$

$$66x-372 = 90$$

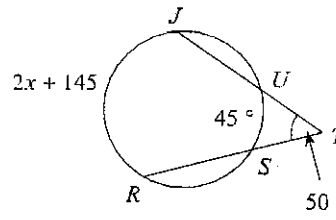
$$+372 \quad +372$$

$$66x = 462$$

$$\frac{66x}{66} = \frac{462}{66}$$

$$x = 7$$

8)



$$\frac{LA-SA}{2} = \text{Angle}$$

$$\frac{2x+145-45}{2} = 50$$

$$\frac{2x+100}{2} = 50$$

$$2x+100 = 100$$

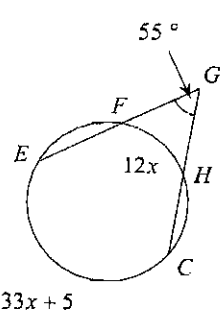
$$-100 \quad -100$$

$$2x = 0$$

$$x = 0$$

Find the measure of the arc or angle indicated. Assume that lines which appear tangent are tangent.

9) Find $m\widehat{FH}$



$$\frac{LA-SA}{2} = \text{Angle}$$

$$\frac{33x+5-12x}{2} = 55$$

$$\frac{21x+5}{2} = 55$$

$$21x+5 = 110$$

$$-5 \quad -5$$

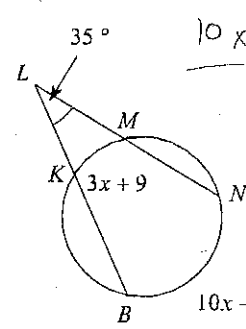
$$21x = 105$$

$$\frac{21x}{21} = \frac{105}{21}$$

$$x = 5$$

$$m\widehat{FH} = 12x = 12(5) = 60$$

10) Find $m\widehat{BN}$



$$\frac{LA-SA}{2} = \text{Angle}$$

$$\frac{10x-5-(3x+9)}{2} = 35$$

$$\frac{10x-5-3x-9}{2} = 35$$

$$\frac{7x-14}{2} = 35$$

$$7x-14 = 70$$

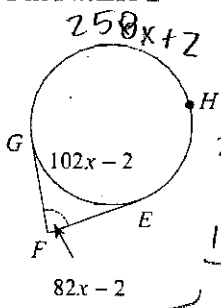
$$+14 \quad +14$$

$$7x = 84$$

$$\frac{7x}{7} = \frac{84}{7} \rightarrow x = 12$$

$$m\widehat{BN} = 10x-5 = 10(12)-5 = 120-5 = 115$$

11) Find $m\widehat{EHG}$



$$\frac{LA-SA}{2} = \text{Angle}$$

$$\frac{258x+2-(102x-2)}{2} = 82x-2$$

$$\frac{258x+2-102x+2}{2} = 82x-2$$

$$\frac{156x+4}{2} = 82x-2$$

$$156x+4 = 2(82x-2)$$

$$156x+4 = 164x-4$$

$$-156x \quad -156x$$

$$4 = 8x-4$$

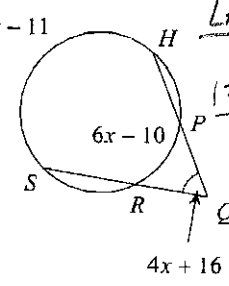
$$+4 \quad +4$$

$$8 = 8x$$

$$\frac{8}{8} = \frac{8x}{8} \rightarrow x = 1$$

$$m\widehat{EHG} = 258x+2 = 258(1)+2 = 260$$

12) Find $m\angle SQH$



$$\frac{LA-SA}{2} = \text{Angle}$$

$$\frac{17x-11-(6x-10)}{2} = 4x+16$$

$$\frac{17x-11-6x+10}{2} = 4x+16$$

$$\frac{11x-1}{2} = 4x+16$$

$$11x-1 = 2(4x+16)$$

$$11x-1 = 8x+32$$

$$-8x \quad -8x$$

$$3x-1 = 32$$

$$+1 \quad +1$$

$$3x = 33$$

$$\frac{3x}{3} = \frac{33}{3} \rightarrow x = 11$$

$$m\angle SQH = 4x+16 = 4(11)+16 = 44+16 = 60$$