Mr. Hansen
Geom. HW due 12/8/2008

§7.4 #1-4, 10, 11, 13, 14

1. (a) equiangular triangle $(n=3) \Rightarrow \frac{360}{3} = \boxed{120}$
   (b) " quadrilateral $(n=4) \Rightarrow \frac{360}{4} = \boxed{90}$
   (c) " octagon $(n=8) \Rightarrow \frac{360}{8} = \boxed{45}$
   (d) " pentadecagon $(n=15) \Rightarrow \frac{360}{15} = \boxed{24}$
   (e) " 23-gon $(n=23) \Rightarrow \frac{360}{23} = \boxed{15\frac{15}{23}}$

2. (a) " pentagon $(n=5) \Rightarrow \frac{360}{5} = 72 \Rightarrow$ int. $\angle$ meas. $= \boxed{108}$
   (b) " hexagon $(n=6) \Rightarrow \frac{360}{6} = 60 \Rightarrow$ " " " $= \boxed{120}$
   (c) " nonagon $(n=9) \Rightarrow \frac{360}{9} = 40 \Rightarrow$ " " " $= \boxed{140}$
   (d) " dodecagon $(n=12) \Rightarrow \frac{360}{12} = 30 \Rightarrow$ " " " $= \boxed{120}$
   (e) " 21-gon $(n=21) \Rightarrow \frac{360}{21} = 17\frac{1}{7} \Rightarrow$ " " " $= \boxed{172\frac{6}{7}}$

3. (a) Each ext. $\angle = 60^\circ \Rightarrow \frac{360}{n} = 60 \Rightarrow n = \boxed{6 \text{ (hexagon)}}$
   (b) " " " $= 40^\circ \Rightarrow \frac{360}{n} = 40 \Rightarrow n = \boxed{9 \text{ (nonagon)}}$
   (c) " " " $= 36^\circ \Rightarrow \frac{360}{n} = 36 \Rightarrow n = \boxed{10 \text{ (decagon)}}$
   (d) " " " $= 2^\circ \Rightarrow \frac{360}{n} = 2 \Rightarrow n = \boxed{180 \text{ (180-gon)}}$
   (e) " " " $= 7.5^\circ \Rightarrow \frac{360}{n} = 7.5 \Rightarrow n =$

4. (a) Each $\angle = 144^\circ \Rightarrow$ each ext. $\angle = 36^\circ \Rightarrow \frac{360}{n} = 36 \Rightarrow n = \boxed{10 \text{ (decagon)}}$
   (b) " " $= 120^\circ \Rightarrow$ " " " $= 60^\circ \Rightarrow \frac{360}{n} = 60 \Rightarrow n = \boxed{6 \text{ (hexagon)}}$
   (c) " " $= 156^\circ \Rightarrow$ " " " $= 24^\circ \Rightarrow \frac{360}{n} = 24 \Rightarrow n = \boxed{15 \text{ (15-gon)}}$
   (d) " " $= 162^\circ \Rightarrow$ " " " $= 18^\circ \Rightarrow \frac{360}{n} = 18 \Rightarrow n = \boxed{20 \text{ (20-gon)}}$
   (e) " " $= 172.8^\circ \Rightarrow$ " " " $= 7.2^\circ \Rightarrow \frac{360}{n} = 7.2 \Rightarrow n = \boxed{50 \text{ (50-gon)}}$

10. Sum of measures $= 5040 \Rightarrow (n-2)180 = 5040$

$$(n-2) = \frac{5040}{180}$$

$$(n-2) = 28$$

$$n = 30$$

With a 30-gon, each ext. $\angle$ has measure $\frac{360}{30} = 12$.
$\therefore$ each angle measure of the 30-gon $= 180 - 12 = \boxed{168}$

11. Let x = meas. of one ext. $\angle = \frac{360}{n}$
n = # of sides of unknown polygon
$180 - x$ = meas. of one int. $\angle = 180 - \frac{360}{n}$
Note: Each ext. $\angle$ of a regular hexagon is $60°$, from #2(b).
Given; sum of int. $\angle$ measures $= 9(60)$

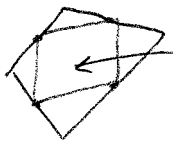
$$(n-2)\,180 = 9(60)$$
$$(n-2)\,180 = 540$$
$$180n - 360 = 540$$
$$180n = 900$$
$$n = 5 \quad \text{(pentagon)}$$

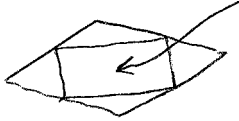
13. (a) Compare $\frac{360}{n}$ to $\frac{360}{(2n)}$. Exterior $\angle$ measures are indeed halved. Answer: (A)

(b) The word "regular" was omitted. Some decagon ext. $\angle$s are large, some small; the same is true of quadrilaterals.
Answer: (S)

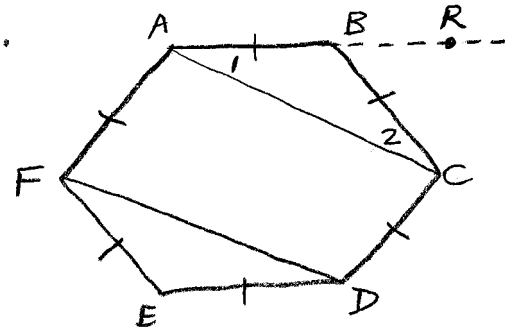
(c) Reg. polygon is both equilat. and equiangular, by def. Answer: (A)

(d) Equilat. polygon may or may not be reg.
Answer: (S)

(e) 
Parallelogram (could be a rhombus under certain conditions)
Answer: (S)

(f) 
Aways a rectangle.
Answer: (N)

14. Given: ABCDEF is a reg. hex.
Prove: ACDF is a rect.



1. ABCDEF is a reg. hex.	1. G
2. $AB=BC=CD=DE=EF=FA$	2. Def. reg. poly.
3. Extend $\overleftrightarrow{AB}$ through R as shown	3. Postulate of Euclidean geometry: Any line can be extended.
4. $m\angle RBC = \frac{360}{6}$	4. Ext. $\angle$ of a reg. poly.
5. $m\angle ABC = 120$	5. Def. supp.
6. $m\angle E = 120$	6. Def. reg. poly. (equiangular)
7. $\angle 1 \cong \angle 2$	7. ITT ($\triangle \Rightarrow \triangle$)
8. $m\angle 1 + m\angle 2 + m\angle ABC = 180$	8. Angles of $\triangle$ add to 180°
9. $m\angle 1 = m\angle 2 = 30$	9. Alg. (steps obvious from (7) and (8), omitted to save space)
10. $m\angle FAB = 120$	10. Def. equiang., see also (5,6)
11. $m\angle FAC = 90$	11. Subtr.
12. $\triangle ABC \cong \triangle DEF$	12. SAS (2,5,6,2)
13. $\overline{AC} \cong \overline{DF}$	13. CPCTC
14. ACDF is a $\square$	14. Both prs. opp. sides $\cong$ (13,2)
15. ACDF is a rect.	15. $\square$ with a rt. $\angle$ (14, 11)

$\square$