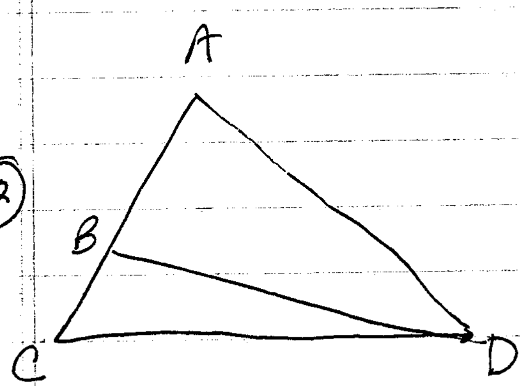
5329 HW3

3.1	Points
8	3
12	2
3.2	
1	4
2	4
3	6
4	6
6	3
9	4
13	3
15	3
Enrichment	4
3.3	
10	4
14	3
18	4
24	3
	56 points

3.1 8 which would satisfy SAS?

$\triangle ABC$ and $\triangle FED$ would work with $ABC \longleftrightarrow FDE$ as the Corresp.

also writing $\triangle ABC \cong \triangle FDE$, while not true yet per our axioms, works as an answer

12 

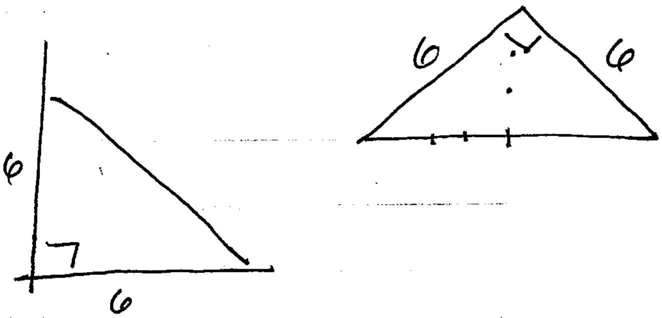
if $\angle DAB \cong \angle DAC$

given (by observation) that A-B-C we know from an earlier hw problem that

$\overline{AB} \subseteq \overrightarrow{AC}$ and we can show that $\overrightarrow{AB} = \overrightarrow{AC}$ so renaming is ok

3.2

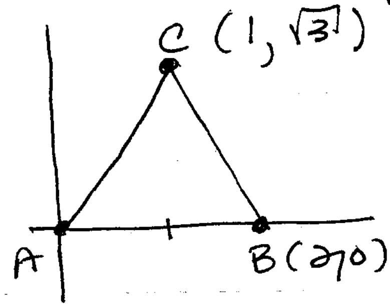
(1.) yes, you do have 6 - 90' - 6 metrically but no they're not congruent



using the Taxicab metric

(2.) no its not equilateral. yes it is isosceles

(3.)



this is Euclidean equilat (2-2-2)

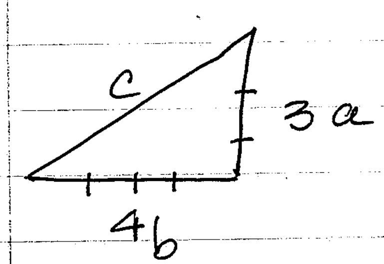
- in Taxicab the sides are $AB = 2$
  $BC = AC = 1 + \sqrt{3}$
- the angles measure 60° each
- no its not equilateral in Taxicab & it is isosceles and equiangular

3.2

4. a. the triangle has side lengths = 16 under Taxicab G

b. no – if you use a protractor, you'll see its scalene ... ea angle is a different measure

c. under Euclidean geometry the triangle is scalene – neither equilateral nor isosceles

6. 

a. in TCG the hypothenuse measures 7

b. $c^2 = 49 \quad a^2 + b^2 = 25$

c. No the Pythagorean thm doesn't hold

9. yes ... if you have a "4-sided polygon having 4 right angles" in TCG then the opposite sides WILL be congruent

3.2

(13) This problem shows exactly how different a perpendicular bisector in EG is from one in TCG ... for a line at a 45° angle there's a rectangle of points equidistant from the endpoints

everyone gets all the points

note that the one in the notes is NOT 45°

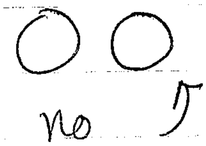
in TCG there are 2 shapes for a P.B. very, very non-euclidean

(15) This illustrates the focal distance in an ellipse

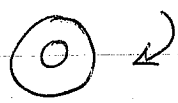
everyone gets all the points

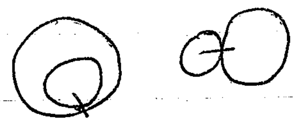
Enrichment

EG

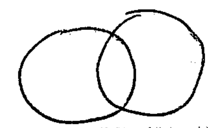


no intersection



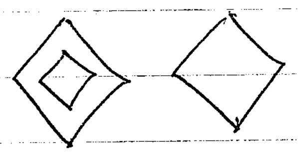


tangent – 1 point intersection

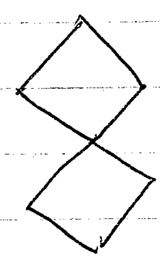


2 point intersection

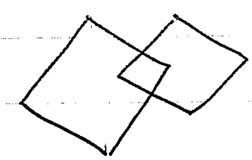
TCG



none

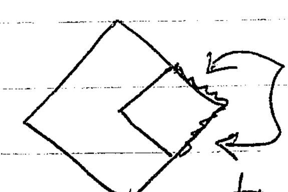


one



2 intersections

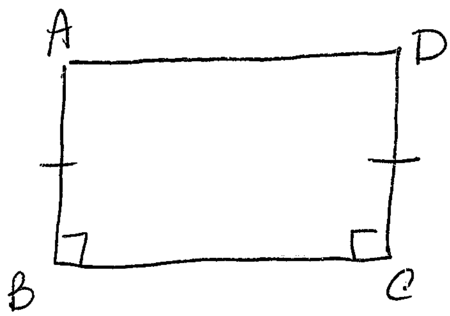
and – an infinite number of shared points



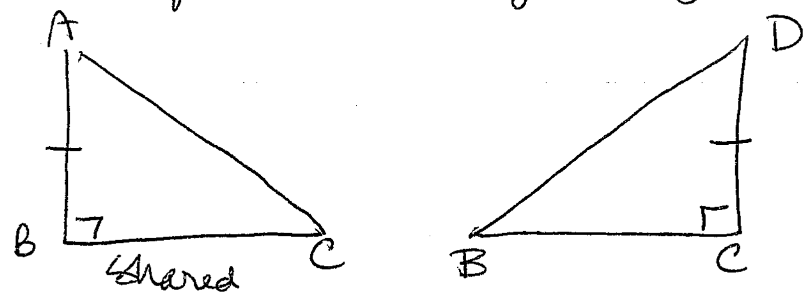
this pops up when you try to do internally tangent

3.3

10



a. why are the diag congruent ?

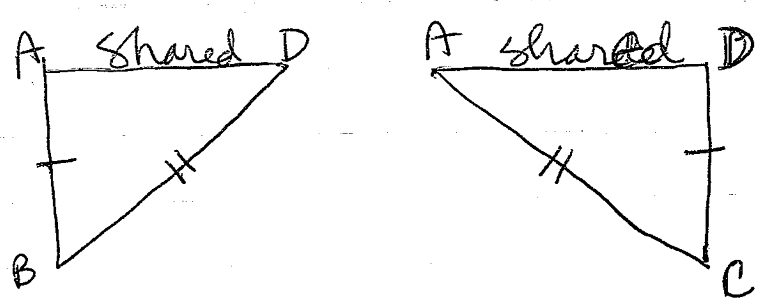


explode the picture

$\triangle ABC \cong \triangle DCB$ SAS

$\overline{AC} \cong \overline{BD}$ CPCF

b.



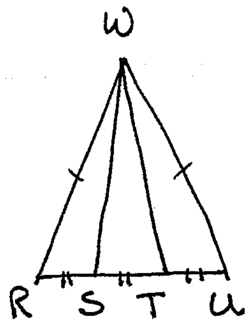
explode again upward

$\triangle ADB \cong \triangle DAC$ SSS

$\angle A \cong \angle D$ CPCF

3.3

14. By 2.5.3 $\measuredangle AMP \cong \measuredangle PMB$ AND by defn of midpoint $AM = MB$.
PM is shared (reflexivity)
so $\triangle AMP \cong \triangle BMP$ by SAS thus
$PA = PB$ CPCF

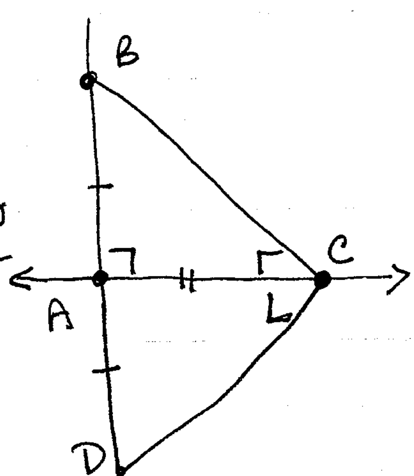


18 given $WR = WU$, $RS = ST = TU$
w/. R-S-T-U colinear

show $\measuredangle RWS \cong \measuredangle TWU$

We are given $RS = TU$ so $\measuredangle WRS \cong \measuredangle WUT$ (3.3.2) by CPCF $WS \cong WT$ ($\triangle WRS \cong \triangle WUT$ by SAS) so $\measuredangle WST \cong \measuredangle WTS$ (3.3.2)
~~Now~~ and $\measuredangle RWS \cong \measuredangle UWT$ CPCF

24. Show that there's exactly one $\perp$ through B to $\overleftrightarrow{AC}$



let $\overline{BA} \perp \overline{AC}$ spse BC is also $\perp$ to AC, contruct D ∋ $AD = AB$
$\triangle BAC \cong \triangle DAC$ by SAS
note that B-C-D because
$m\measuredangle BCA = m\measuredangle ACD = 90°$ ... this makes 2 lines intersecting at B & D $\rightarrow\leftarrow$