

Math 206 - Test 3

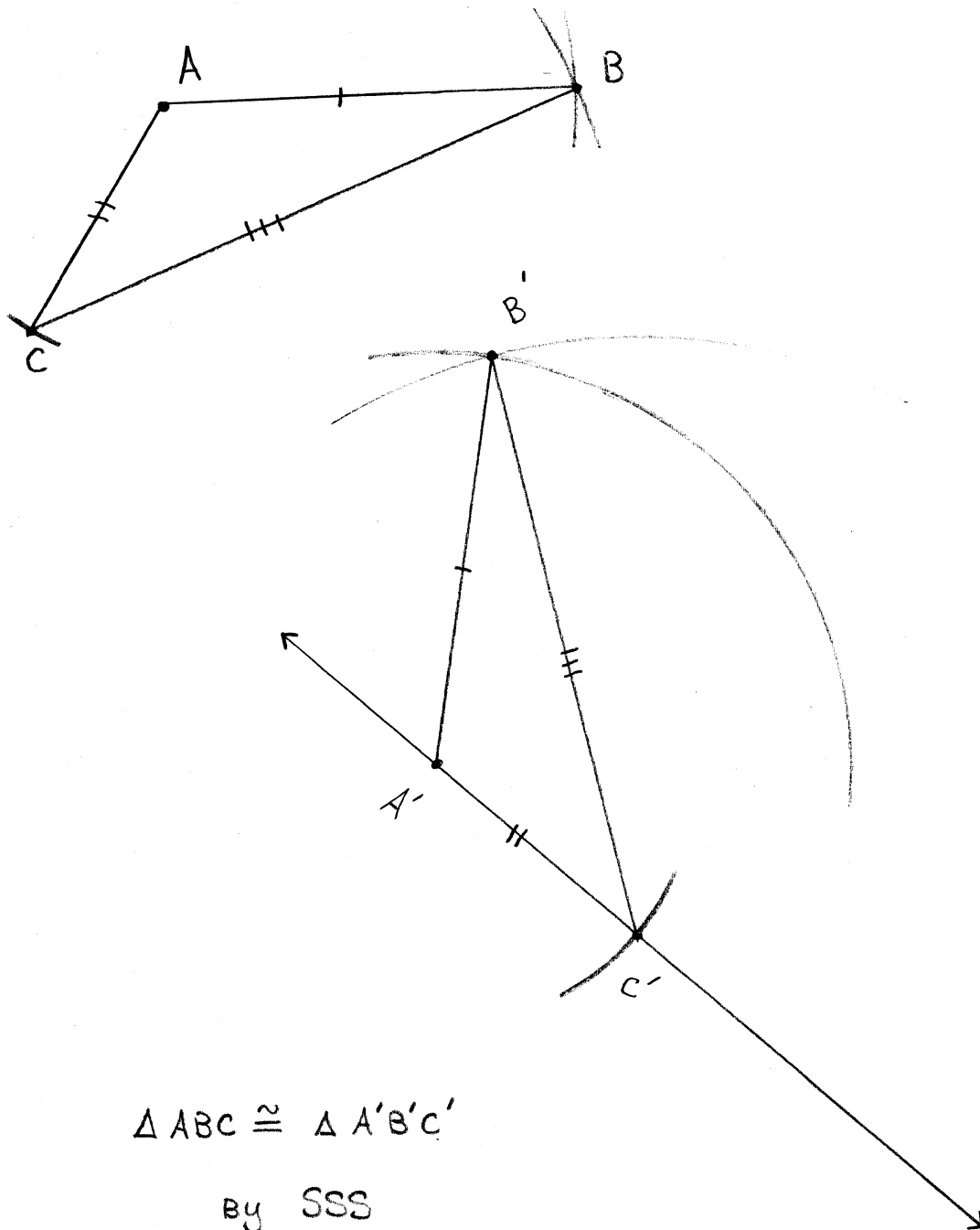
April 20, 2011

Name key

Score _____

Show all work. Supply explanations when necessary.

1. (5 points) Use a straightedge to draw a triangle that is clearly scalene. Then, with only your compass and straightedge, use the SSS property to construct a congruent triangle.



2. (3 points) The figure shown below is a kite. Carefully explain how we can be sure that $\triangle ACD \cong \triangle BCD$.

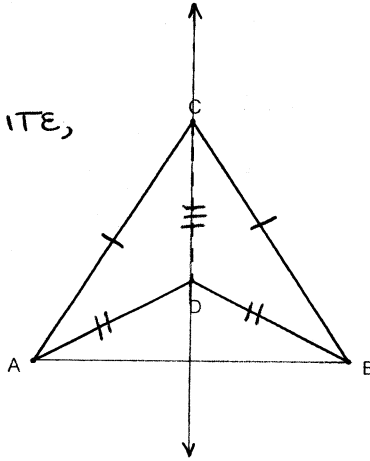
By DEFINITION OF KITE,

$$\overline{AC} \cong \overline{BC}$$

AND

$$\overline{AD} \cong \overline{BD}$$

(AS MARKED).



WE ALSO CLEARLY HAVE $\overline{CD} \cong \overline{CD}$
(MARKED III).

So, BY THE SSS PROPERTY, $\triangle ACD \cong \triangle BCD$.

3. (2 points) Referring to the kite above, connect points A and B to form a segment, and draw the line through C and D . Explain how you know that \overline{CD} bisects \overline{AB} .

SEE
THM 12-4a
p 759

THE POINTS C AND D ARE EQUIDISTANT FROM A & B .

By OUR THEOREM FROM CLASS, ANY POINTS EQUIDISTANT FROM THE ENDPPOINTS OF A SEGMENT ARE ON THE SEGMENT'S PERPENDICULAR BISECTOR.

4. (3 points) What is the measure of each interior angle of a regular heptagon? What is the measure of each exterior angle?

INTERIOR ANGLES:

$$\frac{(7-2)(180^\circ)}{7} = \frac{900^\circ}{7}$$

$$\approx 128.57^\circ$$

EXTERIOR ANGLES:

$$\frac{360^\circ}{7} \approx 51.43^\circ$$

5. (4 points) If the measure of an angle is $57^{\circ} 34' 12''$, what is the measure of its complement? Write your answer both in degrees, minutes, and seconds and in degrees in decimal form.

$$90^{\circ} = 89^{\circ} 59' 60''$$

$$\begin{array}{r} 89^{\circ} 59' 60'' \\ - 57^{\circ} 34' 12'' \\ \hline 32^{\circ} 25' 48'' \end{array}$$

$$32^{\circ} 25' 48''$$

32 WHOLE DEGREES

$$\frac{25 \text{ MIN}}{1} \cdot \frac{1 \text{ DEG}}{60 \text{ MIN}} = 0.41\bar{6}^{\circ}$$

$$\frac{48 \text{ SEC}}{1} \cdot \frac{1 \text{ DEG}}{3600 \text{ SEC}} = 0.01\bar{3}^{\circ}$$

$$32^{\circ} + 0.41\bar{6}^{\circ} + 0.01\bar{3}^{\circ} = 32.43^{\circ}$$

6. (2 points) What does CPCTC stand for?

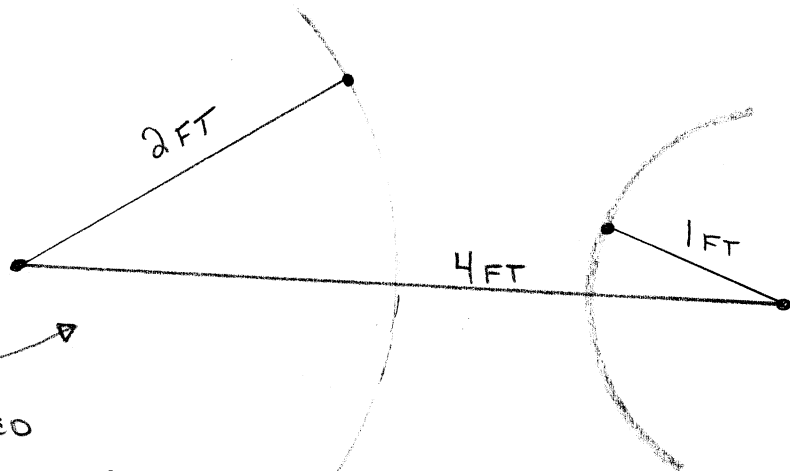
CORRESPONDING PARTS OF

CONGRUENT TRIANGLES ARE CONGRUENT.

7. (3 points) John found three straight sticks and discovered that he could not connect them to form a triangle. Give an example of the possible stick lengths. Then explain and draw a picture to illustrate why a triangle cannot be formed.

EXAMPLE:

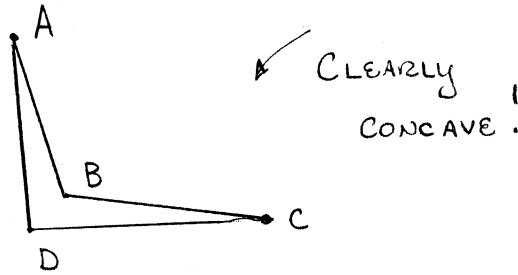
1 FT, 2 FT, 4 FT



THE 1 & 2-FT SIDES ARE SIMPLY TOO SHORT TO CONNECT. THE COMBINED LENGTHS OF THE SHORTER SIDES 3 MUST EXCEED THE LENGTH OF THE LONGEST SIDE.

8. (6 points) Sketch each of the following or explain why it is not possible.

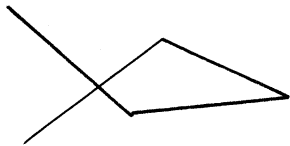
(a) A concave quadrilateral



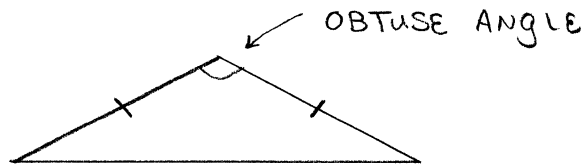
(b) A rhombus that is not a kite

NOT POSSIBLE. ALL FOUR SIDES OF A RHOMBUS ARE CONGRUENT. THEREFORE ADJACENT SIDES ARE AUTOMATICALLY CONGRUENT.

(c) A polygonal curve that is neither simple nor closed



(d) An obtuse, isosceles triangle



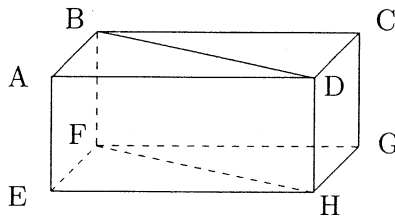
(e) A parallelogram with exactly one right angle

NOT POSSIBLE. A PARALLELOGRAM WITH ONE RIGHT \angle AUTOMATICALLY HAS FORM (I.E. ITS A RECTANGLE.)

(f) An equilateral triangle that is not isosceles

NOT POSSIBLE, IF 3 SIDES ARE CONGRUENT, THEN AT LEAST TWO AUTOMATICALLY ARE CONGRUENT.

9. (3 points) Refer to the following three-dimensional figure. Be sure to use correct notation for your answers below.



- (a) Find a pair of skew lines. (If not possible, explain why.)

\overleftrightarrow{BD} AND \overleftrightarrow{FG} (SKREW LINES
DO NOT SHARE A PLANE)

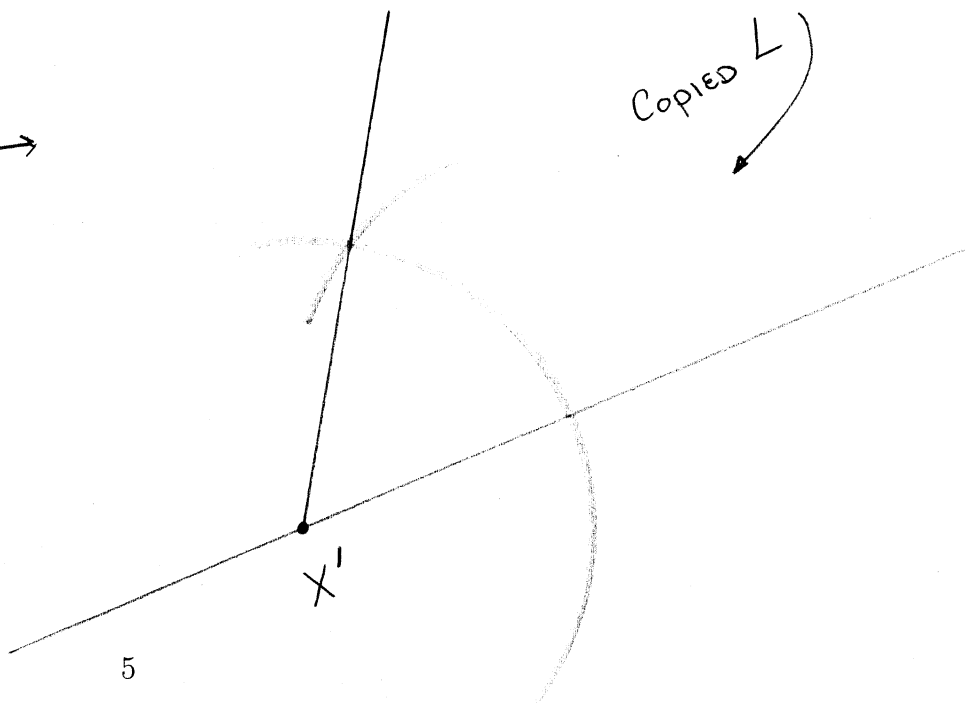
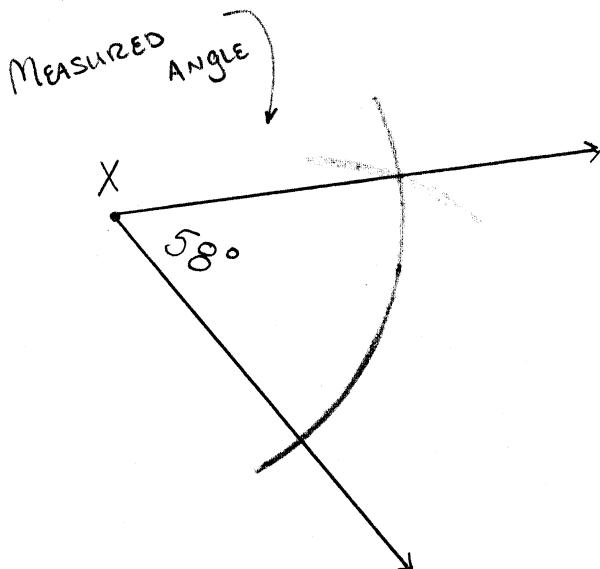
- (b) Find three concurrent lines. (If not possible, explain why.)

\overleftrightarrow{AB} , \overleftrightarrow{DB} , \overleftrightarrow{CB} ALL SHARE POINT B.

- (c) Find three points that are not coplanar. (If not possible, explain why.)

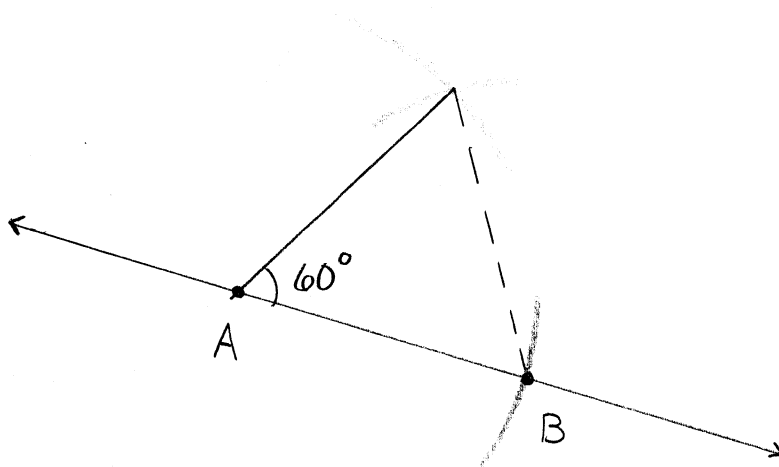
NOT POSSIBLE. THREE POINTS ARE
EITHER COLLINEAR OR THEY
UNIQUELY DETERMINE A PLANE.

10. (5 points) Use a straightedge to sketch an acute angle. Use your protractor to find the measure of the angle. Then use compass and straightedge to construct a congruent angle.

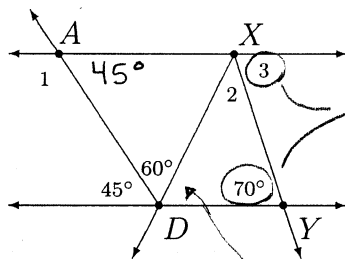


11. (3 points) Using only a compass and straightedge, construct a 60° angle. Explain how you know that it measures 60° .

CONSTRUCT AN EQUILATERAL TRIANGLE USING SSS.



12. (4 points) Given the figure shown below with $\overleftrightarrow{AX} \parallel \overleftrightarrow{DY}$, find each of the following:



ALT INTERIOR \angle 's

$$180^\circ - 60^\circ - 45^\circ = 75^\circ$$

(a) $m(\angle 1) = 180^\circ - 45^\circ = \boxed{135^\circ}$

(b) $m(\angle 2) = 180^\circ - 70^\circ - 75^\circ = \boxed{35^\circ}$

(c) $m(\angle 3) = \boxed{70^\circ}$

13. (1 point) Suppose that a line is taken at random from each of two parallel planes. Must the lines be parallel?

No, REFER TO PROBLEM 9.

\overleftrightarrow{BD} AND \overleftrightarrow{EH} ARE IN PARALLEL PLANES,
BUT THEY ARE NOT PARALLEL.

14. (3 points) Fill in the blank with the correct word.

(a) Lines that share a common point are called CONCURRENT lines.

(b) A curve made up entirely of straight line segments is called a POLYGONAL curve.

(c) Points that lie on the same line are said to be COLLINEAR.

(d) A SIMPLE curve is a curve that does not cross itself.

(e) The angle between two planes is called a DIHEDRAL angle.

(f) Two coplanar lines that have exactly one point in common are called INTERSECTING lines.

15. (3 points) Use your straightedge to sketch a line segment. Then use only your compass and straightedge to construct the segment's perpendicular bisector.

