

**Math 206 - Test 3**  
April 15, 2015

Name key Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations where necessary.

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1. (4 points) Fill in the blank with the appropriate polygon.

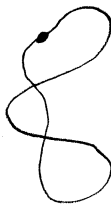
(a) A quadrilateral with two pairs of congruent adjacent sides is called a(n) KITE.

(b) A parallelogram with a right angle is called a(n) RECTANGLE.

(c) A polygon with nine sides is called a(n) NONAGON.

(d) A triangle with no congruent sides is called a(n) SCALENE triangle.

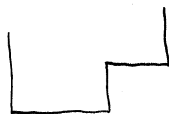
2. (1 point) Sketch a closed curve that is not simple.



STARTS AND ENDS AT SAME POINT.

CROSSES ITSELF.

3. (1 point) Sketch a simple polygonal curve that not closed.



LINE SEGMENTS.

NOT CLOSED.

DOES NOT CROSS ITSELF.

4. (6 points) Determine if the lengths given could be the side lengths of a triangle. If not, say why. If so, state the type of triangle: *scalene*, *equilateral*, or *isosceles*. (State all that apply.)

(a) 4 in, 4 in, 5 in

$$4 + 4 = 8 > 5$$

$$4 + 5 = 9 > 4$$

$\Rightarrow$  YES, ISOSCELES (AT LEAST TWO SIDES CONGRUENT.)

(b) 9 cm, 7 cm, 3 cm

$$9 + 7 = 16 > 3$$

$$7 + 3 = 10 > 9$$

$$3 + 9 = 12 > 7$$

$\Rightarrow$  YES, SCALENE (NO CONGRUENT SIDES)

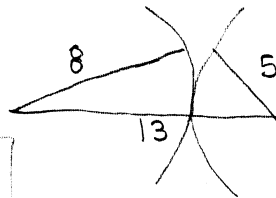
(c) 13 in, 8 in, 5 in

$$8 + 5 = 13 \text{ NOT GREATER THAN } 13.$$

No, THE SUM OF THE SHORT SIDES DOES NOT EXCEED THE LONG SIDE

(d) 2.5 ft, 2.5 ft, 2.5 ft

YES, EQUILATERAL  $\Delta$ , ALSO ISOSCELES  
(ALL SIDES CONGRUENT)



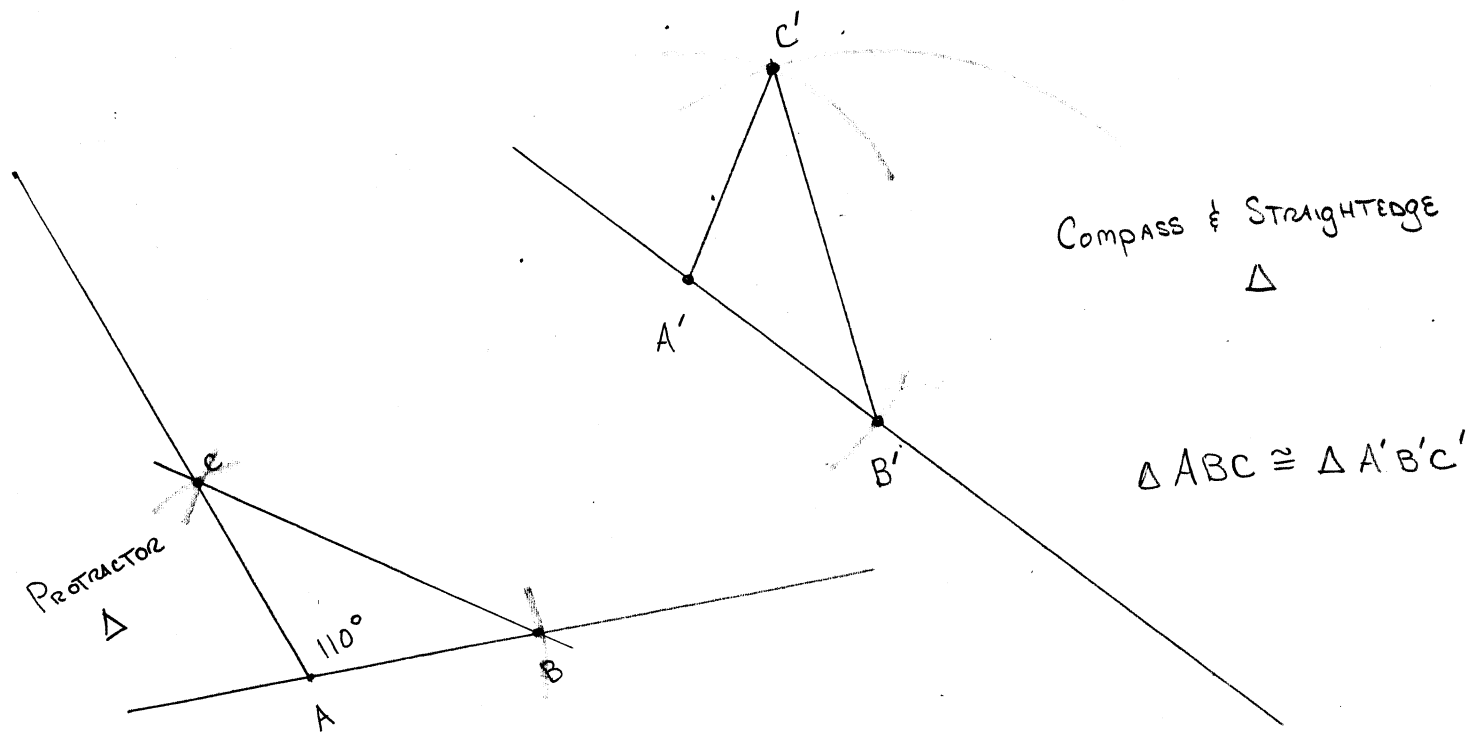
5. (3 points) Determine the measure of each interior angle of a regular dodecagon. What is the measure of each exterior angle?

$$\text{INTERIOR } \angle = \frac{(12-2)(180^\circ)}{12} = \boxed{150^\circ}$$

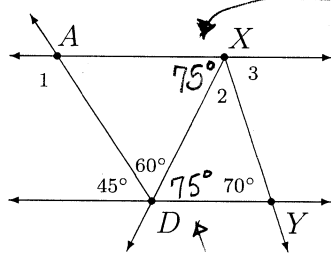
$$\Rightarrow \text{EXTERIOR } \angle = \boxed{30^\circ}$$

(THEY ARE SUPPLEMENTARY.)

6. (5 points) Use a straightedge and protractor to construct a triangle with an angle that measures  $110^\circ$ . Then use a straightedge and compass to copy the triangle. (The steps of your construction must be clear and easy to follow.)



7. (5 points) Given the figure shown below with  $\vec{AX} \parallel \vec{DY}$ , find each of the following.



(ii)  $\angle AXD$  AND  $\angle XDY$   
ARE ALT. INT.  $\angle$ 'S

(i)  
 $m(\angle XDY) = 75^\circ$

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

$\angle 1$  AND  $\angle ADY$  ARE ALT. INT.  $\angle$ 'S

(b)  $m(\angle 2) = \boxed{35^\circ}$

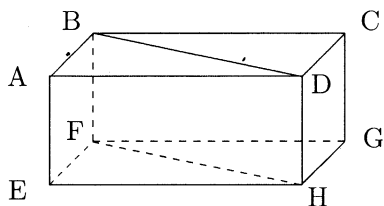
$75^\circ + 70^\circ + m(\angle 2) = 180^\circ$

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

$75^\circ + m(\angle 2) + m(\angle 3) = 180^\circ$

SINCE THE THREE  $\angle$ 'S AT D  
TOGETHER MAKE A  
STRAIGHT  $\angle$ .  
( $45^\circ + 60^\circ + 75^\circ = 180^\circ$ )

8. (6 points) Refer to the following three-dimensional figure. Be sure to use correct notation for your answers below.



- (a) Are the points  $B$ ,  $F$ , and  $H$  coplanar? Briefly explain.

YES, ANY THREE POINTS ARE COPLANAR.

- (b) Find a pair of intersecting lines that are not coplanar. (If not possible, explain why.)

NOT POSSIBLE. ANY PAIR OF INTERSECTING LINES UNIQUELY DETERMINES A PLANE.

- (c) Find a pair of adjacent angles. (If not possible, explain why.)

$\angle ABD$  AND  $\angle DBC$

- (d) Name a dihedral angle. (If not possible, explain why.)

$B - \overline{AE} - D$

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

$\overleftrightarrow{AD}$  AND  $\overleftrightarrow{FH}$

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

$\overleftrightarrow{AB}$ ,  $\overleftrightarrow{BD}$ ,  $\overleftrightarrow{BF}$  ALL SHARE POINT  $B$

9. (1 point) A quadrilateral that is both a kite and a parallelogram is also known as what?

RHOMBUS

10. (3 points) An angle measures  $46^\circ 12' 54''$ . Find the measure of its supplement. Write your answer in degrees in decimal form.

$$\frac{12'}{1} \cdot \frac{1^\circ}{60'} = 0.2^\circ$$

$$\frac{54''}{1} \cdot \frac{1^\circ}{3600''} = 0.015^\circ$$

$$46^\circ 12' 54'' =$$

$$46.215^\circ \Rightarrow$$

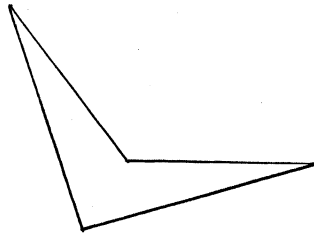
$$180^\circ - 46.215^\circ$$

$$= \boxed{133.785^\circ}$$

11. (1 point) How many distinct lines can be drawn through 6 collinear points? Briefly explain.

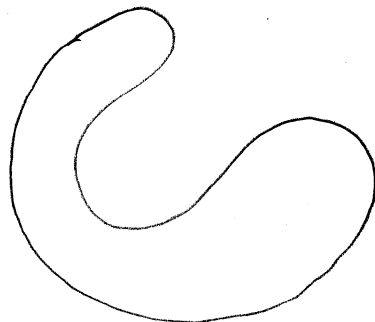
EXACTLY 1. ANY SET OF COLLINEAR  
POINTS DETERMINES  
ONLY A SINGLE LINE.

12. (1 point) Sketch a concave quadrilateral.



4 SIDES AND DENTED IN.

13. (1 point) Sketch a simple closed concave curve.



14. (2 points) Use your compass to construct a circle of radius  $\overline{AB}$  centered at  $P$ .



15. (3 points) While looking at a collection of labeled points in three-dimensional space, John gathered a set of noncoplanar points.

- (a) At least how many points must be in John's set?

AT LEAST 4

- (b) Could it be possible that some of John's points are collinear? Explain.

YES! ANY TWO ARE AUTOMATICALLY COLLINEAR.

- (c) Could it be possible that all of John's points are collinear? Explain.

NO. IF SO, THEY COULD NOT BE

NONCOPLANAR.

16. (3 points) Each exterior angle of a regular  $n$ -gon measures  $9^\circ$ .

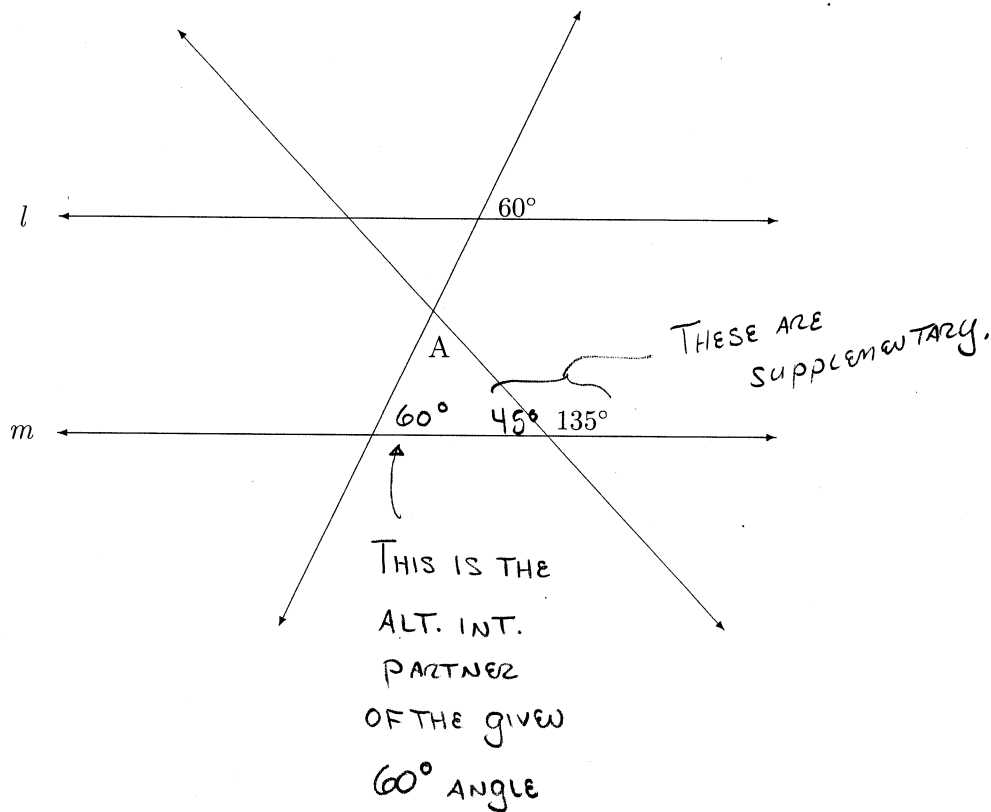
(a) Find  $n$ .

$$\frac{360^\circ}{n} = 9^\circ \Rightarrow \boxed{n = 40}$$

(b) What is the measure of each interior angle?

$$180^\circ - 9^\circ = \boxed{171^\circ}$$

17. (4 points) In the figure below, line  $l$  and line  $m$  are parallel. Find the measure of the angle A. Explain your reasoning or show work.



$$m(\angle A) = 180^\circ - 60^\circ - 45^\circ = \boxed{75^\circ}$$

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