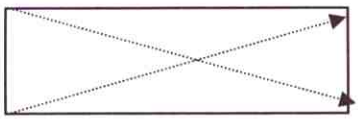
p. #15 Correction #14 #35 box 2 "quadrilateral" #32 "Always"

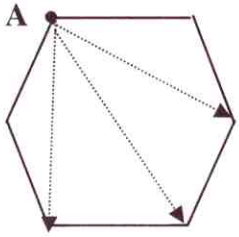
MATH 304 Fall 2010 Review for Exam 1 Name Solution Key Seat # _____

All answers that are measurements must include the unit of measure.
Include the symbol when naming geometric objects. For instance "line AD" should be written $\overleftrightarrow{AD}$.

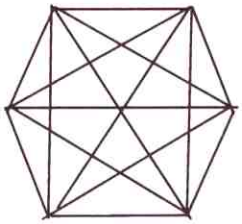
Diagonal of a polygon: A diagonal is a segment connecting two non-adjacent vertices in a polygon.



A rectangle has 2 diagonals.



Diagonals from vertex A.
How many diagonals does a hexagon have, total?



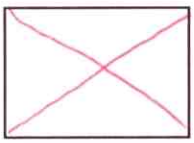
Count them.

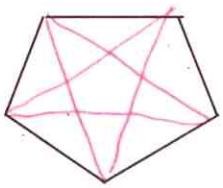
leaving each vertex

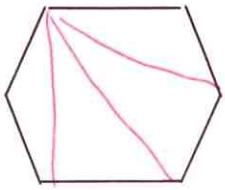
$\frac{3 \times 6}{2}$ ← # vertices

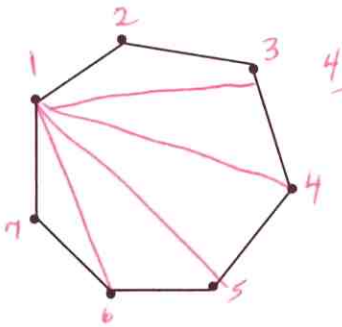
because each diagonal got counted twice

Draw all the diagonals in the following convex polygons. Use that information to fill in the table at the bottom of the page.

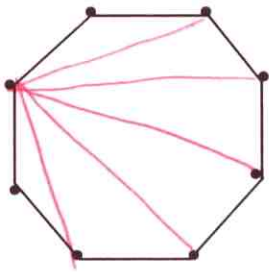




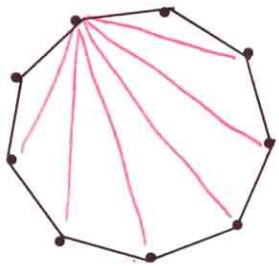




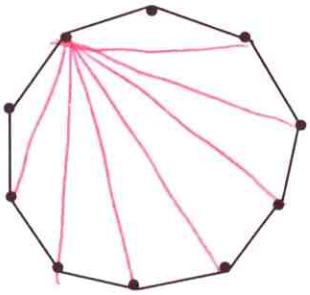
$\frac{4 \times 7}{2}$



$\frac{8 \times 5}{2}$



$\frac{6 \times 9}{2}$



$\frac{7 \times 10}{2}$

$\frac{9 \times 12}{2}$

Polygon	Number of vertices	Number of Diagonals
rectangle	4	2
pentagon	5	5
hexagon	6	9
hectagon	7	14
octagon	8	20
nonagon	9	27
decagon	10	35
dodecagon	12	54

Study the table you have just made and then find the formula for the number of diagonals a polygon has, given the number of sides it has is *n*.

$\frac{(n-3)n}{2}$

Show how to find the solutions to the following set operations using color/shading to show the results of the set operations.

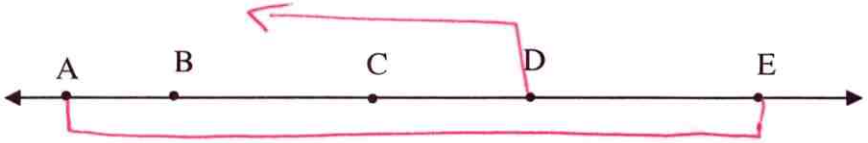
1. $\overline{AB} \cup \overline{BD}$ = $\overline{AD}$

2. $\overrightarrow{AD} \cap \overline{BC}$ = $\overline{BC}$

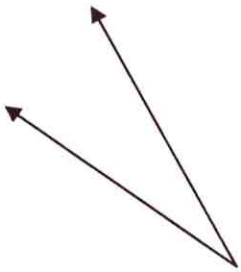
3. $\overline{DE} \cup \overrightarrow{EB}$ = $\overrightarrow{EB}$

4. $\overleftrightarrow{BC} \cap \overline{DE}$ = $\overline{DE}$

5. $\overline{AE} \cup \overrightarrow{DC}$ = $\overrightarrow{ED}$



Measure the following angles using your protractor. Put your answer in the answer blank.



6. _____

7. _____

8. Can a triangle have both a right angle and an obtuse angle? Explain your reasoning.

No, because an obtuse angle is $> 90°$.
So a right angle + an obtuse angle is $> 180°$
so those 2 angles can't both be in the same triangle because a triangle's interior angles always total up to 180°.

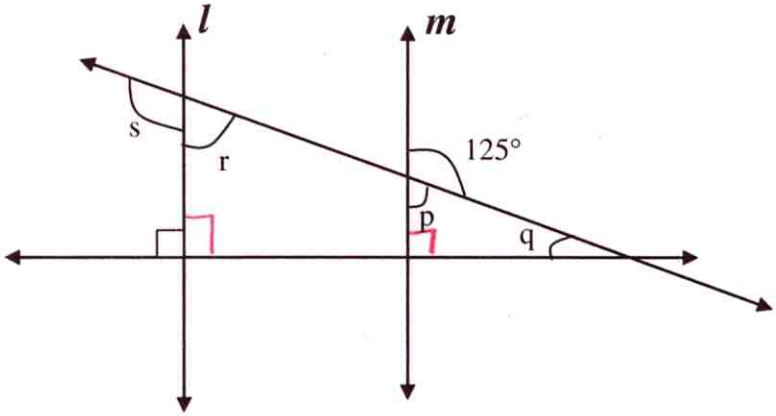
9. In the diagram below, lines l and m are parallel. Find the following angle measures:

(a) measure $\angle p$ = 55°
180 − 125

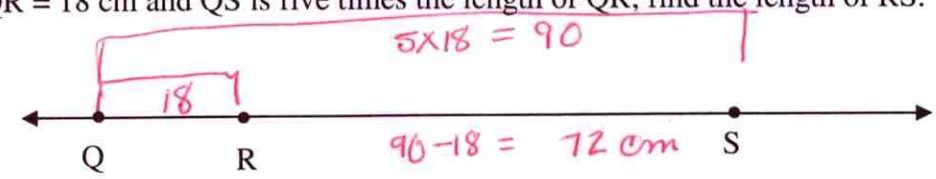
(b) measure $\angle q$ = 35°
180 − (90 + 55)

(c) measure $\angle r$ = 55°
corresponding

(d) measure $\angle s$ = 125°
180 − 55



10. Given $\overline{QR} = 18$ cm and $\overline{QS}$ is five times the length of $\overline{QR}$, find the length of RS.



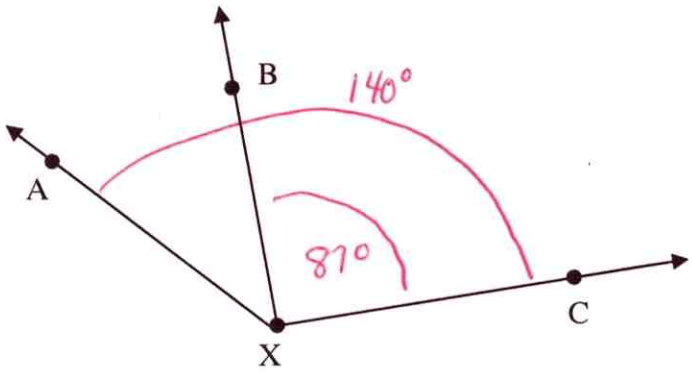
18
4
72

(a) $\overline{QS}$ = 90 cm (b) $\overline{RS}$ = 72 cm

11. Given $\angle CXB = 87^\circ$ and $\angle AXC = 140^\circ$, find the measure of $\angle BXA$.

m $\angle BXA$ = 53°

140
− 87
53

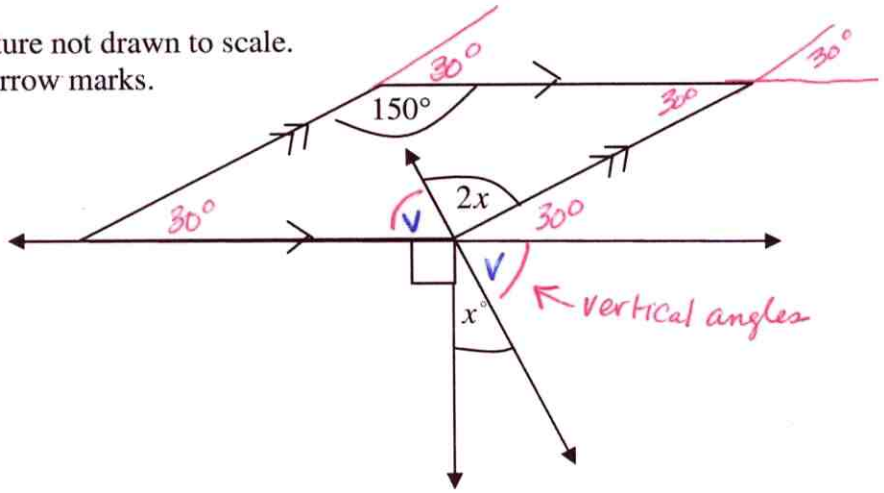


12. Show how to find the value of x. Picture not drawn to scale. Parallel lines are shown with on-line-arrow marks.

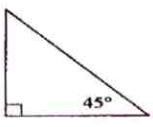
$2x + 30^\circ + v = v + 90^\circ + x$

$2x + 30^\circ = 90^\circ + x$

$x = 60^\circ$

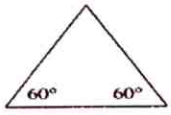


13. Below each triangle (a) identify it as acute, obtuse, or right and (b) tell the measure of the 3rd angle.

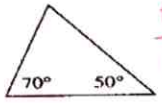


45 180
90 −135
135 45

(a) right (b) 45°

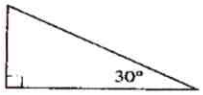


(a) Acute (b) 60°



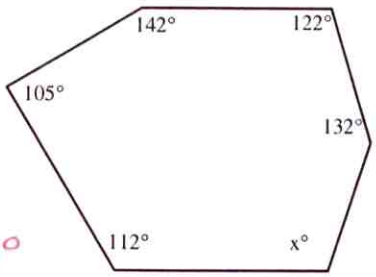
70 180
+50 −120
120 60°

(a) acute (b) 60°



(a) right (b) 60°

14. Find the measurement of angle x in the following figure:



$n = 6$ sides

total interior angles $= (n-2)180°$

$= 4(180°) = 720°$

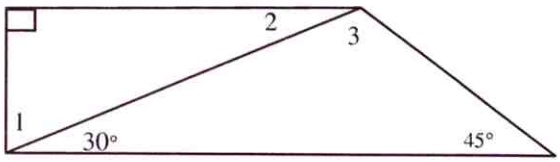
So $105 + 142 + 122 + 132 + 112 + x = 720°$

$613 + x = 720°$ and so $\boxed{x = 107°}$

15. For the polygon in problem ~~#3~~ 14, what is the sum of the measures of the exterior angles?

$360°$

16. Find the measures of the angles 1, 2, and 3 given that TRAP is a trapezoid with TR parallel to PA.



$m\angle 1 =$ 60° sum $\triangle = 180°$

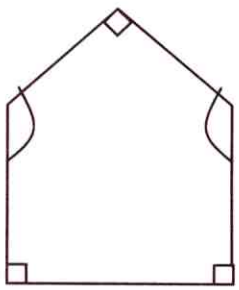
$m\angle 2 =$ 30° alt. interior

$m\angle 3 =$ 105° sum $\triangle = 180°$

$m\angle 3 + 30° + 45° = 180°$

$m\angle 3 = 105°$

17. Home plate on a baseball field has three right angles and two other congruent angles. (See diagram below). Find the measures of the each of these other two angles.



pentagon has 5 sides

Sum interior angles $= (n-2)180°$

$= 3(180)°$

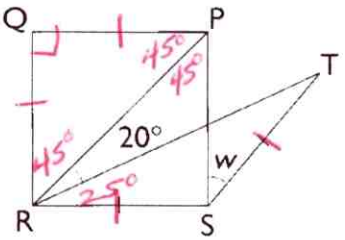
$= 540°$

the 3 right angles total $90 \times 3 = 270°$

that leaves $540 - 270 = 270°$ for the other two angles.

Since those angles are congruent, each must be $\frac{270}{2} = \boxed{135°}$

18. PQRS is a square.
RST is an isosceles triangle.
RS = ST
Find $\angle w$. $= \boxed{40°}$



$\triangle QPR$ must total 180° and base angles are equal so base angles are each 45° ($\angle QRP$ and $\angle QPR$)

$\angle RPS$ is complementary to $\angle RPQ$

$m\angle QRS = 90° = 45° + 20° + m\angle TRS$

So $m\angle TRS = 25°$

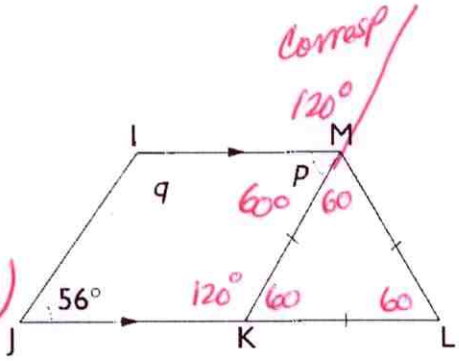
and $m\angle STR = 25°$ because base angles isosc. $\triangle$

$\angle PSR$ is a right angle because PQRS is a square

So the sum of the interior angles of $\triangle RST = 180° = 25 + 90 + w + 25$

which means $w = 40°$

19. MKL is an equilateral triangle.
IM // JL
Find $\angle p$ and $\angle q$.



Corresp / 120°

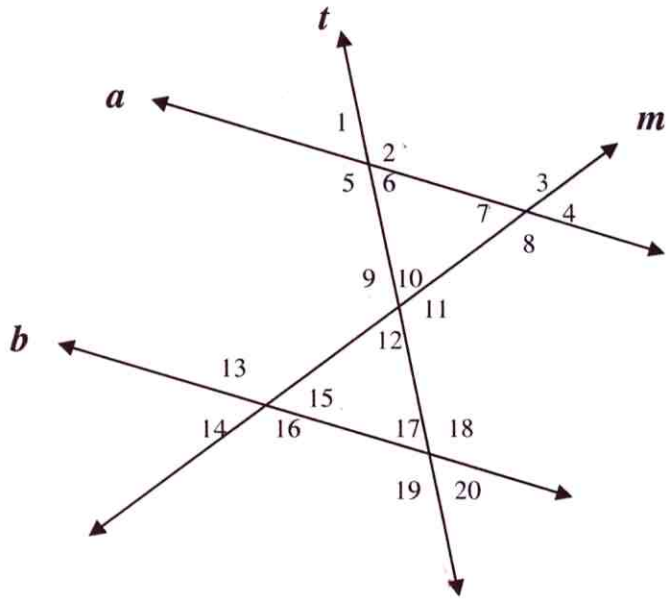
p ~~corresponds to~~ is supplementary to 120° (because of corresp. angle)

so $m\angle p = 60°$

the sum of the interior angles of a convex quadrilateral is 360° so $q + 60° + 56° + 120° = 360°$

and so $q = 124°$

20. ***t, m, a,*** and ***b*** are lines.
Line ***a*** is parallel to line ***b***.



Fill in the blanks below to make each statement true.

a. $\angle 9$ is vertical to $\angle$ 11

b. $\angle 14$ is corresponding to $\angle$ 7

c. $\angle 7$ is alternate interior to $\angle$ 15

d. $\angle 2$ is alternate exterior to $\angle$ 19

e. $\angle 9$ is supplementary to $\angle$ 10 **and** $\angle$ 12

f. $\angle 8$ is corresponding to $\angle$ 16

g. $\angle 17$ is vertical to $\angle$ 20

21. What is the measure of each angle of a regular (and convex) dodecagon (12 sides)?

sum of all interior angles $= (n-2)180$
$= (12-2)180$
$= 10(180)$
$= 1800$

since regular all angles are the same measure so each one is $\frac{1800}{12} = 150°$

22. A 20-gon will have how many diagonals?

$$\frac{(n-3)n}{2} = \frac{(20-3)20}{2} = \frac{17(20)}{2} = 170 \text{ diagonals}$$

ALWAYS

For each figure listed below, match EVERY quality from the second list which the figure will have.
Keep the letters in alphabetic order.

A B C D E F G H	23. Rectangle
B C E H	24. Parallelogram
C F	25. Isosceles Triangle
B C H	26. Isosceles Trapezoid
A B C E F H	27 Rhombus
B H	28. Trapezoid
A C F G	29. Regular Polygon
C F H	30. Kite
A B C D E F G H	31. Square
A C F G	32. Equilateral Triangle

A.	all sides the same length
B.	one or more pairs of parallel sides
C.	at least two sides the same length
D.	4 right angles
E.	two pair of parallel sides
F.	1 or more pairs of adjacent sides the same length
G.	all the interior angles the same measure
H.	is a quadrilateral

33. What are the 3 qualities every polygon MUST have?

a. simple

b. closed

c. made of straight lines

34. List 4 things you should teach your students to help them use their protractors correctly.

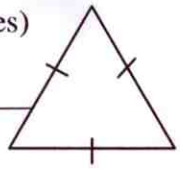
a. center of protractor

b. base line of protractor

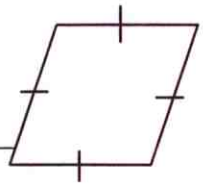
c. how to line up protractor on angle

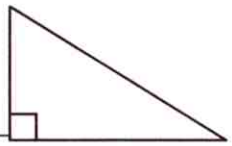
d. how to read the scales

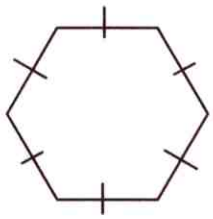
For each of these figures, list ALL of the terms from the box at the right that apply.
(Some figures may have several matches)

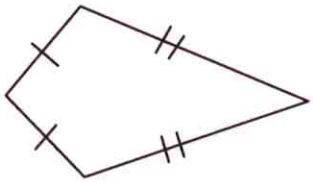
35. BC R 

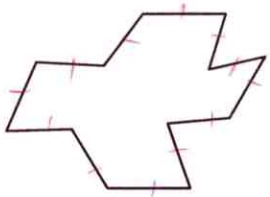
36. I K 

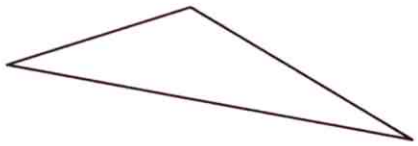
37. G I K 

38. ADE R 

39. N 

40. K L 

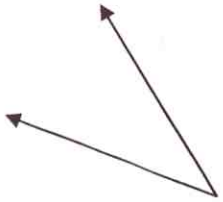
41. O S 

42. A R 

A. Scalene Triangle
B. Isosceles Triangle
C. Equilateral Triangle
D. Right Triangle
E. Right Scalene Triangle
F. Square
G. Rhombus
H. Rectangle
I. Parallelogram
J. Trapezoid
K. Quadrilateral
L. Kite
M. Pentagon
N. Hexagon
O. Dodecagon
P. Regular Polygon
~~Q. Quadrilateral~~
R. Triangle
S. Concave Polygon

Do the following using only compass and straight edge. You know the rules. I have to see correct arcs.

41. Copy this angle.

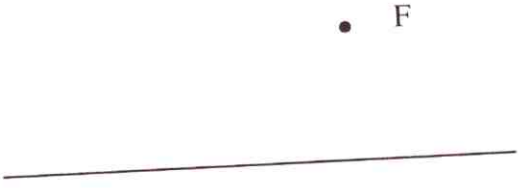


42. Copy and then bisect this segment.

use the directions in your notes and be sure you can do these Constructions

43. Draw a perpendicular to this line at the point C.

43. Draw a perpendicular to this line through the point F



44. Bisect this angle.