Geometry (H)
Final Exam Review

Name: KEY

1. The coordinate of A is $2x - 5$ and the coordinate of B is $x + 8$. If AB = 30, find the possible values of A.

$|(2x-5)-(x+8)| = 30$

$|x - 13| = 30$

$x - 13 = 30$ | $x - 13 = -30$

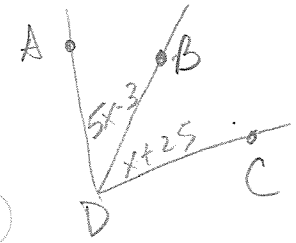
$x = 43$ | $x = -17$

$A = 81$
$A = -39$

ck
$(2(43)-5)-(43+8) \stackrel{?}{=} 30$
$(81)-(51)$
$30 = 30$

ck
$|(2(-17)-5)-(-17+8)| \stackrel{?}{=} 30$
$|-39 - -9|$
$|-30| = 30$

2. B lies on the interior of $\angle ADC$. $m\angle ADC = 64$. $m\angle ADB = 5x - 3$ and $m\angle BDC = x + 25$. Find x. Is $\overrightarrow{DB}$ an angle bisector? yes



$5x - 3 + x + 25 = 64$

$6x + 22 = 64$
$-22 \quad -22$
$6x = 42$
$x = 7$

$5x - 3 = x + 25$

$4x = 28$
$x = 7$

3. Fill in the blank.

a. Supplementary angles sum to 180°
b. Complementary angles sum to 90°
c. Vertical angles are $\cong$
d. Two angles that are supplementary to the same angle are congruent

4. State a formula for each.

a. Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

b. Distance: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

c. Midpoint: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

d. Slope – intercept form of a line: $y = mx + b$

e. Point – slope form of a line: $y - y_1 = m(x - x_1)$

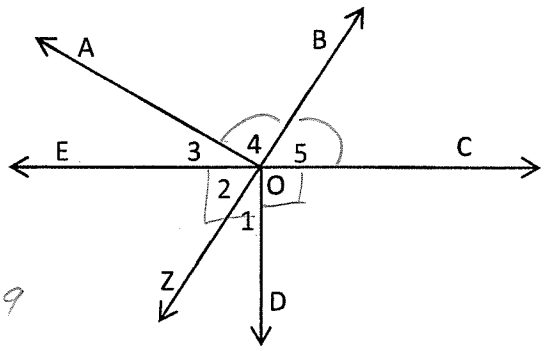
5. In the diagram, $\overrightarrow{OB}$ bisects ∠AOC and $\overleftrightarrow{EC} \perp \overrightarrow{OD}$. Find the value of x.

a. m∠5 = 2x, m∠3 = x

$2x+2x+x=180$

$5x=180$

$x=36$



b. m∠1 = 2x, m∠2 = 6x + 2

$2x+6x+2=90$

$8x=88$

$x=11$

c. m∠2 = 6x +9, m∠5 = 2x + 49

$6x+9=2x+49$

$4x=40$

$x=10$

d. m∠1 = x – 8, m∠2 = 2x + 5, m∠4 = 3x – 26

$x-8+2x+5=90$

$3x-3=90$

$3x=93$

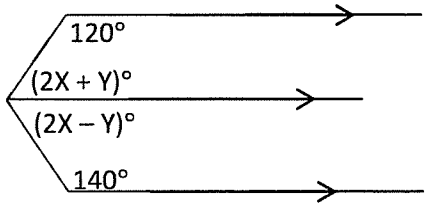
$x=31$

6. Fill in the blank.

If two lines are cut by a transversal then ...

a. Alternate interior angles are congruent
b. Corresponding angles are congruent
c. Same-side interior angles are supplementary

7. Find the value of x and y.



$2x+y+120=180$

$2x-y+140=180$

$2x+y=60$

$2x-y=40$

$4x=100$

$x=25$

$2(25)+y=60$

$y=10$

8. In ΔABC, A(2,1), B(3,-5) and C(-3,0)

a. Classify the triangle by its sides. SCALENE

$AB=\sqrt{(2-3)^2+(1--5)^2}=\sqrt{1+36}=\sqrt{37}$ $AC=\sqrt{(2--3)^2+(1-0)^2}=\sqrt{25+1}=\sqrt{26}$

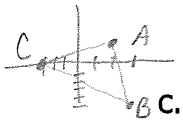
$BC=\sqrt{(3--3)^2+(-5-0)^2}=\sqrt{36+25}=\sqrt{61}$

b. Classify the triangle by its angles.

$a^2+b^2=c^2$?

$37+26$? 61 Acute

$63>61$ $c^2<a^2+b^2$



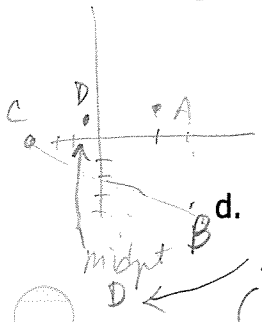
c. Write the equation of the altitude drawn from A. A(2,1)

$m_{\overline{CB}}=\frac{-5-0}{3--3}=\frac{-5}{6}$ $y=mx+b$

$m_{alt.}=\frac{6}{5}$ $1=\frac{6}{5}(2)+b$

$1-\frac{12}{5}=b \rightarrow b=\frac{-7}{5}$

$y=\frac{6}{5}x-\frac{7}{5}$



d. Write the equation of the median drawn from B.

midpt of $\overline{AC}$

$\left(\frac{2+-3}{2},\frac{1+0}{2}\right)\Rightarrow\left(-\frac{1}{2},\frac{1}{2}\right)$ call it pt. D

slope: $m_{\overline{BD}}=\frac{-5-\frac{1}{2}}{3--\frac{1}{2}}=-\frac{11}{7}$

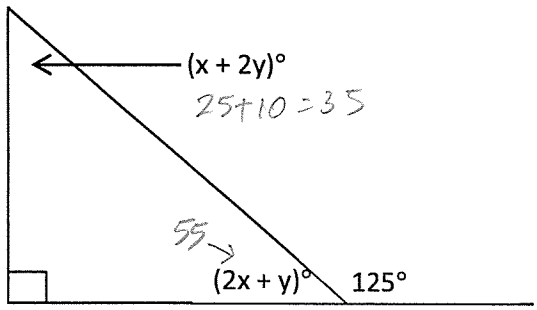
y-int.: $B(3,-5)$

$-5=-\frac{11}{7}(3)+b$

$-\frac{2}{7}=b$

$y=-\frac{11}{7}x-\frac{2}{7}$

9. Find the value of x and y.



$x+2y+2x+y=90$

$2x+y+125=180$

$3x+3y=90 \rightarrow x+y=30$

$2x+y=55 \rightarrow 2x+y=55$

$-x=-25$

$x=25$

$2(25)+y=55$

$y=5$

ck

$35+55=90°$ $55+125=180°$

10. The angle sum of a polygon is 4140. How many sides does the polygon have? 25

$(n-2)180=4140$

$n-2=23$

$n=25$

11. Complete each statement with sometimes, always or never.

a. A square is always a rectangle.

b. A rectangle is sometimes a rhombus.

c. A rhombus is sometimes a square.

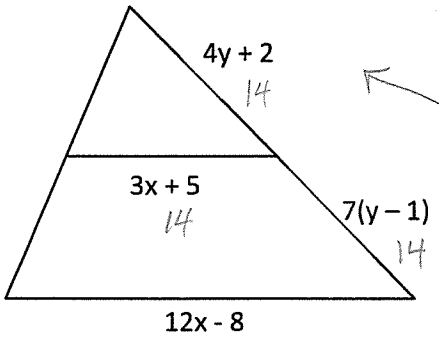
d. A trapezoid sometimes has three congruent sides.

e. The diagonals of a rectangle are always congruent.

f. The diagonals of a parallelogram always bisect each other.

g. The diagonals of a parallelogram are sometimes perpendicular.

12. A segment joins the midpoints of two sides of a triangle. Find the value of x and y.



$4y+2=7(y-1)$

$4y+2=7y-7$

$9=3y$

$3=y$

$\frac{14}{3x+5}=\frac{28}{12x-8}$

$14(12x-8)=28(3x+5)$

$168x-112=84x+140$

$84x=252$

$x=3$

ck

$\frac{14}{14}=\frac{28}{28}$ ✓

13. The lengths of two sides of a triangle are 20 and 52. Find the possible values for the 3rd side.

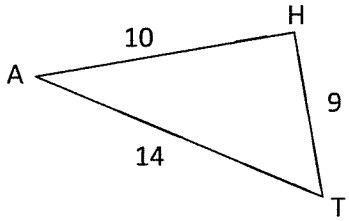
$x+20>52$ $\quad x>32$

$x+52>20$ $\quad x>-32$

$20+52>x$ $\quad 72>x$

$32<x<72$

14. List the angles in the triangle in order from smallest to largest.



$\measuredangle A < \measuredangle T < \measuredangle H$

15. Determine if each of the following are tautologies.

a. $[(p \vee q) \leftrightarrow \sim q] \rightarrow p$

p	q	$(p \vee q)$	$\sim q$	$[(p \vee q) \leftrightarrow \sim q]$	$[(p \vee q) \leftrightarrow \sim q] \rightarrow p$
T	T	T	F	F	T
T	F	T	T	T	T
F	T	T	F	F	T
F	F	F	T	F	T

A tautology.

b. $(\sim p \wedge q) \rightarrow [(p \rightarrow q) \vee p]$

A tautology.

p	q	$\sim p$	$(\sim p \wedge q)$	$(p \rightarrow q)$	$[(p \rightarrow q) \vee p]$	$(\sim p \wedge q) \rightarrow [(p \rightarrow q) \vee p]$
T	T	F	F	T	T	T
T	F	F	F	F	T	T
F	T	T	T	T	T	T
F	F	T	F	T	T	T

16. The areas of two similar triangles are 36 and 81. If the altitude of the smaller triangle is 8. Find the length of the altitude of the larger triangle.

$\frac{36}{81} \rightarrow \frac{6^2}{9^2}$ $\frac{6}{9} = \frac{2}{3}$ ratio of segmts $\frac{2}{3} = \frac{8}{x}$

$2x = 24$

$x = 12$

alt. larger $= 12$

17. Write the equation of a line that passes through (3,-4) and is parallel to the x-axis.

$m = 0$ $-4 = 0(3) + b$

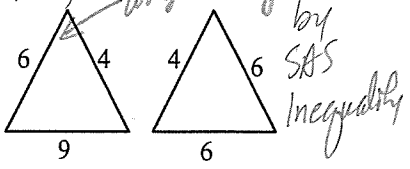
$-4 = b$

$y = -4$

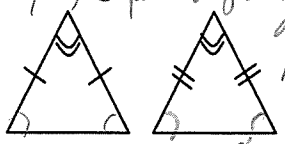
Geometry Honors
Final Exam Review chapters 7 and 8

corresp. angles ≅

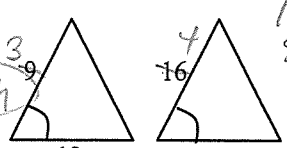
1. Does the following information indicate that the triangles are similar? Explain.



NO, angle is greater by SAS Inequality



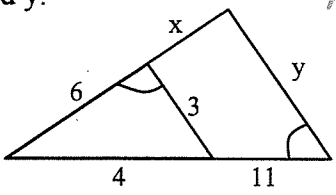
Yes, 3 pairs of corresp ∠s are ≅. Also, SAS similarity

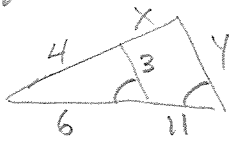


Yes, by SAS similarity

One pair ≅. Those being isos Δs, therefore, each of other 2 ≅.

2. Find x and y.





$\frac{6}{3} = \frac{17}{y}$

$6y = 51$

$y = \frac{51}{6} = \frac{17}{2}$

$\frac{4}{6} = \frac{x}{11}$

$6x = 44$

$x = \frac{22}{3}$

3. State the ways of proving triangles are similar.

① A.A. postulate

② SAS similarity

③ SSS similarity

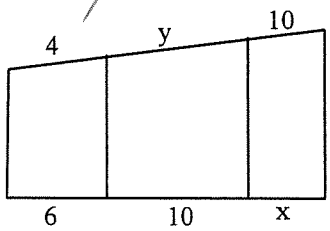
4. State the inequalities dealing with the angles and lengths in a triangle or in 2 triangles.

If one side of a Δ is longer than a 2nd side, ∠ opp 1st side is > than ∠ opp second side.

If one ∠ of a Δ is > than 2nd ∠, then side opposite 1st is longer than side opp. 2nd ∠. Sum of any 2 lengths > length of 3rd side.

SAS Inequality SSS Inequality

5. The vertical segments are parallel. Find the missing lengths.



$\frac{4}{6} = \frac{y}{10}$

$6y = 40$

$y = \frac{20}{3}$

$y = \frac{20}{3}$

$\frac{4}{6} = \frac{10}{x}$

$4x = 60$

$x = 15$

6. If $2x = 9y$, then find the ratio of y to x.

$9y = 2x \rightarrow \frac{y}{x} = \frac{2}{9}$

7. If $2x + 10 = 5y$, find the ratio of $(x + 5) : y$.

$\frac{2x}{5} + \frac{10}{5} = \frac{5y}{5}$

$\frac{2}{5}x + 2 = y$

$\frac{2x+10}{2} = \frac{5y}{2}$

$(x + 5) = \frac{5}{2}y$

$\frac{x+5}{y} : \frac{5}{2}$

8. A 34cm segment is divided into a ratio of 2:3:5. What is the length of each segment?

$2x + 3x + 5x = 34$

$10x = 34$

$x = 3.4$

6.8, 10.2, 17

9. Find x if (x+2) / 4 = (5x+4) / 12

$\frac{x+2}{4} = \frac{5x+4}{12}$ $12x+24 = 20x+16$

$12(x+2) = 4(5x+4)$ $8 = 8x$

$1 = x$

10. Find x if (x – 5) / 3 = 2 / x

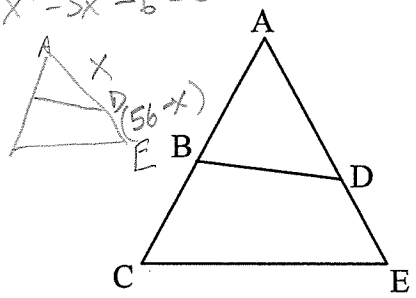
$\frac{x-5}{3} = \frac{2}{x}$ $(x-6)(x+1)=0$

$x(x-5)=6$ $x=6$ $x=-1$

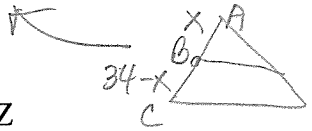
$x^2-5x-6=0$

11. $\frac{AB}{BC} = \frac{AD}{DE}$ Complete the table.

$\frac{4}{10} = \frac{x}{56-x}$



	AB	BC	AC	AD	DE	AE
a.	4	10	14	16	40	56
b.	14	20	34	21	30	51



$\frac{21}{30} = \frac{x}{34-x}$

12. ABCDE ~ VWXYZ

WX = 24 AB = 30

VZ = 30 BC = 20

a. The scale factor of VWXYZ to ABCDE is 6:5. 24:20 = 6:5

b. AE = 25

c. WV = 36

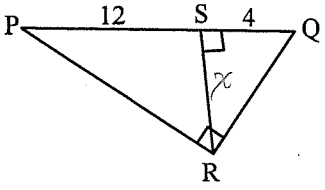
13. What is the geometric mean between 9 and 16?

$gm = \sqrt{9 \cdot 16}$ OR $\frac{m}{9} = \frac{16}{m}$

$= \sqrt{144} = 12$ $m^2 = 144$

$m = 12$

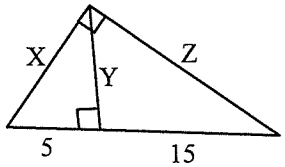
14. Find SR.



$\frac{x}{12} = \frac{4}{x}$ $x = 4\sqrt{3}$

$x^2 = 48$ $SR = 4\sqrt{3}$

15. Find the length of each leg and the altitude.



$\frac{x}{5} = \frac{20}{x}$ $\frac{z}{15} = \frac{20}{z}$

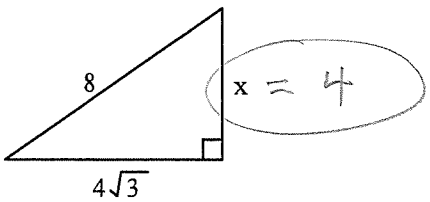
$x^2 = 100$ $z^2 = 300$

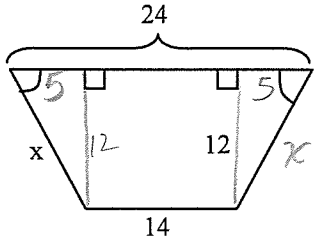
$x = 10$ $z = 10\sqrt{3}$

$\frac{y}{5} = \frac{15}{y}$

$y^2 = 75$ $y = 5\sqrt{3}$

16. Find the missing length.





$5^2 + 12^2 = x^2$

$13 = x$

17. What are the relationships between the sides of a

a. 30-60-90 triangle?

$1 : \sqrt{3} : 2$

b. 45-45-90 triangle?

$1 : 1 : \sqrt{2}$

18. If a right triangle has one leg that is half as long as the hypotenuse, then what is the length of the other leg? What are the measures of the acute angles?

$a, b, c \rightarrow c$ is hypotenuse

$a = \frac{c}{2}$ $\quad a^2 + b^2 = c^2$ $\quad b = \pm\sqrt{\frac{3c^2}{4}}$ $\quad 30°, 60°$

$\frac{c^2}{4} + b^2 = c^2$

$b^2 = c^2 - \frac{c^2}{4}$ $\quad \boxed{b = \pm\frac{\sqrt{3}\,c}{2}}$

19. What is the length of the longest diagonal of a 4 in. by 6 in. by 8 in. box?

$d = \sqrt{w^2 + l^2 + h^2}$

$= \sqrt{4^2 + 6^2 + 8^2}$

$\sqrt{16 + 36 + 64}$ $\quad d = \sqrt{116}$

$d = 2\sqrt{29}$

20. Classify each triangle (by angles) as specifically as you can based on the 3 given side lengths.

a. 4, 5, 7

$4^2 + 5^2 \; ? \; 7^2$

$16 + 25$

$41 < 49$

obtuse

b. 6, 8, 10

$6^2 + 8^2 = 10^2$

right

c. 3, 4, 6

$3^2 + 4^2 \; ? \; 6^2$

$9 + 16 \quad 36$

$25 < 36$

obtuse

d. 2, 3, 4

$2^2 + 3^2 \; ? \; 4^2$

$4 + 9$

$13 < 16$

obtuse

KEY

Geometry Honors Review
Chapters 9 & 11

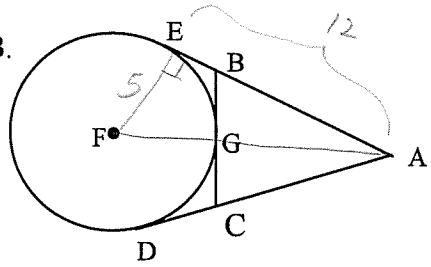
For questions 1-4, answer always, sometimes, or never based on 2 concentric circles.

1. There always exists a line that is tangent to one circle and is secant to the other circle.
2. There never exists a line that is a tangent to both circles.
3. A line that is secant to one circle is sometimes secant to the other circle.
4. A line that intersects the inside of the smaller circle is always a secant for both circles.

5. $\overline{AE}$ and $\overline{AD}$ are tangents to circle F. AE = 12, FE = 5. Find AB.

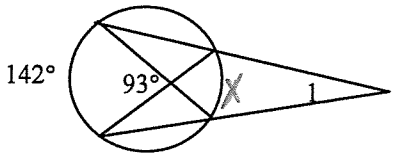
$5^2+12^2=AF^2$
$13=AF$

AB = 26/3



6. Find the measure of ∠1.

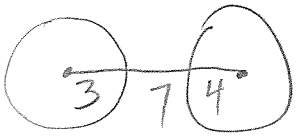
$93=\frac{1}{2}(142+x)$
$186=142+x$
$44=x$



$m\angle 1=\frac{1}{2}(142-44)$
$=\frac{1}{2}(98)$
$m\angle 1=49$

7. $\overline{OP}$ is a common internal tangent of two circles that are 7 units apart. If the radii of the circles are 4 and 3, find $\overline{OP}$.

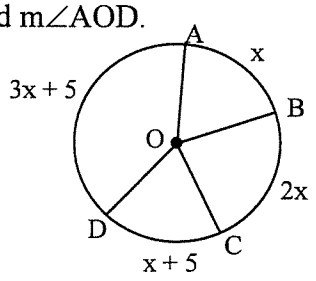
$OP=7\sqrt{3}$



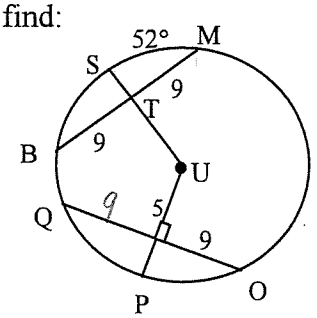
8. The arc measures are given in the figure. Find m∠AOB and m∠AOD.

$7x+10=360$
$7x=350$
$x=50$

$m\angle AOB=50$
$m\angle AOD=155$



9. Use the following diagram to find:
   a. m $\overset{\frown}{OP}$ = 52°
   b. UT = 5
   c. m$\overset{\frown}{OQ}$ = 104°



10. $\overline{WX}$ and $\overline{YZ}$ are the same distance from the center of a circle. If WX = 5x – 9 and YZ = 2x + 12, find the length of each chord.

$5x-9=2x+12$ $\quad WX = 35-9 = 26$

$3x=21$ $\quad YZ = 14+12 = 26$

$x=7$

11. Find $m\angle FHG$, if $m\angle FED = 3x+20$, $m\angle EFH = 5x+30$, and $m\angle EGH = 7x+10$.

$5x+30=7x+10$

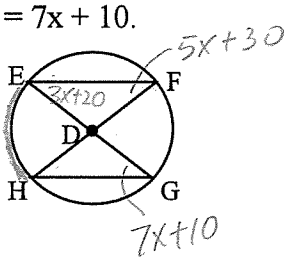
$20=2x$

$10=x$

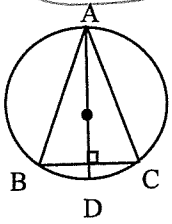
$m\angle FHG = m\angle FED$

$m\angle FHG = 3(10)+20$

$= 50$



12. Given: $\overline{AD} \perp \overline{BC}$, $\overline{AD}$ is a diameter
Prove: ΔABC is isosceles

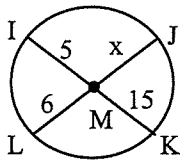


13. If IM = 5, MK = 15, LM = 6, find x.

$6x = 5(15)$

$x = \frac{75}{6} = \frac{25}{2}$

$x = \frac{25}{2}$

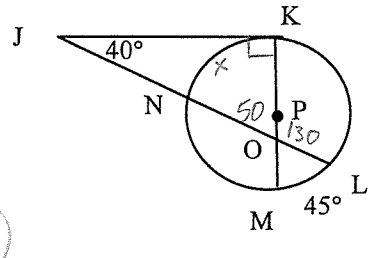


14. In circle P, $\overline{JK}$ is a tangent. $m\overset{\frown}{ML} = 45°$, $m\angle KJL = 40°$. Find each measure.

a. $m\overset{\frown}{NK} = 55°$

b. $m\overset{\frown}{NM} = 130°$

c. $m\angle KOL = 130°$



$50 = \frac{1}{2}(x+45)$

$100 = x+45$

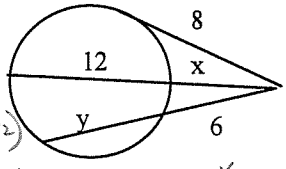
$55 = x$

$\frac{360-(45+55)}{2}$

$m\overset{\frown}{NM} = 130$

15. Solve for x and y.

a.



$8^2 = 6(y+6)$

$64 = 6y + 36$

$28 = 6y$

$\frac{14}{3} = y$

$8^2 = x(x+12)$

$64 = x^2 + 12x$

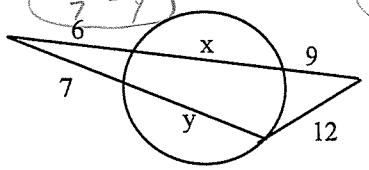
$0 = x^2 + 12x - 64$

$0 = (x+16)(x-4)$

$x = -16$ omitted

$x = 4$

b.



$6(6+x) = 7(7+y)$

$6(6+7) = 49 + 7y$

$29 = 7y$

$\frac{29}{7} = y$

$12^2 = 9(9+x)$

$144 = 81 + 9x$

$63 = 9x$

$7 = x$

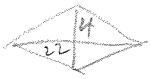
16. One diagonal of a rhombus is 8 inches long and its area is 176 sq. in. Find the length of a side of the rhombus.

x = other diagonal

$A = \frac{1}{2} d_1 d_2$

$176 = \frac{1}{2}(8)d$

$44 = d$



$4^2 + 22^2 = s^2$

$16 + 484 = s^2$

$\sqrt{500} = s$

$s = 10\sqrt{5}$

17. Two regular hexagons have sides in the ratio of 12:17. Find the ratio of their areas.

$\frac{12^2}{17^2} = \frac{144}{289}$

18. If the area of a sector is one-fifth the area of a circle, find the measure of its central angle.

$\frac{1}{5} \cdot 360 = 72°$

19. Find the area of a circle with a circumference of 10π.

$2\pi r = 10\pi$

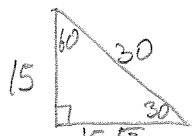
$r = 5$

$\pi r^2 = A$

$\pi 25 =$

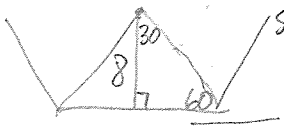
$A = 25\pi$

20. Find the area of a 30°-60°-90° triangle with an hypotenuse of 30 cm.



$\frac{1}{2}(15\sqrt{3})(15) = \frac{225\sqrt{3}}{2} = A$

21. Find the area of a regular hexagon whose apothem measures 8 in.



Side $= \frac{16\sqrt{3}}{3}$

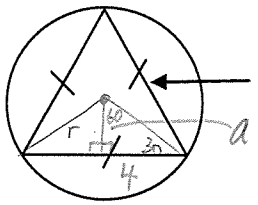
$A = \frac{1}{2} a P$

$= \frac{1}{2}(8)(6)\left(\frac{16\sqrt{3}}{3}\right) = 128\sqrt{3}$

22. Find the circumference of the circle.

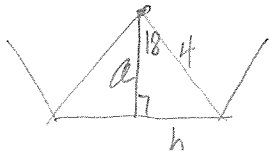
$C = 2\pi\left(\frac{8\sqrt{3}}{3}\right)$

$= \frac{16\pi\sqrt{3}}{3}$



$a = \frac{4\sqrt{3}}{3} \rightarrow r = \frac{8\sqrt{3}}{3}$

23. Find the area of a regular decagon with a radius of 4.



$\cos 18 = \frac{a}{4}$

$a \approx 3.804$

$\sin 18 = \frac{b}{4}$

$b \approx 1.236$

Side ≈ 2.472

$A = \frac{1}{2}(3.804)(24.721\ldots)$

$A \approx 47.02$