

Problem Numbers that are circled are worked out on other page.

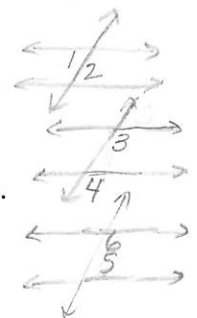
Advanced Geometry

Final Exam Review Guide - May, 2017

Name Mrs. Stirn

1. Find the distance on a number line between -11.2 and 17.6.  $28.8$
2. Find the distance between (4, -8) and (1, -6)  $\sqrt{3^2+2^2} = \sqrt{13}$
3. Determine whether the conditional is TRUE or FALSE. If a triangle is not acute, then it is not equilateral. **TRUE**
4. Write the converse of the previous statement. *If a triangle is not equilateral, then it is not acute.*
5. Determine whether the converse you wrote in the previous question is TRUE or FALSE. **FALSE**
6. A parallelogram has base 12 and height 7. Find its area.  $84u^2$
7. Determine whether a triangle with sides 8, 10, and 13 is acute, right, or obtuse.  $13^2 > 8^2 + 10^2$  **obtuse**
8. Find the measure of one angle of a regular pentagon.  $(5-2)(180) = 540 \div 5 = 108^\circ$
9. Find the sum of the exterior angle measures of a convex decagon.  $360^\circ$  (always)
10. In a circle, a central angle measures  $58^\circ$ . Find the measure of its arc.  $58^\circ$
11. In a circle, an inscribed angle measures  $58^\circ$ . Find the measure of its arc.  $116^\circ$
12. What is the slope of a vertical line? *undefined*
13. What is the slope of a horizontal line?  $0$
14. Write the equation of a vertical line that contains (3, 7).  $x = 3$
15. Write the equation of a horizontal line that contains (3, 7).  $y = 7$
16. What are the undefined terms in geometry? *point, line, plane*
17. The area of a square is 64. What is the length of a diagonal?  $8\sqrt{2}u$
18. A circle has diameter 18. What is its area?  $r=9$   $81\pi u^2$  or  $\approx 254.47u^2$
19. A circle has equation  $(x-3)^2 + (y+4)^2 = 36$ . State the center, diameter, and a point on the circle.  $C(3, -4) r=6$
20. A circle has radius 9. Find the ratio of the circumference to the diameter.  $C = \pi d$   $C/d = \pi$   $d=12$
21. Sketch  $\triangle ABC$ , with  $m\angle C = 90^\circ$ ,  $m\angle A = 26^\circ$ , and  $AC = 12$ . Find the lengths of the remaining angle and sides.
22. Sketch  $\triangle ABC$ , with  $m\angle C = 90^\circ$ ,  $BC = 5$ , and  $AC = 12$ . Give the ratios (fractions) for  $\sin A$ ,  $\cos A$ , and  $\tan A$ .
23. The measures of the angles of a triangle are  $2x + 5$ ,  $3x$ , and  $8x - 20$ . Is this triangle acute, right, or obtuse?
24. A line in the plane of a circle that intersects the circle exactly once is called a(n) **tangent**
25. A line in the plane of a circle that intersects the circle exactly twice is called a(n) **secant**
26. A segment with both endpoints on a circle is called a(n) **chord**
27. What is the longest chord in a circle? **diameter**
28. When two lines meet to form congruent adjacent angles, the lines are said to be **perpendicular**
29. What are complementary angles? *Two angles with sum =  $90^\circ$*
30. What are supplementary angles? *Two angles with sum =  $180^\circ$*
31. When two non-parallel lines intersect, their intersection is a(n) **point**
32. What are skew lines? *non-intersecting, non-coplanar lines*
33. What is a median of a triangle? *line or segment from vertex to midpoint of opp. side*
34. What is an altitude of a triangle? *line or segment from vertex, perpendicular to line containing opp. side*
35. What is the difference between postulates and theorems?
36. Describe an acute angle. *measure is between  $0^\circ$  and  $90^\circ$*
37. Describe an obtuse angle. *measure is between  $90^\circ$  and  $180^\circ$*
38. Describe a right angle. *measure =  $90^\circ$*
39. Sketch two parallel lines and a transversal. Label one pair of alternate interior angles as  $\angle 1$  and  $\angle 2$ .
40. If  $m\angle 1 = 75$ , then  $m\angle 2 = 75^\circ$ .
41. Sketch two parallel lines and a transversal. Label one pair of corresponding angles as  $\angle 3$  and  $\angle 4$ .
42. If  $m\angle 3 = 112$ , then  $m\angle 4 = 112^\circ$ .
43. Sketch two parallel lines and a transversal. Label one pair of same-side interior angles as  $\angle 5$  and  $\angle 6$ .
44. If  $m\angle 5 = 48$ , then  $m\angle 6 = 132^\circ$ .
45. In a circle, a chord of length 6 cm is 4 cm from the center. Find the radius of the circle.
46. A square has diagonal of length 8 cm. Find the perimeter of the square.
47. A cone has radius 10 cm and height 7 cm. Find the exact volume. (Leave  $\pi$  in your answer.)
48. A square pyramid has base edge 18 cm and height 12 cm. Find the slant height.
49. A square pyramid has base edge 18 cm and height 12 cm. Find the area.
50. An equilateral triangle has sides that are 9 cm. Find its area.
51. Two similar polygons have areas of  $45 \text{ cm}^2$  and  $125 \text{ cm}^2$ . Find the ratios of their corresponding sides.  $\frac{45}{125} = \frac{9}{25} \rightarrow \frac{3}{5}$
52. An arc of a circle measures  $67^\circ$ . Find the measure of its central angle.  $67^\circ$
53. An arc of a circle measures  $67^\circ$ . Find the measure of its inscribed angle.  $33.5^\circ$
54. The radius of a regular hexagon measures 10 cm. Find the apothem.  $a = 5\sqrt{3} \text{ cm}$

- Points  
 $(9, -4)$   
 $(-3, -4)$   
 $(3, -10)$   
 $(3, 2)$

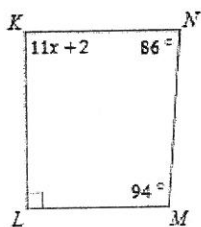


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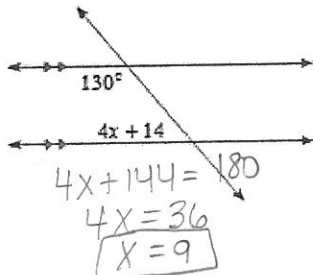
55. The radius of a regular hexagon measures 10 cm. Find the perimeter.  $60 \text{ cm}$
56. The radius of a regular hexagon measures 10 cm. Find the area.  $150\sqrt{3} \text{ cm}^2 \approx 259.8 \text{ cm}^2$
57. A circle has area  $49\pi$ . Find the exact circumference.  $r=7$   $C=14\pi$
58. An isosceles triangle has base 24 cm and the other two sides each measure 13 cm. Find its area.  $60 \text{ cm}^2$
59. An equilateral triangle has sides that each measure 7 in. Find the length of an altitude.
60. A rectangle has length 20 and diagonal 52. Find its area.  $A = \frac{1}{2}(24)(5)$
61. A line has equation  $4x - 3y = 9$ . Give the x-intercept.  $(\frac{9}{4}, 0)$
62. A line has equation  $4x - 3y = 9$ . Give the y-intercept.  $(0, -3)$
63. Give the slope of the line with equation  $4x - 3y = 9$ .
64. Three consecutive vertices of a parallelogram are (4, 7), (9, 5), and (11, 1). What is the coordinate of the fourth vertex?  $(6, 3)$  (Use slopes)
65. Give the equation of a line that passes through (4, 5) and has slope  $\frac{1}{2}$ .  $y - 5 = \frac{1}{2}(x - 4)$
66. A line through (1, -3) and (-2, k) is parallel to the line with equation  $2x + y = 7$ . Find the value of k.
67. A cylinder has diameter 8 cm and height 12 cm. Find the lateral area.  $skip$
68. Find the slope of the line that passes through P(6, 1) and Q(2, -6).  $\frac{-6-1}{2-6} = \frac{-7}{-4} = \frac{7}{4}$
69. Find the slope of the line that is perpendicular to the line that passes through P(6, 1) and Q(2, -6).  $-\frac{4}{7}$
70. Find the midpoint of the segment with endpoints P(6, 1) and Q(2, -6).  $(4, -2.5)$
71. Find the distance from P(6, 1) to Q(2, -6).  $\sqrt{16+49} = \sqrt{65}$
72. Give the equation of the line through P(6, 1) and Q(2, -6).
73. A circle has center P(6, 1) and radius 5. Write the equation of this circle.  $(x-6)^2 + (y-1)^2 = 25$
74. Give the coordinates of a point on the circle in the previous question.  $(11, 1)$   $(1, 1)$   $(6, 6)$   $(6, -4)$   $\rightarrow x=6$
75. Give the x-coordinate of the center of the circle with equation  $x^2 + y^2 - 12x + 18y = 7$ .  $(x-6)^2 + (y+9)^2 = 124$
76. A triangle has vertices A(3, 8), B(-1, 4), and C(5, 6). Give the coordinates of A' after the triangle is reflected across the x-axis.  $(3, -8)$
77. A triangle has vertices A(3, 8), B(-1, 4), and C(5, 6). Give the coordinates of B' after the triangle is rotated  $90^\circ$  clockwise around the origin.  $(4, 1)$
78. A triangle has vertices A(3, 8), B(-1, 4), and C(5, 6). Give the coordinates of C' after the triangle is translated 2 units left and 4 units up.  $(3, 10)$
79. A triangle has vertices A(3, 8), B(-1, 4), and C(5, 6). Give the coordinates of B' after the triangle is dilated by a factor of 2, with center of dilation at the origin.  $(-2, 8)$
80. A 15-ft ladder is leaning against a wall. It makes an angle with the wall of  $13^\circ$ . How far is the base of the ladder from the bottom of the wall?
81. A triangle has sides which measure 8, 9, and 11. Find the measure of the largest angle.
82. In  $\triangle ABC$ ,  $m\angle A = 24^\circ$ ,  $m\angle B = 58^\circ$ , and  $AC = 12.5$ . Find BC.
83. A sector of a circle has central angle  $150^\circ$  and radius 6.4 cm. Find the length of the arc created by this angle.  $16.76 \text{ cm}$
84. A sector of a circle has central angle  $150^\circ$  and radius 6.4 cm. Find the area of this sector.  $\frac{150}{360} \cdot \pi(6.4)^2 = 53.6 \text{ cm}^2$
85. In  $\triangle ABC$ , with perimeter 48 cm,  $AB = 2x + 5$ ,  $BC = x + 12$ , and  $AC = 3x + 1$ . Which angle is smallest?
86. Two sides of a triangle measure 6 cm and 14 cm. The third side must be between 8 cm and 20 cm.
87. The diagonals of a rhombus are 10 cm and 24 cm. Find its area.  $A = \frac{1}{2}d_1 \cdot d_2 = 120 \text{ cm}^2$
88. The diagonals of a rhombus are 10 cm and 24 cm. Find its perimeter.  $P = 52 \text{ cm}$
89. A trapezoid has bases with length  $4x + 1$  and  $2x - 5$ , and the midsegment is 34 in. Find the lengths of the bases.
90. Similar triangles have a scale factor 3:5. If the smaller triangle has a side that is 10.5 cm, find the length of the corresponding side of the larger triangle.  $\frac{3}{5} = \frac{10.5}{x}$   $3x = 52.5$   $x = 17.5 \text{ cm}$
91. Similar triangles have a scale factor 3:5. If the smaller triangle has area  $22.5 \text{ cm}^2$ , find the area of the larger triangle.
92. Similar polygons have areas  $80 \text{ m}^2$  and  $125 \text{ m}^2$ . If the perimeter of the larger figure is 28 m, what is the perimeter of the smaller figure?  $\frac{80}{125} = \frac{16}{25}$  (area)  $\frac{4}{5} = \text{perim}$   $\frac{4}{5} = \frac{x}{28}$   $5x = 112$   $x = 22.4 \text{ m}$
93. If  $\triangle ABC$  is a right triangle with hypotenuse 12 cm and one angle  $30^\circ$ , find the exact value of the perimeter of  $\triangle ABC$ .
94. If  $\triangle ABC$  is a right triangle with hypotenuse 12 cm and one angle  $30^\circ$ , find the exact value of the area of  $\triangle ABC$ .
95. In  $\triangle ABC$ ,  $m\angle A = 22^\circ$ ,  $m\angle B = 81^\circ$ , and  $AC = 6.7$ . Find BC.
96. In  $\triangle ABC$   $m\angle A = 48^\circ$ ,  $AB = 7.3$ , and  $AC = 11.4$ . Find BC.
97. How many possible outcomes are there if you roll one die and flip a coin?  $12$
98. If you are ordering a pizza that will have thin or thick crust, one meat from three options, and one vegetable from four options, how many different pizzas could you order?  $2 \cdot 3 \cdot 4 = 24 \text{ pizzas}$
99. In how many ways can you select a president, vice president, treasurer, and secretary from a group with 20 members?
100. In how many ways can you select three teammates for an event if there are 15 people to choose from?  $20P_4 = 116,280$   
 $15C_3 = 455$

101. A square with diagonal 10 cm is inscribed in a circle. Find the probability that a point chosen at random inside the circle is also inside the square.
102. Two dice are rolled. Find the probability that the sum is 10 or both numbers are even.  $\frac{10}{36}$
103. A coin is flipped three times. Find the probability that at least two of the coins land on tails.  $\frac{4}{8} = \frac{1}{2}$  (HTT, THT, TTH, TTT)
104. If a bag contains 120 tickets numbered from 1 through 120, and one ticket is randomly selected, what is the probability that the ticket number is a multiple of 4 and less than 50?  $\frac{12}{120} = \frac{1}{10}$  (4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48)
105. A password consists of 5 digits (0-9), none of which can be repeated. The first digit must be odd, the second digit must be even (including 0), and the last three can be anything. How many such passwords are possible?  $5 \cdot 5 \cdot 8 \cdot 7 \cdot 6 = 8400$
106. There are 15 songs on your playlist. With random shuffle and no repetition, you listen to two songs. What is the probability that your favorite song played first and your least favorite song played second?  $\frac{1}{210}$
107. In a cooler, there are 12 bottles of sports drinks. Four are lemon-lime, four are orange, and four are fruit punch flavor. If you randomly grab a bottle, what is the probability it is lemon-lime or orange?  $\frac{8}{12} = \frac{2}{3}$
108. A bag contains 6 red marbles and 3 blue marbles. If you randomly pick a marble, return it to the bag, and then pick a second marble, what is the probability that both are red?  $\frac{6}{9} \cdot \frac{6}{9} = \frac{4}{9}$
109. A trapezoid has area 48.72 cm<sup>2</sup> and height 5.6 cm. If one base is 3.4 cm, how long is the other base?  $48.72 = \frac{1}{2}(3.4 + x)5.6$   
 $17.4 = 3.4 + x$   
 $x = 14$
110. Find the area of a rectangle with width 13.4 in and perimeter 64.8 in.  $2(13.4 + l) = 64.8$   
 $26.8 + 2l = 64.8$   
 $2l = 38$   
 $l = 19$   
 $A = 13.4 \cdot 19 = 254.6 \text{ in}^2$
111. How many ways can the letters in the word PASSENGERS be arranged?  $\frac{10!}{3!2!} = 302,400$

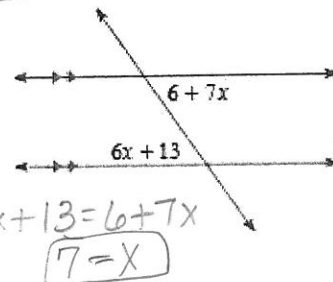
In each of the following diagrams, find the value of the variable.



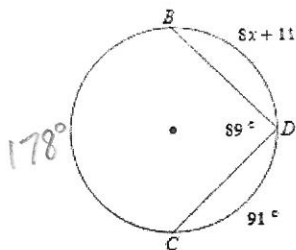
$11x + 272 = 360$   
 $11x = 88$   
 $x = 8$



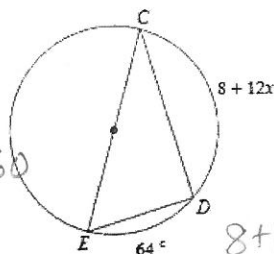
$4x + 144 = 180$   
 $4x = 36$   
 $x = 9$



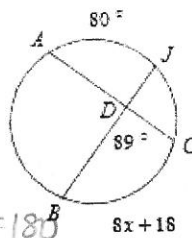
$6x + 13 = 6 + 7x$   
 $7 = x$



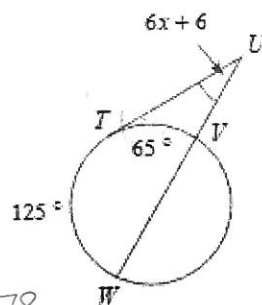
$8x + 280 = 360$   
 $8x = 80$   
 $x = 10$



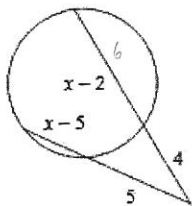
$8 + 12x + 64 = 180$   
 $12x = 108$   
 $x = 9$



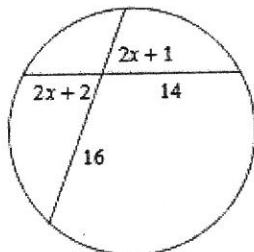
$\frac{8x + 98}{2} = 89$   
 $8x + 98 = 178$   
 $8x = 80$   
 $x = 10$



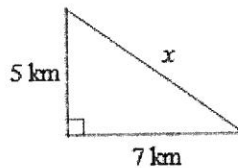
$\frac{125 - 65}{2} = 6x + 6$   
 $60 = 12x + 12$   
 $12x = 48$   
 $x = 4$



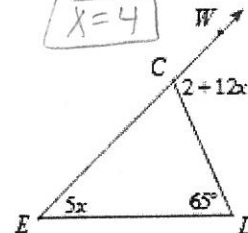
$4(4 + x - 2) = 5(5 + x - 5)$   
 $16 + 4x - 8 = 25 + 5x - 25$   
 $8 = x$



$16(2x + 1) = 14(2x + 2)$   
 $32x + 16 = 28x + 28$   
 $4x = 12$   
 $x = 3$

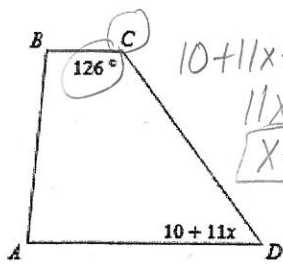


$x^2 = 5^2 + 7^2$   
 $x^2 = 74$   
 $x = \sqrt{74} \text{ km}$   
 $\approx 8.6 \text{ km}$



$5x + 65 = 2 + 12x$   
 $63 = 7x$   
 $x = 9$

The figure is a trapezoid.

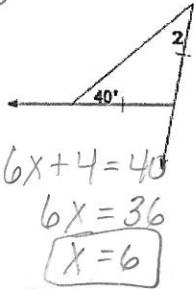


$$10 + 11x + 126 = 180$$

$$11x = 44$$

$$x = 4$$

$$m\angle 2 = 6x + 4$$

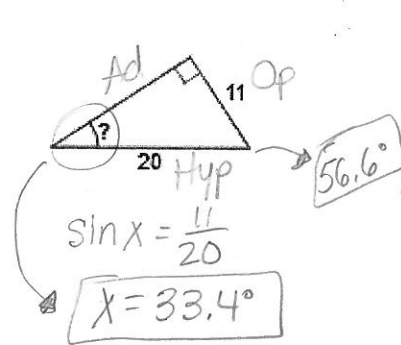


$$6x + 4 = 40$$

$$6x = 36$$

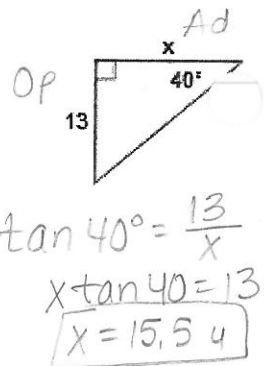
$$x = 6$$

Find the missing angle measure.



$$\sin x = \frac{11}{20}$$

$$x = 33.4^\circ$$



$$\tan 40^\circ = \frac{13}{x}$$

$$x \tan 40 = 13$$

$$x = 15.54$$

These three figures are parallelograms. Find the value of x.

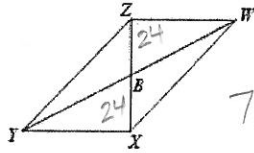
$$BZ = 24$$

$$XZ = 3x + 15$$

$$3x + 15 = 48$$

$$3x = 33$$

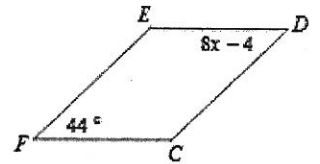
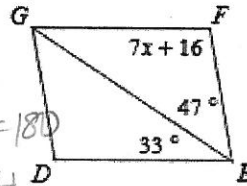
$$x = 11$$



$$7x + 16 + 80 = 180$$

$$7x = 84$$

$$x = 12$$



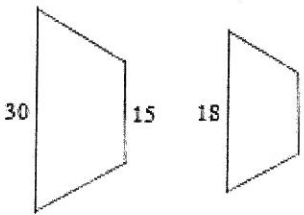
$$8x - 4 = 44$$

$$8x = 48$$

$$x = 6$$

Find the value of x.

These figures are similar.

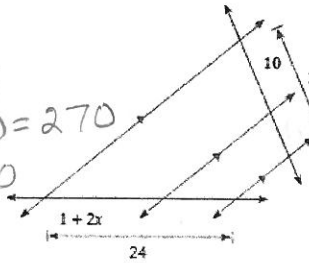


$$\frac{x-2}{15} = \frac{18}{30}$$

$$30x - 60 = 270$$

$$30x = 330$$

$$x = 11$$

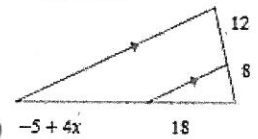


$$\frac{10}{1+2x} = \frac{16}{24}$$

$$16 + 32x = 240$$

$$32x = 224$$

$$x = 7$$



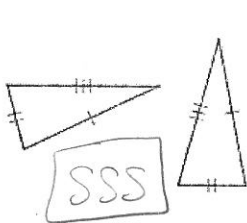
$$\frac{-5+4x}{12} = \frac{18}{8}$$

$$-40 + 32x = 216$$

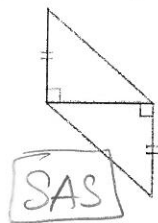
$$32x = 256$$

$$x = 8$$

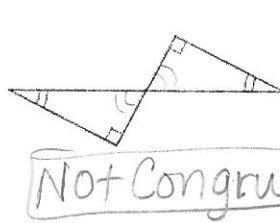
Determine whether the triangles are congruent. If they are, state the postulate or theorem that proves them congruent.



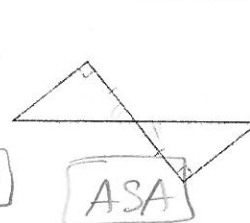
SSS



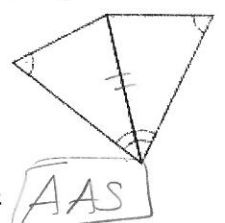
SAS



Not Congruent



ASA



AAS

Find the probabilities.

	Small	Large
Red	18	35
White	11	19
Blue	26	28

$$\frac{53}{137}$$

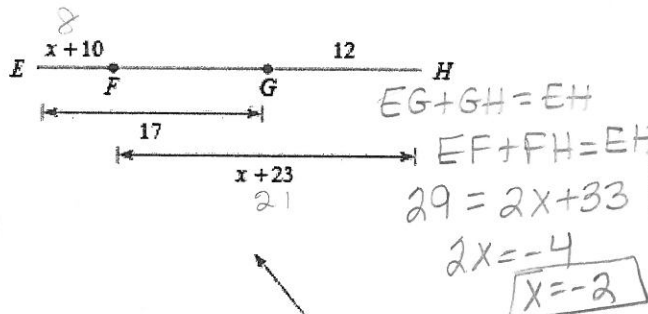
A. P(Red)  $\frac{53}{137}$

B. P(Blue or Large)  $\frac{108}{137}$

C. P(White and Small)  $\frac{11}{137}$

D. P(Red or Blue | Large)  $\frac{63}{82}$

Find the value of x.



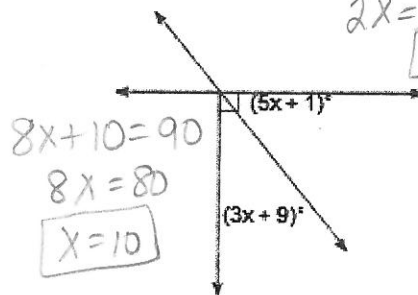
$$EG + GH = EH$$

$$EF + FH = EH$$

$$29 = 2x + 33$$

$$2x = -4$$

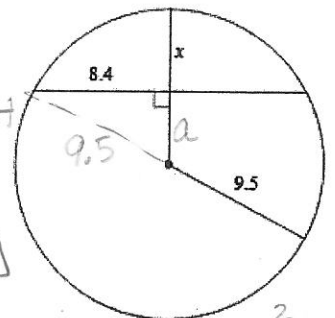
$$x = -2$$



$$8x + 10 = 90$$

$$8x = 80$$

$$x = 10$$



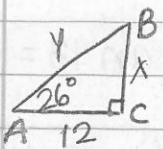
$$a^2 + 8.4^2 = 9.5^2$$

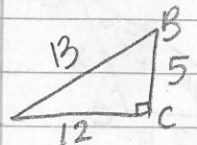
$$a^2 + 70.56 = 90.25$$

$$a^2 = 19.69$$

$$a = 4.44$$

$$x = 5.064$$

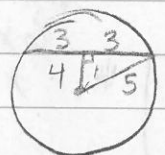
(21)   $m\angle B = 64^\circ$   $\tan 26 = \frac{x}{12}$   $\cos 26 = \frac{12}{y}$   
 $BC = 5.85u$   $AB = 13.35u$

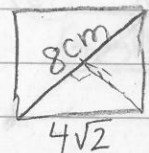
(22)   $\tan A = \frac{5}{12}$   $\sin A = \frac{5}{13}$   $\cos A = \frac{12}{13}$   
 $m\angle A = 22.6^\circ$   $m\angle B = 67.4^\circ$   $AB = 13u$

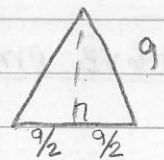
(23)  $2x + 5 + 3x + 8x - 20 = 180$   
 $13x - 15 = 180$   
 $13x = 195$   
 $x = 15$

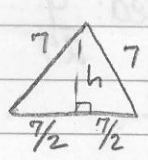
(35) Postulates are accepted without proof.  
 Theorems must be proved.

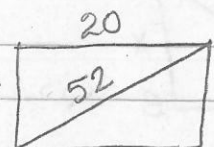
$35^\circ, 45^\circ, 100^\circ \rightarrow$  Obtuse  $\Delta$

(45)   $r = 5\text{cm}$

(46)   $P = 4(4\sqrt{2})$   
 $P = 16\sqrt{2}\text{cm}$

(50)   $h = \frac{9\sqrt{3}}{2}$   
 $A = \frac{1}{2}(9)\left(\frac{9\sqrt{3}}{2}\right)$   
 $A = \frac{81\sqrt{3}}{4}\text{cm}^2$   
 $\approx 35.07\text{cm}^2$

(59)   $h = \frac{7\sqrt{3}}{2}\text{in}$

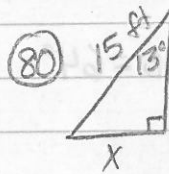
(60)   $A = 960u^2$

(63)  $4x - 3y = 9$   
 $-3y = -4x + 9$   $\text{slope} = \frac{4}{3}$   
 $y = \frac{4}{3}x - 3$

(66)  $(1, -3)$   $(-2, k)$   
 $m = \frac{k+3}{-2-1}$   $2x + y = 7$   $\frac{k+3}{-3} = \frac{-2}{1}$   
 $y = -2x + 7$   $k+3 = 6$   
 $k = 3$

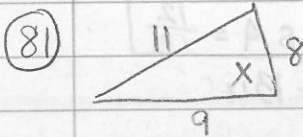
72)  $(6,1)(2,-6)$   
 $m = \frac{-7}{-4} = \frac{7}{4}$

$y - 1 = \frac{7}{4}(x - 6)$



$\tan 13 = \frac{x}{15}$

$x = 3.46 \text{ ft}$

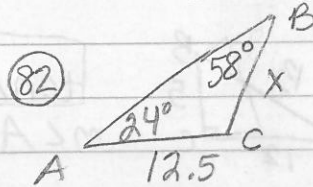


$11^2 = 8^2 + 9^2 - 2(8)(9)\cos x$   
 $121 = 145 - 144 \cos x$   
 $-24 = -144 \cos x$

Law of Cosines

$0.167 = \cos x$

$x = 80.4^\circ$



82)

$\frac{\sin 58^\circ}{12.5} = \frac{\sin 24^\circ}{x}$

$x \sin 58^\circ = 12.5 \sin 24^\circ$

$BC \approx 6u$

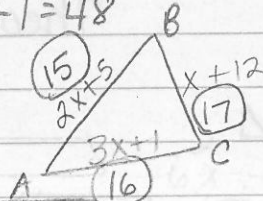
85)  $2x + 5 + x + 12 + 3x + 1 = 48$

$6x + 18 = 48$

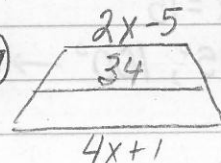
$6x = 30$

$x = 5$

$\angle C$  is smallest



89)



$\frac{6x-4}{2} = 34$

$6x-4 = 68$

$6x = 72$

$x = 12$

bases: 19 in.  
49 in.

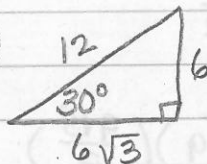
91) SF:  $\frac{3}{5}$  Area:  $\frac{9}{25}$

$\frac{9}{25} = \frac{22.5}{x}$

$9x = 562.5$

$x = 62.5 \text{ cm}^2$

93)



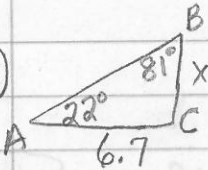
$P = 18 + 6\sqrt{3} \text{ cm}$

94)

$A = \frac{1}{2}(6\sqrt{3})(6)$

$A = 18\sqrt{3} \text{ cm}^2$

95)

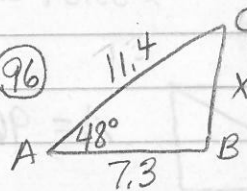


$\frac{\sin 81}{6.7} = \frac{\sin 22}{x}$

$x \sin 81 = 6.7 \sin 22$

$BC = 2.54u$

96)



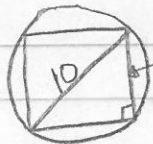
$x^2 = 11.4^2 + 7.3^2 - 2(11.4)(7.3)\cos 48$

$x^2 = 183.25 - 166.44 \cos 48$

$x^2 = 71.88$

$BC = 8.48u$

101)

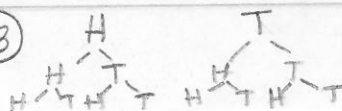


$\square = 5\sqrt{2} \cdot 5\sqrt{2} = 50$

$\circ = \pi(5)^2 = 78.54$

$P = \frac{50}{78.54} = 0.637 = 63.7\%$

103)



102) 46, 55, 64, 22, 24, 26, 42, 44, 62, 66