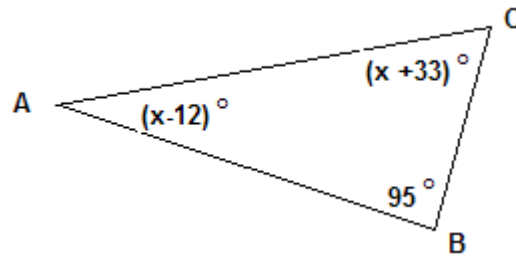
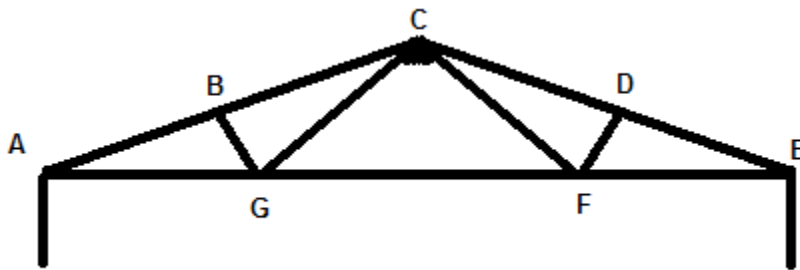


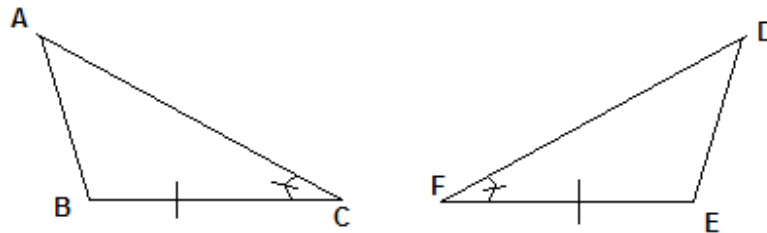
1. Find the measure of $\angle A$ in $\triangle ABC$.



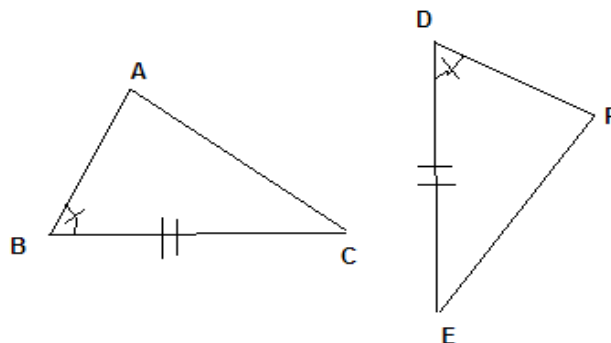
2. The W-truss is the most widely used of light wood trusses. Identify two pairs of triangles in the truss below that appear to be congruent.



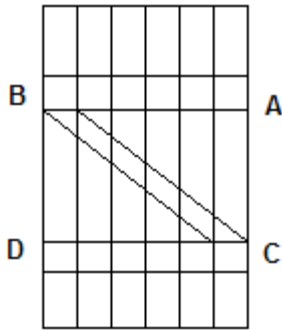
3. Name the additional congruent parts needed so that the triangles are congruent by the reason given.
- AAS



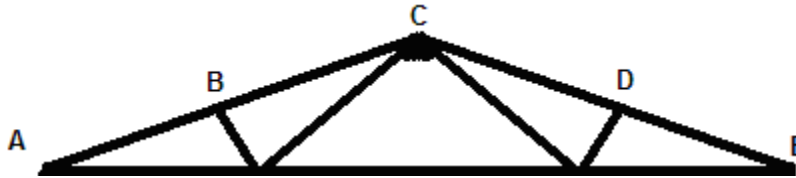
- ASA



4. To brace a door, identical cross boards are spaced at equal distances perpendicular to the vertical boards on the door. Diagonal brace \overline{CB} is also added. Find two congruent triangles. How do you know they are congruent?

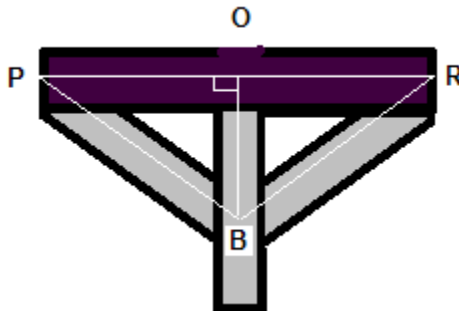


5. Most roofs on residential buildings are made of triangular roof trusses. Explain how the SSS postulate is used to make the truss parts to make congruent trusses.

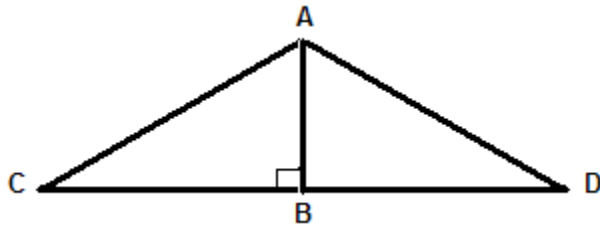


6. Is the information you are given enough for you to prove that the two triangles are congruent? Explain.

The vertical beam \overline{OB} is perpendicular to the porch roof. P, O, and R are equally spaced (O is a midpoint of \overline{PR}).



7. Builders use the King Post truss, below left, for the top of a simple structure. In this truss, $\triangle ABC \cong \triangle ABD$. List the congruent corresponding parts. Hint: there are 3 pairs of angles and 3 pairs of sides



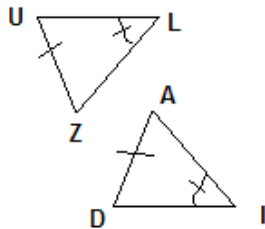
8. Sheds are advertised for sale. For \$800, you can purchase an 8' X 8' shed. They advertise they will build any size.

a) What would a 16' X 16' shed costs?

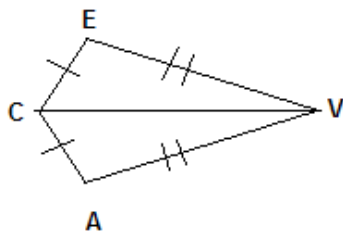
b) What size would \$1600 purchase?

9. What conjecture tells you that the two triangles listed are congruent?

a. $\triangle LUZ \cong \triangle IDA$

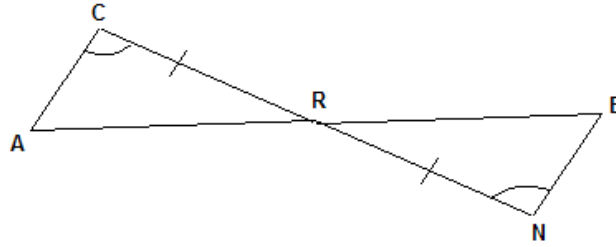


b. $\triangle CAV \cong \triangle CEV$

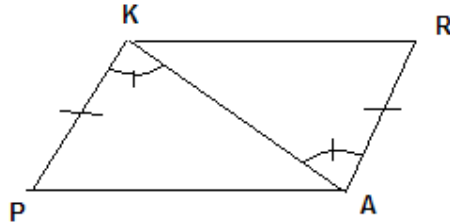


#9 continued

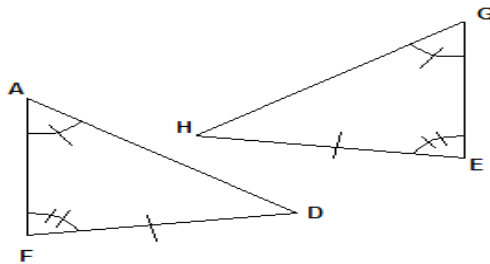
c. $\triangle ARC \cong \triangle ERN$



d. $\triangle KAP \cong \triangle AKR$



e. $\triangle FAD \cong \triangle EGH$

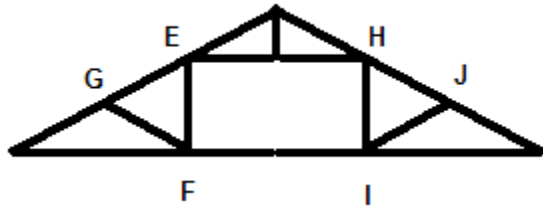


10. Can 3 boards of length 8', 10', and 20' be made into a triangular truss without cutting? Why or why not?

11. Multiply

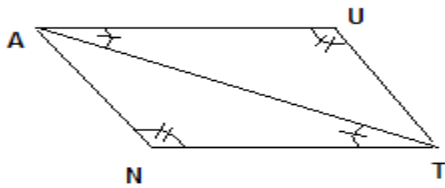
a) $3x^4 \bullet -2x^2$ b) $(y^3)(y^3)$ c) $5x \bullet 2x^3$ d) $(2x^2)^3$ e) $(x+3)(2x-1)$

12. The Attic Frame truss (truss that provides space in an attic), provides open space in the center for storage. In this truss, $\triangle EFG \cong \triangle HIJ$. List the congruent corresponding parts. Remember there are 3 angles and 3 sides.

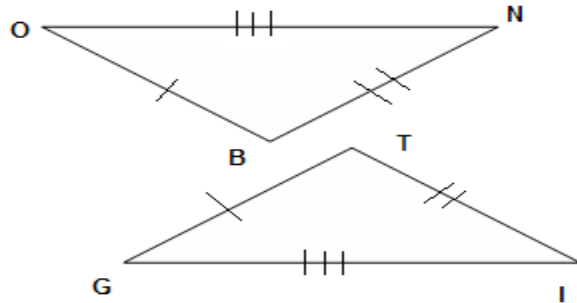


13. Complete each statement from the given information. If the triangles cannot be determined to be congruent from the information given, write “Cannot be determined”. Do not assume that segments or angles are congruent just because they appear to be congruent. If they are congruent, please state **WHY**.

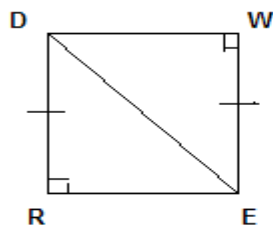
a. $\triangle ANT \cong \triangle ? - ? -$



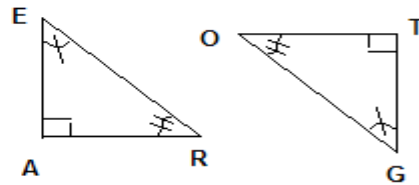
b. $\triangle GIT \cong \triangle ? - ? -$



c. $\triangle RED \cong \triangle ? - ? -$

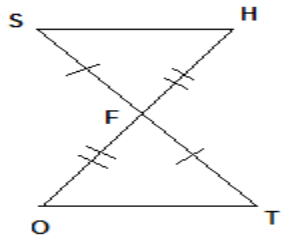


d. $\triangle ARE \cong \triangle ? - ? -$

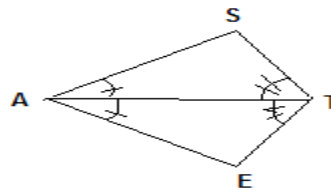


#13 continued

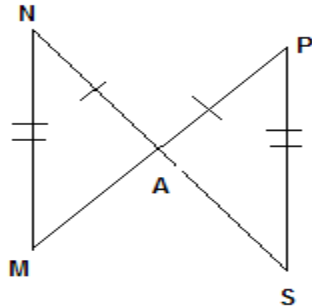
e. $\triangle FSH \cong \triangle \text{---} \text{---}$



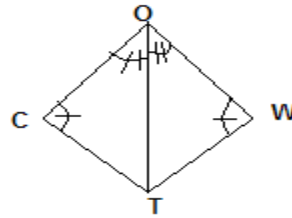
f. $\triangle SAT \cong \triangle \text{---} \text{---}$



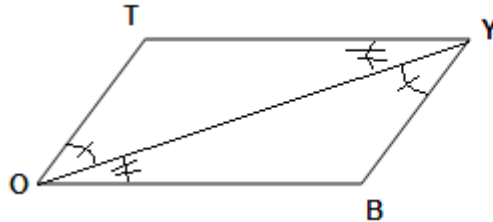
g. $\triangle MAN \cong \triangle \text{---} \text{---}$



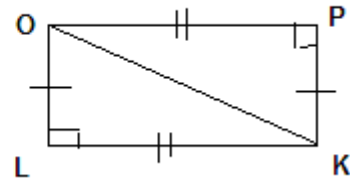
h. $\triangle COT \cong \triangle \text{---} \text{---}$



i. $\triangle TOY \cong \triangle \text{---} \text{---}$

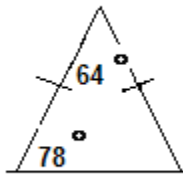


j. $\triangle POK \cong \triangle \text{---} \text{---}$

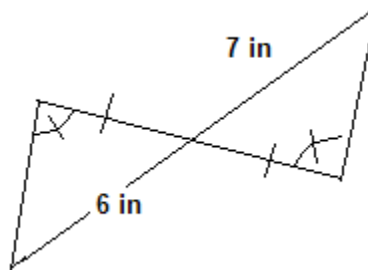


14. What's wrong with this picture?

a.



b.



15. What is the value of the expression below?

$$(-2.0)^4 - 2.0$$

16. If the numbers below were placed in increasing order, what would be the fourth number in the sequence?

$$\frac{-1}{4}, 10^{-2}, -.246, 2 \cdot 10^{-3}, \sqrt{2}, 25\%, -2^3, 2\%$$

17. The plan for a new house calls for a square patio with an area of 15 square feet.

a) What is the length of a side to the nearest tenth of a foot?

b) What is the length of the diagonal of the patio as an exact answer (simplified radical form)?

18. Find the sum or difference (no decimals).

a. $5^{\circ} 9'' + 7^{\circ} 10''$

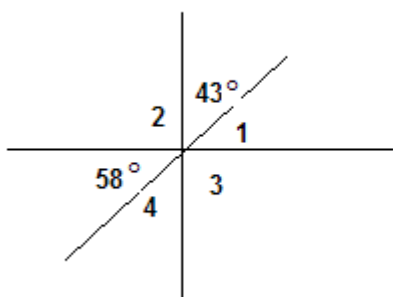
b. $21^{\circ} 4'' - 9^{\circ} 11''$

c. $4^{\circ} 3'' + 19^{\circ} 1''$

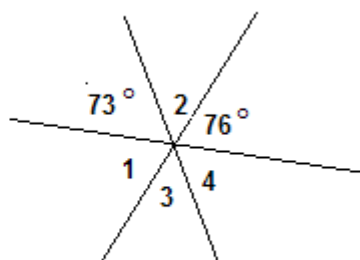
d. $124^{\circ} 5 \frac{1}{8}'' - 54^{\circ} 7''$

19. Find $m\angle 1, m\angle 2, m\angle 3, m\angle 4$

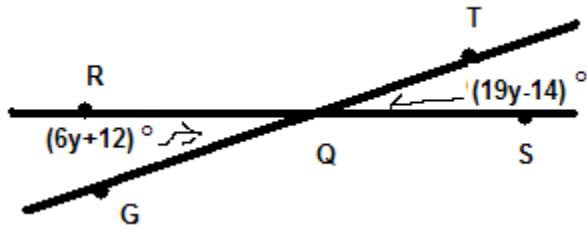
a)



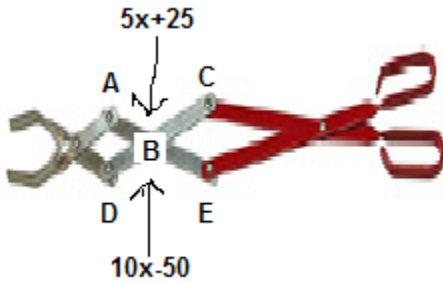
b)



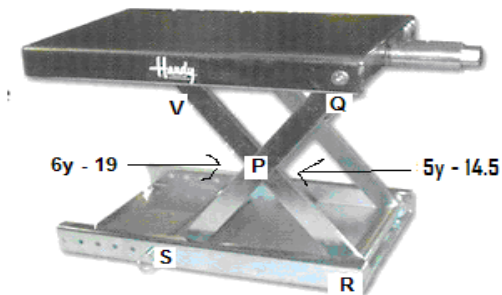
20. Find $m\angle GQR$ and $m\angle TQS$ for the lever system shown.



21. Find $m\angle ABC$ and $m\angle DBE$



22. Find $m\angle VPS$ and $m\angle QPR$



23. Simplify

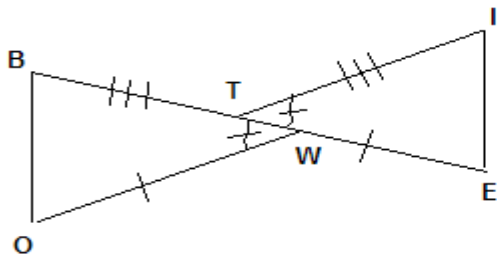
a) $x^3 \bullet -5x^2$ b) $(2y^3)(6y^4)$ c) $5x+2x$ d) $(-3x^2)^4$

e) $(2x+3)(2x-7)$ f) $(x+3) + (2x-1)$ g) $(x+3) - (2x-1)$

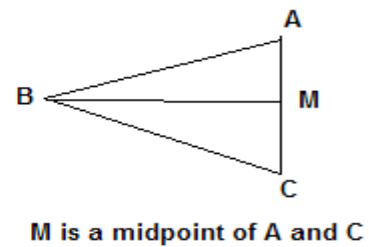
24. Find the slope of a line passing through (33,-56) and (-43,-60)

25. Complete each statement from the information given. If the triangles cannot be shown to be congruent from the information given, write "Cannot be determined" otherwise state **WHY**.

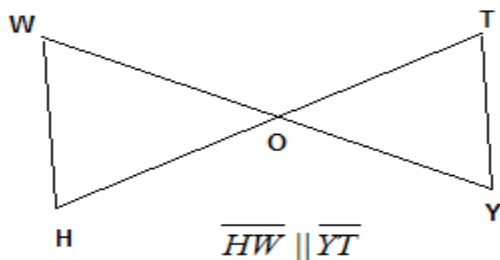
a. $\triangle BOW \cong \triangle$ _____



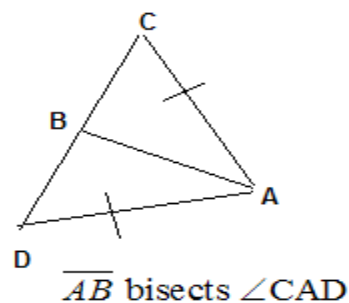
b. $\triangle ABM \cong \triangle$ _____



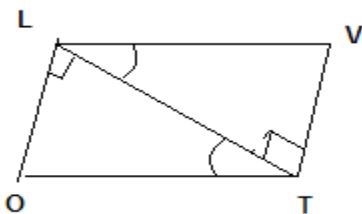
c. $\triangle WHO \cong \triangle$ _____



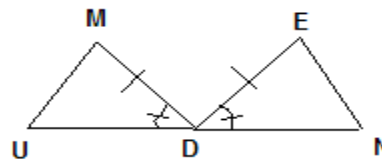
d. $\triangle ABD \cong \triangle$ _____



e. $\triangle LVT \cong \triangle$ _____

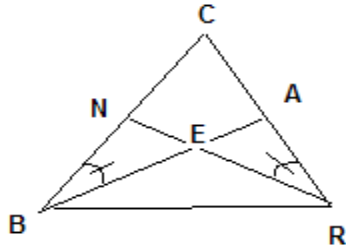


f. $\triangle MUD \cong \triangle$ _____



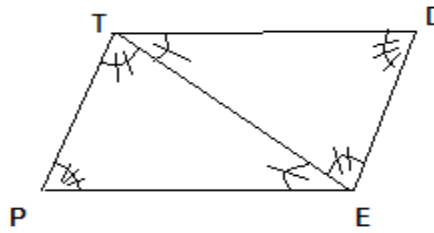
#25 continued

g. $\triangle BCA \cong \triangle \underline{\hspace{1cm}}$

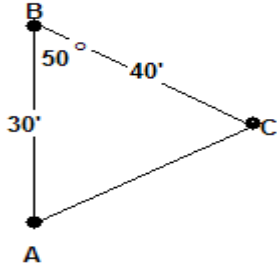


$\triangle BCR$ is isosceles

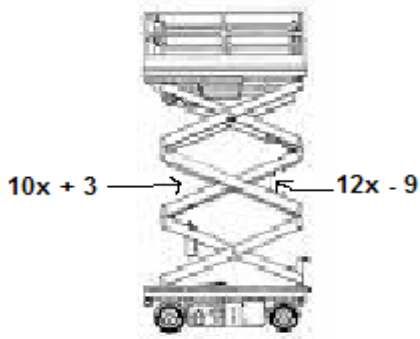
h. $\triangle PET \cong \triangle \underline{\hspace{1cm}}$



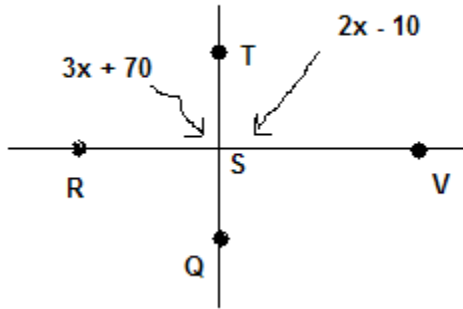
26. Alyssa is surveying. She starts at point A and measures 30' to point B. Once at point B, she turns right 50° . She measures 40' along this site line and places a stake at point C. If she were to come back to point A with the same measurements and orientation, would she be able to find the Corner C? Why or why not?



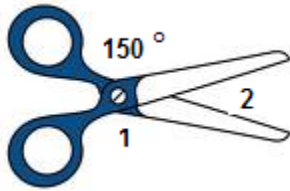
27. Find the value of x . Find the measure of each angle indicated.



28. Find $m\angle RST$ and $m\angle VST$



29. Find $m\angle 1$ and $m\angle 2$



30. Two school crossing signs are shown below. They are similar with a scale factor of two. If the area of the small figure is 28 sq. inches, what is the area of the large figure?



31. Simplify:

a. $\sqrt{32}$

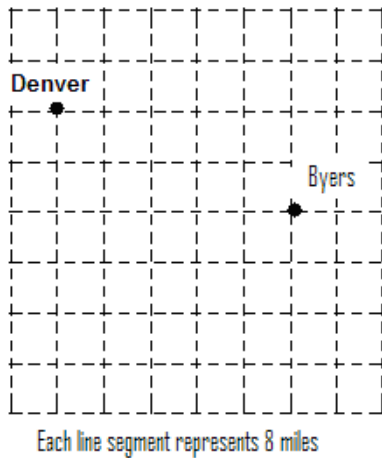
b. $\sqrt{50}$

c. $3\sqrt{80}$

32. Yesterday, Sam was planning to put a circular window with a radius of one foot in his new house. Today, Sam changes his mind and decides to put in a bigger circular window with a radius of two feet. By how much will the area of the bigger window change? Circle one.

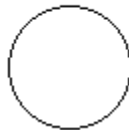
It will double
 It will triple
 It will quadruple
 It will be half

33. Find the distance from Denver to Limon using the grid below.



34. Jessica designs two pens, one a square and one a circle, each with a perimeter of 120 ft.

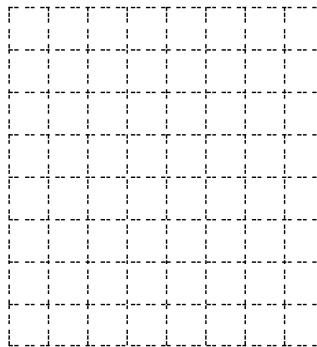
- Which one will maximize the area?
- Find the radius of the circle.
- Find the area of the square and of the circle



35. Find the slope of a line passing through:

- $\left(\frac{1}{2}, 5\right)$ and $\left(2\frac{1}{2}, 1\right)$
- $(1, 3.5)$ and $(6, 3.5)$
- $(-1, -5)$ and $(3, -1)$

36. Graph the line $y = \frac{2}{3}x - 1$



37. Simplify.

a) $-x^3y^2 \cdot -5x^3y^3$ b) $(-2y^3z)(4y^4z^4)$ c) $5x^2 + 2x^2$ d) $(3xy^2)^3$

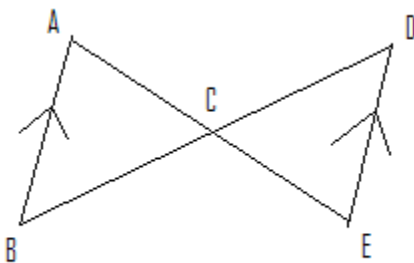
e) $(5x - 3)(2x - 9)$

f) $(2x-3) + (2x+5)$

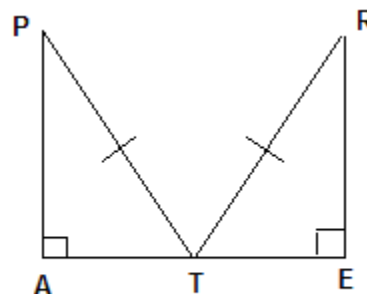
g) $(3x - 4) - (2x - 9)$

38. If the triangles cannot be shown to be congruent from the information given, write “Cannot be determined” otherwise state **WHY**.

a)

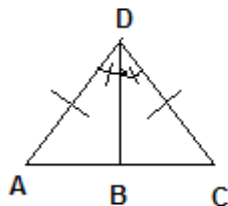


b)

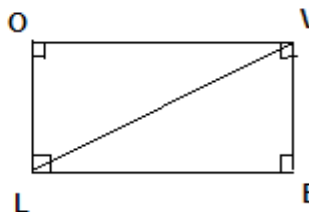


T is the midpoint of AE

c)

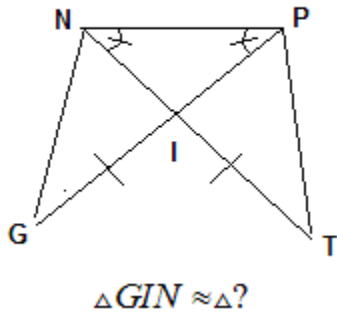


d)

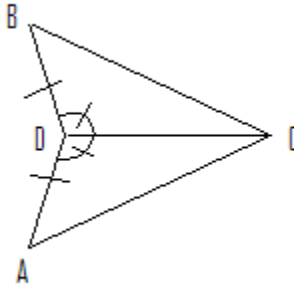


#38 continued

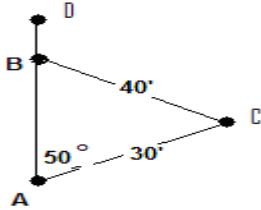
e)



f)



39. Tony is surveying. He starts at point A and sites point D. He measures a 50° angle between point D and a new point C. He measures 30' to point C. At point C, he turns and measures 40° towards the line between A and D. He places a stake at point B. If he were to come back to point A with the same measurements and orientation, would he be able to find the Corner D? Why or why not?

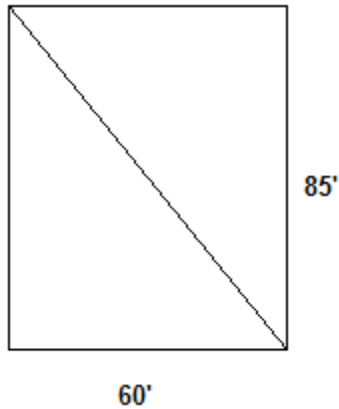


40. Given each set of points, determine if \overline{JK} and \overline{LM} are parallel, perpendicular, or neither.

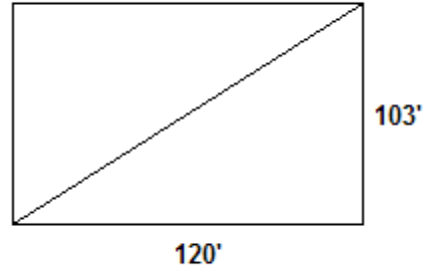
- J (-4,11), K (-6,3), L (7,7), M (6,3)
- J (6,9), K (4,6), L (0,8), M (3,6)
- J (-8,1), K (-5,-8), L (0,10), M (3,11)

41. Find the length of the diagonals of the rectangular foundations. Find your answer to the nearest $\frac{1}{8}$ th inch.

a)



b)



42. Max is trying to compare numbers. Which of the following is closest to π ?

$$3\sqrt{2}, \left(\frac{3}{4}\right)^{-4}, 3.14^0, 3\frac{1}{4}$$

43. Evaluate each algebraic expression if $s = 5$ and $t = -3$.

a. $3(2s - t)$

b. $s + 3t - 8$

c. $(s + t) - 2 \cdot 3$

d. $3s - 4t + 2$

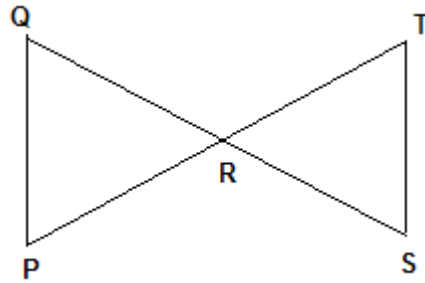
e. $s - \frac{t}{3} \cdot 5$

f. $-2t^3$

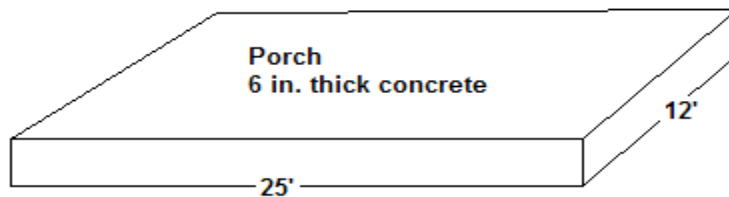
g. $-s^3$

h. $-t$

44. R is the midpoint of both \overline{PT} and \overline{QS} .
Why are the triangles congruent?



45. Find the number of **cubic yards** of concrete needed for the concrete floor shown below.



46. Simplify

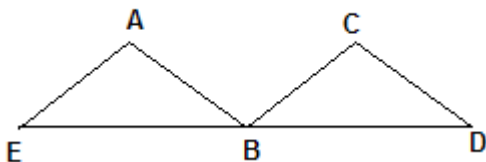
a) $\frac{x^5}{x^3}$

b) $\frac{12d^{10}}{4d^4}$

c) $\frac{15a^3}{3a}$

d) $\frac{6a^3b^7}{-2ab^2}$

47. a) $\triangle AEB$ and $\triangle CDB$ are isosceles with
 $\overline{AE} \cong \overline{AB} \cong \overline{CB} \cong \overline{CD}$
B is the midpoint of \overline{ED}
Why are the triangles congruent?

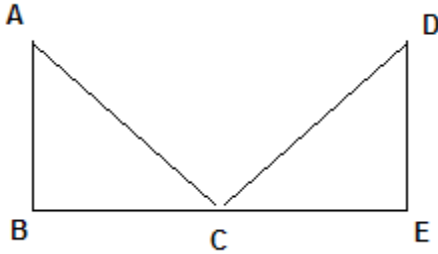


#47 continued

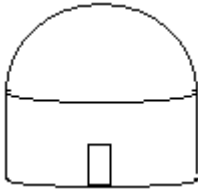
b) $\overline{AB} \perp \overline{BE}$ and $\overline{DE} \perp \overline{BE}$

$\overline{AB} \cong \overline{DE}$ and $\angle BAC \cong \angle EDC$

Why are the triangles congruent?



48. The yurt shown below has walls 6 feet tall and a hemispherical dome with a diameter of 20 feet.



- Find the surface area.
- Find the volume.
- If the dimensions of the yurt were halved, what would the new surface area and volume be?

49. Two 2 by 4's are 3' and 4' long.

- What is the longest and shortest the third 2 by 4 can be to make a triangular brace?
- What is the length of the third side to create a right triangle?

50. Amber is in charge of selecting trees to be thinned. The circumference of a particular tree is 140 inches. Amber can estimate the diameter of the tree without cutting it down.

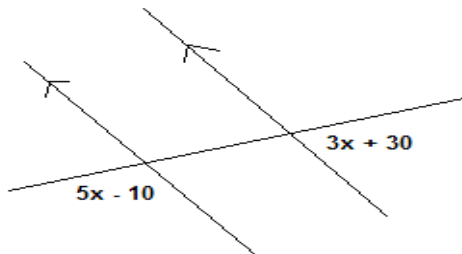
- a) What is the diameter of the tree?
- b) What is the largest **square** piece that can be cut from a cross section of this tree? Hint: You can use special right triangles for this.



51. Zach picks two 1 by 2's to create a design. Each one measures 6 feet.

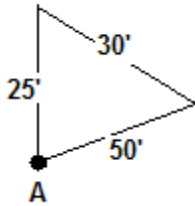
- a) What is the length of the third board if he wants an equilateral triangle?
- b) What is the range of lengths Zach can use to make the third side of the triangle if he does not care what type of triangle he makes?

52. Find the value of x .

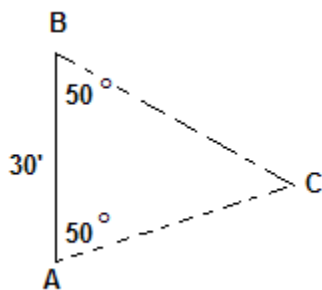


53. Two 2 by 6's are being used to create a truss for a 24' wide house. One 2 by 6 is 16' long. If you are not concerned with the truss design, what is the range of lengths the third side of the 2 by 6 can be?

54. Melissa is surveying. She starts at point A with 3 measuring tapes that are 25', 30', and 50' and forms a triangle. She marks the 3 corners where the tapes intersect. If she were to come back to point A with the same measurements and oriented the same direction, would she be able to find the corners? Why or why not?



55. Sam is surveying. He starts at point A and measures a 30' line to point B. From point A, and from point B, he measures a 50° angle. He extends the sides of each of the angles to where they intersect and places a stake named C. If he were to come back to point A with the same measurements and orientation, would he be able to find the Corner C? Why or why not?



56. Trent is a roofing contractor and is viewing the saltbox roof shown below for a roofing estimate. Find the area of the total roof if the house is 50 feet long.



57. A standard brick paver used to cover a walkway or a patio is a rectangle that is 4" by 8". You have a 10 ft by 12 ft patio. How many brick pavers should you order to complete the patio (cover the patio with the small pavers)?

58. Simplify

a) $\frac{10x^3y^6}{5xy^2}$

b) $\frac{x^4}{x^6}$

c) $\frac{4a^5b^8}{-2a^7b^{10}}$

d) $\frac{12xy^4}{2xy^4}$

e) $(3x^2y^5)^3$

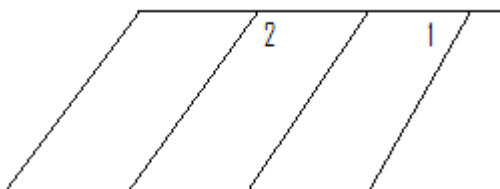
f) $(3x^4y)(-x^2y^6)$

g) $(3x^2 + 2) + (-5x^2 - 3)$

h) $(3x^2 + 2) - (-5x^2 - 3)$

i) $(3x^2 + 2)(-5x^2 - 3)$

59. A public parking lot is constructed so that all parking spaces in an aisle are parallel. If angle 1 is 43° , find the measure of angle 2.



60. Name each part of the circle.

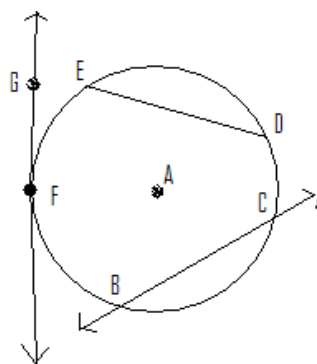
BC

FDC

\overline{ED}

\overline{BC}

\overline{GF}



61. The Luis I bridge in Portugal is shown below. Using circle terms, tell what each part of the bridge is called.

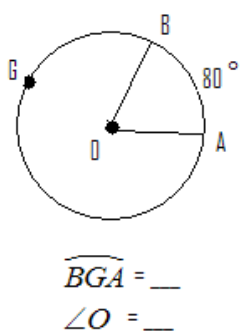
a) The roadway at the top of the arc.

b) The pedestrian walkway at the bottom of the arc.

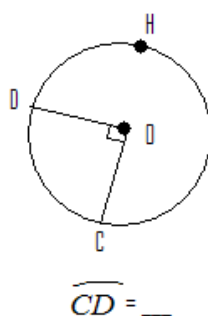


62. Find the requested measures

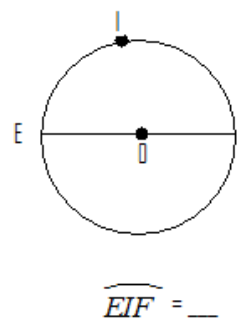
a)



b)



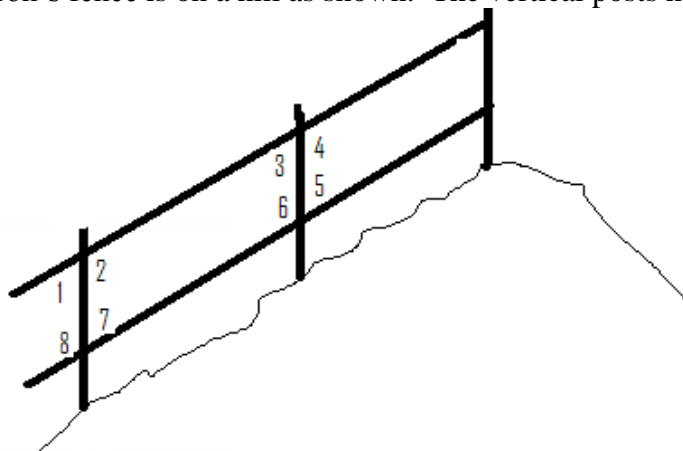
c)



63. In the photo below, the edge of the guide represents a _____ to circular blade of the saw.



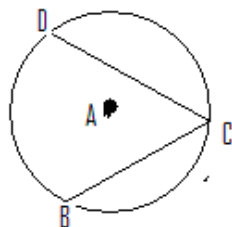
64. Aaron's fence is on a hill as shown. The vertical posts hold parallel rails.



- If $m\angle 1 = 81^\circ$, what is $m\angle 7$?
- If $m\angle 6 = x - 20$, what is $m\angle 3$?
- If $m\angle 2 = 3x + 10$ and $m\angle 4 = 2x + 30$, what is $m\angle 8$?

65. Find the requested values

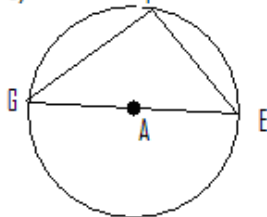
a)



$$\widehat{BCD} = 230^\circ$$

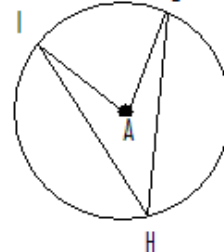
$$\angle BCD = \underline{\hspace{2cm}}$$

b)



$$\angle GFE = \underline{\hspace{2cm}}$$

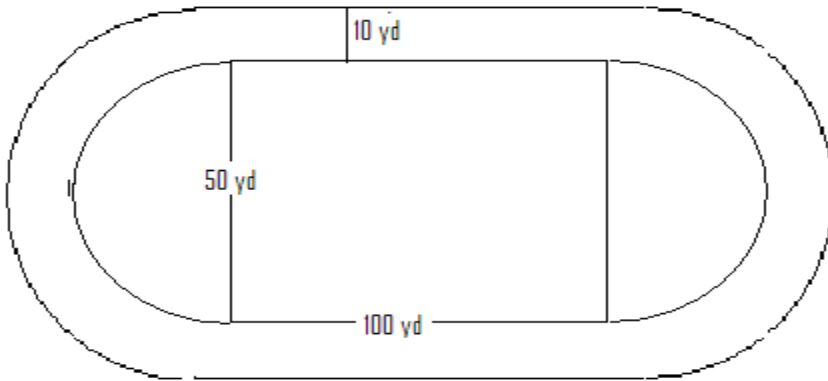
c)



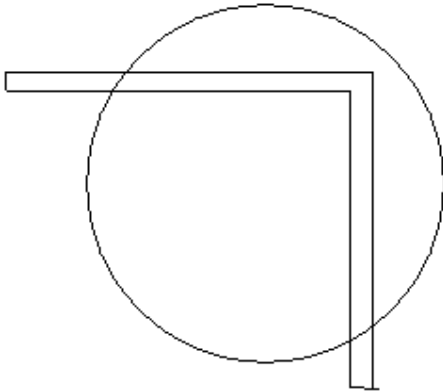
$$\widehat{IJ} = 70^\circ$$

$$\angle IHJ = \underline{\hspace{2cm}}$$

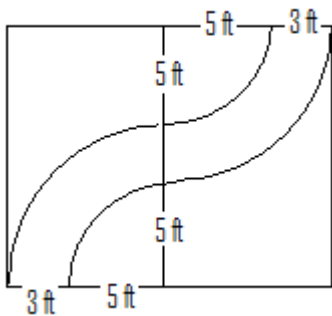
66. The high school athletic field is a rectangle, 100 yd by 50 yd, with a semicircle at each end. A running track 10 yd wide surrounds the field. If the track is divided into 5 lanes of equal width, find the distance around the track along the inside edge of each lane.



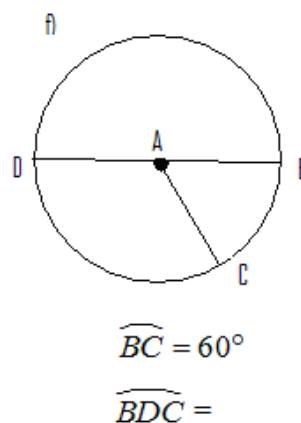
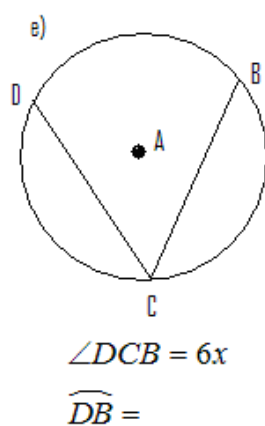
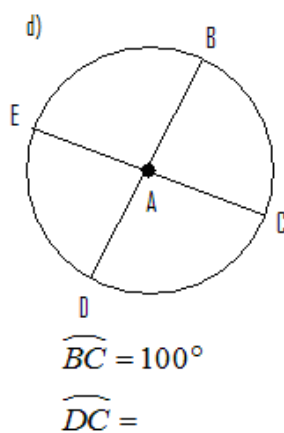
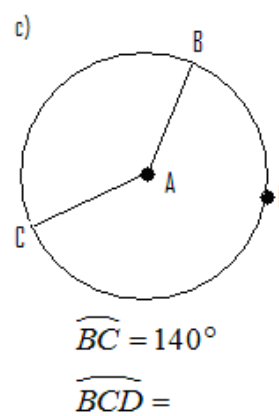
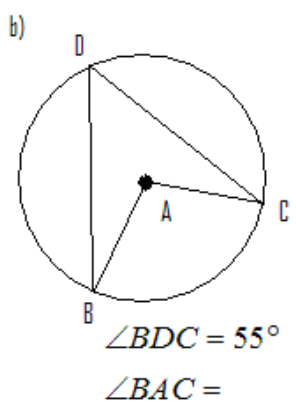
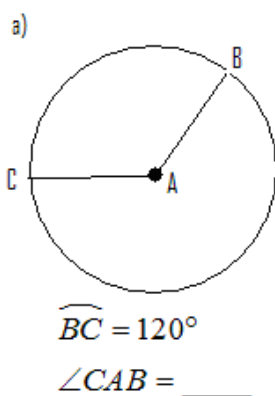
67. Explain how a carpenter can find the center of a circular piece of wood using only a carpenter's square.



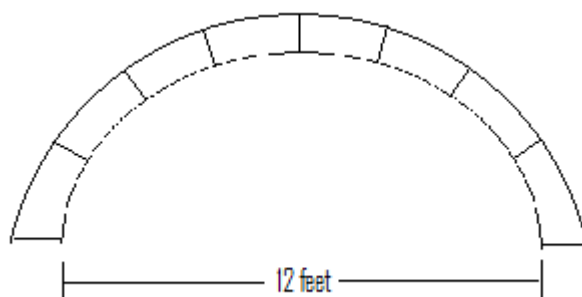
68. JD is building a curved path through a rectangular front yard. He will edge the stone path with steel edging. Find the total amount of edging needed.



69. Find the requested measures for $\odot A$.

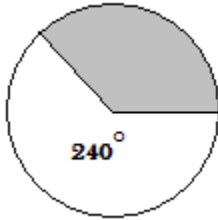


70. Lizzy has an arch above the entrance to her home created using iron. The 9 segments connecting the two concentric semicircles are each 4 ft long. Find the total length of iron used to make this arch.

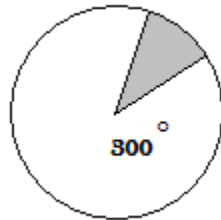


71. In North Carolina, a subdivision of round homes have been built at the base of one of the ski resorts (small resort but...big by North Carolina standards). Below are some of the footprints of the homes. **Note that the shaded part is not part of the home** but rather a deck/viewing area. Find the area of the livable space in each of the homes shown below. The radius is 24 feet.

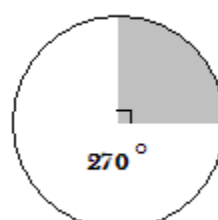
a)



b)



c)



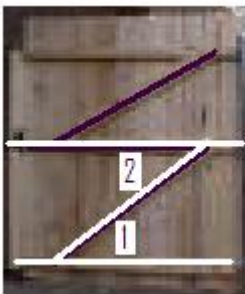
72. Find the amount of fascia needed for the homes above.

a)

b)

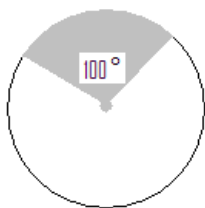
c)

73. The boards securing this gate are parallel with a cross member (transversal). Give the name of the pair of angles shown.

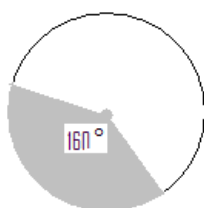


74. Find the arc length of the shaded region. The radius of each circle is 15 feet.

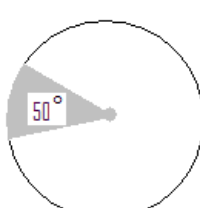
a)



b)



c)



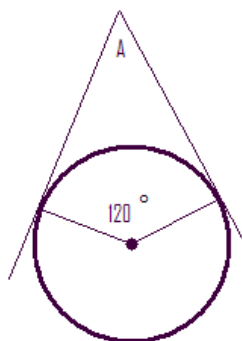
75. Find the area of the shaded portions of the circles in #79.

a)

b)

c)

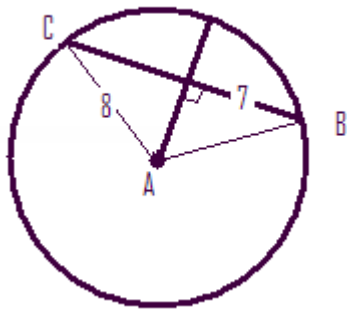
76. Find the value of angle A.



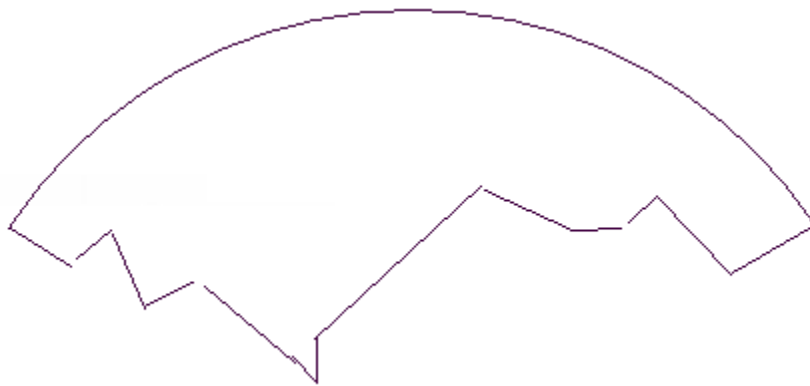
77. What angle does the bike spoke make with the ground?



78. Find the perimeter of $\triangle ABC$.



79. Find the center of the broken plate found by archeologist Digger Dirt.

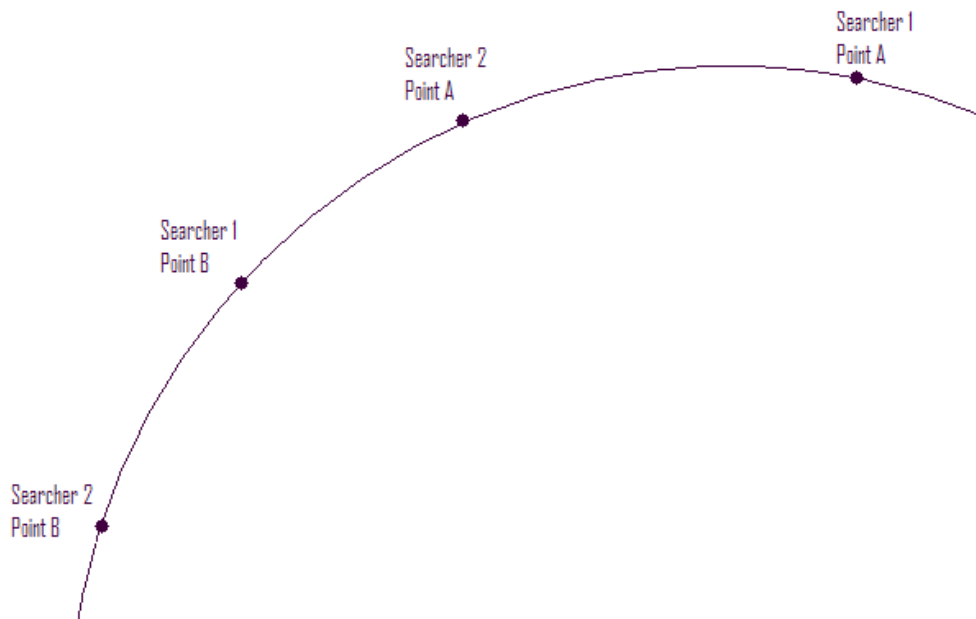


80. Many back country skiers/snow shoers carry rescue beacons. The beacon sends electromagnetic field signals in circular patterns in the event of an avalanche.

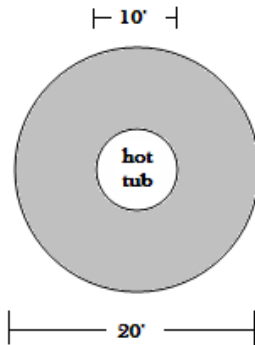
When a searcher encounters the signal he/she stops, marks the spot, and walks in a straight path until the signal is lost and then marks the spot. He/she then finds the midpoint of that path.

Meanwhile another searcher repeats the process at a different location.

- a) Find the center of the circle.
- b) What is the significance of the center of the circle?



81. Find the area of the deck surrounding the hot tub. The hot tub has a diameter of 10 ft.



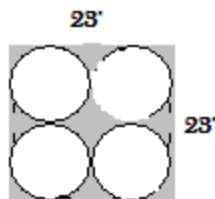
82. Find the area of the shaded regions of problems a and b which are 2 possible arrangements of irrigation circles.



a)



b)

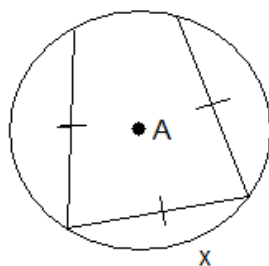


c) Compare the answers to a and b. What implications does this have for farmers using irrigation?

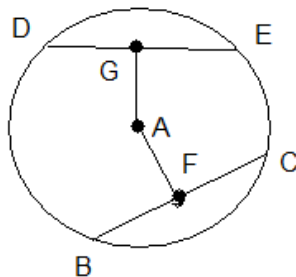
83. Find the requested measures for $\odot A$. Give a reason that you used to support your answer.

a) Find x

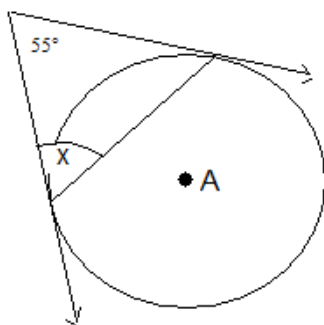
60°



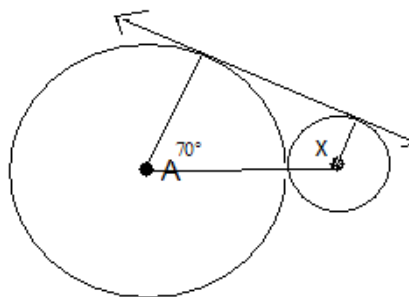
b) $DE=BC$; $AG = 10$; find AF



c) Find x

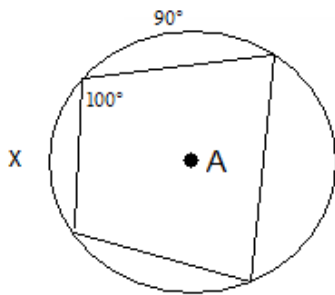


d) Find x



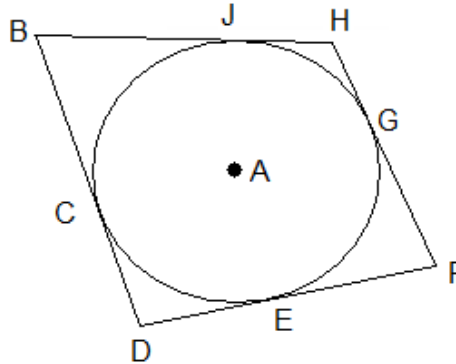
83. Continued

e) Find x



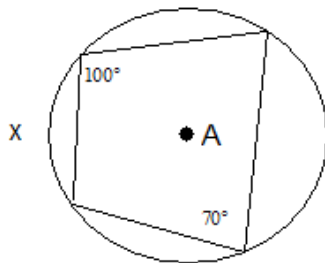
f) $BH = 12$; $DF = 10$; $BC = 7$; $FG = 6$:

Find the perimeter of BHFD

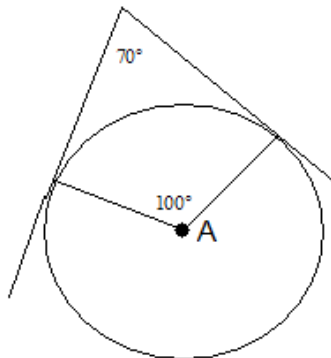


84. What is wrong with the drawing? Explain why it is wrong.

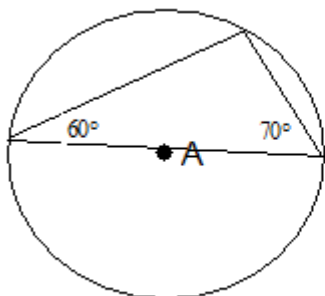
a)



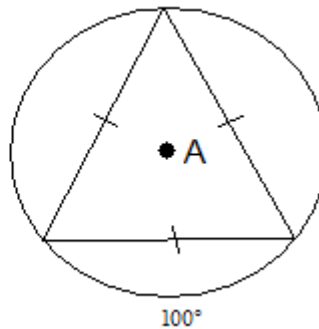
b)



c)

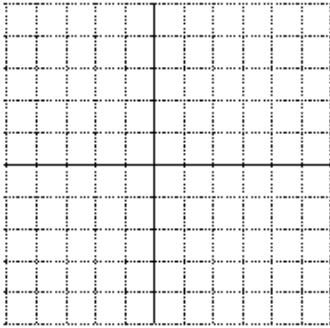


d)

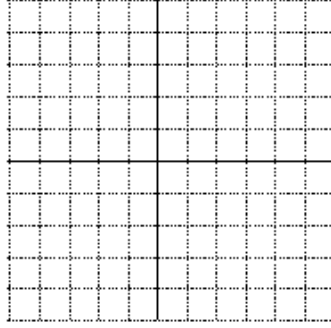


85. Graph the circles:

a) $(x-3)^2 + (y-1)^2 = 9$

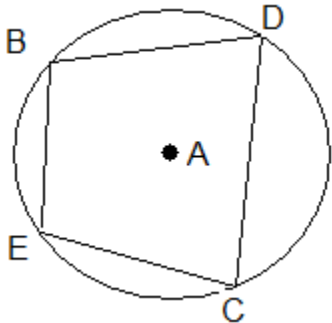


b) $(x+1)^2 + (y-2)^2 = 16$



86. For the circle in problem a above, does the point $(\frac{1}{2}, \sqrt{2})$ lie on the circle? Explain why or why not?

87. Write a short paragraph as to how you know (prove) that opposite angles in a quadrilateral inscribed in a circle are supplementary. Use the drawing below as a reference.



88. A fine woodworker created the door below has an arc along the top of the door for decorative appeal. Explain how a carpenter would find the center of the circle that created the arc.

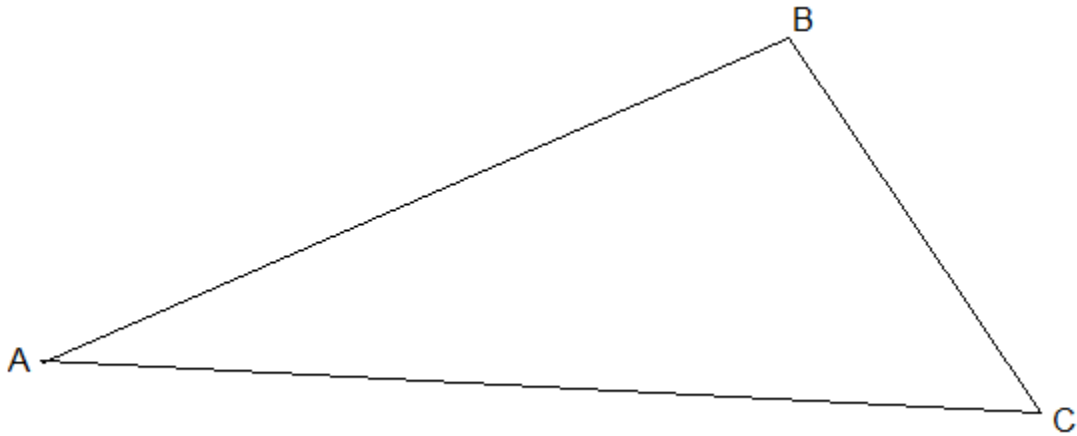


89. Tile is being installed in a circular pattern in the center of a kitchen. The intricate pattern will have a diameter of 3 feet. How can the tile layer use a carpenter's square to find the exact center of the circle?

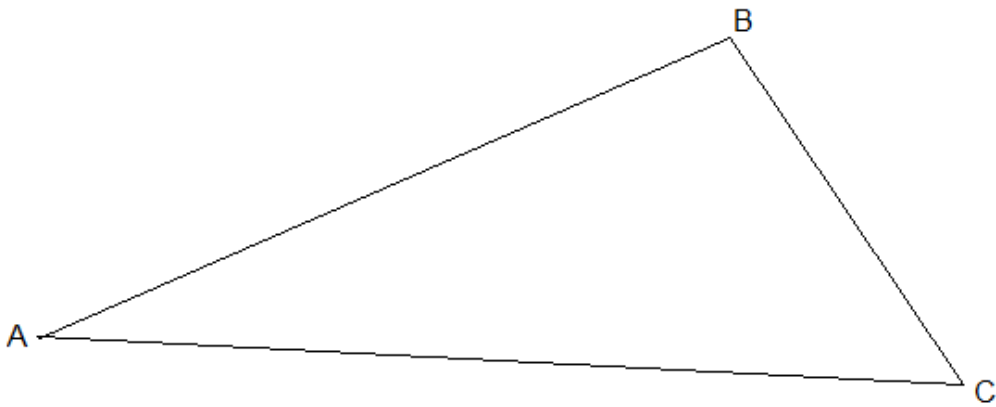
90. The equation of a circle is $(x-2)^2 + (y+1)^2 = 4$.

- a) What is the center of the circle?
- b) What is the radius of the circle?
- c) Does the point (0,0) lie on the circle? Explain using the distance formula.

91. Construct (using straightedge and compass) a circle inscribed in the triangle ABC.
Hint: Construct 2 angle bisectors.



92. Construct (using straightedge and compass) a circle circumscribed about the triangle ABC. Hint: Construct perpendicular bisectors of 2 sides.



93. Construct (using a straightedge and compass) a line tangent to a given circle A through a point B outside the circle. Hint: Construct the perpendicular to AB.

