

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

Basics of Geometry

Solve the equations.

1)  $3(x - 1) + 3 = 9$

$3x - 3 + 3 = 9$

$3x = 9$

$x = 3$

2)  $\frac{1}{3}(x + 4) = 5$

$(x + 4) = 15$

$x = 11$

3) The Pythagorean Theorem is  $c^2 = a^2 + b^2$ . However, you are often given the theorem a different way ( $a^2 + b^2 = c^2$ ). What property allows the use of this order? symmetric property

4) How would you explain the difference between a "statement" and a "reason" in a proof?

statements = facts / steps

reasons = why facts are true - definitions, thms, etc.

Justify the following statements:

5) If  $x=100$ , then  $100=x$ . symmetric

6) If  $AB=CD$  and  $CD=EF$ , then  $AB=EF$ . transitive

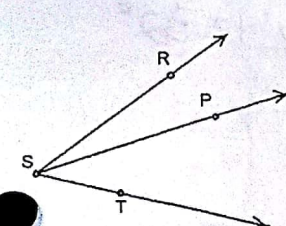
7)  $JK=JK$  reflexive

8) If  $x=30$ , then  $2x=60$ . multiplication

9) If  $5x=20$  and  $x=4$ , then  $5(4)=20$ . substitution

10) If  $x=y$ , then  $x-5=y-5$ . subtraction

11) There are 3 angles in this diagram, name each angle.



$\angle RST$   
 $\angle RSP$   
 $\angle PST$

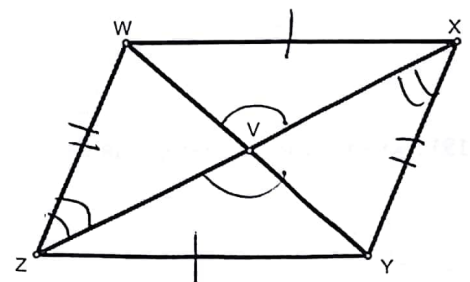
12) Mark the figure with the given information.

$\overline{WX} \cong \overline{YZ}$

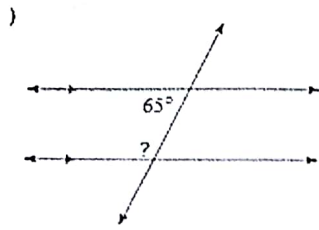
$\overline{ZW} \cong \overline{XY}$

$\angle WVX \cong \angle YVZ$

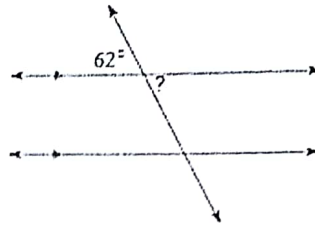
$\angle WZV \cong \angle YXZ$



Find the measure of the angle indicated

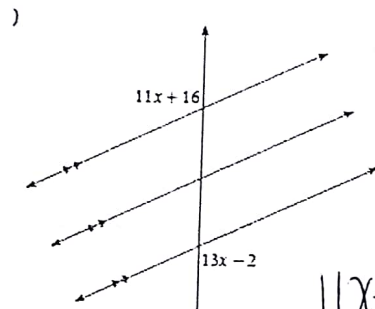


- 13) A)  $120^\circ$  B)  $130^\circ$   
 C)  $100^\circ$  D)  $115^\circ$



- 14) A)  $95^\circ$  B)  $117^\circ$   
 C)  $101^\circ$  D)  $62^\circ$

Solve for x.

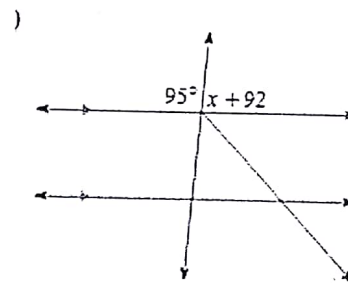


- 15) A) 9 B) -2  
 C) 6 D) 7

$$11x + 16 = 13x - 2$$

$$18 = 2x$$

$$x = 9$$



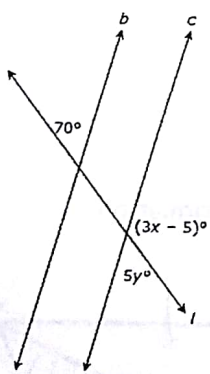
- 16) A) 6 B) -5  
 C) -7 D) 11

$$x + 92 + 95 = 180$$

$$x + 187 = 180$$

$$x = -7$$

17) Solve for x and y



$$5y = 70$$

$$y = 14$$

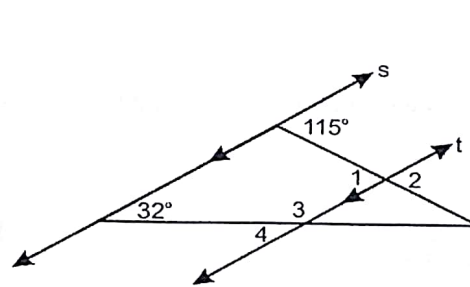
$$3x - 5 + 70 = 180$$

$$3x + 65 = 180$$

$$3x = 115$$

$$x = 38.33$$

18) Solve for every numbered angle



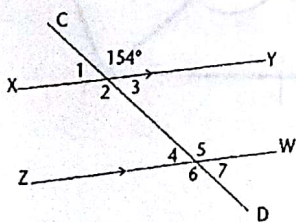
$$\angle 1 = 115^\circ$$

$$\angle 2 = 115^\circ$$

$$\angle 3 = 148^\circ$$

$$\angle 4 = 32^\circ$$

19) Solve for the following angles



- $m\angle 1$        $m\angle 5$        $m\angle 6$        $m\angle 7$   
 $26^\circ$        $154^\circ$        $154^\circ$        $26^\circ$

Module 4: Congruence and Triangles

20) If  $\triangle BAX \cong \triangle TER$ , name the six congruent pairs.

- $\angle B \cong \angle T$
- $\angle A \cong \angle E$
- $\angle X \cong \angle R$
- $\overline{BA} \cong \overline{TE}$
- $\overline{AX} \cong \overline{ER}$
- $\overline{BX} \cong \overline{TR}$

21)

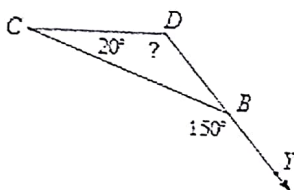
Apply the dilation  $D$  to the polygon with the given vertices. Name the coordinates of the image points. Identify and describe the transformation.

$D: (x, y) \rightarrow (4x, 4y)$

$A(2, 1), B(4, 1), C(4, -3)$

$A'(8, 4) B'(16, 4) C'(16, -12)$

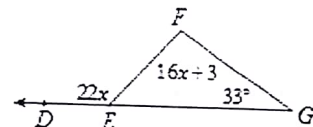
Dilation by a scale factor of 4



$20 + x = 180$

$x = 130^\circ$

22)



A) 10

B) 12

$16x + 3 + 33 = 22x$

C) 6

D) 3

$16x + 36 = 22x$

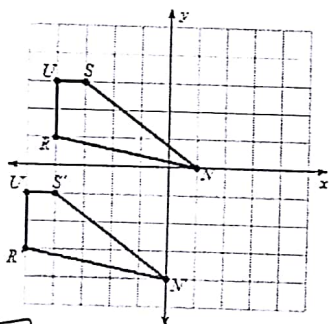
$36 = 6x$

$x = 6$

23) Find  $m\angle DEF$

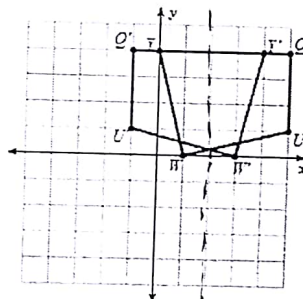
$22(6) = 132^\circ$

Write a rule to describe each transformation.



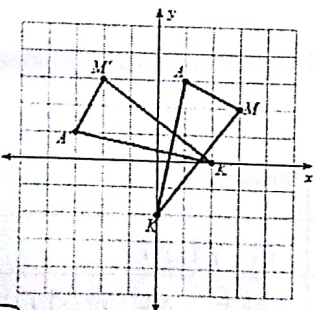
- A) translation:  $(x, y) \rightarrow (x - 1, y - 4)$
- B) rotation  $90^\circ$  clockwise about the origin
- C) rotation  $180^\circ$  about the origin
- D) reflection across the y-axis

24)



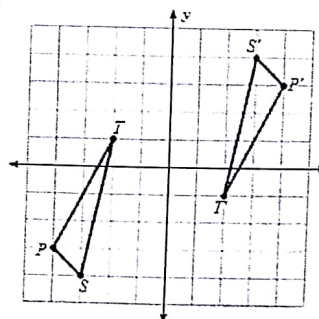
- A) reflection across  $y = 1$
- B) rotation  $90^\circ$  counterclockwise about the origin
- C) translation:  $(x, y) \rightarrow (x - 2, y - 4)$
- D) reflection across  $x = 2$

25)



- A) rotation  $90^\circ$  counterclockwise about the origin
- B) rotation  $180^\circ$  about the origin
- C) translation:  $(x, y) \rightarrow (x + 1, y - 3)$
- D) translation:  $(x, y) \rightarrow (x - 3, y - 2)$

26)



- A) reflection across the x-axis
- B) reflection across  $y = -2$
- C) translation:  $(x, y) \rightarrow (x + 1, y + 4)$
- D) rotation  $180^\circ$  about the origin

27)



28) The measures of the angles of a triangle are  $2x + 10$ ,  $3x$  and  $8x - 25$ . Solve for  $x$ .

$$2x + 10 + 3x + 8x - 25 = 180$$

$$13x - 15 = 180$$

$$13x = 195$$

$$x = 15$$

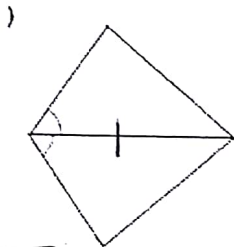
**Module 5: Proving Triangles Congruent**

29) List all of the ways that you learned to prove triangles congruent.  $SSS, SAS, ASA, AAS, HL$

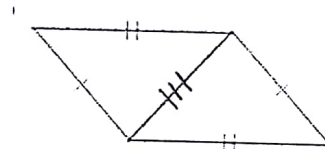
30) What does CPCTC stand for?

Corresponding parts of Congruent triangles are congruent

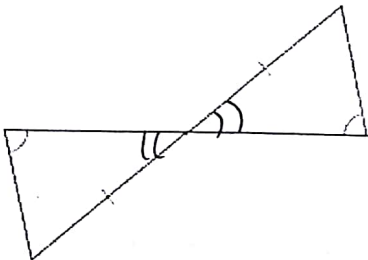
State if the triangles are congruent. If so, state the reason.



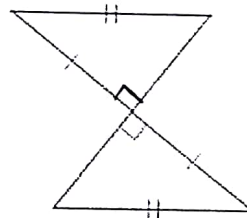
- 31)  A) Not congruent      B) HL  
 C) SSS                      D) SAS



- 32)  A) ASA                      B) Not congruent  
 C) SSS                      D) AAS

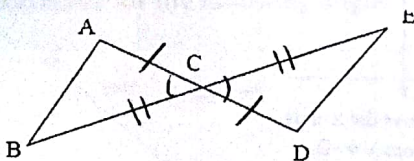


- 33)  A) Not congruent       B) AAS  
 C) SSS                      D) SAS



- 34)  A) ASA                      B) AAS  
 C) HL                        D) SSS

35) Given:  $C$  is the midpoint of  $\overline{AD}$  and  $\overline{BE}$   
 Prove:  $\triangle ABC \cong \triangle DEC$

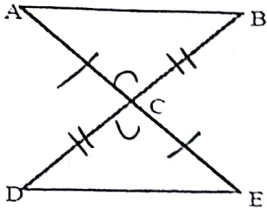


Statements	Reasons
$C$ is the midpt of $\overline{AD}$ & $\overline{BE}$	given
$\overline{AC} \cong \overline{CE}$	def. of midpt
$\overline{BC} \cong \overline{CD}$	def. of midpt
$\angle ACB \cong \angle DCE$	vert. $\angle$ s are $\cong$
$\triangle ABC \cong \triangle DEC$	SAS

36)

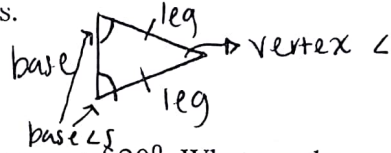
Given:  $\overline{AC} \cong \overline{EC}$   
 C bisects  $\overline{BD}$

Prove:  $\overline{AB} \cong \overline{ED}$

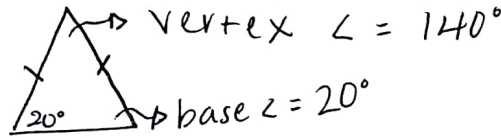


Statements	Reasons
$\overline{AC} \cong \overline{EC}$	given
C bisects $\overline{BD}$	given
$\overline{BC} \cong \overline{CD}$	def. of bisect
$\angle ACB \cong \angle ECD$	vert. $\angle$ s are $\cong$
$\triangle ACB \cong \triangle ECD$	SAS
$\overline{AB} \cong \overline{ED}$	CPCTC

37) Draw an isosceles triangle and label its angles and sides.



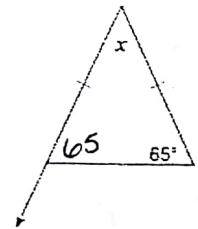
38) In an Isosceles triangle, one of the base angles has a measure of  $20^\circ$ . What are the measures of the other base angle and the vertex angle?



39)

40)

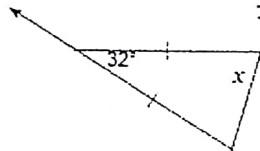
41)



- A)  $33^\circ$       B)  $39^\circ$   
 C)  $59^\circ$       D)  $50^\circ$

$$180 - 32 = 148$$

$$\frac{148}{2} = 74$$

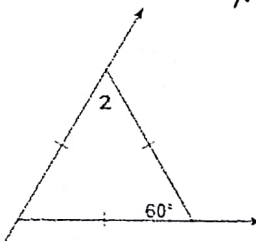


- A)  $53^\circ$       B)  $74^\circ$   
 C)  $97^\circ$       D)  $87^\circ$

$$m\angle 2 = x + 67$$

$$x + 67 = 60$$

$$x = -7$$



- A)  $-7$       B)  $-8$   
 C)  $-11$       D)  $11$

Module 6: Special Points and Segments in Triangles

42)

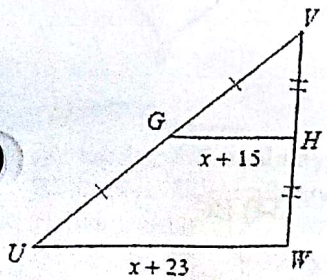
43)

$$2(2x + 27) = x + 24$$

$$4x + 54 = x + 24$$

$$3x = -30$$

$$x = -10$$

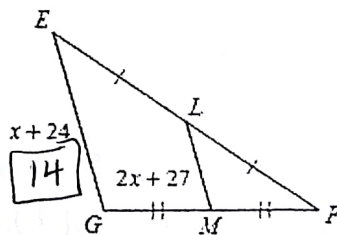


$$2(x + 15) = x + 23$$

$$2x + 30 = x + 23$$

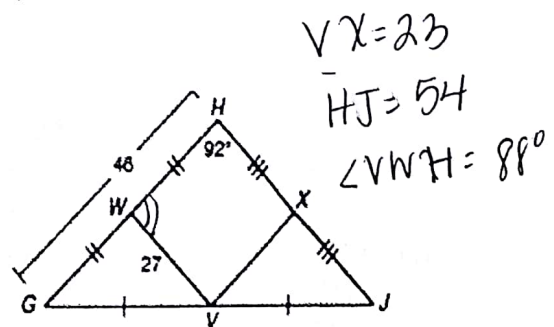
$$x = -7$$

Find EG



14

44) Find VX, HJ, and  $m\angle VWH$

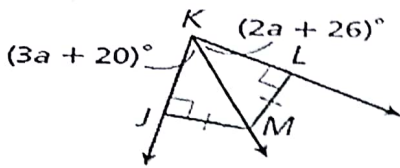


$$VX = 23$$

$$HJ = 54$$

$$\angle VWH = 88^\circ$$

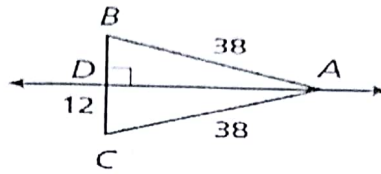
45) Solve for a



$$3a + 20 = 2a + 26$$

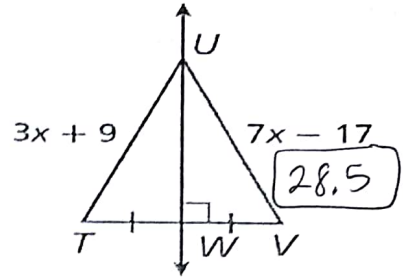
$$a = 6$$

46) Find BC



$$BC = 24$$

47) Find UV



$$3x + 9 = 7x - 17$$

$$26 = 4x$$

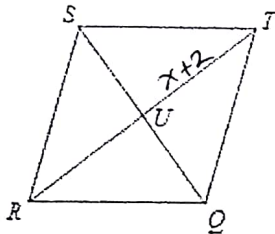
$$x = 6.5$$

Module 7: Proving Theorems about Parallelograms

48) Solve for x.

$$RT = 14$$

$$UT = x + 2$$



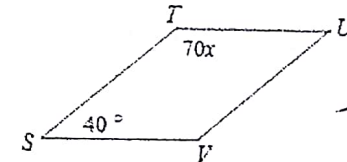
$$2(x + 2) = 14$$

$$2x + 4 = 14$$

$$2x = 10$$

$$x = 5$$

49) Solve for x.



- A) 5
- B) 1
- C) 4
- D) 2

$$70x + 40 = 180$$

$$70x = 140$$

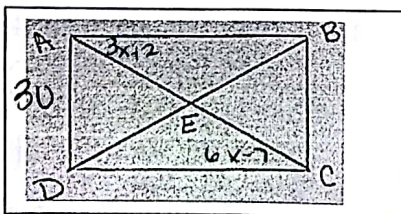
$$x = 2$$

50) Name the 5 properties of a parallelogram.

- 1) opp. sides are parallel
- 2) opp. sides are  $\cong$
- 3) opp.  $\angle$ s are  $\cong$
- 4) diagonals bisect each other

5) consecutive  $\angle$ s are supplementary

ABCD is a rectangle.  $AD = 30$ ,  $DB = 26$ ,  $m\angle BAE = (3x + 2)$ ,  $m\angle DCE = (6x - 7)$ . Find each of the following measures.



$$3x + 2 = 6x - 7$$

$$9 = 3x$$

$$x = 3$$

51) AE

$$13$$

52)  $m\angle ADC$

$$90^\circ$$

53)  $m\angle BAE$

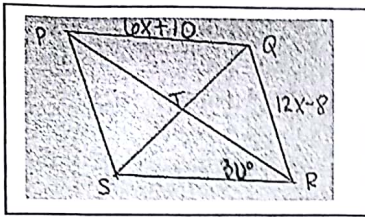
$$3(3) + 2 = 11^\circ$$

54) BC

$$30$$



PQRS is a rhombus. The  $m\angle STR = 5z + 10$  and the  $m\angle TRS = 30^\circ$ . Find each of the following measures.



55)  $z$   $5z + 10 = 90$   
 $5z = 80$   
 $z = 16$

56)  $x$   $6x + 10 = 12x - 8$   
 $18 = 6x$   
 $x = 3$

57) SR  
 $6(3) + 10$   
 $28$

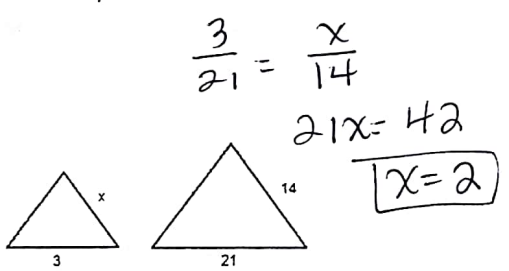
58)  $m\angle SRQ$   
 $60^\circ$

**Module 8: Similarity**

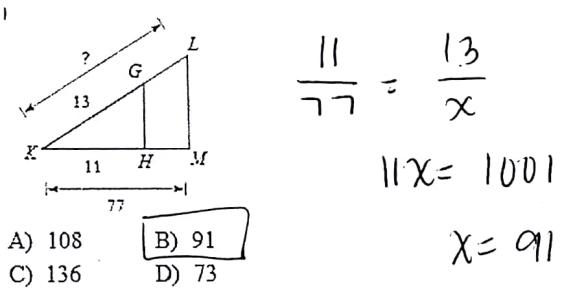
59) What is the definition of similar figures? Same shape, but not necessarily same size.  
 Congruent  $\triangle s$ ,  $\frac{1}{3}$  corresponding sides are proportional

60) What are the 3 ways you learned to prove triangles are similar?  
 SSS $\sim$ , SAS $\sim$ , AA

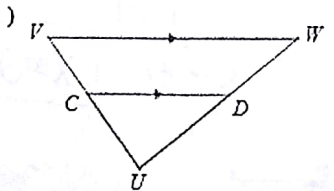
61) Solve for x.



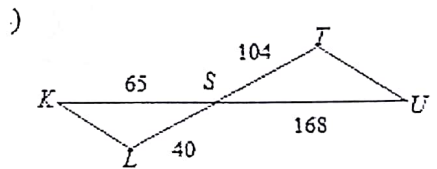
62) Find the missing length in the similar triangles.



State if the triangles are similar. If so, state the reason and the similarity statement.



- $\triangle UVW \sim$  \_\_\_\_\_
- A) similar; AA similarity;  $\triangle UDC$   
 B) similar; SSS similarity;  $\triangle UDC$   
 C) not similar  
 D) similar; AA similarity;  $\triangle UCD$



- $\triangle STU \sim$  \_\_\_\_\_
- A) similar; SAS similarity;  $\triangle SLK$   
 B) not similar  
 C) similar; SAS similarity;  $\triangle KSL$   
 D) similar; SAS similarity;  $\triangle SKL$

$\frac{KS}{SU} = \frac{40}{168} = \frac{5}{21}$   
 $\frac{65}{104} = \frac{5}{8}$

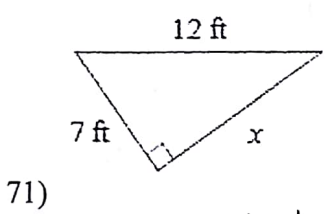
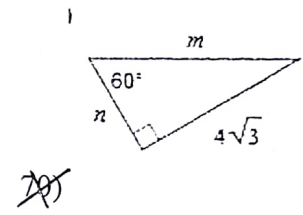
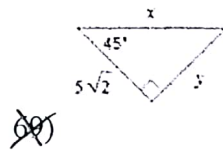
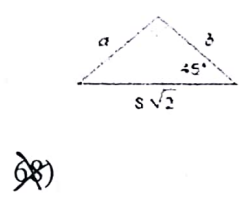
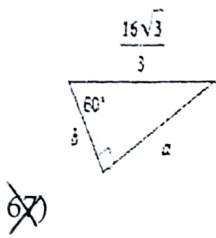
**Module 9: Right Triangles**

~~65)~~ Draw and label each of the special right triangles.

66) What is the Pythagorean Theorem?

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

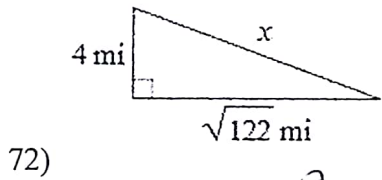
Find the missing side lengths. Leave your answers as radicals in simplest form.



$$x^2 + 49 = 144$$

$$\sqrt{x^2} = \sqrt{95}$$

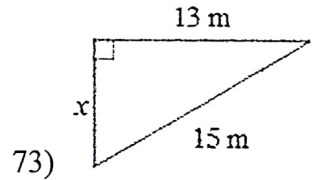
$$x = \sqrt{95}$$



$$16 + 122 = x^2$$

$$\sqrt{138} = \sqrt{x^2}$$

$$x = \sqrt{138}$$



$$x^2 + 169 = 225$$

$$\sqrt{x^2} = \sqrt{56}$$

$$x = 2\sqrt{14}$$

**Module 10: Trigonometry**

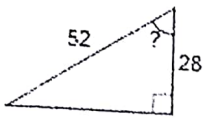
74) What is the  $\sin 51^\circ$ ? .78

75)

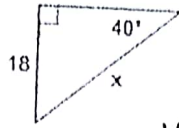
sin C

A)  $\frac{35}{12}$       B)  $\frac{12}{35}$   
 C)  $\frac{37}{35}$       D)  $\frac{12}{37}$

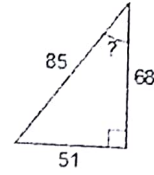




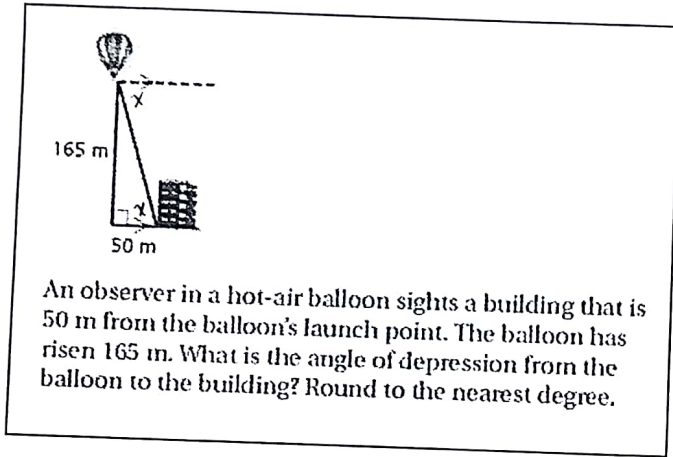
76)  $\cos x = 28/52$   
 $x = \cos^{-1}(28/52)$   
 $= 57.4^\circ$



77)  $\sin 40 = \frac{18}{x}$   
 $x = \frac{18}{\sin 40} = 28$



78)  $\sin x = \frac{68}{85}$   
 $x = \sin^{-1}(\frac{68}{85})$   
 $x = 36.87^\circ$



$\tan x = \frac{165}{50}$   
 $x = \tan^{-1}(\frac{165}{50})$   
 $= 73.1^\circ$

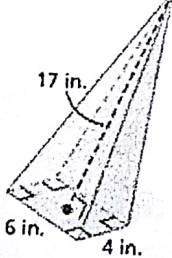
Module 11: Area and Volume

80) A globe has a diameter of 12 inches. What is the volume of the northern hemisphere?

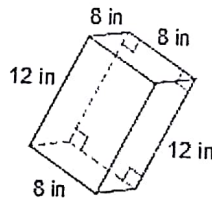
$V = \frac{4}{3}\pi r^3$   
 $= \frac{4}{3}\pi(6)^3 = 288\pi / 2 = 144\pi \text{ in}^3$

Find the Volume of the following figures:

81)  $V = \frac{1}{3}Bh$   $B = lw$   
 $= \frac{1}{3}(24)(17) = 6 \cdot 4 = 24$   
 $= 136 \text{ in}^3$



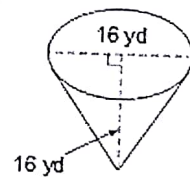
82)  $V = Bh$   $B = lw$   
 $= 64 \cdot 12 = 8 \cdot 8 = 64$   
 $= 768$



- A) 538 in<sup>3</sup>      B) 768 in<sup>3</sup>  
 C) 593 in<sup>3</sup>      D) 605 in<sup>3</sup>

83)

$V = \frac{1}{3}\pi r^2 h$   
 $= \frac{1}{3}\pi(8)^2(6)$   
 $= 341.33\pi$



- A) 341.33π yd<sup>3</sup>  
 B) 1365.33π yd<sup>3</sup>  
 C) 508.73π yd<sup>3</sup>  
 D) 448.9π yd<sup>3</sup>

84) Find the surface area of a sphere with a volume of 972π ft<sup>3</sup>.

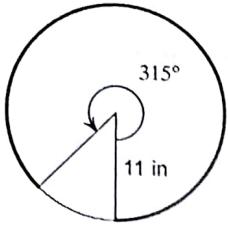
$S = 4\pi r^2$   
 $= 4\pi(9)^2$   
 $= 324\pi \text{ ft}^2$

$V = \frac{4}{3}\pi r^3$   
 $972\pi = \frac{4}{3}\pi r^3$   
 $729 = r^3$   
 $r = 9$

Assignment

Find the length of each arc.

1)

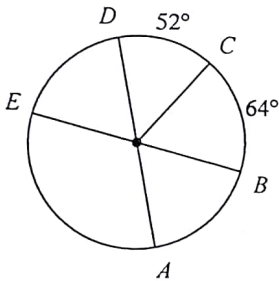


$$L = \frac{2\pi r \theta}{360}$$

$$= \frac{2\pi(11)(315)}{360} = \boxed{19.25\pi \text{ in}}$$

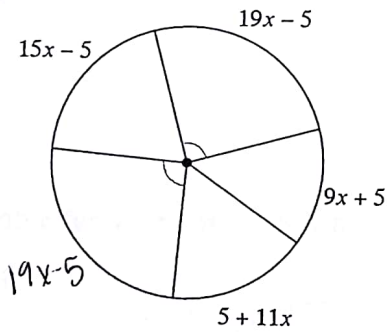
Find the measure of the arc or central angle indicated. Assume that lines which appear to be diameters are actual diameters.

2)  $m\widehat{AE} = \boxed{116^\circ}$



Solve for  $x$ . Assume that lines which appear to be diameters are actual diameters.

3)



$$19x-5 + 9x+5 + 5+11x + 19x-5 + 15x-5 = 360$$

$$73x - 5 = 360$$

$$73x = 365$$

$$\boxed{x=5}$$

Find the area of each.

4) circumference =  $24\pi$  km

$$24\pi = 2\pi r$$

$$r = 12$$

$$A = \pi r^2$$

$$= \pi(12)^2$$

$$= \boxed{144\pi \text{ km}^2}$$

Find the diameter of each circle.

5) area =  $16\pi \text{ km}^2$

$$A = \pi r^2$$

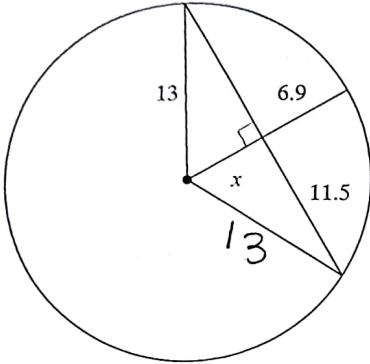
$$16\pi = \pi r^2$$

$$r = 4$$

$$d = 8 \text{ km}$$

Find the length of the segment indicated. Round your answer to the nearest tenth if necessary.

6)



$$x^2 + 11.5^2 = 13^2$$

$$x^2 + 132.25 = 169$$

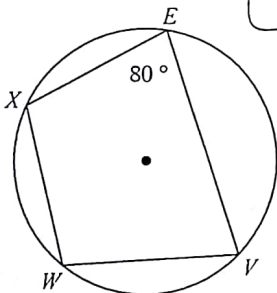
$$x^2 = 36.75$$

$$x = 6.1$$

Find the measure of the arc or angle indicated.

7) Find  $m\widehat{VX}$

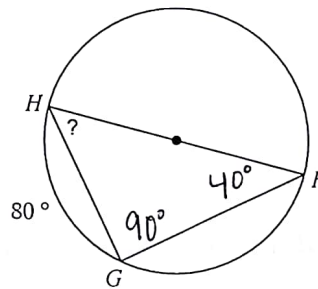
$$160^\circ$$



8)

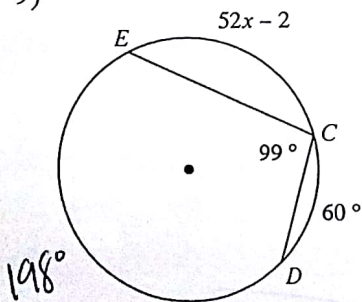
$$180 - 90 - 40 =$$

$$50^\circ$$



Solve for x.

9)



$$52x - 2 + 60 + 198 = 360$$

$$52x + 256 = 360$$

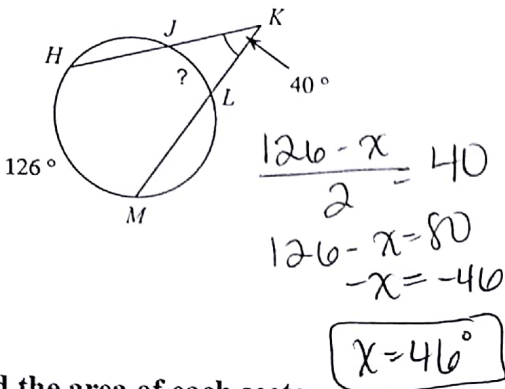
$$52x = 104$$

$$x = 2$$

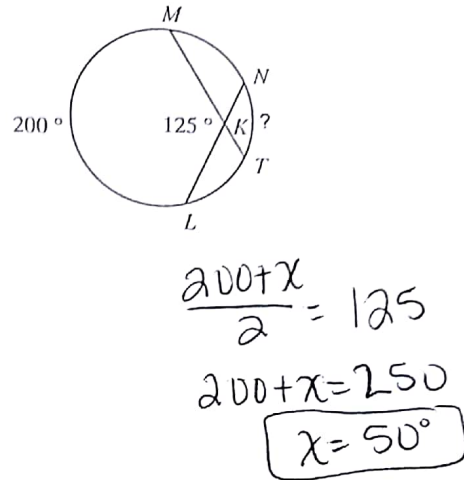


Find the measure of the arc or angle indicated. Assume that lines which appear tangent are tangent.

10)

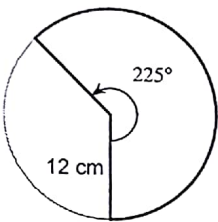


11)



Find the area of each sector.

12)

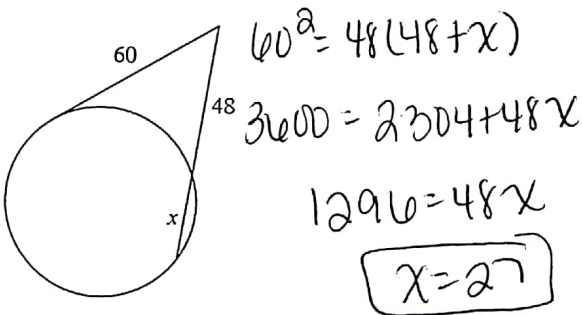


$$A = \pi r^2 \frac{\theta}{360}$$

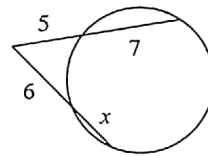
$$= \pi (12)^2 \frac{(225)}{360} = 90\pi \text{ cm}^2$$

Solve for  $x$ . Assume that lines which appear tangent are tangent.

13)



14)



$$5(12) = 6(x + 6)$$

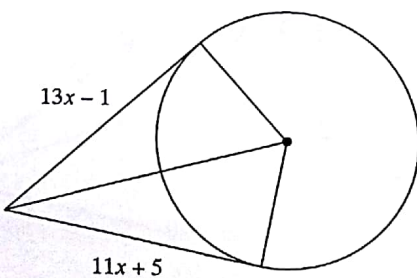
$$60 = 6x + 36$$

$$24 = 6x$$

$$x = 4$$

Solve for  $x$ . Assume that lines which appear to be tangent are tangent.

15)



$$13x - 1 = 11x + 5$$

$$2x = 6$$

$$x = 3$$