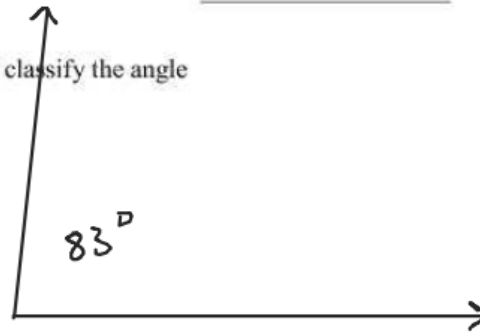


1. Draw an angle with the measure of 83° and classify the angle

Acute



2. The vertices of triangle ABC are $A(0, -2)$, $B(5, -2)$, and $C(8, 2)$. Use the distance formula to find the perimeter of triangle ABC .

$$\begin{aligned} AB &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(5 - 0)^2 + (-2 - (-2))^2} \\ &= \sqrt{5^2 + 0^2} \\ &= \sqrt{25} \\ &= 5 \end{aligned}$$

$$\begin{aligned} BC &= \sqrt{(8 - 5)^2 + (2 - (-2))^2} \\ &= \sqrt{(3)^2 + (4)^2} \\ &= \sqrt{9 + 16} \\ &= \sqrt{25} \\ &= 5 \end{aligned}$$

$$\begin{aligned} AC &= \sqrt{(8 - 0)^2 + (2 - (-2))^2} \\ &= \sqrt{(8)^2 + (4)^2} \\ &= \sqrt{64 + 16} \\ &= \sqrt{80} \end{aligned}$$

Perimeter $5 + 5 + \sqrt{80} = 18.94$

3. M is the midpoint of \overline{AB} . The coordinates of A are $(-2, 3)$ and the coordinates of B are $(4, -3)$. Find the coordinates of M .

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

$$\left(\frac{-2 + 4}{2}, \frac{3 + (-3)}{2} \right) \rightarrow \left(\frac{2}{2}, \frac{0}{2} \right) = (1, 0)$$

4. If $M(0, 2)$ is the midpoint of \overline{AB} and the coordinates of A are $(3, 6)$, then find the coordinates of B .

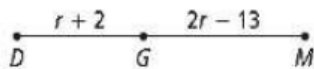
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \quad \frac{6 + y_2}{2} = 2 \quad A(x_1, y_1) \quad B(x_2, y_2)$$

$$\frac{6 + y_2}{2} = 2 \quad \frac{3 + x_2}{2} = 0 \quad \begin{matrix} 3 & 6 \\ 3 & 4 \end{matrix} \quad \begin{matrix} (-3, -2) \end{matrix}$$

$$6 + y_2 = 4 \quad 3 + x_2 = 0 \quad x_2 = -3$$

$$y_2 = -2$$

5. If $DM = 35$, what is the value of r ?



$$DG + GM = DM$$

$$r + 2 + 2r - 13 = 35$$

$$3r - 11 = 35$$

$$3r = 46$$

$$r = \frac{46}{3} = 15.\bar{3}$$

6. If $\angle 1$ has a measure of 38° , what is the measure of its complement?

$$x + 38 = 90$$
$$x = 52^\circ$$

7. Write the **inverse** of the following statement:

"If you enter the Grand Prize drawing, then you will get rich."

If you do not enter the Grand Prize drawing, then you will not get rich

8. Write the **converse** of the following statement:

"If you lower your cholesterol, then you eat Quirky oatmeal."

If you eat Quirky oatmeal, then you will lower your cholesterol

9. Write the **contrapositive** of the following statement:

"If you feed your dog Crazy Kibble, then it will grow three inches."

If your dog does not grow 3 inches, then you do not feed it Crazy Kibble.

10. Given each conditional, write the desired form:

a) If 3 is a prime number, then it is odd. **INVERSE**

If 3 is not a prime number, then it is not odd.

b) If two segments are congruent, then they have the same length. **CONVERSE**

If two segments have the same length, then they are congruent.

c) If the weather is cloudy, then it will rain. **CONTRAPOSITIVE**

If it will not rain, then the weather is not cloudy.

11. Two angles are complementary. The measure of one angle is 15° more than twice the other. What is the measure of the *smaller* angle?

A. 35°

B. 65°

C. 55°

D. 25°

$$x + 2x + 15 = 90^\circ$$

$$3x + 15 = 90$$

$$3x = 75$$

$$x = 25^\circ$$

12. The measure of two supplementary angles are represented by $(3x+15)$ and $(2x-10)$.
What is the value of x ?

$$3x+15+2x-10=180$$

$$5x+5=180$$

$$5x=175$$

$$x=35$$

13. In the accompanying figure, two lines intersect, $m\angle 1=2x+18$, and $m\angle 2=8x-30$. Find the number of degrees in $m\angle 4$.

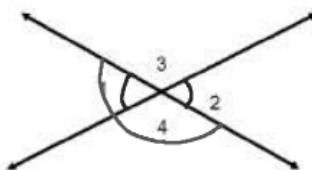
$$m\angle 1 = m\angle 2$$

$$2x+18 = 8x-30$$

$$18 = 6x-30$$

$$48 = 6x$$

$$x = 8$$



$$m\angle 1 + m\angle 4 = 180$$

$$2x+18 + m\angle 4 = 180$$

$$34 + m\angle 4 = 180$$

$$m\angle 4 = 146^\circ$$

14. In the accompanying diagram, \overline{AB} and \overline{CD} intersect at E . If $m\angle AEC = 4x-40$ and $m\angle BED = x+50$, find the number of degrees in $\angle AEC$.

$$m\angle AEC = m\angle BED$$

$$4x-40 = x+50$$

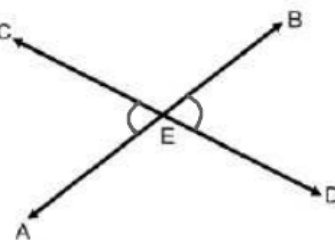
$$3x = 90$$

$$x = 30$$

$$m\angle AEC = 4x-40$$

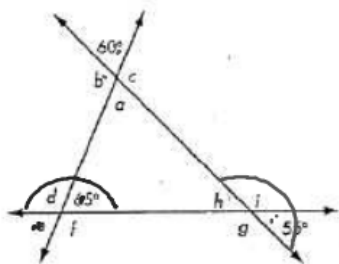
$$4(30)-40$$

$$80^\circ$$



15. Find the measure of each letter.

4.



$$a = 60^\circ \quad d = 115$$

$$b = 120^\circ \quad e = 65$$

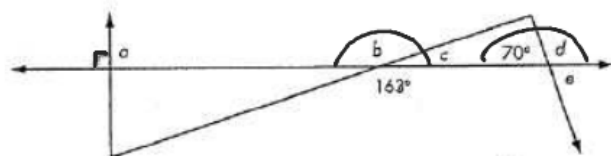
$$c = 120^\circ \quad f = 115$$

$$h = 55^\circ$$

$$i = 125$$

$$g = 125$$

5.



$$a = 90^\circ$$

$$b = 163^\circ$$

$$c = 17^\circ$$

$$d = 110^\circ$$

$$e = 70^\circ$$

$$3x - 5 + x + 1 = 180$$

$$4x - 4 = 180$$

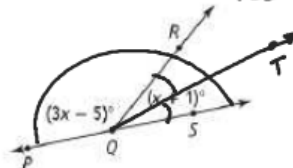
$$4x = 184$$

$$x = 46$$

$$m\angle PAR = 3x - 5$$

$$3(46) - 5$$

$$133^\circ$$



$$m\angle RAS = 47$$

16. Points P, Q, and S are collinear.

a. What is $m\angle PQR$?

b. If a ray QT bisects $\angle RQS$, what will be the measure of one of the resulting angles?

$$23.5^\circ$$

17. Points L, M, and N are collinear and M is between L and N. You are given $LM = 13$ and $LN = 20$. What is a possible value of MN ?

$$LM + MN = LN$$

$$13 + MN = 20$$

$$MN = 7$$

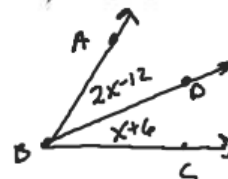


18. Ray BD bisects $\angle ABC$ so that $m\angle DBC = (x + 6)$ and $m\angle ABD = (2x - 12)$. What is x ?

$$2x - 12 = x + 6$$

$$x - 12 = 6$$

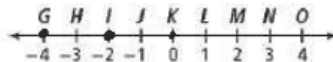
$$x = 18$$



19. Use the number line.

a. What is $KN + IK$?

$$3 + 2 = 5$$



b. What is the coordinate of the midpoint of \overline{GO} ?

I

20. Use inductive reasoning to find the next two terms in the sequence. Describe the pattern.

a. $-4, 2, 8, 14, \dots$ $20, 26$

$+6 +6 +6$

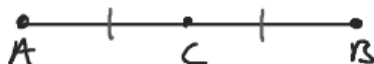
Add 6

b. $9, 5, 1, -3, \dots$ $-7, -11$

$-4 -4 -4$

subtracting 4

21. Draw and label segment AB with midpoint C.



Use your drawing from above: If $\overline{AC} = 8x + 10$ and $\overline{CB} = 10x - 6$ find the value of x , AC and AB.

$$8x + 10 = 10x - 6$$

$$10 = 2x - 6$$

$$16 = 2x$$

$$x = 8$$

$$AC = 8(8) + 10$$

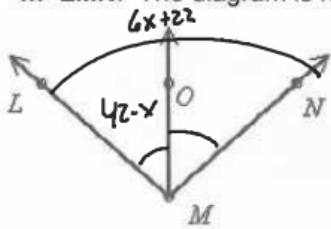
$$64 + 10$$

$$74$$

$$AB = 74 + 74$$

$$= 148$$

22. \overline{MO} bisects $\angle LMN$, $m\angle LMO = 42 - x$ and $m\angle LMN = 6x + 22$. Solve for x and find $m\angle LMN$. The diagram is not to scale.



$$2(42-x) = 6x+22$$

$$x = 7.75$$

$$84 - 2x = 6x + 22$$

$$m\angle LMN = 6x + 22$$

$$84 = 8x + 22$$

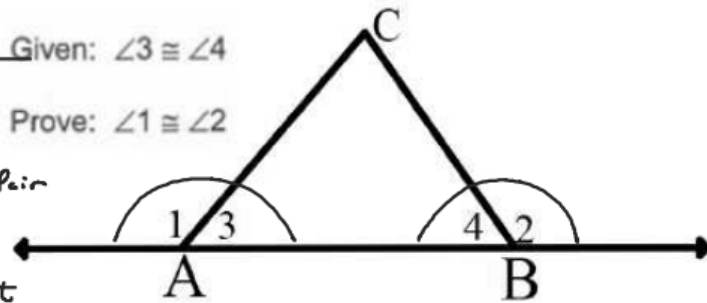
$$6(7.75) + 22$$

$$62 = 8x$$

$$= 68.5$$

23. Write a proof.

Statement	Reason
1) $\angle 3 \cong \angle 4$	1) Given
2) $m\angle 3 = m\angle 4$	2) Def \cong \angle 's.
3) $\angle 1$ & $\angle 3$ form Linear Pair $\angle 2$ & $\angle 4$ form Linear Pair	3) Def of Linear Pair
4) $m\angle 1 + m\angle 3 = 180$ $m\angle 2 + m\angle 4 = 180$	4) Linear Pair Post
5) $m\angle 1 + m\angle 3 = m\angle 2 + m\angle 4$	5) Sub Prop.
6) $m\angle 1 = m\angle 2$	6) Subst Prop.
7) $\angle 1 \cong \angle 2$	7) Def \cong \angle 's.

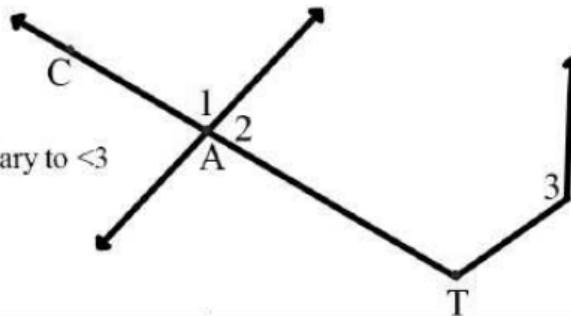


Given: $\angle 3 \cong \angle 4$

Prove: $\angle 1 \cong \angle 2$

Given: $\angle 1 \cong \angle 3$

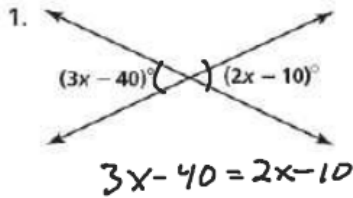
Prove: $\angle 2$ is supplementary to $\angle 3$



Statements	Reasons
1. $\angle 1 \cong \angle 3$	1. Given
2. $m\angle 1 = m\angle 3$	2. definition of congruent angles
3. $\angle 1$ and $\angle 2$ are a linear pair	3. Def Linear Pair
4. $m\angle 1 + m\angle 2 = 180$	4. Linear Pair Postulate

5. $m\angle 3 + m\angle 2 = 180$	5. Substitution
6. $\angle 2$ is supplementary to $\angle 3$	6. Def of Supp \angle 's.

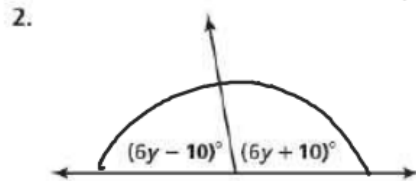
25. Find the value of the variable. Be sure to show your work.



$$3x - 40 = 2x - 10$$

$$x - 40 = -10$$

$$x = 30$$



$$6y - 10 + 6y + 10 = 180$$

$$12y = 180$$

$$y = 15$$

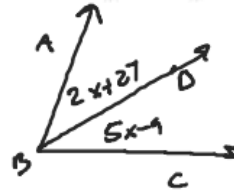
26. Ray BD bisects $\angle ABC$ so that $m\angle DBC = (5x - 9)^\circ$ and $m\angle ABD = (2x + 27)^\circ$. What is x ? (hint: create a picture)

$$2x + 27 = 5x - 9$$

$$27 = 3x - 9$$

$$36 = 3x$$

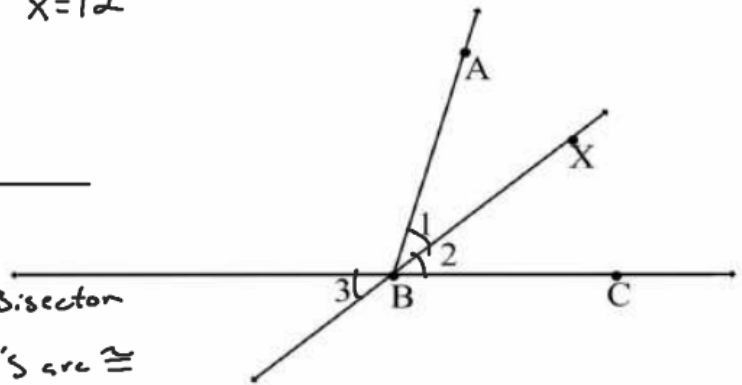
$$x = 12$$



27. Write a proof:

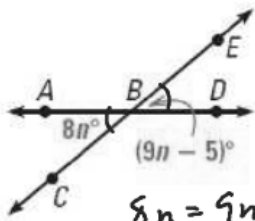
Given: \vec{BX} bisects $\angle ABC$,
 prove: $\angle 1 \cong \angle 3$

Statement	Reason
1) \vec{BX} bisects $\angle ABC$	1) Given
2) $\angle 1 \cong \angle 2$	2) Def of Bisector
3) $\angle 2 \cong \angle 3$	3) Vertical \angle 's are \cong
4) $\angle 1 \cong \angle 3$	4) Transitive prop.



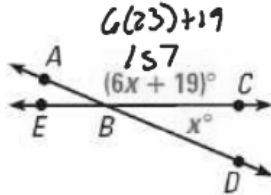
Using Algebra Find the value of the variable. Then use substitution to find $m\angle ABC$.

54.



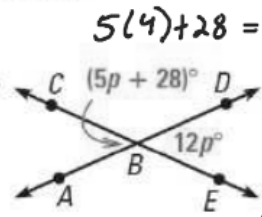
$$\begin{aligned} 8n &= 9n - 5 \\ n &= 5 \\ m\angle ABC &= 8n \\ &= 40 \end{aligned}$$

55.



$$\begin{aligned} 6(23) + 19 &= 157 \\ 6x + 19 + x &= 180 \\ 7x + 19 &= 180 \\ 7x &= 161 \\ x &= 23 \end{aligned}$$

56.



$$\begin{aligned} 5(4) + 28 &= 48 \\ 5p + 28 &= 12p \\ 28 &= 7p \\ p &= 4 \end{aligned}$$

28. Find a counterexample for the following statement? "All even numbers are multiples of 4."

$$\frac{6}{4} = 1.5$$

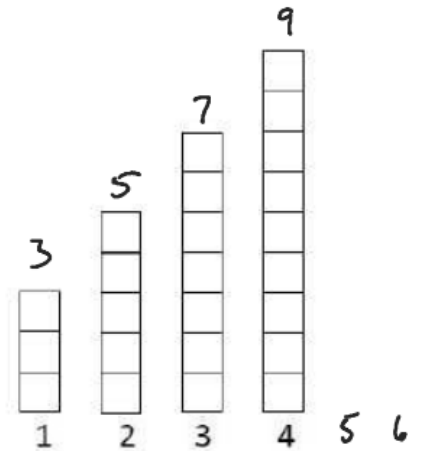
29. Scott has decided to add push-ups to his daily exercise routines. He has created a chart that shows how many push-ups he has done in a day.

a. How many push-ups will he have on day 6?

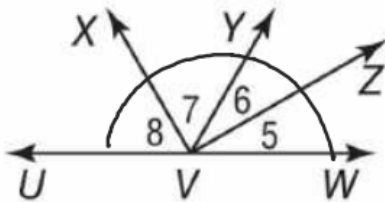
13

b. Make a conjecture about how many push-ups he has at any given day.

$$2n + 1$$



30. Find x



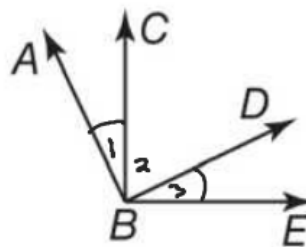
$$\begin{aligned} m\angle 5 &= 5x, \\ m\angle 6 &= 4x + 6, \\ m\angle 7 &= 10x, \\ m\angle 8 &= 12x - 12 \end{aligned}$$

$$\begin{aligned} 5x + 4x + 6 + 10x + 12x - 12 &= 180 \\ 31x - 6 &= 180 \\ 31x &= 186 \\ x &= 6 \end{aligned}$$

Example: Write a two-column proof.

Given: $\angle ABC$ and $\angle CBD$ are complementary.
 ~~$\angle DBE$ and $\angle CBD$ form a right angle.~~
 ~~$\overrightarrow{CB} + \overrightarrow{BE}$~~

Prove: $\angle ABC \cong \angle DBE$



Statement	Reason
1) $\angle ABC$ & $\angle CBD$ are Comp $\overrightarrow{CB} + \overrightarrow{BE}$ form Rt \angle	1) Given
2) $m\angle 1 + m\angle 2 = 90$	2) Def comp \angle 's
3) $m\angle CBE = 90^\circ$	3) Def Rt \angle .
4) $m\angle 2 + m\angle 3 = 90^\circ$	4) Angle Add Post
5) $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	5) Sub prop
6) $m\angle 1 = m\angle 3$	6) Subtr prop

7) $\angle ABC \cong \angle DBE$	7) Def $\cong \angle$'s.
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Complete each proof.

1. Given: \perp ;
 $\angle 1$ and $\angle 3$ are complementary.

Prove: $\angle 2 \cong \angle 3$

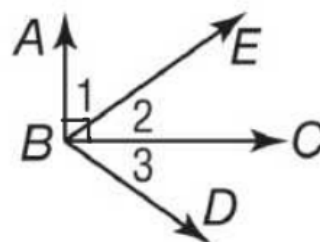
Proof:

Statements

- \perp , $\angle 1$ and $\angle 3$ are complementary
- $\angle ABC$ is Rt \angle .
- $m\angle ABC = 90$
- $m\angle ABC = m\angle 1 + m\angle 2$
- $90 = m\angle 1 + m\angle 2$
- $\angle 1$ and $\angle 2$ are compliments
- $\angle 2 \cong \angle 3$

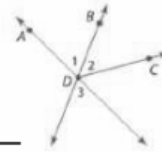
Reasons

- Given
- Definition of \perp
- Def. of right angle
- Angle Add Post
- Substitution
- Def comp \angle 's
- \cong complement theorem



7. Complete the following proof.

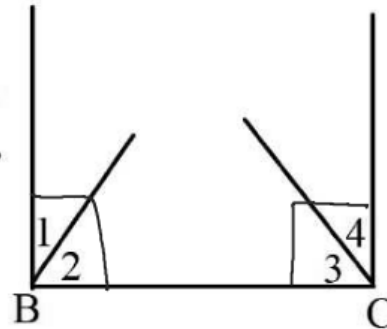
Given: bisects \overrightarrow{BD} bisects $\angle ADC$
 Prove: $\angle 2 \cong \angle 3$



Proof:	Statements	Reason
	1) \overrightarrow{BD} Bisects $\angle ADC$	1) Given
	2) $\angle 1 \cong \angle 2$	2) Def of Bisector
	3) $\angle 1 \cong \angle 3$	3) Vertical \angle 's \cong
	4) $\angle 2 \cong \angle 3$	4) Substitution prop

Given: $\angle B$ is a right angle,
 $\angle C$ is a right angle,
 $\angle 1 \cong \angle 4$

Prove: $\angle 2 \cong \angle 3$



Statement	Reason
1) $\angle B$ is Rt \angle $\angle C$ is Rt \angle $\angle 1 \cong \angle 4$	1) Given
2) $m\angle 1 = m\angle 4$	2) Def $\cong \angle$'s
3) $m\angle B = 90$ $m\angle C = 90$	3) Def of Rt \angle
4) $m\angle 1 + m\angle 2 = m\angle B$ $m\angle 3 + m\angle 4 = m\angle C$	4) Angle Add Post
5) $m\angle 1 + m\angle 2 = 90$ $m\angle 3 + m\angle 4 = 90$	5) Sub Prop.
6) $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	6) Sub Prop.
7) $m\angle 2 = m\angle 3$	7) Subtr prop
8) $\angle 2 \cong \angle 3$	8) Def $\cong \angle$'s