Topic 1 Notes: Solving Equations

Term: "coefficient" $\boxed{a}\boxed{x}$

Steps for solving equations: Goal: isolate the variable {x, y, n, a, b etc. . .}

1. Distributive Property
2. Combine Like Terms (CLT)
3. Use inverse operations to collect variables on the same side of the = sign.
4. Add or subtract the non-variable term
5. Multiply or divide the coefficient to isolate the variable

Distributive Property:

-3 is the constant here.

① Multiply the constant by each term inside the parenthesis.

$$-3(2x+7) = -3(2x) + -3(7) = \boxed{-6x-21}$$

Combining Like Terms: Rule: to combine terms they must be on the same side of =, with the same variable and power (exponent).

② $3x+8-11-14x = 7x+21-2x$

$-11x-3 = 5x+21$

*NOTE: The sign in front of the term stays with that term; deciding whether you add or subtract the coefficient.

Solving Equations with Variables on Both Sides:

③ Cancel one set of terms on one side of the = by + or − it from BOTH SIDES.

$-11x-3 = 5x+21$
$+11x \quad\; +11x$
$-3 = 16x+21$

④ $-3 = 16x+21$
$-21 \quad\;\; -21$

⑤ $\frac{-24}{16} = \frac{16x}{16}$

$\boxed{x = \frac{-3}{2}}$

For #1 – 3: Solve each equation for the variable.

1) $5x + 8 = 73$
$-8 \quad -8$
$\frac{5x}{5} = \frac{65}{5}$
$\boxed{x=13}$

2) $4x + 20 - 7x + 42 = 90$
$-3x+62 = 90$
$-62 \quad -62$
$\frac{-3x}{-3} = \frac{28}{-3}$
$\boxed{x = -28/3}$

3) $6(5y - 4) = 23$
$30y - 24 = 23$
$+24 \; +24$
$\frac{30y}{30} = \frac{47}{30}$
$\boxed{y = \frac{47}{30}}$

Reduced fractions are ok!

You try! For #4-6: Solve each equation for the variable.

4) $13 = -2(5 - 11a)$
$13 = -10 + 22a$
$+10 \; +10$
$\frac{23}{22} = \frac{22a}{22}$
$\boxed{23/22 = a}$

5) $23 - 4x = 51$
$-23 \qquad -23$
$\frac{-4x}{-4} = \frac{28}{-4}$
$\boxed{x=-7}$

6) $2b + 4 + 5b - 11 = 30$
$7b - 7 = 30$
$+7 \; +7$
$\frac{7b}{7} = \frac{37}{7}$
$\boxed{b = 37/7}$

For #7 – 9: Solve each equation. Observe: What do #7&#8 have that the last equations didn't?

7) $6x + 8 = 4x - 24$

*use inverse operations to move the variables to one side of the =.

$-4x \quad -4x$

$2x + 8 = -24$

$-8 \quad -8$

$\frac{2x}{2} = \frac{-32}{2}$

$\boxed{x = -16}$

8) $-3(4d - 2) = 7d + 3$

* Distribute first.

$-12d + 6 = 7d + 3$

$+12d \quad +12d$

$6 = 19d + 3$

$-3 \quad -3$

$\frac{3}{19} = \frac{19d}{19}$

$\boxed{d = 3/19}$

9) $5 + 4(8 - 3y) = 5(2y + 1)$

$\boxed{5+32} - 12y = 10y + 5$

$37 - 12y = 10y + 5$

$+12y \quad +12y$

$37 = 22y + 5$

$-5 \quad -5$

$\frac{32}{22} = \frac{22y}{22}$

$\boxed{y = \frac{16}{11}}$

$\frac{32 \div 2}{22 \div 2} = \frac{16}{11}$

* Reduce fractions!

You try! For #10-12: Solve each equation.

10) $2(8x - 10) = 23 + 16x$

$16x - 20 = 23 + 16x$

$-16x \quad -16x$

$-20 \neq 23$ False.

$\boxed{\text{No Solution}}$

11) $7(3c - 4) = 2 - 4(5 + 6c)$

$21c - 28 = \boxed{2 - 20} - 24c$

$21c - 28 = \boxed{-18} - 24c$

$+24c \quad +24c$

$45c - 28 = -18$

$+28 \quad +28$

$\frac{45c}{45} = \frac{10 \div 5}{45 \div 5} = \frac{2}{9}$

$\boxed{c = 2/9}$

12) $6w + 40 - 2w = 5w - 1$

$4w + 40 = 5w - 1$

$-4w \quad -4w$

$40 = w - 1$

$+1 \quad +1$

$\boxed{41 = w}$

Topic 2 Notes: Simplifying Radicals, Naming Shapes, & Plotting Points

Perfect Squares 1–13
1
4
9
16
25
36
49
64
81
100
121
144
169

Simplifying a radical: $\sqrt{\ }$

NO DECIMALS!

- Most commonly seen as a square root.

Ask this to your self! { What number times itself will give me the number inside the radical? [$n \cdot n$ = square] ↳ $\sqrt{n^2}$ (square root)

$\sqrt{49}$ → 7 7 What # times itself is 49? $\boxed{7}$

HOWTO:
1. Make a factor tree.
2. Look for pairs or perfect squares. → p.s.
3. multiply pairs/p.s. outside and everything else (leftovers) multiplied inside the radical.

$\boxed{\text{pairs}\sqrt{\text{leftovers}}}$

For #1–3: Simplify each radical expression (no decimal answers.)

1) $\sqrt{24}$ → 2, 12 → 2, 6 → 2, 3

$2\sqrt{2 \cdot 3}$

$\boxed{2\sqrt{6}}$

or $\sqrt{24}$ → 4, 6 → 2, 3; $\sqrt{4}=2$

$\sqrt{4}\cdot\sqrt{2\cdot 3}$

$\boxed{2\sqrt{6}}$

2) $-3\sqrt{50}$ → 5, 10 → 5, 2 (Bring down)

$-3\cdot 5\sqrt{2}$

$\boxed{-15\sqrt{2}}$

or $-3\sqrt{50}$ → $\sqrt{25}$, 2

$-3\cdot\sqrt{25}\cdot\sqrt{2}$

$-3\cdot 5\sqrt{2}$

$\boxed{-15\sqrt{2}}$

3) $\sqrt{192}$ → 3, 64 → 8, 8

$\boxed{8\sqrt{3}}$

HINT: Rule of 3: $1+9+2=12$, $\frac{12}{3}$

OR $\sqrt{192}$ → 2, 96 → 3 32 → 2, 16 → 2, 8 → 2, 4 → 2, 2

$2\cdot 2\cdot 2\sqrt{3}$

$\boxed{8\sqrt{3}}$

You try! For #4-6: Simplify each radical expression (no decimal answers).

4) $2\sqrt{12}$ → 2, 6 → 2, 3

$2\cdot 2\sqrt{3}$

$\boxed{4\sqrt{3}}$

5) $\sqrt{54}$ → 2, 27 → 3, 9 → 3, 3

$3\sqrt{2\cdot 3}$

$\boxed{3\sqrt{6}}$

6) $5\sqrt{60}$ → 2, 30 → 2, 15 → 3, 5

$5\cdot 2\sqrt{3\cdot 5}$

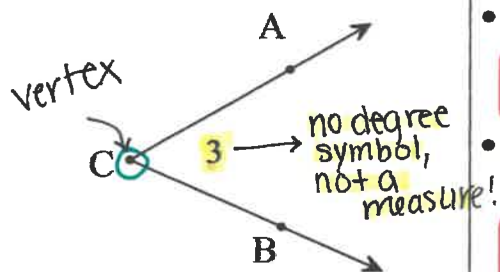
$\boxed{10\sqrt{15}}$

Naming Shapes

	Definition	Naming Convention
Points	A point is an undefined term. It is a locator in space. *Note:* points do not have any size.	Points are named by using a capital letter. . A . B
Lines	A line is an undefined term. Lines are straigh and go to infinity in both (two) directions.	Lines are named by… *m* A B C • 2 capital letters with a double arrow any point, 2nd point $\overleftrightarrow{AB}$ $\overleftrightarrow{BA}$ $\overleftrightarrow{AC}$ $\overleftrightarrow{CA}$ $\overleftrightarrow{BC}$ $\overleftrightarrow{CB}$ • one *italicized lower-case letter* with the word "line" *line* ____ *line m*
Line Segments	A line segment is a part of a line, with two end points. (e.p.)	Line Segments are named by using the two endpoints *in any order*, with a bar symbol. end point, 2nd end point $\overline{AC}$, $\overline{CA}$ ep A, pt. B, ep C $\cancel{\overline{AB}}$ NO! B is not an end point!
Rays	A ray is part of a line, with one endpoint, and extending to infinity in one direction.	Rays are named by using the endpoint (first), followed by any other point (second). Draw an arrow on top of the two endpoints that is pointing right. end point, 2nd point ray pt. C, ray pt. B, e.p. A $\overrightarrow{AB}$ $\overrightarrow{AC}$

Angles

An angle is two rays with a common endpoint, called the vertex.



To name an angle:

- Use the ∠ symbol with a number.

$\boxed{\angle \#}$ $\angle 3$

- Use the ∠ symbol with the vertex.

$\boxed{\angle \text{vertex point}}$ $\angle C$

- Use the ∠ symbol with 3 points, listing the vertex as the 2nd point.

∠	Ray pt	vertex	other ray pt

$\angle ACB$

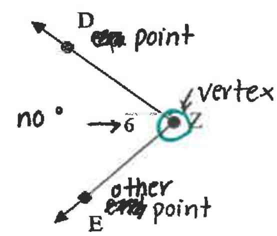
$\angle BCA$

For #7–9: Name each shape in as many ways as possible.

7) the segment shown below (2 ways)

$\boxed{\overline{CD}, \overline{DC}}$

8) the angle shown below (4 ways)

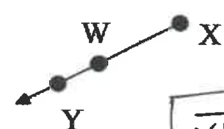


$\boxed{\angle 6, \angle Z, \angle DZE, \angle EZD}$

9) the line shown below (3 ways)

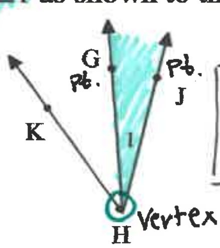
$\boxed{\overleftrightarrow{HP}, \overleftrightarrow{PH}, \text{line } m}$

10) the ray shown below (2 ways)



$\boxed{\overrightarrow{XW}, \overrightarrow{XY}}$

11) ∠1 as shown to the right (2 ways)



$\boxed{\angle GHJ \quad \angle JHG}$

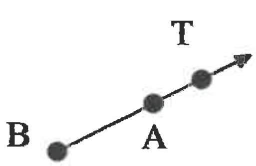
HELP: Use a highlighter to identify the ∠ you are referencing.

*BECAUSE: When two angles are adjacent we only want to name the included angle.

*∠H is the sum of two ∠'s so it cannot be the name of ∠1.

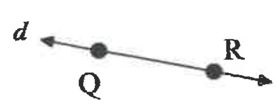
You try! For #12–16: Name each shape in as many ways as possible.

12) the ray shown below (2 ways)



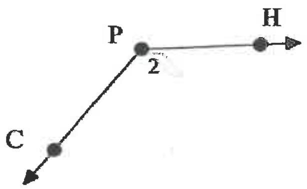
$\boxed{\overrightarrow{BA}, \overrightarrow{BT}}$

13) the line shown below (3 ways)



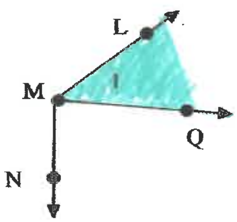
$\boxed{\overleftrightarrow{QR}, \overleftrightarrow{RQ}, \text{line } d}$

14) the angle shown below (4 ways)



∠2, ∠P, ∠CPH, ∠HPC

15) ∠1 as shown below (2 ways)



∠LMQ
∠QML

∠1 is already named ◡̈

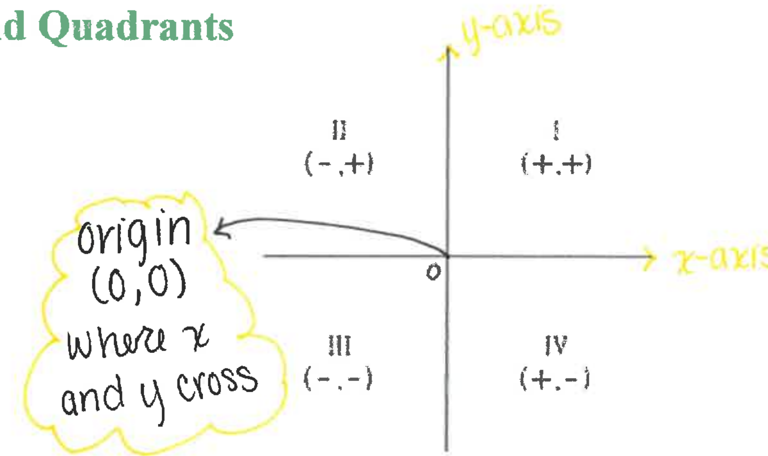
16) the segment shown below (2 ways)

$\overline{EF}$, $\overline{FE}$

Review of Plotting Points and Quadrants

(x, y)

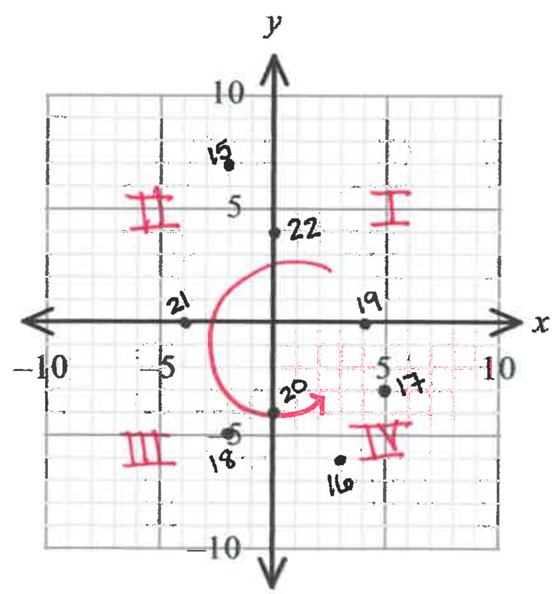
+x →
−x ←
+y ↑
−y ↓



For #15-22: Use the graph below. Plot each point, and LABEL each one with the problem number.

15) (−2,7) 16) (3,−6) 17) (5,−3) 18) (−2,−5)

19) (4,0) 20) (0,−4) 21) (−4,0) 22) (0,4)



For #23–26: Identify which quadrant each point is in.

MUST use roman numerals to identify quadrants

23) the point from #15

II

24) the point from #18

III

25) the point from #17

IV

26) the point form #16

IV

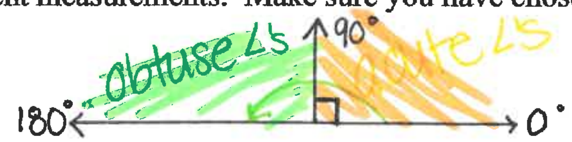
1.1 Notes: Angles

Objectives:

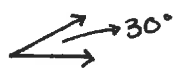
- **Students will classify angles and use them to solve problems.**
- **Students will use Angle Addition to find angle measurements.**

Exploration: Use the link below to explore angles of different measurements. Make sure you have chosen "one" on the drop-down menu.

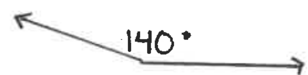
- Link: https://www.visnos.com/demos/basic-angles



- Click rays and drag them to form angles of different sizes. Make a sketch below for angles of each size.
  - 30 degrees

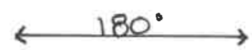


  - 140 degrees

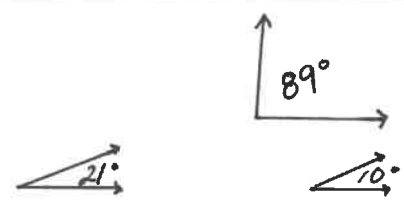
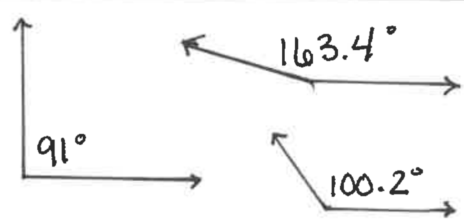
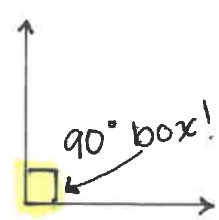
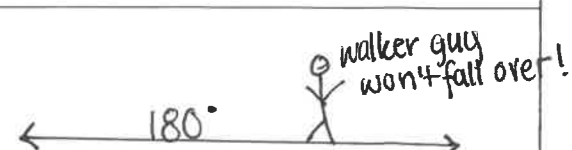


  - 90 degrees

  - 180 degrees

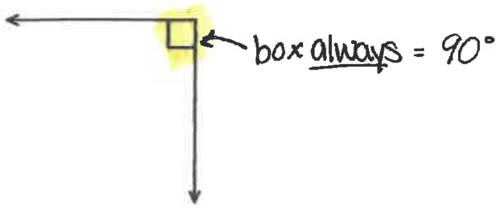


Classifying Angles

Acute Angle	If an angle is an acute angle, then its measure is *between* 0° and 90° degrees.	
Obtuse Angle	If an angle is an obtuse angle, then its measure is *between* 90° and 180° degrees.	
Right Angle	If an angle is a right angle, then its measure is *exactly* 90° degrees.	
Straight Angle	If an angle is a straight angle, then its measure is *exactly* 180° degrees.	

For #1-4: Classify each angle as acute, obtuse, right, or straight.

1)

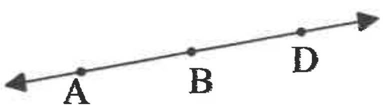


A) acute B) obtuse
C) straight D) right

2)

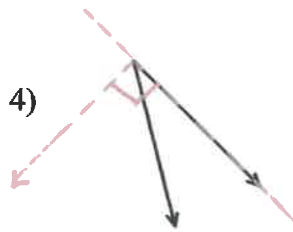
A) obtuse B) straight
C) right D) acute

3)



A) right B) obtuse
C) straight D) acute

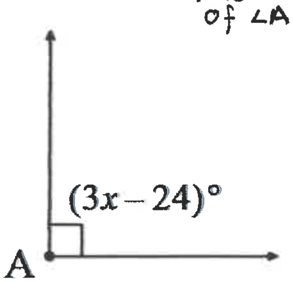
4)



A) acute B) straight
C) obtuse D) right

"The measure of ∠"...

5) $m\angle A = 3x - 24$, and $\boxed{\angle A}$ is a $\boxed{\text{right angle}}$. Find the value of x. "The measure of ∠A is 90°" 90°



$\angle A = 90°$

$3x - 24 = 90°$

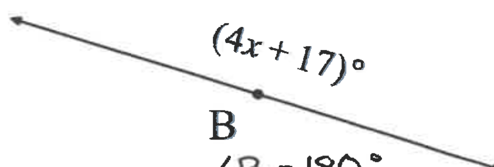
$+24 \quad +24$

$\frac{3x}{3} = \frac{114°}{3}$

$\boxed{x = 38}$

* x is a value of the unknown, not a measure. omit a degree symbol

You try! **6)** $\angle B$ is a straight angle. Find x. 180°



$\angle B = 180°$

$4x + 17 = 180°$

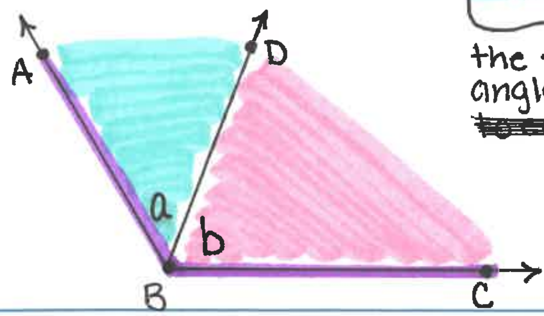
$-17 \quad -17$

$\frac{4x}{4} = \frac{163}{4}$

$\boxed{x = \frac{163}{4}}$

or $\boxed{x = 40.75}$

Angle Addition:



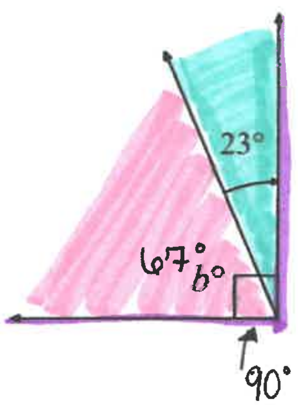
$\underbrace{\angle a + \angle b}_{\text{the smaller angles sum}} = \underbrace{\angle ABC}_{\text{the larger angle.}}$

~~to equal~~. . .

Always start these problems with the angle addition equation (think ∠ names not #'s).

For #7–8: Find the value of the missing angle for each diagram.

7) Find the value of *b*.

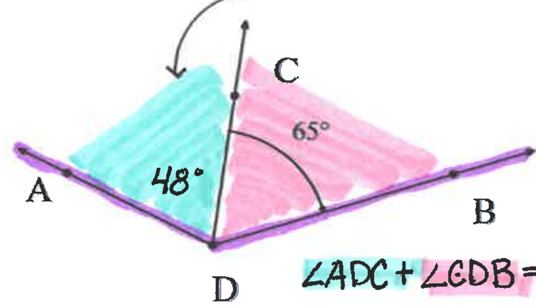


$b° + \cancel{23°} = 90°$

$-\cancel{23} \quad -23$

$\boxed{b = 67°}$

8) Find the $m\angle ADB$ if $m\angle ADC = 48°$.



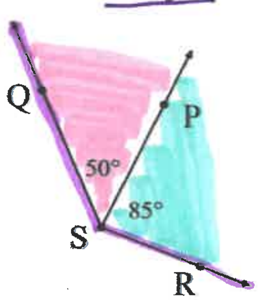
$\angle ADC + \angle CDB = \angle ADB$

$48° + 65° = 113°$

$\boxed{\angle ADB = 113°}$

You Try! For #9–10: Find the value of the missing angle for each diagram.

9) Find the $m\angle QSR$.



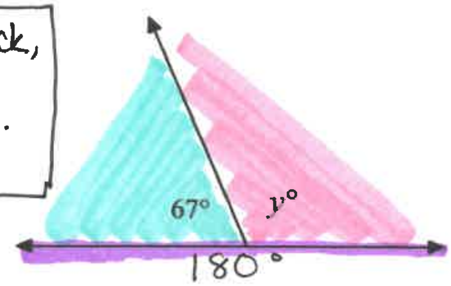
$\angle QSP + \angle PSR = \angle QSR$

$50° + 85° = 135°$

$\boxed{\angle QSR = 135°}$

If it looks like a duck,
sounds like a duck,
might be a duck . . .
• duck = "line" •

10) Find *y*.



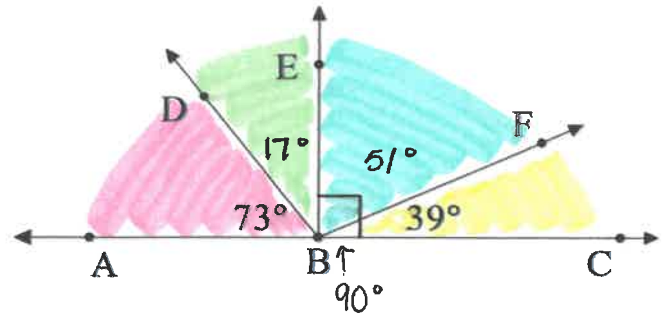
$\cancel{67°} + y = 180°$

$-\cancel{67°} \quad -67°$

$\boxed{y = 113°}$

11) Find the measure of each angle.

NOTE: It helps to write the measure in the diagram once the requested angle is found.



a. $\angle EBF$

$\angle EBF + \angle FBC = 90°$

$\angle EBF + \cancel{39°} = 90°$

$\cancel{-39} \quad -39°$

$\boxed{\angle EBF = 51°}$

b. $\angle EBA$

$\boxed{90°}$

c. $\angle DBE$

$\angle DBE + \angle DBA = 90°$

$\angle DBE + \cancel{73°} = 90°$

$\cancel{-73} \quad -73$

$\boxed{\angle DBE = 17°}$

d. $\angle DBC$

$17 + 51 + 39 =$

$\boxed{107°}$

or $90° + 17° = \boxed{107°}$

e. $\angle ABF$

~~180°-39°~~

$180° = \angle ABF + \cancel{39°}$

$-39° \qquad \cancel{-39°}$

$\boxed{141° = \angle ABF}$

f. $\angle DBF$

$180° = 73° + \angle DBF + 39°$

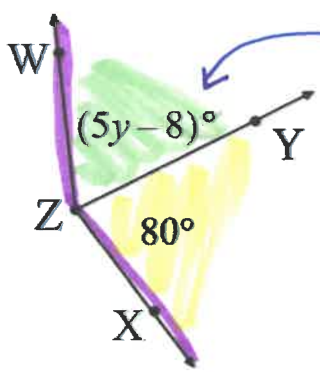
$180 - 73 - 39 = \angle DBF$

$\boxed{68° = \angle DBF}$

or $17° + 51° = \boxed{68°}$

For #12-13: Find the value of the variable in each problem.

12) $m\angle WZX = 110°$



The measure of an angle can be represented by an algebraic expression.

$\angle WZX = \angle WZY + \angle YZX$

$110° = 5y - 8 + 80°$

$110° = 5y + \cancel{72}$

$-72 \qquad \cancel{-72}$

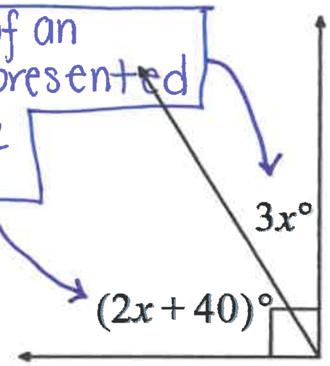
$\frac{38}{5} = \frac{5y}{5}$

$\boxed{y = \frac{38}{5}}$

or

$\boxed{y = 7.6}$

You try! 13)



$2x + 40 + 3x = 90°$

$5x + 40 = 90°$

$-40 \quad -40$

$\frac{5x}{5} = \frac{50}{5}$

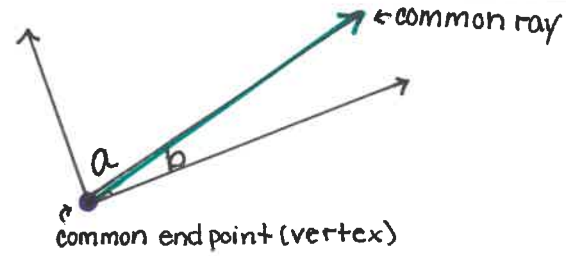
$\boxed{x = 10}$

1.2 Notes: Angle Pair Relationships

Objectives:

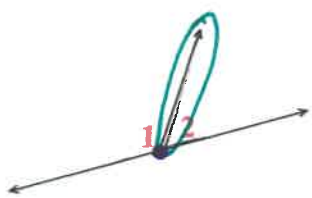
- **Students will identify angle pair relationships and use them to solve problems.**
  - **Adjacent Angles**
  - **Vertical Angles**
  - **Linear Pairs**

Adjacent Angles

Definition of Adjacent Angles	Two angles are adjacent if they share a common ray and vertex.	

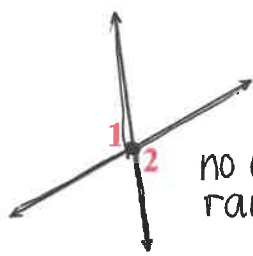
1) For which diagrams below are angles 1 and 2 adjacent angles?

a.



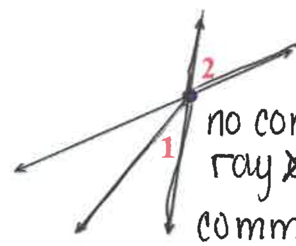
common ray ✓
common ep. ✓
yes

b.



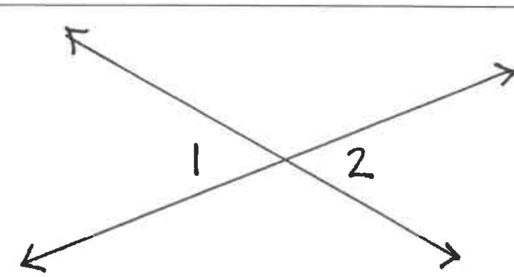
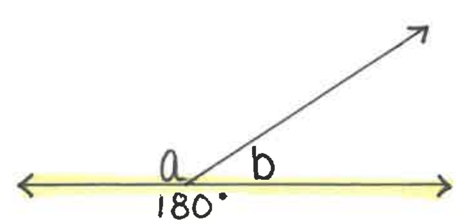
no common ray ✗
common ep. ✓

c.



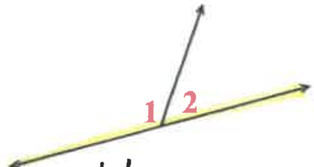
no common ray ✗
common ep. ✓

Vertical Angles and Linear Pairs

Definition of Vertical Angles	Two angles are vertical if they are non-adjacent angles formed by two intersecting lines. *Note:* Their sides form opposite rays.	
Definition of Linear Pair	Two adjacent angles form a linear pair if their non-common sides form a straight angle.	

2) Determine if the following pair of angles are vertical angles, linear pairs, or neither.

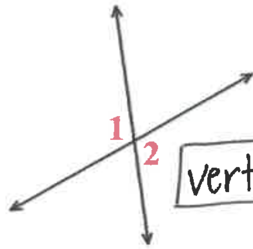
a.



straight ∠

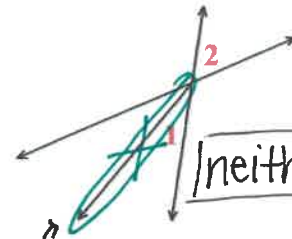
linear pair

b.



vertical

c.



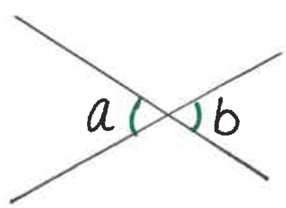
neither

does not have an opposite ray.

Exploration #1: Use this link to explore vertical angles' relationship.

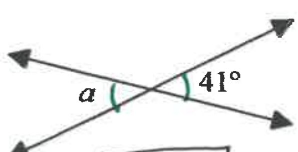
- Link: https://www.geogebra.org/m/SGhM48n5
- Slide the rays into different positions and slide the shaded region into different positions.
- What do you think is true for any pair of vertical angles? (This is called a **conjecture**.)

They are the same.

Congruent Angles	If two angles are congruent, then they have the same measure. Congruent symbol: $\cong$	$\angle C \cong \angle A$ $\angle C = 8^\circ$ $\angle A = 8^\circ$
Vertical Angle Theorem	If two angles form vertical angles, then the two angles are congruent.	 $\angle a \cong \angle b$

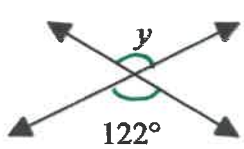
3) Find the variable for each diagram below.

A)



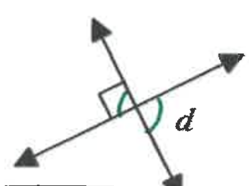
$\boxed{a = 41^\circ}$

You Try! B)



$\boxed{y = 122^\circ}$

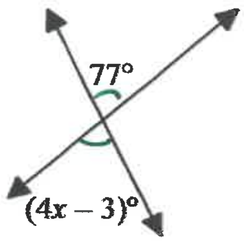
You Try! C)



$\boxed{d = 90^\circ}$

4) Find the variable for each diagram below.

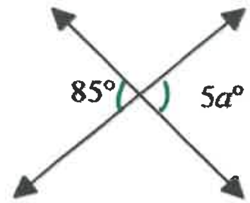
A)



$77 = 4x - 3$
$+3 \quad +3$
$\frac{80}{4} = \frac{4x}{4}$
$\boxed{x = 20}$

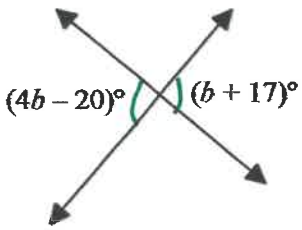
∗ Angles that are ≅ can be set = to eachother in an equation; then solve for the variable.

B)



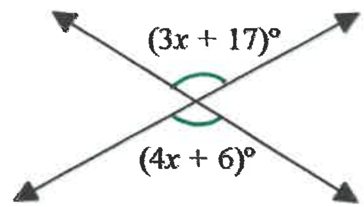
$\frac{85}{5} = \frac{5a}{5}$
$\boxed{17 = a}$

You Try! C)



$4b - 20 = b + 17$
$-b \quad -b$
$3b - 20 = 17$
$+20 \quad +20$
$\frac{3b}{3} = \frac{37}{3}$
$\boxed{b = \frac{37}{3}}$

You Try! D)

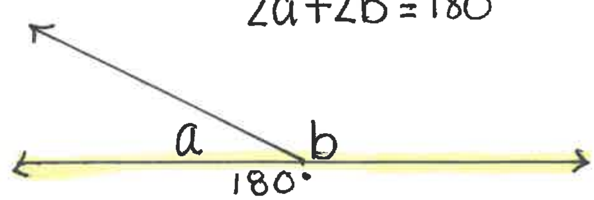


$3x + 17 = 4x + 6$
$-3x \quad -3x$
$17 = x + 6$
$-6 \quad -6$
$\boxed{11 = x}$

Exploration #2: Use this link to explore the relationship with linear pairs.

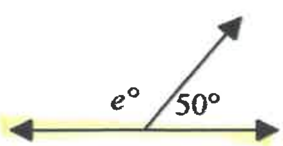
- Link: https://www.geogebra.org/m/txA6R64k
- Slide the rays into different positions and note the measurements of the angles formed.
- What do you think is true for any linear pair? **This is called a conjecture.**

The sum to 180°

Linear Pair Theorem	If two angles form a linear pair, then the angles have a sum of 180°.	$\angle a + \angle b = 180°$ 

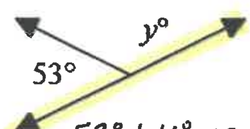
5) Find the variable for each diagram below.

A)



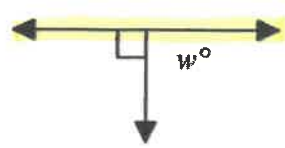
$e° + 50 = 180°$
$-50 \quad -50$
$\boxed{e° = 130°}$

You Try! B)



$53° + y° = 180°$
$-53° \quad -53°$
$\boxed{y = 127°}$

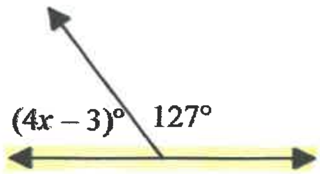
You Try! C)



$90° + w° = 180°$
$-90° \quad -90°$
$\boxed{w = 90°}$

6) Find the variable for each diagram below.

A)



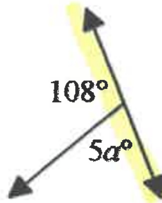
$4x-3+127=180$

$4x+124=180$

$-124 \quad -124$

$\frac{4x}{4}=\frac{56}{4}$ $\boxed{x=14}$

You Try! B)



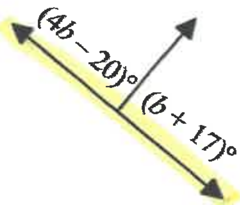
$108+5a=180$

$-108 \quad -108$

$\frac{5a}{5}=\frac{72}{5}$

$\boxed{a=\frac{72}{5}}$

C)



$4b-20+b+17=180°$

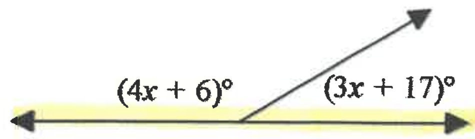
$5b-3=180$

$+3 \quad +3$

$\frac{5b}{5}=\frac{183}{5}$

$\boxed{b=\frac{183}{5}}$

You Try! D)



$4x+6+3x+17=180°$

$7x+23=180$

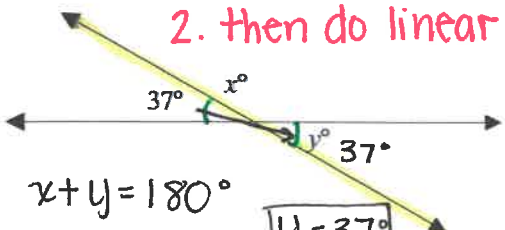
$-23 \quad -23$

$\frac{7x}{7}=\frac{157}{7}$ $\boxed{x=\frac{157}{7}}$

7) Find the measure of each variable in the diagrams below.

1. start with vertical angles
2. then do linear pairs

A)



$x+y=180°$

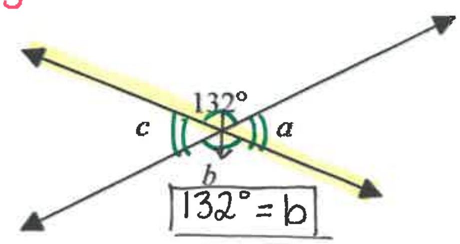
or $x+37°=180°$

$-37 \quad -37$

$\boxed{x=143°}$

$\boxed{y=37°}$

B)



$\boxed{132°=b}$

$a+132°=180°$

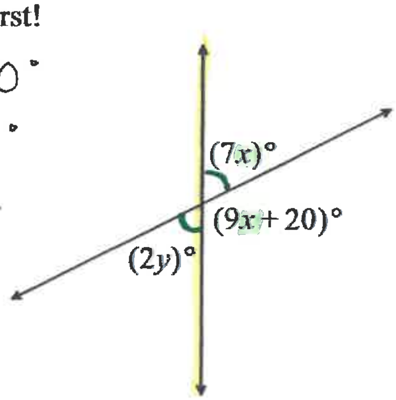
$-132°=182$

$\boxed{a=48°}$

$\angle a \cong \angle c$

$\boxed{48°=c}$

C) Hint: Find *x* first!



$7x+9x+20=180°$

$16x+20=180°$

$-20 \quad -20$

$\frac{16x}{16}=\frac{160}{16}$

$\boxed{x=10}$

$7x=2y$

$7(10)=2y$

$\frac{70}{2}=\frac{2y}{2}$ $\boxed{y=35}$

1. Identify the angles with the same variable.
2. Write equations: use what you know about the angle pair relationship.
   i.e. linear, vertical, adjacent
   (180°) (≅) (sum)
3. find the variable and use substitution if needed

1.3 Notes: More Angle Pair Relationships

Objectives:

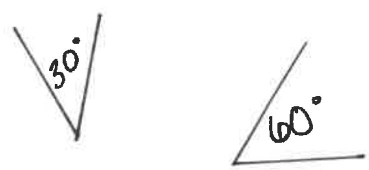
- **Students will identify angle pair relationships and use them to solve problems.**
  - **Complementary Angles**
  - **Supplementary Angles**
  - **Bisected Angles**

Exploration #1: Use the link below to explore complementary angles. Make sure you have chosen "**complementary**" on the drop-down menu.

- Link: https://www.visnos.com/demos/basic-angles
- Click on the rays and drag them to different positions.
  - Pay attention to the measures of the angles in the diagrams.
- Make a **conjecture** about **complementary angles:**

they add to 180°

Complementary Angles

Complementary Angles	If two angles are complementary angles, then they have a sum of ________. *Note:* Complementary angles do not have to be adjacent to each other.	
The Complement of an Angle	The complement of an angle is the degree measure that adds up to 90° with the given angle measurement.	"the complement of 30° is 60°" "the complement of 60° is 30°"

1) Which pairs of angles below are complementary angles? Select all that apply.

A) 42° and 48° $42+48=90°$ B) 20° and 160° $20+160=180°$ C) 10° and 80 $10+80=90°$

D) 90° and 90° $180°$ E) 45° and 45° $90°$

2) Find the complement of each angle below, if possible. Remember, angle measures ~~must~~ be positive!

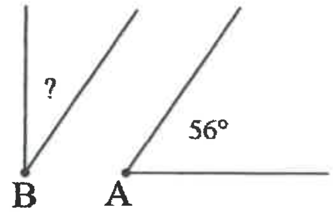
A) 30° $90-30=\boxed{60°}$ B) 71° $90-71=\boxed{19°}$ C) 100°

$90-100=-10$

*not a complement

$\boxed{DNE}$

3) $\angle A$ is $\underbrace{\text{complementary}}_{\text{sums to } 90^\circ}$ to $\angle B$. If $m\angle A = 56°$, then find $m\angle B$.



$\angle A + \angle B = 90^\circ$

$56 + \angle B = 90$

$-56 \quad\quad -56$

$\boxed{\angle B = 34^\circ}$

You Try! 4) $\angle D$ complementary to $\angle E$. If $m\angle D = (3x - 2)°$, and ~~$m\angle D = (3x - 2)°$~~ E, then find x.

$m\angle E = (6x-8)$

$\angle D + \angle E = 90^\circ$

$3x - 2 + 6x - 8 = 90$

$9x - 10 = 90$

$9x - 10 = 90$

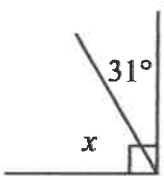
$+10 \quad +10$

$\frac{9x}{9} = \frac{100}{9}$

$\boxed{x = \frac{100}{9}}$

5) Find x in each diagram below.

A)

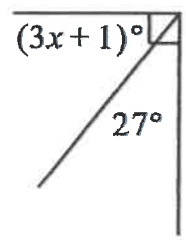


$x + 31 = 90$

$-31 \quad -31$

$\boxed{x = 59^\circ}$

You try! B)



$3x + 1 + 27 = 90^\circ$

$3x + 28 = 90$

$-28 \quad -28$

$\frac{3x}{3} = \frac{62}{3}$

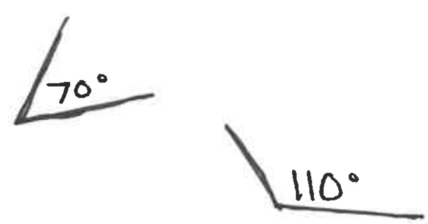
$\boxed{x = \frac{62}{3}}$

Exploration #2: Use the link below to explore supplementary angles. Make sure you have chosen "**supplementary**" on the drop-down menu.

- Link: https://www.visnos.com/demos/basic-angles
- Click on the rays and drag them to different positions. Pay attention to the measures of the angles in the diagrams.
- Make a **conjecture** about **supplementary angles:**

they add to 180°

Supplementary Angles

Definition of Supplementary Angles	If two angles are **supplementary** angles, then they have a sum of <u>180°</u>. Note: Supplementary angles do not need to be adjacent to each other.	
Supplement of an Angle	The **supplement of an angle** is the degree measure that adds up to <u>180°</u> with the given angle measurement.	• the supplement of 70° is 110° • the supplement of 110° is 70°

6) Which pairs of angles below are supplementary angles? Select all that apply.

A) 42° and 48°
$42+48=90$

B) 20° and 160°
$20+160=180$

C) 10° and 80°
$10+80=90°$

D) 90° and 90°
$90+90=180°$

E) 45° and 45°
$45+45=90$

7) Find the supplement of each angle below, if possible. Remember, angle measurements *must* be positive values.

A) 30°
$180-30=\boxed{150°}$

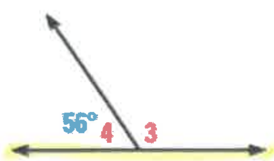
B) 71°
$180-71=\boxed{109°}$

C) 90°
$180-90=\boxed{90°}$

D) 132°
$180-132=\boxed{48°}$

E) 200°
$180-200=-20$
$\boxed{\text{DNE}}$

8) Find the measure of $\angle 3$.



* straight angle is 180°
$\angle 3+\angle 4=180°$
$56+\angle 3=180°$
$\boxed{\angle 3=124°}$

9) $\angle 1$ and $\angle 2$ are supplementary angles. $\angle 1=(4x+8)°$ and $\angle 2=(x+2)°$. Find the value of x.

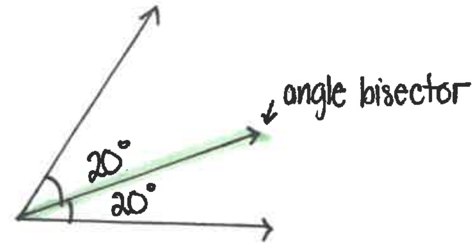
$\angle 1+\angle 2=180°$
$4x+8+x+2=180°$
$5x+10=180$
$-10 \quad -10$
$\frac{5x}{5}=\frac{170}{5}$
$\boxed{x=34}$

Exploration #3: Click on the link below to explore an angle bisector.

- Link: https://www.geogebra.org/m/PrhX27f3
- For this exploration, $\overleftrightarrow{DB}$ bisects $\angle ABC$. Slide points $A, B, C,$ and D to different positions. What do you notice about the angles formed?
- Make a **conjecture** about what happens when an angle is bisected.
  2

cuts in half

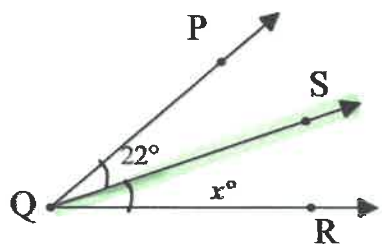
Bisecting an Angle

Bisecting an Angle	When an angle is bisected, two congruent angles are created.	

10) In the diagram shown, $\angle PQR$ is bisected by $\overrightarrow{QS}$.

Find the value of x and the measure of $\angle PQR$.

$\boxed{x = 22°}$



11) In the diagram shown, $\angle PQR$ is bisected by $\overrightarrow{QS}$.

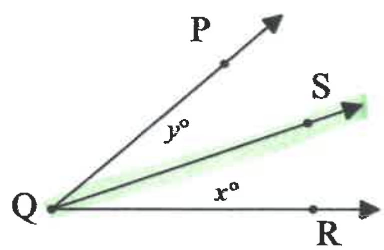
The measure of $\angle PQR$ is known to be $62°$,

Find the value of x and y.

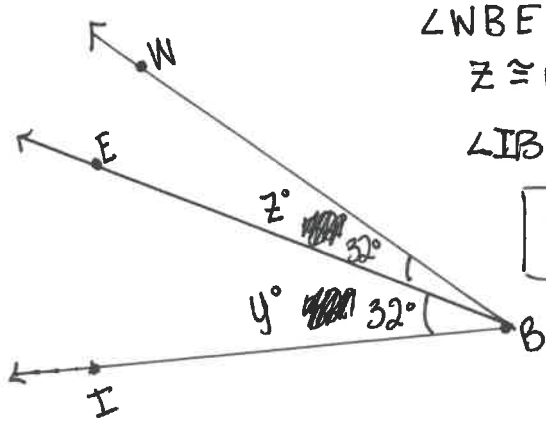
$x + y = 62$

$x \cong y$ so $\frac{62}{2} = 31°$

$\boxed{x = y = 31°}$



12) Draw an angle that is bisected by a ray. Create measurements for all three angles in the diagram that verify that the angle is bisected.



$\angle WBE + \angle EBI = \angle WBI$

$z \cong y$

$\angle IBW$ is bisected by $\overrightarrow{BE}$

$\boxed{32 + 32 = 64°}$

Ch 1 Study Guide

Skills you must be able to do:

- Solve equations for variables.
- Simplify Radicals
- Plot points
- Name shapes

Vocabulary you need to know:

- Acute angles: angles with a measure greater than 0 but less than 90 degrees
- Right angles: angles that measure exactly 90 degrees
- Obtuse angles: angles with measure greater than 90 but less than 180 degrees
- Straight angles: angles that measure exactly 180 degrees
- Angle Addition Postulate: the measure of adjacent angles can be added to find the value of the angle formed by their non-common rays
- Adjacent Angles: angles with a common ray and endpoint
- Vertical Angles:
  - opposite angles formed by two intersecting lines
  - vertical angles are congruent
- Linear Pair:
  - two adjacent angles that form a straight angle
  - the measures of linear pair angles have a sum of 180 degrees
- Complementary Angles: two angles whose measures have a sum of 90 degrees
- Supplementary Angles: two angles who measures have a sum of 180 degrees
- Bisecting an Angle: if a ray bisects an angle, then it divides the angle into two congruent angles