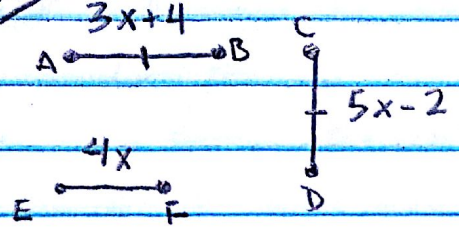
Unit 1 Notes

I. Congruence

A. "Congruent" means same size & same shape.

B. If the figures are congruent, you can set their measures equal

ex 1



EF = ?

Tick mark means that $\overline{AB} \cong \overline{CD}$

set them equal

$AB = CD$

$3x+4 = 5x-2$

$4 = 2x-2$

$6 = 2x$

$3 = x$

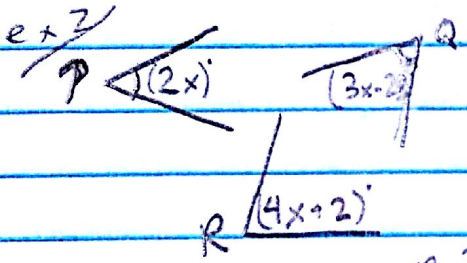
$x = 3$

$EF = 4x$

$EF = 4(3)$

$EF = \boxed{12}$

ex 2



$m\angle R = ?$

$\angle P \cong \angle Q$ (arcs mean =)

$m\angle P = m\angle Q$

$2x = 3x-20$

$-x = -20$

$x = 20$

$m\angle R = 4x+2$

$m\angle R = 4(20)+2$

$m\angle R = \boxed{82}$

ex 3 $\overline{AB} \cong \overline{LM}$, $AB = 6x+5$, $FG = 7x-1$, and $LM = 5x+9$. $FG = ?$

If $\overline{AB} \cong \overline{LM}$, then I can set them equal

$AB = LM$

$6x+5 = 5x+9$

$x+5 = 9$

$x = 4$

$LM = 5x+9 = 5(4)+9$

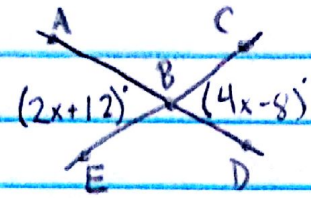
$LM = \boxed{29}$

II. Angle Pairs

*A. **Vertical Angles** are congruent angles that are across an X from each other.

1. Set them equal & solve.

ex/



$m\angle CBD = ?$

← Same problem as →

$\angle ABE$ & $\angle CBD$ are vertical angles.

$m\angle ABE = (2x+12)^\circ$ &

$m\angle CBD = (4x-8)^\circ$,

$m\angle CBD = ?$

Vertical angles are congruent, so...

$\angle ABE \cong \angle CBD$

$m\angle ABE = m\angle CBD$

$2x+12 = 4x-8$

$12 = 2x-8$

$20 = 2x$

$10 = x$

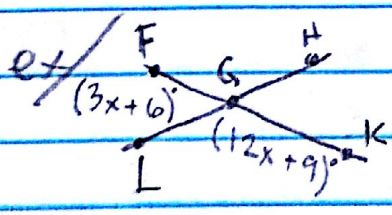
$x = 10$

$m\angle CBD = 4x-8 = 4(10)-8$

$m\angle CBD = \boxed{32^\circ}$

*B. **Linear Pair** angles are angles that add to equal 180°, because they make a line.

ex/



$m\angle LGK = ?$

← Same problem as →

$\angle FGL$ & $\angle LGK$ are a linear pair. $m\angle FGL = (3x+6)^\circ$

$m\angle LGK = (12x+9)^\circ$, $m\angle LGK = ?$

Linear pairs add to equal 180, so...

$m\angle FGL + m\angle LGK = 180$

$3x+6+12x+9 = 180$

$15x+15 = 180$

$15x = 165$

$x = 11$

$m\angle LGK = 12x+9$

$m\angle LGK = 12(11)+9$

$m\angle LGK = \boxed{141^\circ}$

★C. Complementary Angles are angle pairs that add to equal 90°

ex/ ∠1 & ∠2 are complementary angles. $m\angle 1 = (7x+4)°$ & $m\angle 2 = (4x+9)°$. $m\angle 1 = ?$

They are complementary, so...

$m\angle 1 + m\angle 2 = 90°$

$(7x+4)+(4x+9) = 90$

$11x+13 = 90$ $\quad m\angle 1 = 7x+4$

$11x = 77$ $\quad m\angle 1 = 7(7)+4$

$x = 7$ $\quad m\angle 1 = \boxed{53°}$

★D. Supplementary Angles are angle pairs that add to equal 180°.

ex/ ∠3 & ∠4 are supplementary angles. $m\angle 3 = (4x+13)°$ & $m\angle 4 = (3x+27)°$. $m\angle 4 = ?$

They are supplementary, so...

$m\angle 3 + m\angle 4 = 180°$

$(4x+13)+(3x+27) = 180$

$7x+40 = 180$ $\quad m\angle 4 = (3x+27)°$

$7x = 140$ $\quad m\angle 4 = 3(20)+27$

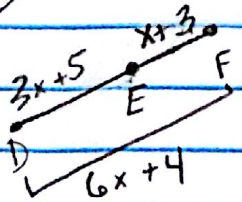
$x = 20$ $\quad m\angle 4 = \boxed{87°}$

III. ★Segment and Angle Addition

A. This is the process of adding parts of a segment or an angle to equal the whole.

B. PART1 + PART2 = WHOLE

ex/



← same problemos →

E is on $\overline{DF}$. $DE = 3x+5$, $DF = 6x+4$ & $EF = x+3$. $DF = ?$

$DF = ?$

Part + Part = whole → DE + EF = DF

$(3x+5)+(x+3) = (6x+4)$

$4x+8 = 6x+4$ $\quad DF = 6x+4$

$8 = 2x+4$ $\quad DF = 6(2)+4$

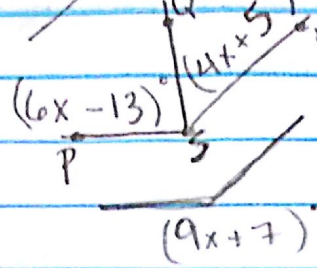
$4 = 2x$

$2 = x$ $\quad DF = \boxed{16}$

DE & EF → PARTS

DF → whole

Ex 2/



m∠QSR = ?

← Same problem as →

$\overrightarrow{SQ}$ goes through ∠PSR

m∠PSR = (9x+7)°,

m∠PSQ = (6x-13)° &

m∠QSR = (4x+5)°.

m∠QSR = ?

∠PSQ & ∠QSR are PARTS

Part + Part = Whole

m∠PSQ + m∠QSR = m∠PSR

$(6x-13)+(4x+5)=(9x+7)$

$10x-8=9x+7$

$x-8=7$

$x=15$

m∠QSR = (4x+5)°

m∠QSR = 4(15)+5

m∠QSR = 65°

IV * Midpoints & Bisectors

A. Midpoint & bisector problems are segment/angle addition problems with one added fact: the parts are equal

B. Part 1 = Part 2 & Part 1 + Part 2 = Whole

Ex 1/ $\overrightarrow{BC}$ bisects ∠ABD. m∠ABC = (4x+2)° & m∠CBD = (6x-20)°. m∠ABD = ?

2 processes:

∠ABC & ∠CBD are parts

∠ABD is whole

PART + PART = WHOLE

m∠ABC + m∠CBD = m∠ABD

$4x+2+6x-20=m\angle ABD$

$10x-18=m\angle ABD$

$10(11)-18=m\angle ABD$

$92^\circ=m\angle ABD$

m∠ABD = 92°

PART = PART

m∠ABC = m∠CBD

$4x+2=6x-20$

$2=2x-20$

$22=2x$

$11=x$

$x=11$

ex 2/ R is the midpoint of $\overline{QS}$. $QR = 6x+10$ & $QS = 14x+18$.
$RS = ?$

2 processes: PART + PART = WHOLE PART = PART

QR & RS are parts

QS is whole

$QR + RS = QS$

$(6x+10) + RS = (14x+18)$

$QR = RS$

$6x+10 = RS$

$RS = 6x+10$

$(6x+10) + (6x+10) = (14x+18)$

$12x + 20 = 14x + 18$

$20 = 2x + 18$

$2 = 2x$

$1 = x$

$x = 1$

$RS = 6(1) + 10$

$RS = \boxed{16}$