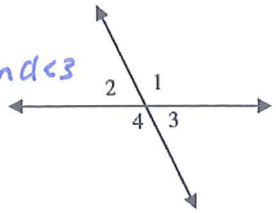
Angle Relationships Review Focus: (Schmidt)

Key

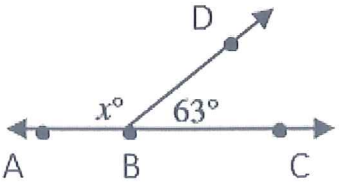
Part 1:

1. Which set of angles form a linear pair?
   ∠1 and ∠2, ∠2 and ∠4, ∠4 and ∠3
   ∠3 and ∠1
2. Which set of angles form vertical angles?
   ∠1 ≅ ∠4 and ∠2 ≅ ∠3



Directions for part 2: find the value of the missing variable and the missing angle(s) if indicated. Show your geometry and justification.

1.



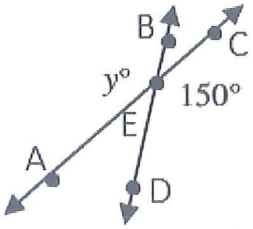
Geometry:

∠ABD + ∠DBC = 180°
x + 63 = 180
x = 117°

Justification:

linear pairs are suppl.

2.



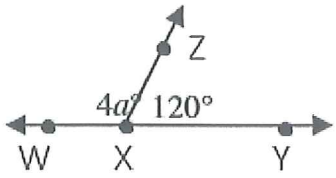
Geometry:

∠AEB ≅ ∠CED
y = 150°

Justification:

vertical ∠s are ≅

3.



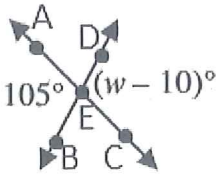
Geometry:

∠WXZ + ∠ZXY = 180
4a + 120 = 180
−120 −120
4a = 60°
a = 15°

Justification:

linear pairs are suppl.

4.



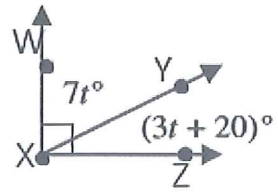
Geometry:

∠AEB ≅ ∠DEC
105 = w − 10
115° = w

Justification:

vertical angles are ≅

5.

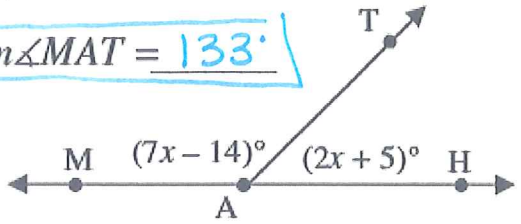


Geometry: **Justification:**

$\angle WXY + \angle YXZ = 90°$ def of
$7t + 3t + 20 = 90°$ Compl.
$10t + 20 = 90$
$10t = 70$
$t = 7$

6.

$m\angle MAT =$ 133°

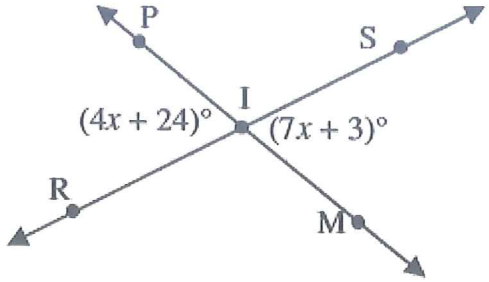


Geometry: **Justification:**

$\angle MAT + \angle TAH = 180°$ linear Pairs are Suppl.
$7x - 14 + 2x + 5 = 180$
$9x - 9 = 180$
$9x = 189$
$x = 21°$
$\angle MAT = 7 \times 21 - 14$
$\angle MAT = 133°$

7. $x =$ 7

$m\angle PIR =$ 52°
$m\angle RIM =$ 128°



Geometry: **Justification:**

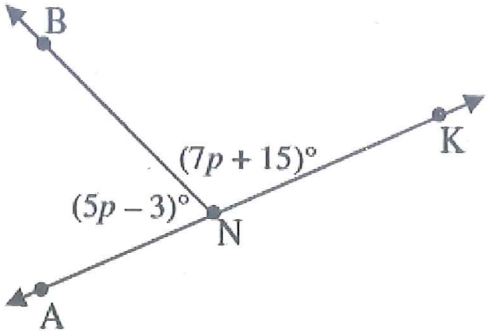
$\angle PIR \cong \angle SIM$ Vertical $\angle$s are $\cong$
$4x + 24 = 7x + 3$
$-4x \quad -4x$
$24 = 3x + 3$
$-3 \quad -3$
$\frac{21}{3} = \frac{3x}{3}$
$7 = x$

$\angle PIR = 4(7) + 24$
$\angle PIR = 52°$

$\angle PIR + \angle RIM = 180$ linear Pairs are Suppl.
$52 + \angle RIM = 180$
$\angle RIM = 128°$

8. $p =$ 14

$m\angle BNK =$ 113°

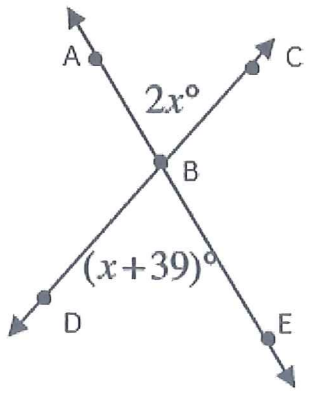


Geometry: **Justification:**

$\angle ANB + \angle BNK = 180$ linear Pairs are Suppl.
$5p - 3 + 7p + 15 = 180$
$12p + 12 = 180$
$12p = 168$
$p = 14$

$\angle BNK = 7(14) + 15$
$\angle BNK = 113°$

9. $x =$ _____



Geometry:

$\angle ABC \cong \angle DBE$

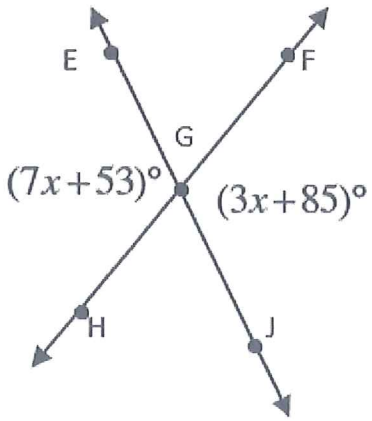
$2x = x + 39$

$x = 39°$

Justification:

Vertical $\angle$s are $\cong$

10. $x =$ _____



Geometry:

$\angle EGH \cong \angle FGJ$

$7x + 53 = 3x + 85$

$4x + 53 = 85$

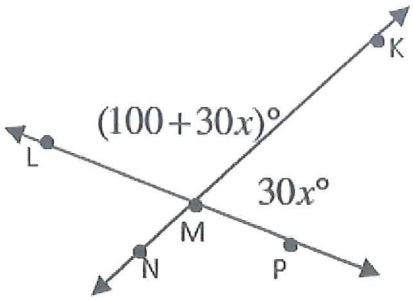
$4x = 32$

$x = 8$

Justification:

Vertical $\angle$s are $\cong$

11. $x =$ _____



Geometry:

$\angle LMK + \angle KMP = 180°$

$100 + 30x + 30x = 180$

$100 + 60x = 180$

$\frac{60x}{60} = \frac{80}{60}$

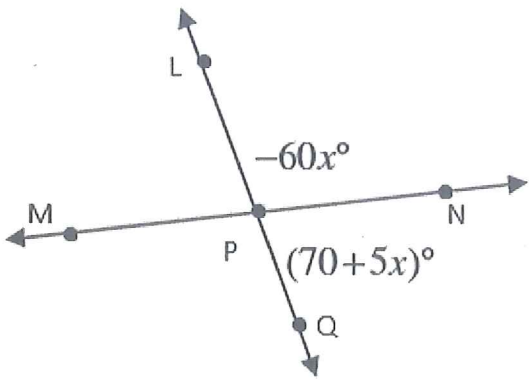
$x = \frac{8}{6} = \frac{4}{3}$

$x = \frac{4}{3}$

Justification:

linear pairs are suppl.

12. $x =$ _____



Geometry:

$\angle LPN + \angle NPQ = 180$

$-60x + 70 + 5x = 180$

$-55x + 70 = 180$

$-70 \quad -70$

$-55x = 110$

$x = -2$

Justification:

linear pairs are suppl.

Part 3: Writing in Mathematics.

13. An angle is 70° smaller than its supplement. Find the two angles.

$x + x - 70 = 180$ $\quad 2x = 250$

$2x - 70 = 180$ $\quad x = 125°$

125° and 55°

14. An angle exceeds its complement by 2°. Find the angle. ← that exceeds

$x + x + 2 = 90$ $\quad 2x = 88$

$2x + 2 = 90$ $\quad x = 44°$

46°

15. Find an angle that is twice its complement.

$x + 2x = 90$ $\quad x = 30°$

$3x = 90$

60°

16. An angle is 33° less than one-half its supplement. Find the angle.

$x + \frac{1}{2}x - 33 = 180$ $\quad x = 142°$

$1.5x - 33 = 180$

38°

17. Find an angle that is 30° less than twice its supplement.

$x + 2x - 30 = 180$ $\quad 3x = 210$

$3x - 30 = 180$ $\quad x = 70°$

110°

18. What is the supplement of the complement of 53°?

$x + 53 = 90$ $\quad y + 37 = 180°$

$x = 37°$ $\quad 143° = y$ ← This is the Suppl.

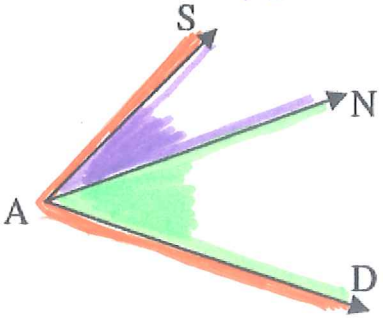
19. Write and simplify an expression for the supplement of $\angle B$, if $m\angle B = (5n+6)°$.

$180 - (5n + 6)$

$-5n + 174$

Part 4: Angle Addition and Angle Bisectors.

1. Find x and the $m\angle SAD$ if $m\angle SAD = 135°, m\angle SAN = 3x + 1, and\ m\angle DAN = 2x - 6$.



∠SAN

Geometry:

$\angle SAN + \angle DAN = \angle SAD$

$3x + 1 + 2x - 6 = 135$

$5x - 5 = 135$

$5x = 140°$

$x = 28$

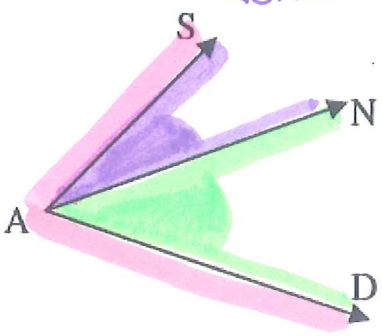
Justification:

Angle addition

$\angle SAN = 3(28) + 1$

$\angle SAN = 85°$

2. Find x and the $m\angle SAD$ if $m\angle SAD = 94°, m\angle SAN = 3x + 15, and\ m\angle DAN = x + 7.$



~~$\angle SAD$~~ $\angle SAN$

Geometry:

$\angle SAD = \angle SAN + \angle DAN$

$94 = 3x + 15 + x + 7$

$94 = 4x + 22$

$72 = 4x$

$\boxed{18 = x}$

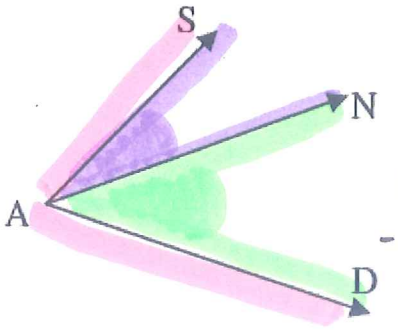
Justification:

angle addition

$\angle SAN = 3(18) + 15$

$\boxed{\angle SAN = 69°}$

3. Find x and the $m\angle SAD$ if $m\angle SAD = 16x - 2, m\angle SAN = 9x - 7, and\ m\angle DAN = 3x + 17.$



Geometry:

$\angle SAD = \angle SAN + \angle DAN$

$16x - 2 = 9x - 7 + 3x + 17$

$16x - 2 = 12x + 10$

$-12x \quad -12x$

$4x - 2 = 10$

$4x = 12$

$\boxed{x = 3}$

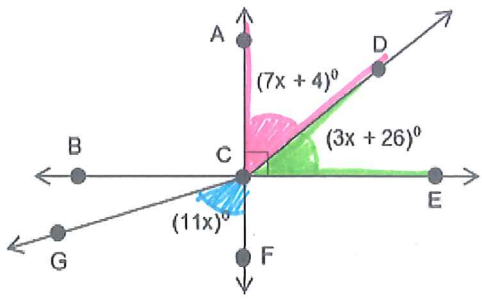
Justification:

angle addition

$\angle SAD = 16(3) - 2$

$\boxed{\angle SAD = 46°}$

4. Solve for x and find $m\angle GCF$



Geometry:

$\angle ACD + \angle DCE = 90°$

$7x + 4 + 3x + 26 = 90°$

$10x + 30 = 90$

$\frac{10x}{10} = \frac{60}{10}$

Justification:

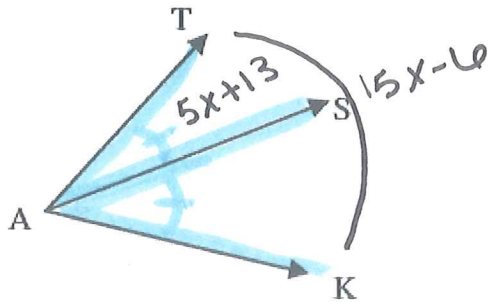
def of compl.

$\boxed{x = 6}$

$m\angle GCF = 11(6)$

$\boxed{m\angle GCF = 66°}$

5. Find x and the $m\angle KAS$ if $\overrightarrow{AS}$ $bisects\ \angle KAT, m\angle SAT = 5x + 13\ and\ m\angle KAT = 15x - 6.$



Geometry:

$\angle KAT = 2\angle SAT$

$15x - 6 = 2(5x + 13)$

$15x - 6 = 10x + 26$

$5x - 6 = 26$

$5x = 32$

$x = 6.4$

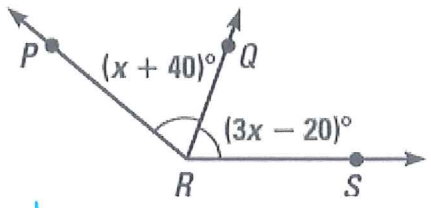
Justification:

def of $\angle$ bisector

$\angle KAS = 5(6.4) + 13$

$\boxed{\angle KAS = 45°}$

6. In the diagram, $\overrightarrow{RQ}$ bisects $\angle PRS$. The measures of the two congruent angles are $(x + 40)°$ and $(3x - 20)°$. Solve for x.



Geometry: **Justification:**

$\angle PRQ \cong \angle QRS$ def of $\angle$ bisector.

$x + 40 = 3x - 20$

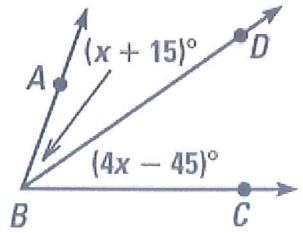
$40 = 2x - 20$

$+20 \quad +20$

$60 = 2x$

$\boxed{30 = x}$

7. $\overrightarrow{BD}$ **bisects** $\angle ABC$. **Find the value of** x. **Geometry:** **Justification:**



$\angle ABD \cong \angle DBC$ def of $\angle$ bisector

$x + 15 = 4x - 45$

$15 = 3x - 45$

$\frac{60}{3} = \frac{3x}{3}$ $\boxed{x = 20}$

8. If $m\angle FGE = 5x + 10$ and $\overrightarrow{FC} \perp \overrightarrow{AE}$, find x.

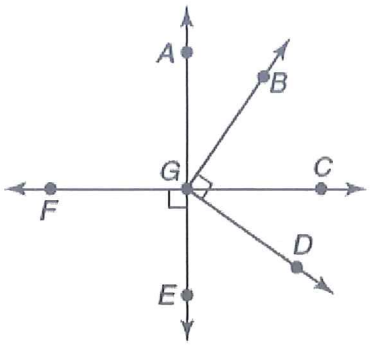
Geometry: **Justification:**

$\angle FGE = 90°$ def of $\perp$ or Right $\angle$

$5x + 10 = 90$

$5x = 80$

$\boxed{x = 16}$

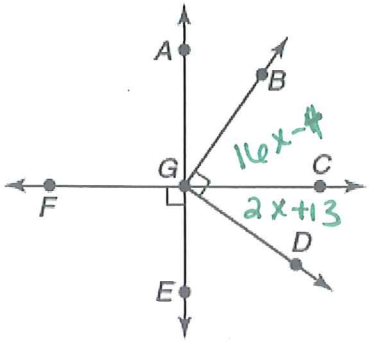


9. If $m\angle BGC = 16x - 4$, $m\angle CGD = 2x + 13$, and $\overrightarrow{BG} \perp \overrightarrow{GD}$, find x.

$\angle BGD = 90°$ def of $\perp$

$\angle BGC + \angle CGD = \angle BGD$ angle addition

Geometry: **Justification:**



$\angle BGC + \angle CGD = 90°$ def of compl.

$16x - 4 + 2x + 13 = 90$

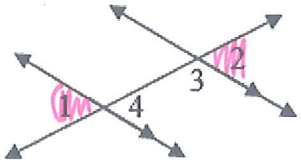
$18x + 9 = 90$

$18x = 81$

$\boxed{x = 4.5}$

Part 5: Parallels cut by transversals.

1. m∠1 = 3x - 17° and m∠2 = x + 1°. Find x.



Geometry:

$\angle 1 \cong \angle 2$

$3x - 17 = x + 1$

$2x - 17 = 1$

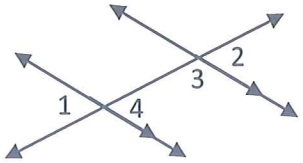
$2x = 18$

$\boxed{x = 9}$

Justification:

alt. ext. ∠s are ≅

2. m∠3 = 20k + 11° and m∠4 = 8k + 1°. Find k.



Geometry:

$\angle 3 + \angle 4 = 180°$

$20k + 11 + 8k + 1 = 180°$

$28k + 12 = 180°$

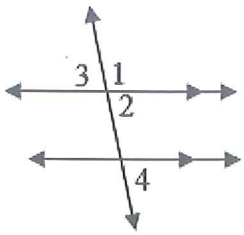
$28k = 168$

$\boxed{k = 6}$

Justification:

con. int ∠s are suppl.

3. m∠1 = 95° + 7h and m∠2 = 55° - h. Find h.



Geometry:

$\angle 1 + \angle 2 = 180°$

$95 + 7h + 55 - h = 180$

$6h + 150 = 180$

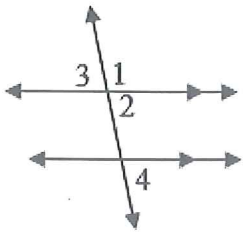
$6h = 30$

$\boxed{h = 5}$

Justification:

linear pairs

4. m∠3 = 5k + 12° and m∠4 = 7k - 16°. Find k.



Geometry:

$\angle 3 \cong \angle 4$

$5k + 12 = 7k - 16$

$12 = 2k - 16$

$28 = 2k$

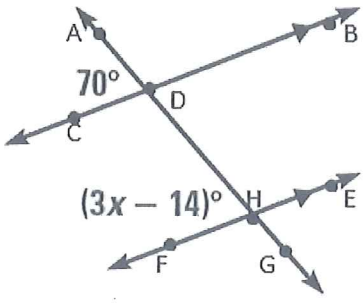
$\boxed{14 = k}$

Justification:

alt. ext. ∠s are ≅

Directions: Find x.

5.



Geometry:

$\angle ADC \cong \angle DHF$

$70 = 3x - 14$

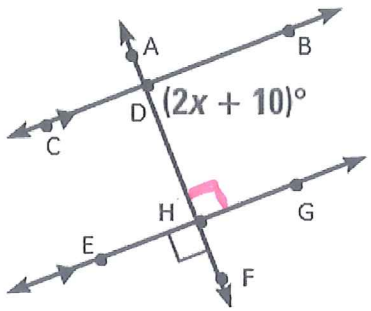
$84 = 3x$

$\boxed{28 = x}$

Justification:

Corresponding angles are $\cong$

6.



Geometry:

$\angle BDH + \angle DHG = 180°$

$2x + 10 + 90 = 180$

$2x + 100 = 180$

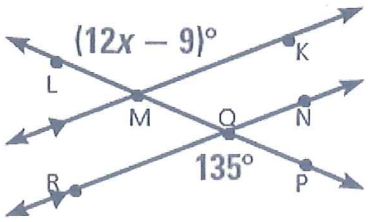
$2x = 80$

$\boxed{x = 40}$

Justification:

Consecutive int. $\angle$s are suppl.

7.



Geometry:

$\angle LMK \cong \angle RQP$

$12x - 9 = 135$

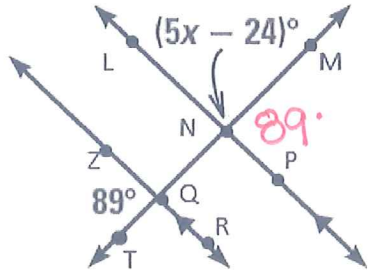
$12x = 144$

$\boxed{x = 12}$

Justification:

alt. Ext $\angle$s are $\cong$

8.



Geometry:

$\angle LNM + \angle MNP = 180°$

$5x - 24 + 89 = 180°$

$5x + 65 = 180$

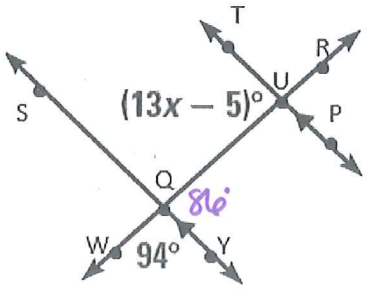
$5x = 115$

$\boxed{x = 23}$

Justification:

linear pairs are suppl.

9.



Geometry:

$\angle TUQ \cong \angle UQY$

$13x - 5 = 86$

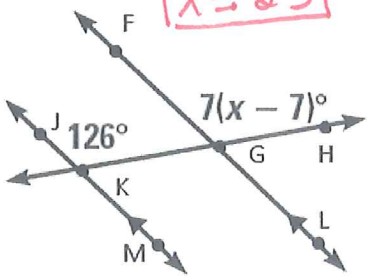
$13x = 91$

$\boxed{x = 7}$

Justification:

alt. int $\angle$s are $\cong$

10.



Geometry:

$\angle JKG \cong \angle FGH$

$126 = 7(x - 7)$

$126 = 7x - 49$

$175 = 7x$

Justification:

Corresponding $\angle$s are $\cong$

$\boxed{x = 25}$