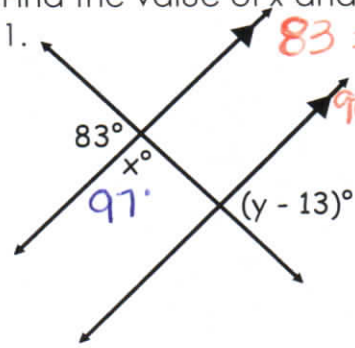
Name: _____ Date: _____

Parallel Lines and Transversals

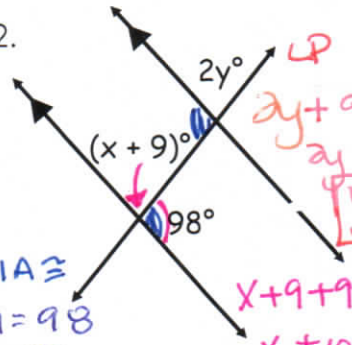
Find the value of x and y.

1.



$83 = y - 13$
$96 = y$
$97°$

2.



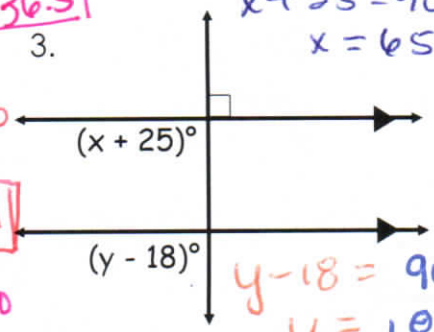
Corresponding: $2y = 73$
$\boxed{y = 36.5}$

LP
$2y + 98 = 180$
$2y = 82$
$\boxed{y = 41}$

AIA ≅
$x + 9 = 98$
$x = 89$

$x + 9 + 98 = 180$
$x + 107 = 180$
$\boxed{x = 73}$

3.

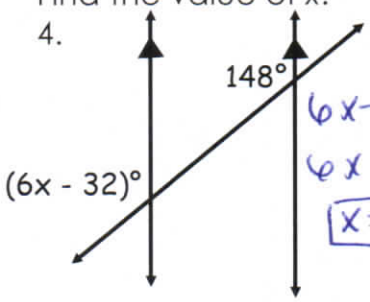


$x + 25 = 90$
$x = 65$

$y - 18 = 90$
$y = 108$

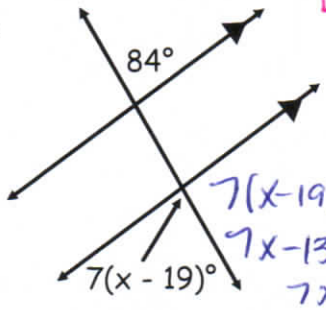
Find the value of x.

4.



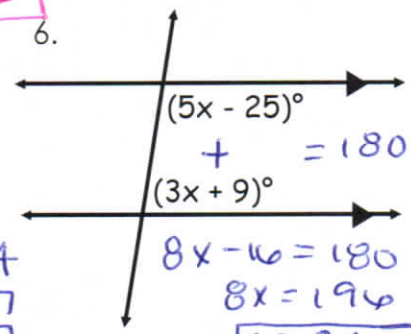
$6x - 32 = 148$
$6x = 180$
$\boxed{x = 30}$

5.



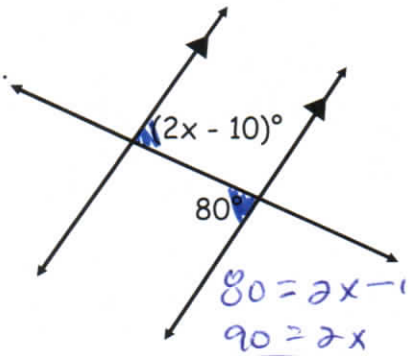
$7(x - 19) = 84$
$7x - 133 = 84$
$7x = 217$
$\boxed{x = 31}$

6.



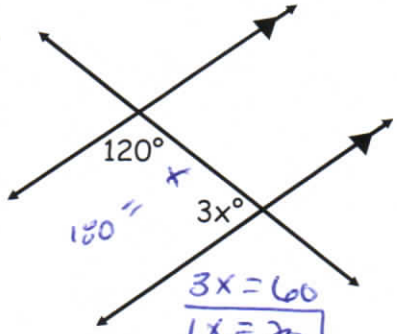
$+ \quad = 180$
$8x - 16 = 180$
$8x = 196$
$\boxed{x = 24.5}$

7.



$80 = 2x - 10$
$90 = 2x$
$\boxed{45 = x}$

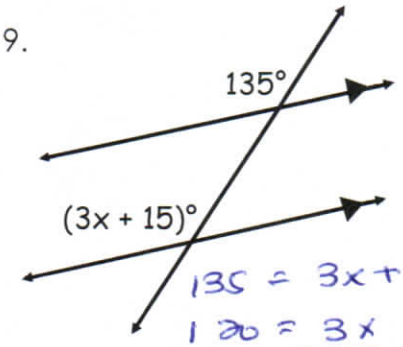
8.



x
$180°$

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

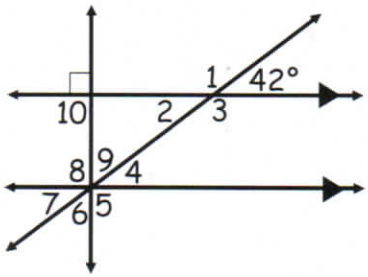
9.



$135 = 3x + 15$
$120 = 3x$
$\boxed{40 = x}$

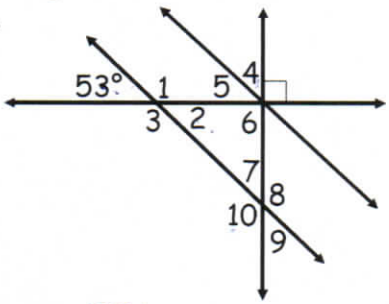
Find the measures of all labeled angles in the diagram.

10.



$m\angle 1 = 138°$
$m\angle 2 = 42$
$m\angle 3 = 138°$
$m\angle 4 = 42$
$m\angle 5 = 90°$
$m\angle 6 = 48°$
$m\angle 7 = 42$
$m\angle 8 = 90$
$m\angle 9 = 48°$
$m\angle 10 = 90°$

11.



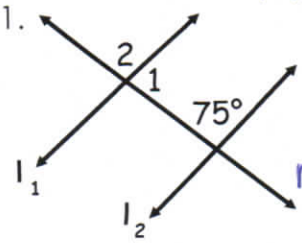
$m\angle 1 = 127°$
$m\angle 2 = 53°$
$m\angle 3 = 127°$
$m\angle 4 = 37$
$m\angle 5 = 53°$
$m\angle 6 = 90°$
$m\angle 7 = 37°$
$m\angle 8 = 143°$
$m\angle 9 = 37°$
$m\angle 10 = 143°$

Name: _____ Date: _____

Parallel Lines and Transversals Practice

In problems 1 – 4, assume that $l_1 \| l_2$. Find the measures of ∠1 and ∠2.

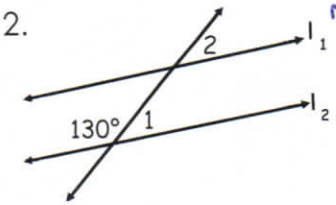
1.



m∠2 = 75° corresponding angles ≅

m∠1 = 105° Same Same Interior are supplementary

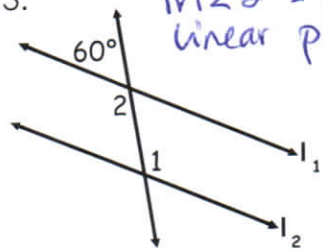
2.



m∠2 = 50° corresponding angles are congruent

m∠1 = 50° linear pairs supplementary

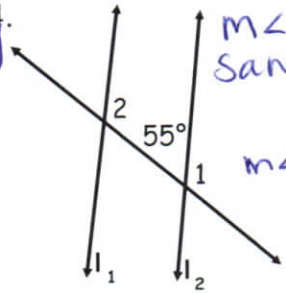
3.



m∠2 = 120° linear pairs are supplementary

m∠1 = 120° Alternate interior angles are congruent.

4.



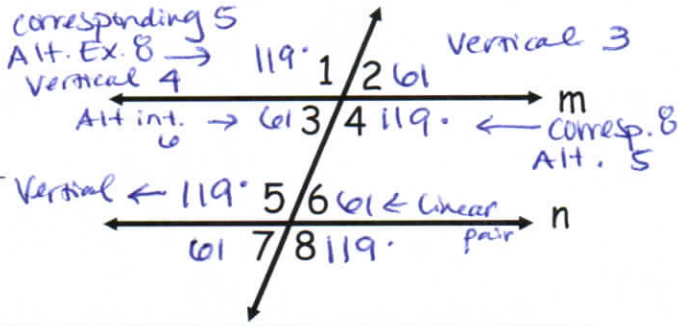
m∠2 = 125° Same side Supplementary

m∠1 = 125° corresponding angles ≅

5. Given $m \| n$ and m∠8 = 119°, find the measures of all the numbered angles in the figure.

m∠1 = 119, m∠2 61, m∠3 = 61

m∠4 = 119, m∠5 = 119, m∠6 = 61, m∠7 = 61



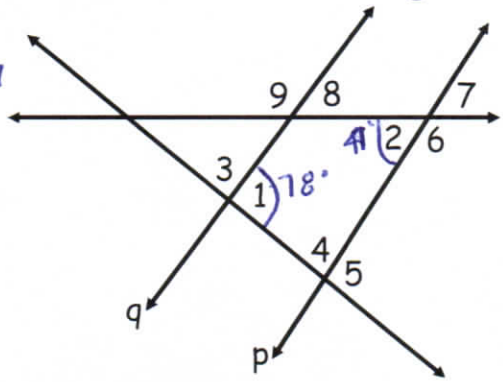
6. Given $p \| q$, m∠1 = 78°, and m∠2 = 47°, find the measures of all the numbered angles.

m∠3 = 102, m∠4 = 102, m∠5 = 78, m∠6 = 133

Linear pair to 1 corresponding 3 corresponding 1 Linear to 7

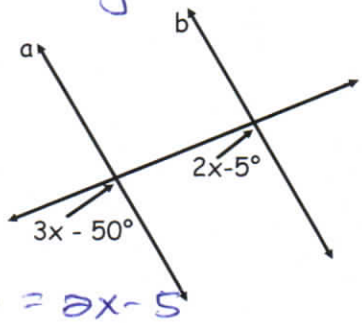
m∠7 = 47, m∠8 = 47, m∠9 = 133

Vertical to 2 Alternate interior 2 Linear pair to 8



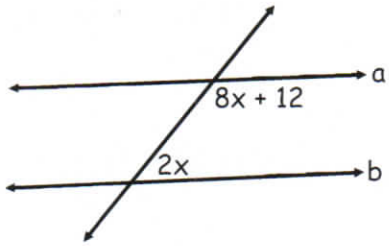
In problems 7 – 10, assume $a \| b$. Find the value of x.

7. Corresponding angles congruent



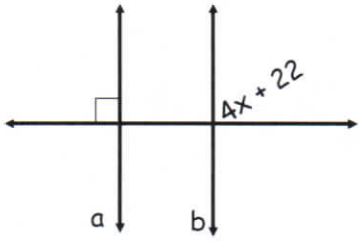
$3x - 50 = 2x - 5$
$x = 45$

8. Same Side Interior – Supplementary



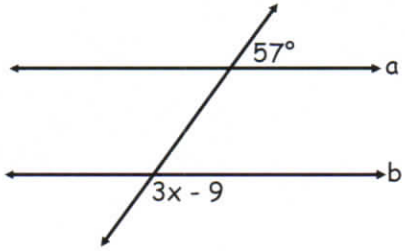
$8x + 12 + 2x = 180$
$10x + 12 = 180$
$10x = 168$ $x = 16.8$

9. Same Side Exterior – Supple.



$90 + 4x + 22 = 180$
$4x + 112 = 180$
$4x = 68$
$x = 17$

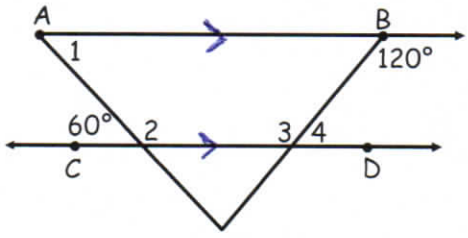
10. Same Side exterior – Supplementary



$3x - 9 + 57 = 180$
$3x + 48 = 180$
$3x = 132$
$x = 44$

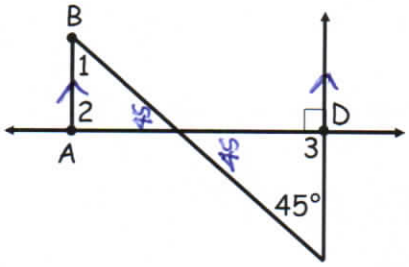
In problems 11 & 12, $\overline{AB} \| \overline{CD}$, find the measure of each numbered angle.

11.



$m\angle 1 = 60$ Alternate Interior $\cong$
$m\angle 2 = 120$ Linear pair supplementary
$m\angle 3 = 120$ Alternate Interior $\cong$
$m\angle 4 = 60$ Linear pair Supplementary

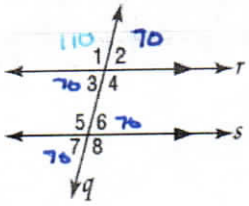
12.



$m\angle 3 = 90$ Linear pair Supplementary
$m\angle 2 = 90$ Same side Interior Suppl
$m\angle 1 = 45$

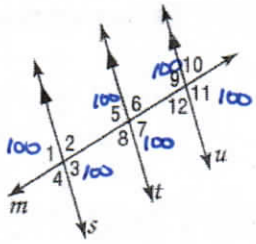
Angles and Parallel Lines

In the figure, $m\angle 2 = 70$. Find the measure of each angle.



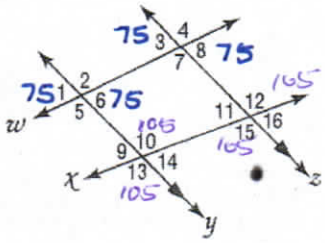
1. $\angle 3$ 70
2. $\angle 5$ 110
3. $\angle 8$ 110
4. $\angle 1$ 110
5. $\angle 4$ 110
6. $\angle 6$ 70

In the figure, $m\angle 7 = 100$. Find the measure of each angle.



7. $\angle 9$ 100
8. $\angle 6$ 80
9. $\angle 8$ 80
10. $\angle 2$ 80
11. $\angle 5$ 100
12. $\angle 11$ 100

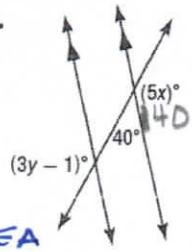
In the figure, $m\angle 3 = 75$ and $m\angle 10 = 105$. Find the measure of each angle.



13. $\angle 2$ 105
14. $\angle 5$ 105
15. $\angle 7$ 105
16. $\angle 15$ 105
17. $\angle 14$ 75
18. $\angle 9$ 75

Find the value of the variable(s) in each figure. Explain your reasoning.

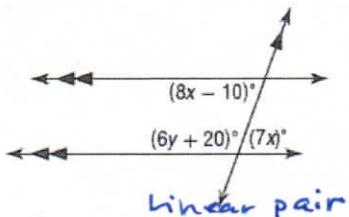
19.



Linear pair
$5x + 40 = 180$
$5x = 140$
$\boxed{x = 28}$

AEA
$3y - 1 = 140$
$3y = 141$
$\boxed{y = 47}$

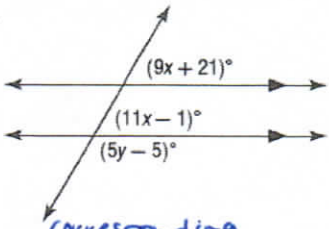
20.



VA
$8x - 10 = 7x$
$-10 = -x$
$\boxed{10 = x}$

Linear pair
$6y + 20 + 70 = 180$
$6y + 90 = 180$
$6y = 90$
$\boxed{y = 15}$

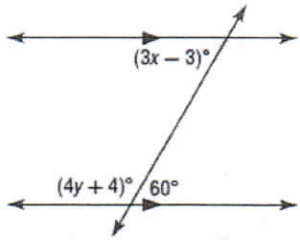
21.



Corresponding
$9x + 21 = 11x - 1$
$22 = 2x$
$\boxed{11 = x}$

Linear pair
$120 + 5y + 5 = 180$
$5y + 125 = 180$
$5y = 55$
$\boxed{y = 11}$

22.



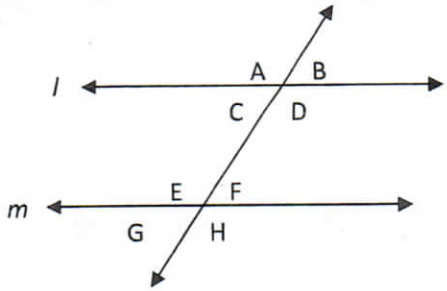
VA
$3x - 3 = 60$
$3x = 63$
$\boxed{x = 21}$

Linear pair
$4y + 4 + 60 = 180$
$4y + 64 = 180$
$4y = 116$
$\boxed{y = 29}$

Parallel Lines With Algebra

Remember – drawings are not necessarily drawn accurately!

1 – 3: Find the value of x in each question given that lines l and m are parallel. Check your answers by finding the measure of each angle.



VA 1) $m\angle C = 3x - 10;$ $m\angle F = x + 70$

$3x - 10 = x + 70$
$2x = 80$
$\boxed{x = 40}$

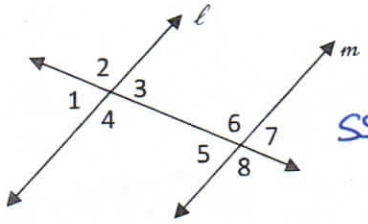
SSI 2) $m\angle D = x + 27;$ $m\angle F = 2x - 39$

$x + 27 + 2x - 39 = 180$
$3x - 12 = 180$
$3x = 192$ $\boxed{x = 64}$

AEA 3) $m\angle B = 2(x + 40);$ $m\angle G = 5x + 44$

$2x + 80 = 5x + 44$
$36 = 3x$ $\boxed{x = 12}$

4 – 6: Find the value of x in each question given that lines l and m are parallel. Check your answers by finding the measure of each angle.



VA 4) $m\angle 3 = 2x + 16;$ $m\angle 5 = 7x - 4$

$2x + 16 = 7x - 4$
$20 = 5x$
$\boxed{4 = x}$

SSI 5) $m\angle 4 = 8x - 80;$ $m\angle 5 = -2x + 116$

$8x - 80 + 116 - 2x = 180$
$6x + 36 = 180$
$6x = 144$ $\boxed{x = 24}$

correspond 6) $m\angle 2 = 3x + 19;$ $m\angle 6 = 2(x + 10)$

$3x + 19 = 2x + 20$
$\boxed{x = 1}$

7) Given $l \parallel m \parallel n$ and $s \parallel t$, and $m\angle 1 = 143°$, find

$m\angle 2 =$ _____ $m\angle 11 =$ _____ $m\angle 20 =$ _____

$m\angle 3 =$ _____ $m\angle 12 =$ _____ $m\angle 21 =$ _____

$m\angle 4 =$ _____ $m\angle 13 =$ _____ $m\angle 22 =$ _____

$m\angle 5 =$ _____ $m\angle 14 =$ _____ $m\angle 23 =$ _____

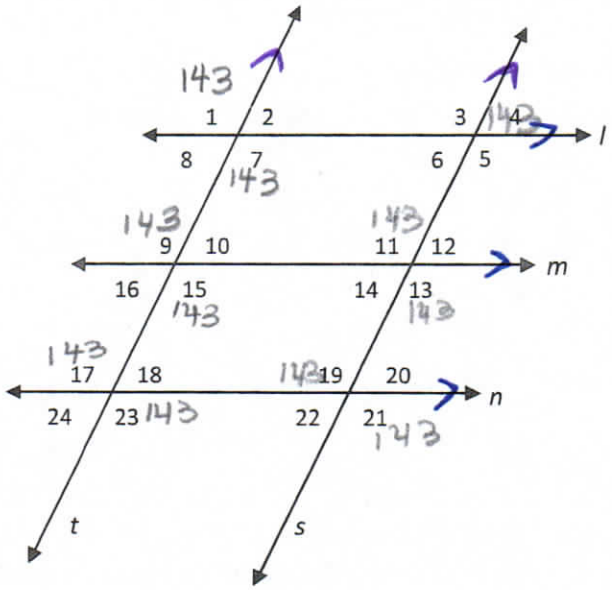
$m\angle 6 =$ _____ $m\angle 15 =$ _____ $m\angle 24 =$ _____

$m\angle 7 =$ _____ $m\angle 16 =$ _____

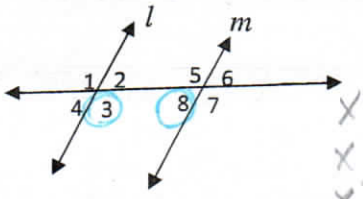
$m\angle 8 =$ _____ $m\angle 17 =$ _____

$m\angle 9 =$ _____ $m\angle 18 =$ _____

$m\angle 10 =$ _____ $m\angle 19 =$ _____



8 – 10: Given $l \parallel m$, find the value(s) of x and each angle. Be sure to check for extraneous solutions.



8) $m\angle 3 = x^2 + 112$; $m\angle 8 = 16x + 131$

$\boxed{x = -7}$ $x = -9$

9) $m\angle 3 = x^2 - 2x$; $m\angle 6 = 3x + 108$

10) $m\angle 1 = x^2 - 7x$; $m\angle 7 = -x + 7$

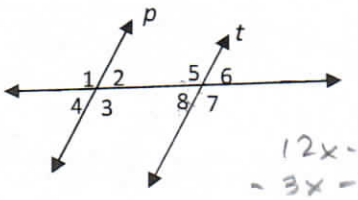
$x^2 + 112 + 16x + 131 = 180$

$x^2 + 16x + 243 = 180$

$x^2 + 16x + 63 = 0$

$(x+7)(x+9) = 0$

11 – 13: Given $p \parallel t$, find the value(s) of each variable and each angle.



11) $m\angle 1 = 12x - 4y$, $m\angle 8 = x - 4y$, $m\angle 5 = 15x + 8y$

12) $m\angle 2 = 8b + a$, $m\angle 5 = 7a + 25b$, $m\angle 4 = 3a + 5b$

13) $m\angle 3 = 14s - 3t$, $m\angle 7 = 9s + 12t$, $m\angle 4 = 5s + 6t$

$12x - 4y = 15x + 8y$

$-3x - 12y = 0$

$48x + 12y = 540$

$x - 4y + 15x + 8y = 180$

$16y + 4y = 180$

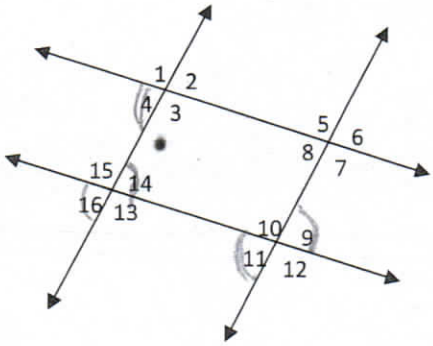
14) Given that $m\angle 4 = 3x + 10$ and $m\angle 12 = 2x + 30$, find the value of x, $m\angle 4, m\angle 10$.

$45x = 540$

$\boxed{x = 12}$

$\boxed{m\angle 4 = 94}$

$\boxed{m\angle 10 = 86}$



$3x + 10 + 2x + 30 = 180$

$5x + 40 = 180$

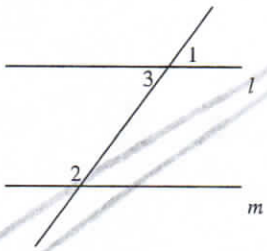
$5x = 140$

$\boxed{x = 28}$

Write a two-column proof.

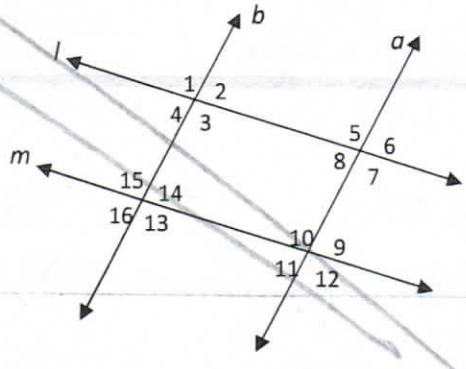
15) **Given:** $l \parallel m$

Prove: $\measuredangle 1$ and $\measuredangle 2$ are supplementary



16) **Given:** $l \parallel m$ and $a \parallel b$

Prove: $\measuredangle 1 \cong \measuredangle 12$



9. $x^2 - 2x + 3x + 108 = 180$

$x^2 + x - 72 = 0$

$(x+9)(x-8) = 0$

$\boxed{x = -9 \quad x = 8}$

10. $x^2 - 7x = -x + 7$

$x^2 - 6x - 7 = 0$

$(x-7)(x+1) = 0$

$x = 7 \quad \boxed{x = -1}$

(11) $x - 4y + 15x + 8y = 180$ $\qquad$ $12x - 4y = 15x + 8y$

$16x + 4y = 180$ $\qquad$ $-3x - 12y = 0$

$\cancel{16x + 4y = 180}$] 3

$-3x - 12y = 0$ $\qquad$ $-3(12) - 12y = 0$

$48x + 12y = 540$ $\qquad$ $-36 - 12y = 0$

$45x = 540$ $\qquad$ $-36 = 12y$

$\boxed{x = 12}$ $\qquad$ $\boxed{-3 = y}$

(12) $8b + a + 7a + 25b = 180$ $\qquad$ $8b + a = 3a + 5b$

$8a + 33b = 180$ $\qquad$ $-2a + 3b = 0$

$8a + 33b = 180$

[$-2a + 3b = 0$] 4

$\cancel{8a} + 33b = 180$ $\qquad$ $-2a + 3(4) = 0$

$\cancel{-8a} + 12b = 0$ $\qquad$ $-2a + 12 = 0$

$45b = 180$ $\qquad$ $-2a = -12$

$\boxed{b = 4}$ $\qquad$ $\boxed{a = 6}$

(13) $14s - 3t = 9s + 12t$ $\qquad$ $9s + 12t + 5s + 6t = 180$

$5s - 15t = 0$ $\qquad$ $14s + 18t = 180$

$* \; 14s - 3t + 5s + 6t = 180$

$19s + 3t = 180$

$5s - 15t = 0$

$19s + 3t = 180$] 5

$5s - 15t = 0$ $\qquad$ $\boxed{s = 9}$ $\qquad$ $\boxed{t = 3}$

$95 + 15t = 900$

$100s = 900$