Unit 1, Vocabulary and Algebra

Name: _____

Notes 1-1: Midpoints, Bisectors, Vertical Angles

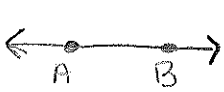
Date: _____ Period: _____

Notation -

Segments

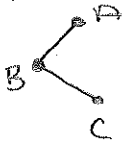
$\overline{AB}$ = line segment

$\overleftrightarrow{AB}$ = line $\overrightarrow{AB}$ = Ray



Angles

$\angle ABC$ ← vertex

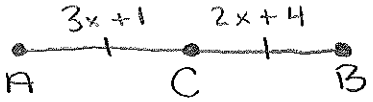


$m\angle ABC$

"Measure of"

Midpoints

Ex. 1 If C is the midpoint of $\overline{AB}$, AC = 3x + 1, CB = 2x + 4, find x, AC, CB, and AB.



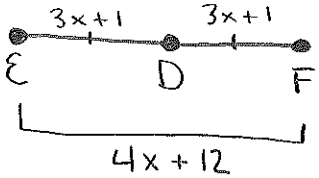
$x = 3$
$AC = 10$
$CB = 10$
$AB = 20$

① $3x + 1 = 2x + 4$
$-2x \quad -2x$
$x + 1 = 4$
$-1 \quad -1$
$x = 3$

② $3(3) + 1$
$9 + 1 = 10$

③ $10 + 10 = 20$

Ex. 2 If D is the midpoint of $\overline{EF}$, ED = 3x + 1, EF = 4x + 12, find x, ED, DF, and EF.



① $3x + 1 + 3x + 1 = 4x + 12$

② $3x + 1 + 3x + 1 = 4x + 12$

$6x + 2 = 4x + 12$
$-4x \quad -4x$
$2x + 2 = 12$
$-2 \quad -2$
$\frac{2x}{2} = \frac{10}{2} = 5$

$x = 5$
$ED = 16$
$DF = 16$
$EF = 32$

② $3x + 1$
$= 3(5) + 1$
$= 16$

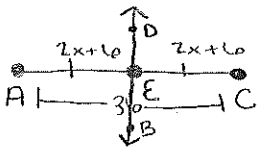
④ $16 + 16 = 32$

Notes 2-2 **Midpoints, Bisectors, Vertical Angles**

Segment Bisectors

Ex. 3 $\overleftrightarrow{DB}$ bisects $\overline{AC}$ at E, AE = 2x + 6 and AC = 36, find x, AE, and EC.

↑ cuts in half



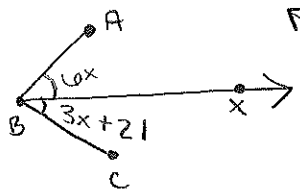
② $2x+6$
$2(6)+6$
$12+6$
18

$x = 6$
$AE = 18$
$EC = 18$

① $2x+6+2x+6=36$
$4x+12=36$
$-12 \quad -12$
$\frac{4x}{4} = \frac{24}{4} = 6$

Angle Bisectors

Ex. 4 If $\overrightarrow{BX}$ bisects ∠ABC, m∠ABX = 6x, and m∠XBC = 3x + 21, find x, m∠ABX, and m∠ABC.



84°

① $6x = 3x+21$
$-3x \quad -3x$
$\frac{3x}{3} = \frac{21}{3} = 7$

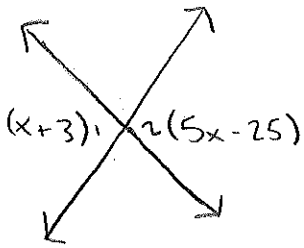
② $6(7)$
$42°$

$x = 7$
$ABX = 42°$
$ABC = 84°$

Vertical Angles

Ex. 5 ∠1 and ∠2 are vertical angles. If m∠1 = x + 3 and m∠2 = 5x − 25, find x and m∠1.

Verticle angles are always congruent



① $5x-25 = x+3$
$-x \quad -x$
$4x-25 = 3$
$+25 \quad +25$
$\frac{4x}{4} = \frac{28}{4} = 7$

$x = 7$
$m\angle 1 = 10°$

Geometry

Worksheet 1-1

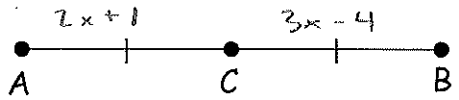
Name: _____

Date: _____ Period: _____

Use the Four-Step Problem-Solving Procedure for each problem. Write your final answers in the appropriate blank.

Midpoints

1. If C is the midpoint of $\overline{AB}$, $AC = 2x + 1$, $CB = 3x - 4$, find x, AC, CB, and AB.



$x =$ 5

$AC =$ 11

$CB =$ 11

$AB =$ 22

① $3x - 4 = 2x + 1$

$x - 4 = 1$

$+4 \quad +4$

$x = 5$

$2(5) + 1$

$10 + 1 = 11$

$11 + 11 = 22$

2. If T is the midpoint of $\overline{PQ}$, $PT = 5x + 3$, $TQ = 7x - 9$, find x, PT, TQ, and PQ.

$x =$ 6

$PT =$ 33

$TQ =$ 33

$PQ =$ 66

$5x + 3 = 7x + 9$

$-5x \quad -5x$

$7x + 9 = 5x + 3$

$2x + 9 = 3$

$2x - 9 = 3$

$+9 \quad +9$

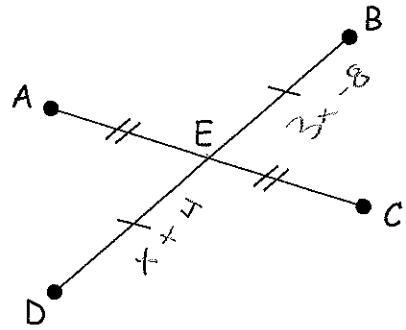
$\frac{2x}{2} = \frac{12}{2}$

$5x$

$5(6) + 3$

$30 + 3 = 33$

Segment Bisectors



3. If $DE = x + 4$ and $EB = 3x - 8$, find x and DB.

$x =$ 6

$DB =$ 20

$2x - 8 = 4$

$+8 \quad +8$

12

$x = 6$

$3x - 8 = x + 4$

$-x \quad -x$

$2x - 8 = 4$

4. $\overleftrightarrow{DB}$ bisects $\overline{AC}$ at E, $AE = 2x + 7$ and $AC = 34$, find x, AE, and EC.

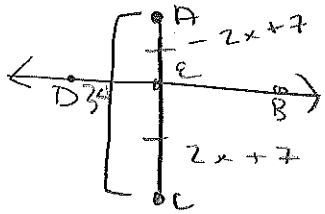
$x =$ 5

$AE =$ 17

$EC =$ 17

$2(5) + 7$

$10 + 7 = 17$



$2x + 7 + 2x + 7 = 34$

$4x + 14 = 34$

$-14 \quad -14$

$\frac{4x}{4} = \frac{20}{4}$ $x = 5$

5. If $AE = 12$ and $AC = 4x - 36$, find x, EC, and AC.

$x =$ 15

$EC =$ 12

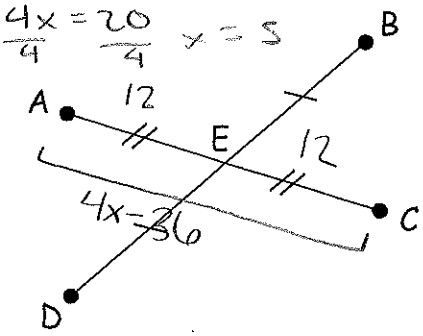
$AC =$ 24

$4(12) - 36$

48

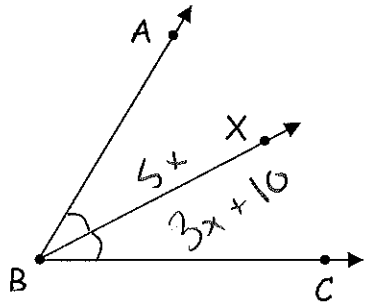
-36

12



Angle Bisectors

6. If $\overrightarrow{BX}$ bisects $\angle ABC$, $m\angle ABX = 5x$, and $\angle XBC = 3x + 10$, find x, $m\angle ABX$, and $m\angle ABC$.



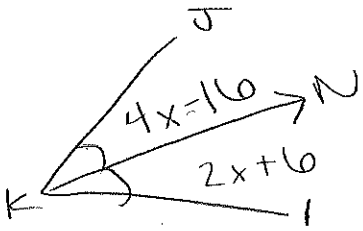
$5x = 3x + 10$

x = 5

$m\angle ABX$ = 25

$m\angle ABC$ = 50

7. If $\overrightarrow{KN}$ bisects $\angle JKL$, $m\angle JKN = 4x - 16$, and $m\angle NKL = 2x + 6$, find x and $m\angle JKL$.



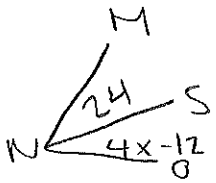
$4x - 16 = 2x + 6$
$+16 \quad +16$

$\frac{2x}{2} + \frac{22}{2} = 11$

x = 11

$m\angle JKL$ = 56°

8. If $\overrightarrow{NS}$ bisects $\angle MNO$, $m\angle MNS = 24$, and $m\angle MNO = 4x - 12$, find x and $m\angle MNO$.



24
$+24$

$4x - 12 = 24$
$+12 \quad +12$
$4x = 36$

$4(9) - 12$ $\quad x = 9$

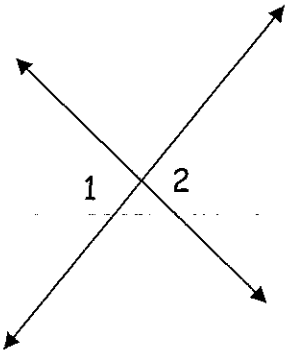
24
24
48

x = 9

$m\angle MNO$ = 48

Vertical Angles

9. If $m\angle 1 = x + 10$ and $m\angle 2 = 4x - 35$, find x and $m\angle 1$.



$x + 10 = 4x - 35$

x = _____

$m\angle 1$ = _____

10. $\angle 3$ and $\angle 4$ are vertical angles. $m\angle 3 = 3x + 8$ and $m\angle 4 = 5x - 20$, find x and $m\angle 4$.

x = _____

$m\angle 4$ = _____