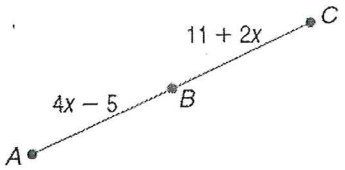
Key

Advanced Angle and Segment Relationships: Class Work

1. Find the measure of $\overline{BC}$ if B is the midpoint of $\overline{AC}$.



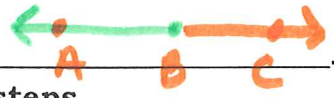
AB = BC def of midpt
4x − 5 = 11 + 2x substitution
2x − 5 = 11 subtraction
2x = 16 addition
x = 8 division
BC = 27 units

Find the value of the variable and ST if S is between R and T. Justify your steps.

2. $RS = 7a, ST = 12a, RT = 76$

3. $RS = 12, ST = 2x, RT = 34$

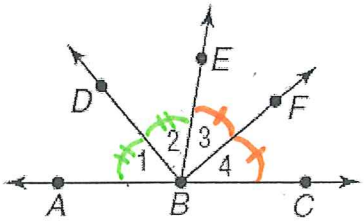
4. $RS = 4y - 1, ST = 2y - 1, RT = 5y$

$\overrightarrow{BA}$ and $\overrightarrow{BC}$ are opposite rays, which means 

. **$\overrightarrow{BF}$ bisects <CBE and $\overrightarrow{BD}$ bisects <ABE. Justify your steps.**

5. What does it mean to bisect an angle? Cut < into 2 ≅ <s

6. If $m < EBF = 6x + 4$ and $m < CBF = 7x - 2$, find $m < EBC$.



7. If $m < 1 = 4x + 10$ and $m < 2 = 5x$, find $m < 2$.

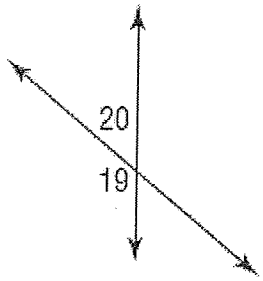
8. If $m < 2 = 6y + 2$ and $m < 1 = 8y - 14$, find $m < ABE$.

9. Is $< DBF$ a right angle? Explain.

Justify your steps.

10. Find x.

$m\angle 19 = 100 + 20x,$
$m\angle 20 = 20x$



$\angle 19 + \angle 20 = 180°$ linear pairs are suppl.

$100 + 20x + 20x = 180$ substitution

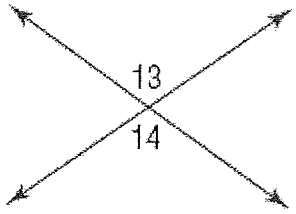
$100 + 40x = 180$ CLT - subst.

$40x = 80$ Subtraction

$\boxed{x = 2}$ division

11. Find x.

$m\angle 13 = 2x + 94,$
$m\angle 14 = 7x + 49$



$\angle 13 = \angle 14$ vertical $\angle$s are $\cong$

$2x + 94 = 7x + 49$ Substitution

$94 = 5x + 49$ Subtraction

$45 = 5x$ subtraction

$\boxed{9 = x}$ division

12. The measures of two complementary angles are $m < A = 16z - 9$ and $m < B = 4z + 3$. Find the measures of both angles.

Complementary means $\angle$s which add to equal 90°

$\angle A + \angle B = 90°$ def of compl.

$16z - 9 + 4z + 3 = 90$ Substitution

$20z - 6 = 90$ CLT - substitution

$20z = 96$ addition

$z = 4.8$ division

$\angle A = 16(4.8) - 9$

$\angle = 67.8°$

$\angle B = 4(4.8) + 3$

$\angle B = 22.2°$

check work
$67.8 + 22.2 = 90°$ ✓

2. $RS + ST = RT$ Segment addition

$7a + 12a = 76$ substitution

$19a = 76$ CLT-subst.

$\boxed{a = 4}$ division

$\boxed{ST = 48 \text{ units}}$

3.) $RS + ST = RT$ segment addition

$12 + 2x = 34$ substitution

$2x = 22$ subtraction

$\boxed{x = 11}$ division

$\boxed{ST = 22}$

4.) $RS + ST = RT$ segment addition

$4y - 1 + 2y - 1 = 5y$ substitution.

$6y - 2 = 5y$ CLT-substitution

$-2 = -y$ subtraction

$\boxed{2 = y}$ division

$ST = 2 \cdot 2 - 1$

$\boxed{ST = 3}$

6.) ~~$\angle EBF + \angle CBF = \angle EBC$~~ ~~angle addition~~

~~$6x + 4 + 7x - 2 = \angle EBC$~~ Bad

$\angle EBF = \angle CBF$ def of $\angle$ bisector

$6x + 4 = 7x - 2$ Substitution

$4 = x - 2$ subtraction

$6 = x$ addition

$\angle EBF + \angle CBF = \angle EBC$ angle addition

$6 \cdot 6 + 4 + 7 \cdot 6 - 2 = \angle EBC$ Substitution

$\boxed{m\angle EBC = 83^\circ}$

7.) $\angle 1 = \angle 2$ def of $\angle$ bisector

$4x+10 = 5x$ Substitution

$10 = x$ subtraction

$m\angle 2 = 5 \cdot 10$ Substitution

$\boxed{m\angle 2 = 50^\circ}$

8.) $\angle 1 = \angle 2$ def of $\angle$ bisector

$8y-14 = 6y+2$ Substitution

$2y-14 = 2$ subtraction

$2y = 16$ addition

$y = 8$ division

$m\angle ABE = \angle 1 + \angle 2$ angle addition

$\angle ABE = 8 \cdot 8 - 14 + 6 \cdot 8 + 2$ substitution

$\angle ABE = 100^\circ$

9.) Based on the fact that

$\angle 1 = 50^\circ$ $\angle 2^\circ = 50$

That leaves $\angle EBC = 80^\circ$

and b/c $\angle 3 = \angle 4$ by def of $\angle$ bisector,

$\angle 3 = 40^\circ$ $\angle 4 = 40^\circ$

So, $\angle DBF = \angle 2 + \angle 3$ by $\angle$ addition

$\angle DBF = 50^\circ + 40^\circ$ by substitution

Therefore, $\angle DBF = 90^\circ$

So, Yes $\angle DBF$ is a Right Angle