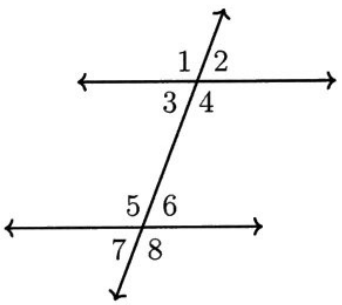
BECA / Dr. Huson / Geometry
Unit 3: Parallel lines and transversals
17 October 2022

Name: Solutions

3.1 Parallel lines and transversals

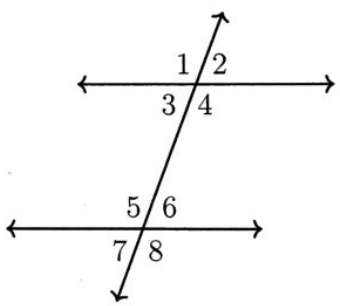
1. Given two parallel lines and a transversal, as shown, with $m\angle 6 = 70°$. Write down the value of each angle measure.

   (a) $m\angle 1 =$ 110
   (b) $m\angle 2 =$ 70
   (c) $m\angle 3 =$ 70
   (d) $m\angle 4 =$ 110
   (e) $m\angle 5 =$ 110
   (f) $m\angle 6 =$ 70
   (g) $m\angle 7 =$ 70
   (h) $m\angle 8 =$ 110



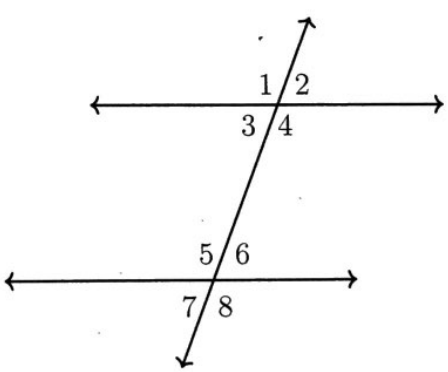
2. Label the relationship of each pair: adjacent, vertical, corresponding, alternate interior, same side interior, alternate exterior, or same side exterior

   (a) $\angle 1, \angle 4$ Vertical
   (b) $\angle 3, \angle 6$ Alt. Int.
   (c) $\angle 5, \angle 3$ Same side Int.
   (d) $\angle 6, \angle 2$ Corresponding
   (e) $\angle 1, \angle 8$ Alt. Exterior

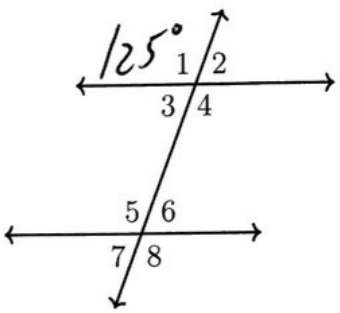


3. Identify each angle

   (a) Opposite $\angle 4$ $\angle 1$
   (b) Corresponding to $\angle 3$ $\angle 7$
   (c) Alternate exterior to $\angle 8$ $\angle 1$
   (d) Same side interior to $\angle 5$ $\angle 3$
   (e) Alternate interior to $\angle 4$ $\angle 5$



4. Given two parallel lines and a transversal, as shown, with $m\angle 1 = 125°$. Write down the value of each angle measure.



(a) $m\angle 5 =$ 125°

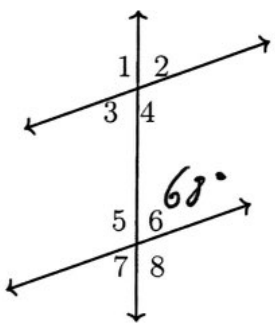
(b) $m\angle 6 =$ 55°

(c) $m\angle 4 = 5y$. Find y.

$5y = 125$

$y = 25°$

5. Given two parallel lines and a transversal, as shown, with $m\angle 6 = 68°$. Write down the value of each angle measure.

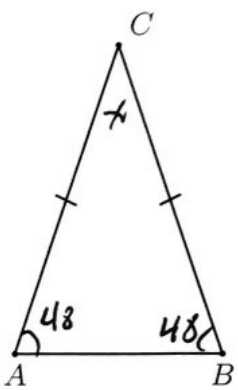


(a) What angle is corresponding to $\angle 6$? $\angle 2$

(b) What angle is alternate interior to $\angle 4$? $\angle 5$

(c) Find $m\angle 1$ $180 - 68 = 112°$

6. Given $\triangle ABC$. $\overline{AC} \cong \overline{BC}$, $m\angle A = 48$. Find $m\angle C$.



$x + 48 + 48 = 180$

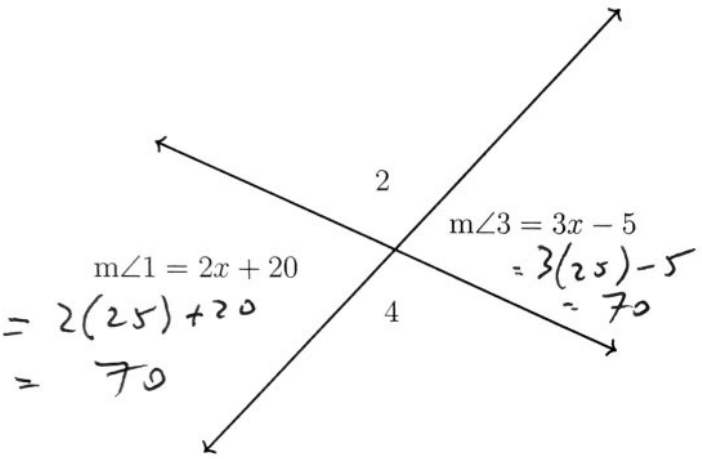
$x = 84$

BECA / Dr. Huson / Geometry
Unit 3: Parallel lines and transversals
17 October 2022

Name: Solutions

3.1 Homework: Mixed review

1. Two lines intersect with vertical angles $m\angle 1 = 2x + 20$ and $m\angle 3 = 3x - 5$. Find $m\angle 2$.



$= 2(25) + 20$
$= 70$

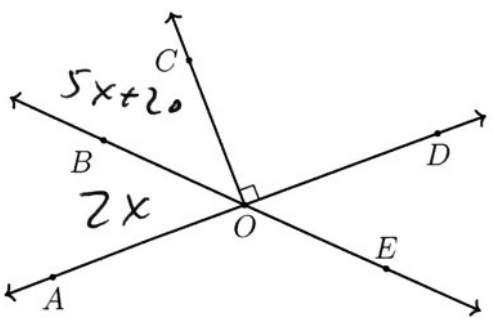
$2x + 20 = 3x - 5$
$x = 25$

$= 3(25) - 5$
$= 70$

$m\angle 2 + 70 = 180$
$m\angle 2 = 110°$

2. Write the appropriate name for the type of angle depending on its measure in degrees. (acute, right, obtuse, or straight)
   (a) $m\angle = 90$: Right
   (b) $90 < m\angle < 180$: obtuse
   (c) $0 < m\angle < 90$: acute
   (d) $m\angle = 180$: Straight

3. Identify the true statement(s) given $\angle AOB = 2x$ and $\angle BOC = 5x + 20$.



   (a) $\angle AOB \cong \angle BOC$
   $2x = (5x + 20)$

   (b) $\angle AOB$, $\angle BOC$ are complementary
   $2x + (5x + 20) = 90°$ True

   (c) $\angle AOB$ and $\angle BOC$ are a linear pair
   $2x + (5x + 20) = 180°$

Copy the correct equation and solve for x. Check your answer.

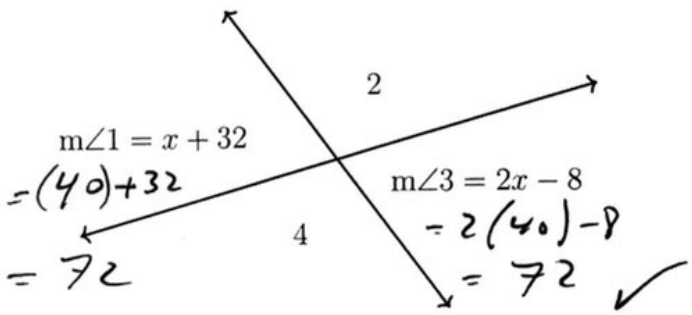
$2x + (5x + 20) = 90$
$7x = 70$
$x = 10$

$5(10) + 20 = 70$
$2(10) = 20$
$70 + 20 = 90$ ✓

4. As shown below, two lines intersect making four angles: $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$. Given that $m\angle 1 = x + 32$ and $m\angle 3 = 2x - 8$, find $m\angle 1$.

$x + 32 = 2x - 8$

$40 = x$

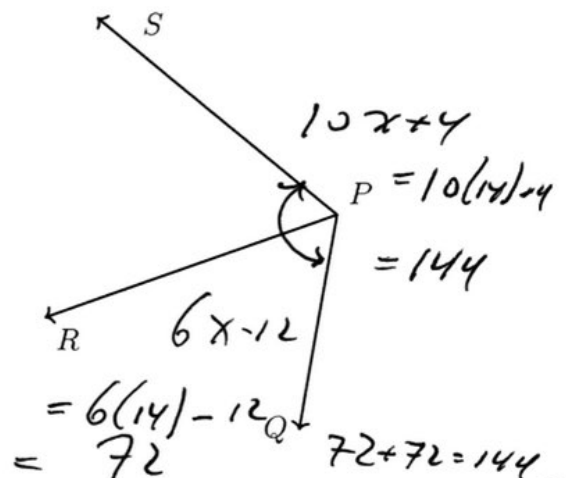


5. An angle bisector is shown below, with $\overrightarrow{PR}$ bisecting $\angle QPS$. Given $m\angle QPR = 6x - 12$ and $m\angle QPS = 10x + 4$, find $m\angle QPS$.

$2(6x - 12) = 10x + 4$

$2x = 28$

$x = 14$



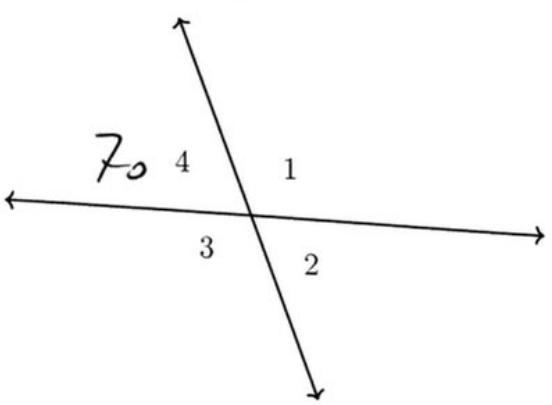
6. As shown below, two lines intersect making four angles: $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$.

(a) Name a pair of vertical angles.

$\angle 1 \cong \angle 3$

(b) Given $m\angle 4 = 70°$, write down $m\angle 2$.

$70°$



(c) Find $m\angle 1$.

$180 - 70 = 110$

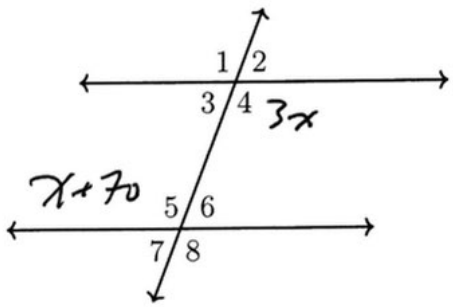
BECA / Dr. Huson / Geometry
Unit 3: Parallel lines and transversals
18 October 2022

Name: Solutions

3.2 Classwork: Finding angle measures for transverse lines

1. Given two parallel lines and a transversal, with $m\angle 4 = 3x$ and $m\angle 5 = x + 70$. Write an equation, then solve for x.

$3x = x + 70$
$2x = 70$
$x = 35$

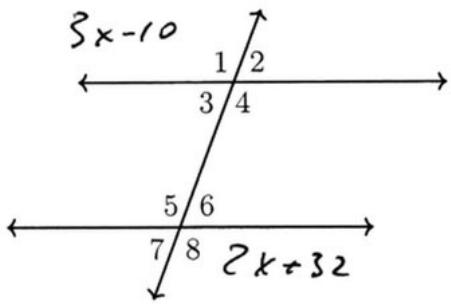


$m\angle 5 = x + 70 = 35 + 70 = 105$
$m\angle 4 = 3(35) = 105$ $\quad 105 = 105$ ✓

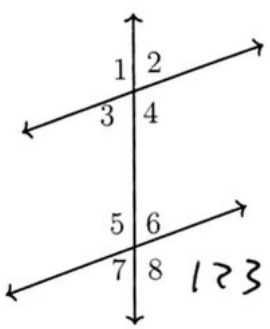
2. Given two parallel lines and a transversal, with $m\angle 1 = 3x - 10$ and $m\angle 8 = 2x + 32$. Write an equation, then solve for x.

$3x - 10 = 2x + 32$
$x = 42$

$3(42) - 10 = 2(42) + 32$?
$126 - 10 = 84 + 32$
$116 = 116$ ✓



3. Given two parallel lines and a transversal, as shown, with $m\angle 8 = 123°$.



(a) What angle is corresponding to $\angle 8$?

$\angle 4$

(b) What angle is alternate exterior to $\angle 8$?

$\angle 1$

(c) Find $m\angle 2$

$m\angle 2 + 123 = 180$
$m\angle 2 = 57°$

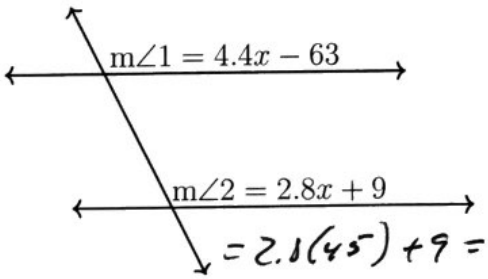
4. Two parallel lines intersect a transversal. Given corresponding angles $m\angle 1 = 4.4x - 63$ and $m\angle 2 = 2.8x + 9$, find the measure of $\angle 1$.

$4.4x - 63 = 2.8x + 9$

$1.6x = 72$

$x = 45$

$m\angle 1 = 4.4(45) - 63 =$



$= 2.8(45) + 9 =$

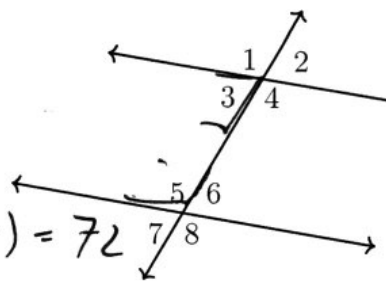
5. Given two parallel lines and a transversal, with $m\angle 3 = 18(x - 1)$ and $m\angle 5 = 18(x + 1)$. Find $m\angle 1$. (First write an equation, and solve for x)

$18(x-1) + 18(x+1) = 180$

$x - 1 + x + 1 = 10$

$2x = 10$

$x = 5$

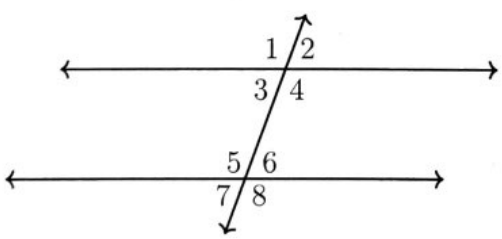


$18(5-1) = 72$

$18(5+1) = 108$

$72 + 108 = 180$ ✓

6. Given two parallel lines and a transversal, as shown below.



(a) State the angle corresponding with $\angle 7$. $\angle 3$

(b) What theorem would justify $m\angle 4 + m\angle 6 = 180°$? Same side interior $\angle$s are $\cong$

(c) What theorem would justify $\angle 3 \cong \angle 6$? Alt. side Interior $\angle$s $\cong$

(d) Given $m\angle 1 = 117°$ and $m\angle 8 = (4x - 3)°$. Find x.

$4x - 3 = 117$

$x = 30$

$4(30) - 3 = 117$

$120 - 3 = 117$ ✓

BECA / Dr. Huson / Geometry
Unit 3: Parallel lines and transversals
18 October 2022

Name: Solutions

3.2 Homework: Mixed review

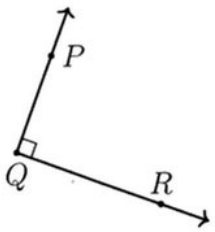
1. Demonstrate your ability to classify angles and use standard terminology.

   (a) Which of the following are true with respect to the angle, m$\angle PQR$?

   True False It is a right angle

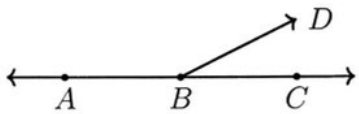
   True False It's measure is 180°

   True False $\overrightarrow{QP}$ is perpendicular to $\overrightarrow{QR}$



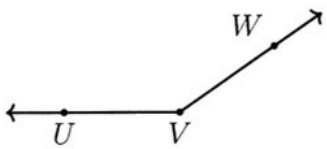
   (b) What is the sum of the degree measures of this linear pair, $\angle ABD$ and $\angle CBD$?

   180°



   (c) The given angle $\angle UVW$ is which of the following: acute, obtuse, or right?

   obtuse

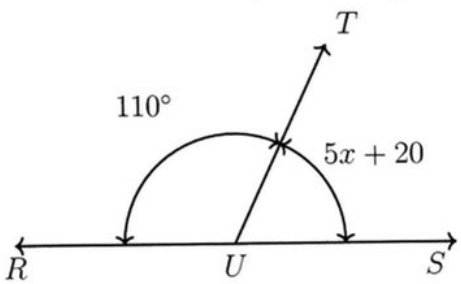


2. A linear pair is formed by two angles, m$\angle RUT = 110°$ and m$\angle SUT = 5x + 20$.

   Write an equation, then solve for x.

$5x + 20 = 110$
$5x = 90$
$x = 18$

$= 5(18) + 20$
$= 110$ ✓



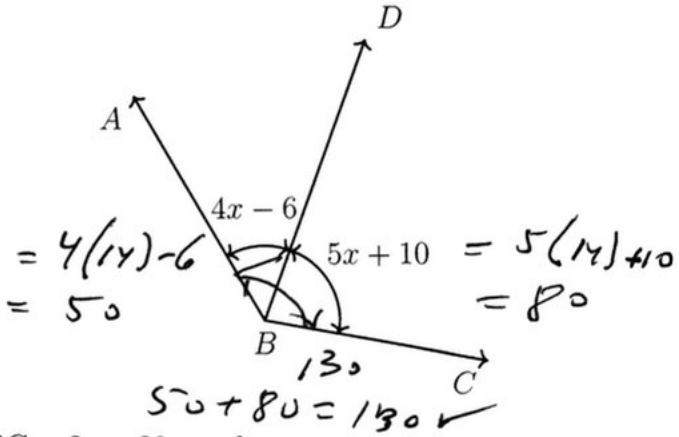
3. Given $m\angle ABD = 4x - 6$, $m\angle DBC = 5x + 10$, and $m\angle ABC = 130°$, as shown.

   Model the situation with an equation, then solve for x. Check your solution for full credit.

$(4x-6) + (5x+10) = 130$

$9x + 4 = 130$

$x = 14$



$= 4(14)-6$ $= 5(14)+10$

$= 50$ $= 80$

130

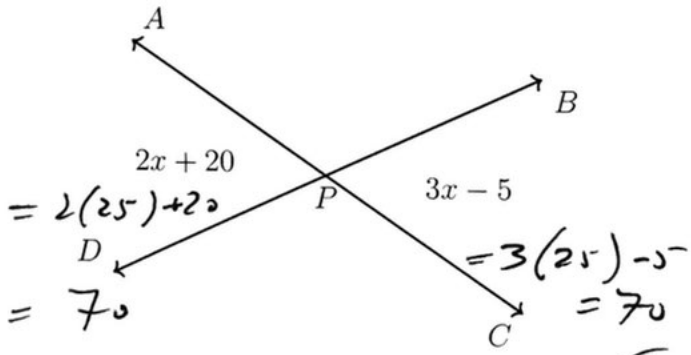
$50 + 80 = 130$ ✓

4. Given vertical angles, $m\angle APD = 3x - 5$, $m\angle BPC = 2x + 20$, as shown.

   Find x. Check your solution for full credit.

$3x - 5 = 2x + 20$

$x = 25$ ✓



$= 2(25)+20$ $= 3(25)-5$

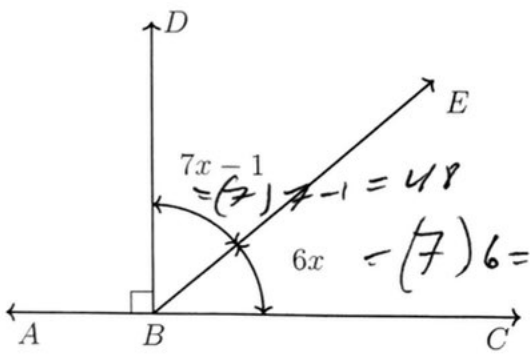
$= 70$ $= 70$ ✓

5. In the diagram shown, $\overrightarrow{BD} \perp \overleftrightarrow{ABC}$ with $m\angle DBE = 7x - 1°$ and $m\angle EBC = 6x°$. Find x. Show the check for full credit.

$(7x-1) + 6x = 90$

$13x = 91$

$x = 7$



$= (7)7-1 = 48$

$= (7)6 = 42$

$48 + 42 = 90$ ✓

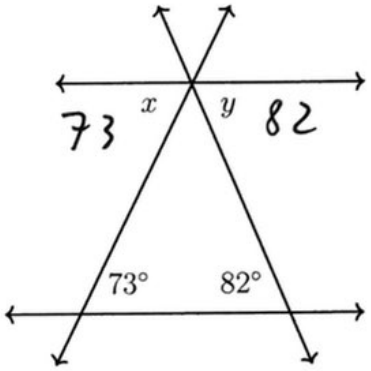
BECA / Dr. Huson / Geometry
Unit 3: Parallel lines and transversals
20 October 2022

Name: Solutions

3.3 Classwork: Situations with parallel lines and transversals

1. Given two parallel lines, two transversals

   (a) Find x, y

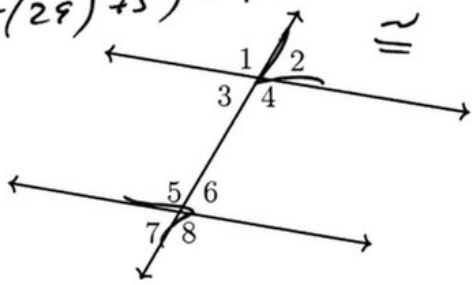


   (b) What relationship are you using?
   Alternate interior angles
   (e.g. vertical angles, same-side exterior angles, alternate interior angles, etc.)

2. Find $m\angle 1$ given two parallel lines and a transversal, with

   $m\angle 2 = 2x + 17$ $m\angle 7 = \frac{1}{2}(5x + 5)$

   $= 2(29)+17 = 75$ $= \frac{1}{2}(5(29)+5) = 75$ ✓



   $2x + 17 = \frac{1}{2}(5x + 5)$

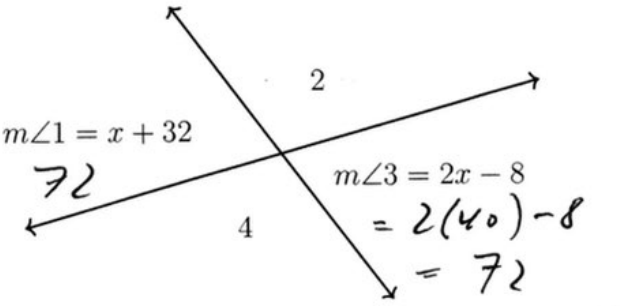
   $4x + 34 = 5x + 5$

   $29 = x$

3. As shown below, two lines intersect making four angles: $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$. Given that $m\angle 1 = x + 32$ and $m\angle 3 = 2x - 8$, find $m\angle 1$.

   $x + 32 = 2x - 8$

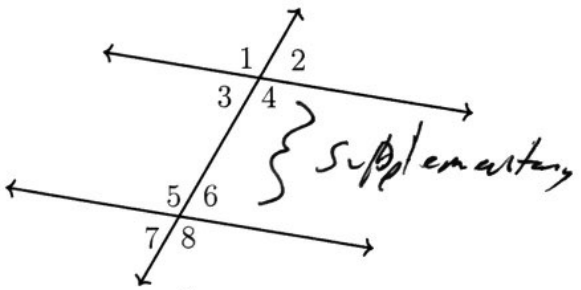
   $40 = x$



   ✓

4. Find $m\angle 1$ given two parallel lines and a transversal, with

$m\angle 4 = 12(7x-4)$ $\quad$ $m\angle 6 = 6(7x-4)$



$12(7x-4) + 6(7x-4) = 180$

$18(7x-4) = 180$

$7x-4 = 10$

$7x = 14$

$x = 2$

$m\angle 1 = m\angle 4 = 12(7(2)-4)$

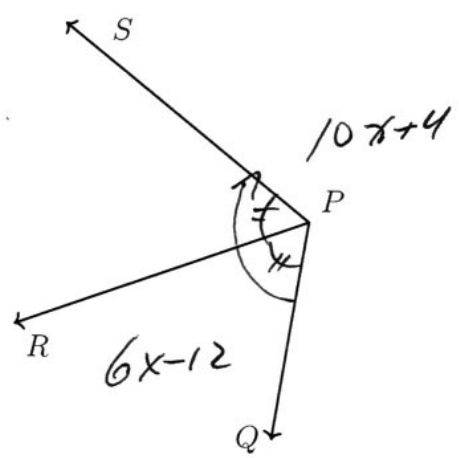
$= 120$

$m\angle 6 = 6(7(2)-4)$

$= 60$

$120 + 60 = 180$ ✓

5. An angle bisector is shown below, with $\overrightarrow{PR}$ bisecting $\angle QPS$. Given $m\angle QPR = 6x-12$ and $m\angle QPS = 10x+4$, find $m\angle QPS$.



$2(6x-12) = 10x+4$

$6x-12 = 5x+2$

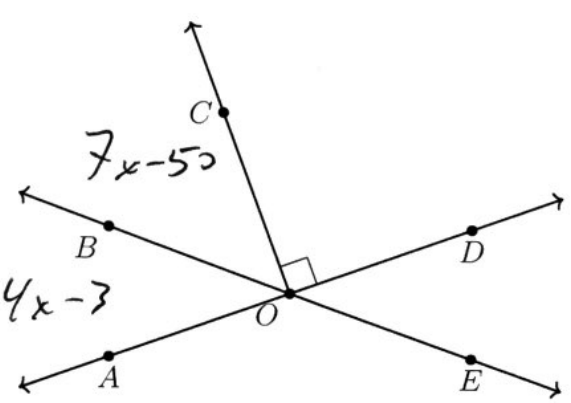
$x = 14$

$m\angle QPS = 10(14)+4 = 144$

$m\angle QPR = 6(14)-12 = 72$

$72+72 = 144$

6. In the diagram below $\angle BOC = 7x-50$ and $\angle AOB = 4x-3$. Find $m\angle AOB$. CCSSM.8.G.B.5



$(7x-50) + (4x-3) = 90$

$11x = 143$

$x = 13$

$m\angle AOB = 4(13)-3 = 49$

$m\angle BOC = 7(13)-50 = 41$

$49+41 = 90$ ✓

Name: SOLUTIONS

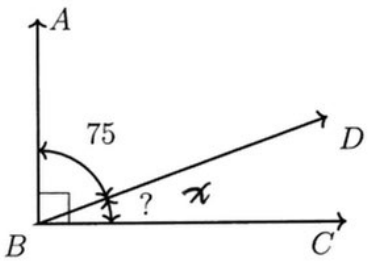
3.3 Homework: Mixed review

1. Apply the Angle Addition postulate. Write and equation to support your work.

Given $m\angle ABD = 75°$, $m\angle ABC = 90°$.

$x + 75 = 90$

$x = 15$



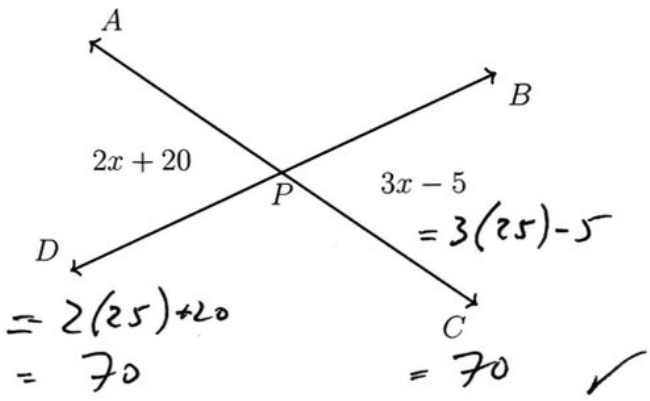
Find $m\angle CBD$.

2. Given vertical angles, $m\angle APD = 3x - 5$, $m\angle BPC = 2x + 20$, as shown.

Find x. Check your solution for full credit.

$2x + 20 = 3x - 5$

$x = 25$



$= 3(25) - 5$

$= 2(25) + 20$

$= 70$

$= 70$ ✓

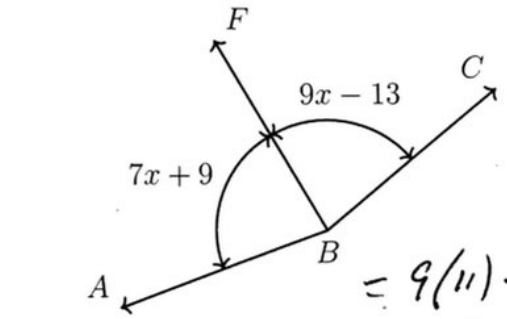
3. Ray $\overrightarrow{BF}$ is the angle bisector of $\angle ABC$. Given that the angle measures are $m\angle ABF = 7x + 9$ and $m\angle CBF = 9x - 13$.

Find $m\angle ABC$.

$7x + 9 = 9x - 13$

$22 = 2x$

$x = 11$



$= 9(11) - 13$

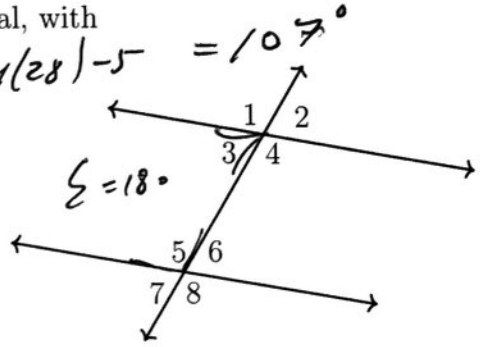
$= 7(11) + 9$

$= 86$

$= 86$ ✓

4. Find $m\angle 1$ given two parallel lines and a transversal, with

$m\angle 3 = 2x + 17$ $\quad m\angle 5 = 4x - 5$ $= m\angle 1 = 4(28) - 5 = 107°$



$(2x+17) + (4x-5) = 180$

$6x + 12 = 180$

$6x = 168$

$x = 28$

$\angle 3 = 2(28) + 17$

$= 73$

$107 + 73 = 180$ ✓

5. Given $\overleftrightarrow{ABC}$, right angle $\angle DBE$, $m\angle ABE = 4x + 12$, and $m\angle CBD = 3x - 6$.

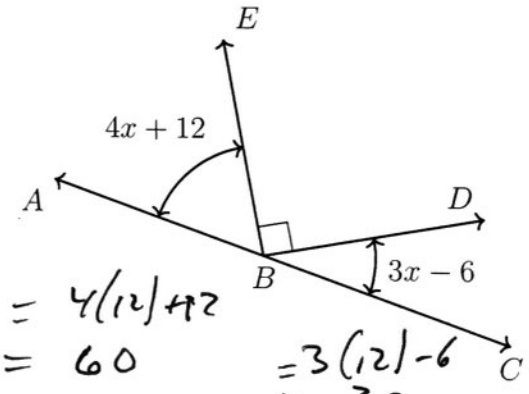
Find $m\angle CBD$.

$(4x+12) + 90 + (3x-6) = 180$

$7x + 6 = 90$

$7x = 84$

$x = 12$



$= 4(12) + 12$

$= 60$

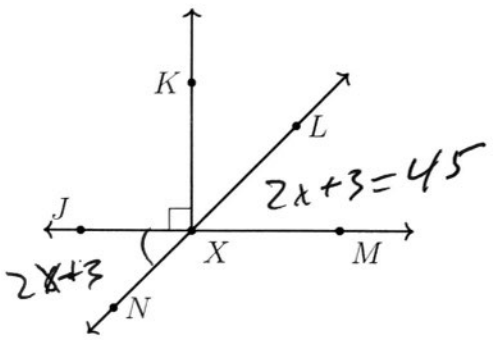
$= 3(12) - 6$

$= 30$ ✓

6. Ray $\overrightarrow{XL}$ is the angle bisector of $\angle KXM$. Given $m\angle JXN = 2x + 3$.

$30 + 60 + 90 = 180$

Find x.



$2x + 3 = 45$

$x = 21$

$2(21) + 3 = 45$

$= \frac{1}{2}(90)$ ✓