

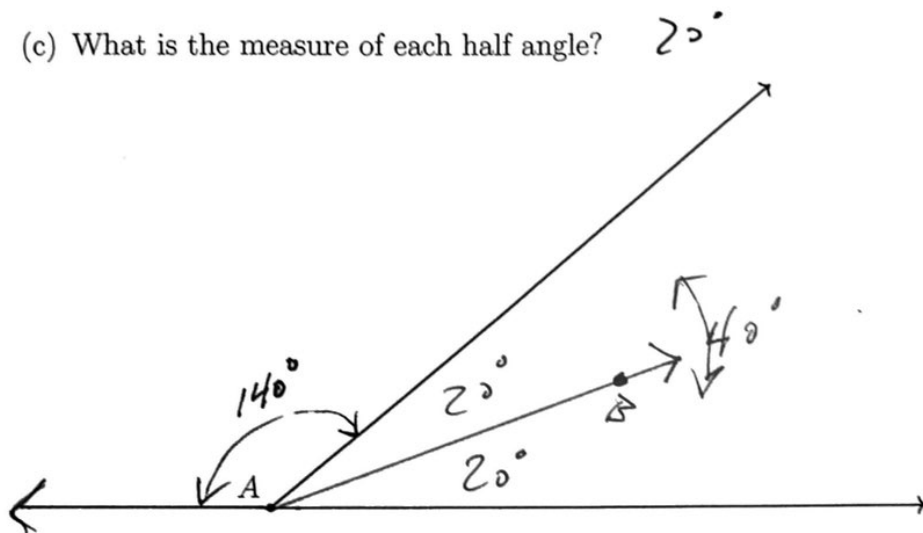
2.4 Classwork: Angle bisector

1. Given an angle with vertex A .

(a) Using a protractor, measure angle A in degrees. $m\angle A =$

(b) Draw a ray \overrightarrow{AB} that exactly bisects $\angle A$.

(c) What is the measure of each half angle?



2. What is the measure of a straight angle in degrees? 180°

3. Given two congruent angles, with one having a measure of 28° . What is the measure of the other angle?

28°

4. Two perpendicular lines intersect at point P . What is the measure of angle P in degrees?

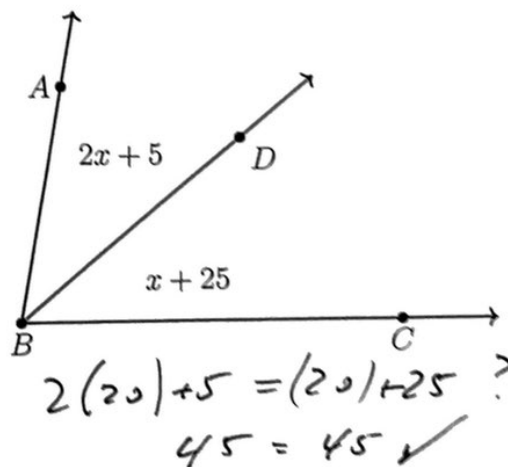
90°

5. The ray \overrightarrow{BD} bisects $\angle ABC$. $m\angle ABD = 2x + 5$, $m\angle DBC = x + 25$. Find $m\angle ABC$.

$$2x + 5 = x + 25$$

$$x = 20$$

$$m\angle ABC = 45 + 45 = 90^\circ$$



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

$$45 = 45 \checkmark$$

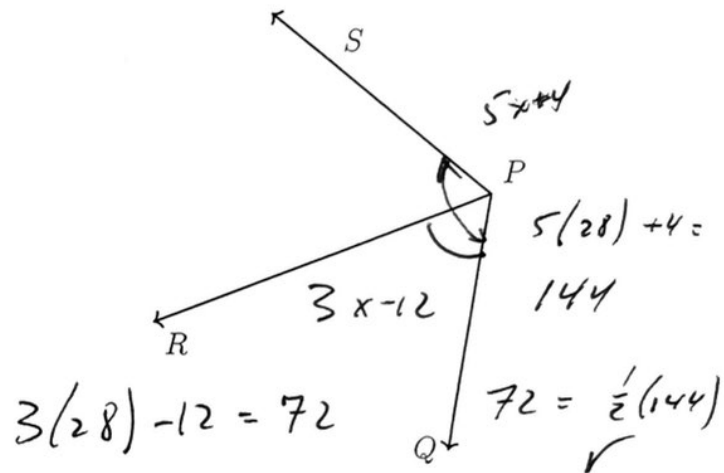
6. An angle bisector is shown below, with \overrightarrow{PR} bisecting $\angle QPS$. Given $m\angle QPR = 3x - 12$ and $m\angle QPS = 5x + 4$, find $m\angle QPS$.

$$2(3x - 12) = 5x + 4$$

$$6x - 24 = 5x + 4$$

$$x = 28$$

$$m\angle QPS = 144$$

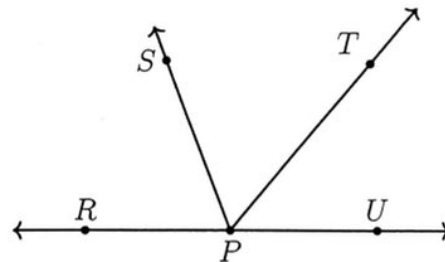


7. Given the situation in the diagram, answer each question. Circle True or False.

(a) T or F: \overrightarrow{PU} and \overrightarrow{PT} are opposite rays.

(b) T or F: $\angle RPT$ and $\angle SPU$ are adjacent angles.

(c) T or F: $\angle TPU$ is an acute angle.



8. Given a straight line and a ray, making two angles.

(a) Write down the names of the two angles using proper notation.

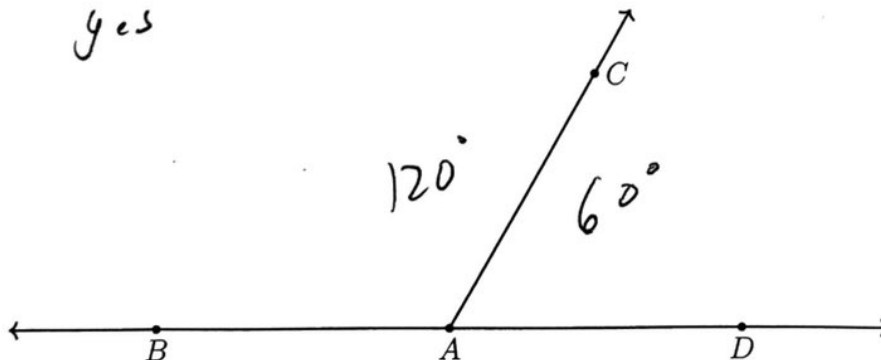
$\angle BAC$, $\angle CAD$

(b) Using a protractor, measure the two angles in degrees.

60° , 120°

(c) Do they sum to 180° ?

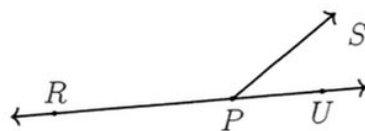
yes



9. Do Not Solve. Circle the appropriate equation. Cite a justification on the line.

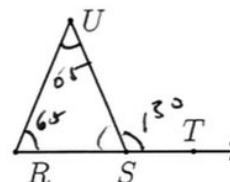
- "definition of bisector"
- "linear pairs sum to 180° "
- "vertical \angle s are \cong "
- "isosceles base angle theorem"
- " \perp rays with complementary \angle s adding to 90° "

(a) $\overleftrightarrow{RP\bar{U}}$ with ray \overrightarrow{PS} .



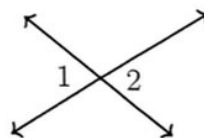
$\angle RPS \cong \angle SPU$ $m\angle RPS + m\angle SPU = 180^\circ$ Linear pairs sum 180°

(b) Given $m\angle R = m\angle U = 65$, and $m\angle UST = 130$. Find $m\angle RSU$.



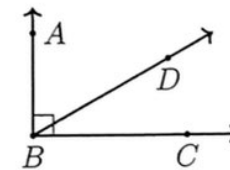
$\angle UST \cong \angle RSU$ $m\angle UST + m\angle RSU = 180$ Linear pairs sum 180°

(c) Given $m\angle 1 = 4x + 6$, $m\angle 2 = 6x - 32$. Find $m\angle 1$.



$\angle 1 \cong \angle 2$ $m\angle 1 + m\angle 2 = 180$ Vertical angles are \cong

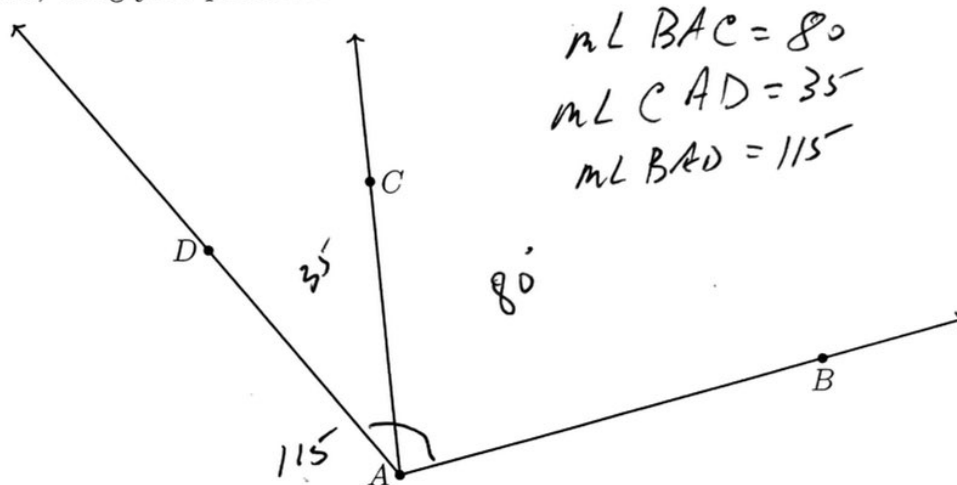
(d) Given $\overrightarrow{BA} \perp \overrightarrow{BC}$, $m\angle ABD = 2x - 5$, and $m\angle DBC = x - 10$.



$\angle ABD \cong \angle DBC$ $m\angle ABD + m\angle DBC = 90$ \perp rays with complementary \angle s add to 90°

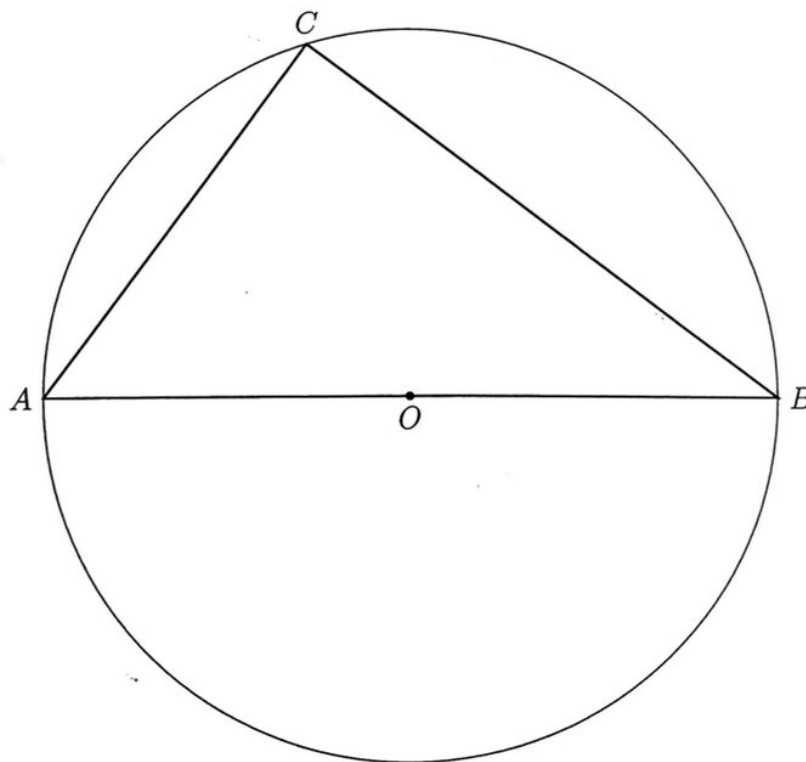
4.

10. Write down the name of the *three* angles shown in the diagram below and their angle measures, using your protractor.



11. The $\triangle ABC$ is inscribed a semi-circle. Measure its angles and sides using a ruler and protractor.

- | | |
|-------------------------|----------------------------|
| (a) $AB = 10\text{ cm}$ | (d) $m\angle A = 53^\circ$ |
| (b) $AC = 6\text{ cm}$ | (e) $m\angle B = 37^\circ$ |
| (c) $BC = 8\text{ cm}$ | (f) $m\angle C = 90^\circ$ |



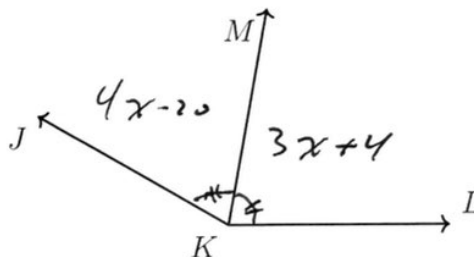
2.4 Homework: Modeling with algebra, "Do Not Solve!"

1. The ray \overrightarrow{KM} bisects $\angle JKL$. Given $m\angle JKM = 4x - 20$ and $m\angle MKL = 3x + 4$. Identify the true statement(s).

(a) $\angle JKM$ and $\angle MKL$ are a linear pair
 $(4x - 20) + (3x + 4) = 180^\circ$

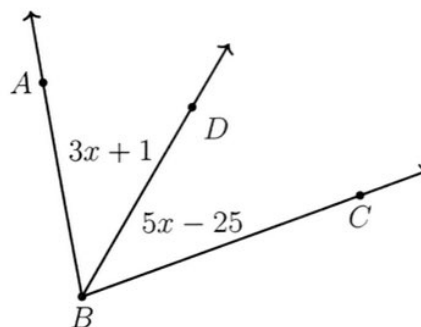
(b) $\angle JKM$, $\angle MKL$ are adjacent and
 $4x - 20 = 90^\circ$

(c) $\angle JKM \cong \angle MKL$
 $4x - 20 = 3x + 4$

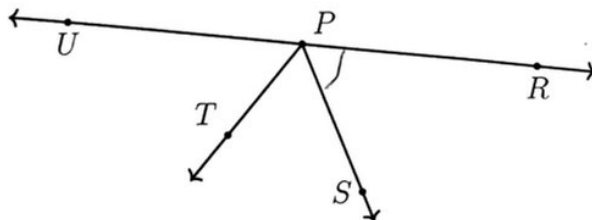


2. The ray \overrightarrow{BD} bisects $\angle ABC$. $m\angle ABD = 3x + 1$, $m\angle DBC = 5x - 25$. Find $m\angle ABC$.

$$3x + 1 = 5x - 25$$



3. Given the situation in the diagram, answer each question. Circle True or False.



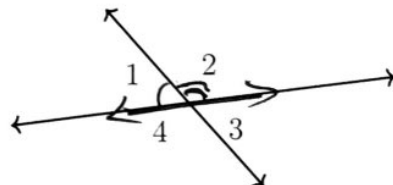
- (a) True or False: \overrightarrow{RP} and \overrightarrow{UP} are opposite rays.
 (b) True or False: $\angle TPR$ is supplementary to $\angle TPU$.
 (c) True or False: $\angle RPS$ and $\angle TPS$ are complementary angles.
 (d) True or False: $\angle RPS$ and $\angle TPU$ are vertical angles.

Do Not Solve!

Model the situation with an equation. Circle where it states what to solve for.

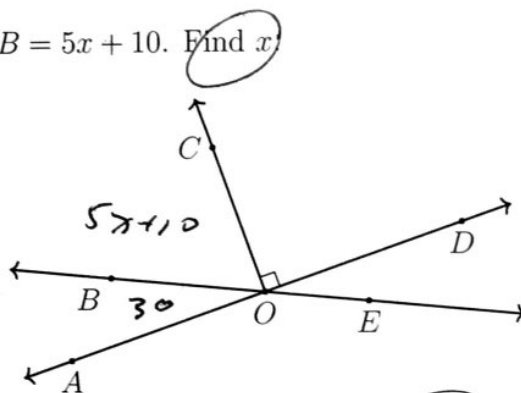
4. Two lines intersect making four angles: $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$. Given that $m\angle 1 = 4x + 30$ and $m\angle 2 = 8x - 10$. Find x .

$$(4x + 30) + (8x - 10) = 180$$



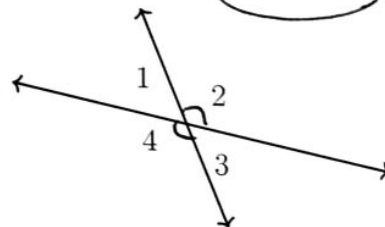
5. In the diagram below $\angle AOB = 30^\circ$ and $\angle COB = 5x + 10$. Find x .

$$(5x + 10) + 30 = 90$$



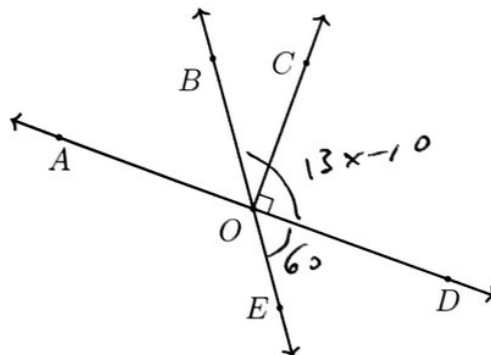
6. Given that $m\angle 2 = 5x + 30$ and $m\angle 4 = 7x - 10$ as shown in the diagram, find $m\angle 2$.

$$5x + 30 = 7x - 10$$



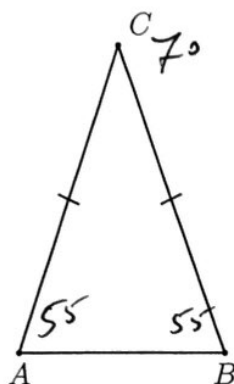
7. In the diagram below $\angle DOE = 60^\circ$ and $\angle DOB = 13x - 10$. Find x .

$$(13x - 10) + 60 = 180$$



Name: S. L. Johnson**2.5 Classwork: Isosceles base theorem***Diagrams are not necessarily drawn to scale unless otherwise stated.*

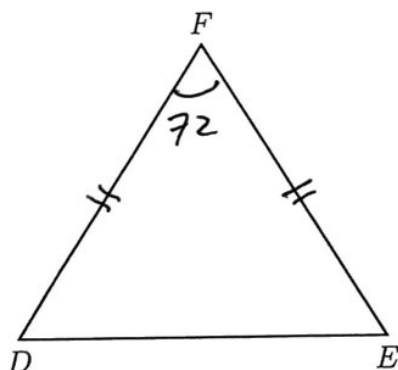
1. Given $\triangle ABC$. $\overline{AC} \cong \overline{BC}$, $m\angle A = 55$. Find $m\angle C$.



$$55 + 55 + x = 180$$

$$x = 70$$

2. Given $\triangle DEF$. $\overline{DF} \cong \overline{EF}$, $m\angle F = 72$. Find $m\angle D$.

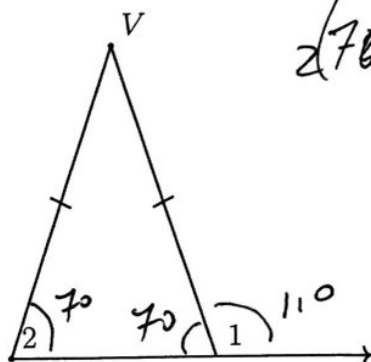


$$2x + 72 = 180$$

$$2x = 108$$

$$x = 54$$

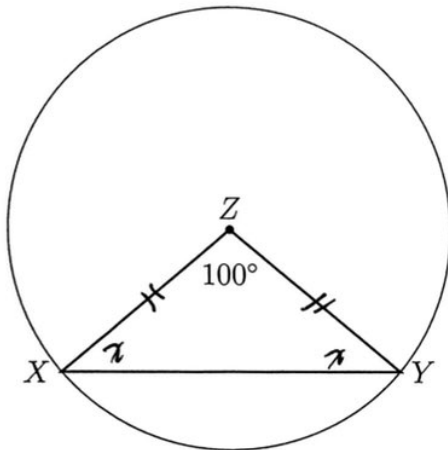
3. Given the triangle shown with congruent sides marked. $m\angle 1 = 110$. Find $m\angle 2$
Spicy: Find the measure of the vertex angle.



$$2(70) + m\angle V = 180$$

$$m\angle V = 40$$

4. Given circle with center Z and isosceles $\triangle XYZ$. $m\angle Z = 100^\circ$. Find $m\angle Y$.

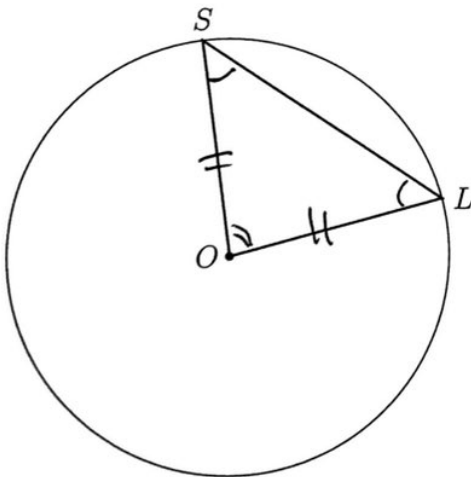


$$2x + 100 = 180$$

$$x = 40$$

$$m\angle Y = 40^\circ$$

5. Given circle O with inscribed $\triangle SLO$. $m\angle S = x + 17$. Find $m\angle O = 2x - 18$. Find x .
For full credit, check your answer.



~~$$2(x + 17) = 2x - 18$$~~

$$x + 17 = 2x - 18$$

$$x = 35$$

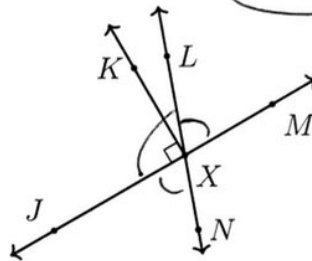
6. Writing to learn: Why do we write down the theorems that justify each step to solve a problem?

To show the underlying logic
so we know we are correct
in our thinking.

2.5 Homework: Angle terminology and angle addition

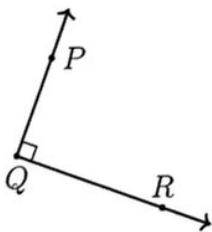
1. Use standard notation to represent an angle, the angle symbol followed by three letters, $\angle ABC$.

- (a) Name a right angle: $\angle JXK$
 (b) Name the angle vertical to $\angle LXM$: $\angle JXN$
 (c) Name the ray opposite to \overrightarrow{XJ} : \overrightarrow{XM}
 (d) What is the measure of $\angle KXM$? 90°
 (e) Are $\angle JXL$ and $\angle LXM$ complementary, supplementary, or neither?



2. The size of an angle is its "measure," which can be from 0° to 360°

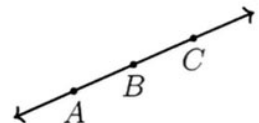
- (a) What is the degree measure of the angle, $m\angle PQR$?



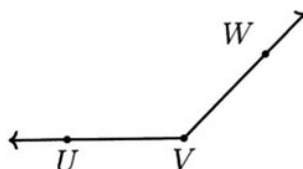
90°

- (b) What is the degree measure made by these two opposite rays, \overrightarrow{BA} and \overrightarrow{BC} ?

180°



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

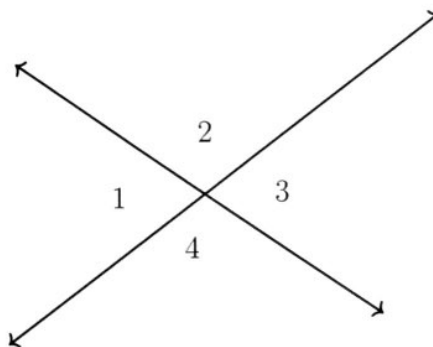


3. As shown below, two lines intersect making four angles: $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$.

Given $m\angle 2 = 120^\circ$.

(a) Find $m\angle 3$ 60°

(b) Find $m\angle 4$ 120°



Angle addition situations

4. Apply the Angle Addition postulate. Write an equation to support your work.

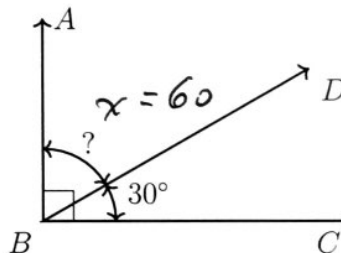
Given $m\angle CBD = 30^\circ$, $m\angle ABC = 90^\circ$.

$$30 + x = 90$$

$$x = 60$$

Find $m\angle ABD$.

60°



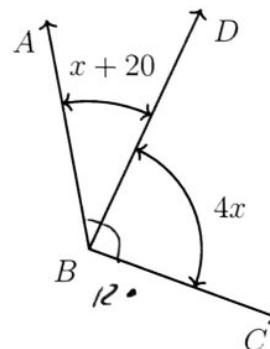
5. Given $m\angle ABD = x + 20$, $m\angle DBC = 4x$, and $m\angle ABC = 120^\circ$, as shown.

Write an equation and solve for x .

$$(x + 20) + 4x = 120$$

$$5x + 20 = 120$$

$$x = 20$$



Show your check for full credit.

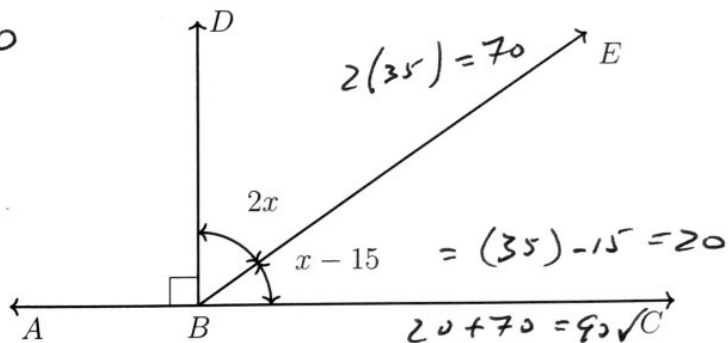
$$(20) + 20 + 4(20) = 120 \quad ?$$

$$40 + 80 = 120 \quad \checkmark$$

6. Given $\overrightarrow{BD} \perp \overrightarrow{ABC}$, $m\angle DBE = 2x$, and $m\angle EBC = x - 15^\circ$, as shown below.

Write an equation and solve for x .

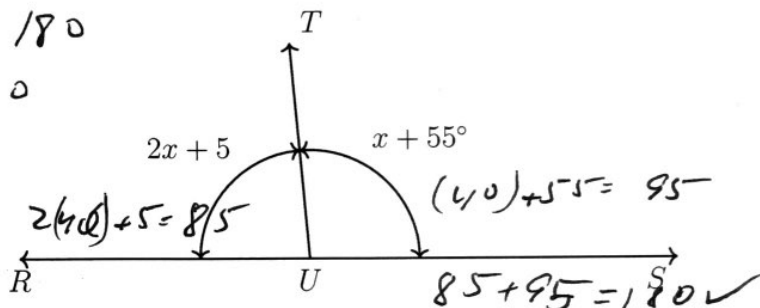
$$\begin{aligned} 2x + (x - 15) &= 90 \\ 3x - 15 &= 90 \\ x &= 35 \end{aligned}$$



7. A linear pair is formed by two angles, $m\angle RUT = 2x + 5$ and $m\angle SUT = x + 55^\circ$.

Write an equation, then solve for x .

$$\begin{aligned} (2x + 5) + (x + 55) &= 180 \\ 3x + 60 &= 180 \\ x &= 40 \end{aligned}$$



8. In the diagram shown, $\overrightarrow{BD} \perp \overrightarrow{ABC}$ and angle measures are given.

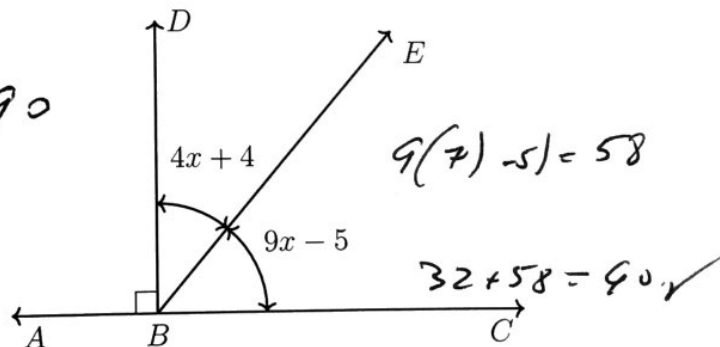
Find x . Show the check for full credit.

$$4(7) + 4 = 32$$

$$m\angle DBE = 4x + 4^\circ$$

$$\begin{aligned} (4x + 4) + (9x - 5) &= 90 \\ 13x - 1 &= 90 \\ x &= 7 \end{aligned}$$

$$m\angle EBC = 9x - 5^\circ$$



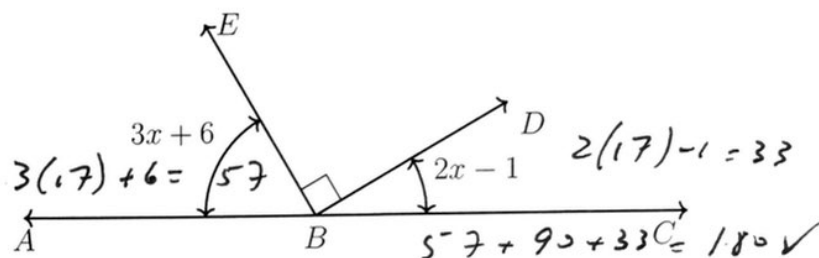
9. Given \overleftrightarrow{ABC} , right angle $\angle DBE$, $m\angle ABE = 3x + 6$, and $m\angle DBC = 2x - 1$.

Find $m\angle ABE$.

$$(3x + 6) + 90 + (2x - 1) = 180$$

$$5x + 5 = 90$$

$$x = 17$$



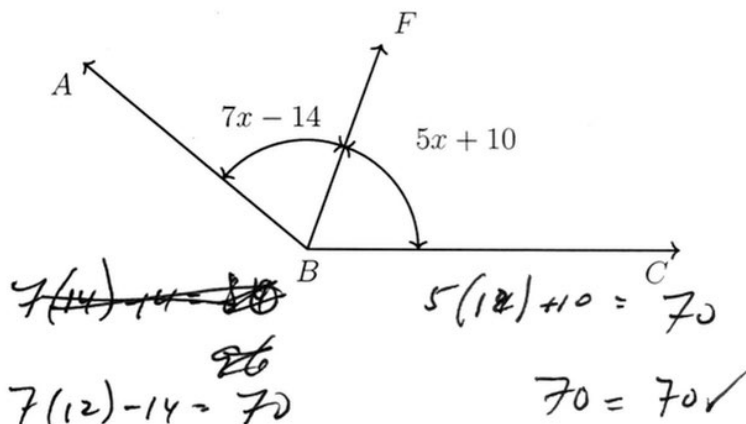
10. Ray \overrightarrow{BF} is the angle bisector of $\angle ABC$. Given that the angle measures are $m\angle ABF = 7x - 14$ and $m\angle CBF = 5x + 10$.

Find x .

$$7x - 14 = 5x + 10$$

$$2x = 24$$

$$x = 12$$



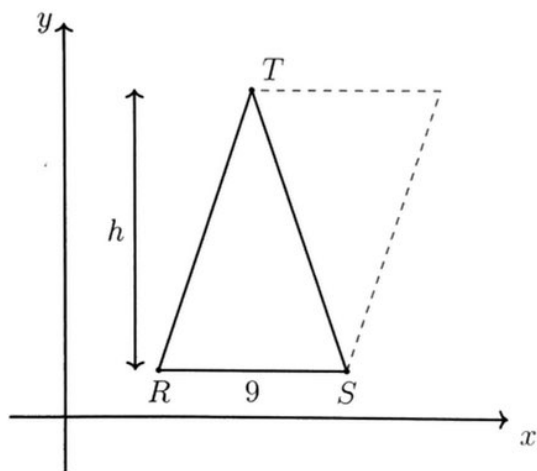
11. Find the height of the $\triangle RST$, having an area of $A = 117$ and base $RS = 9$.

Start by substituting values in the area formula:

$$A = \frac{1}{2}bh = 117$$

$$\frac{9h}{2} = 117$$

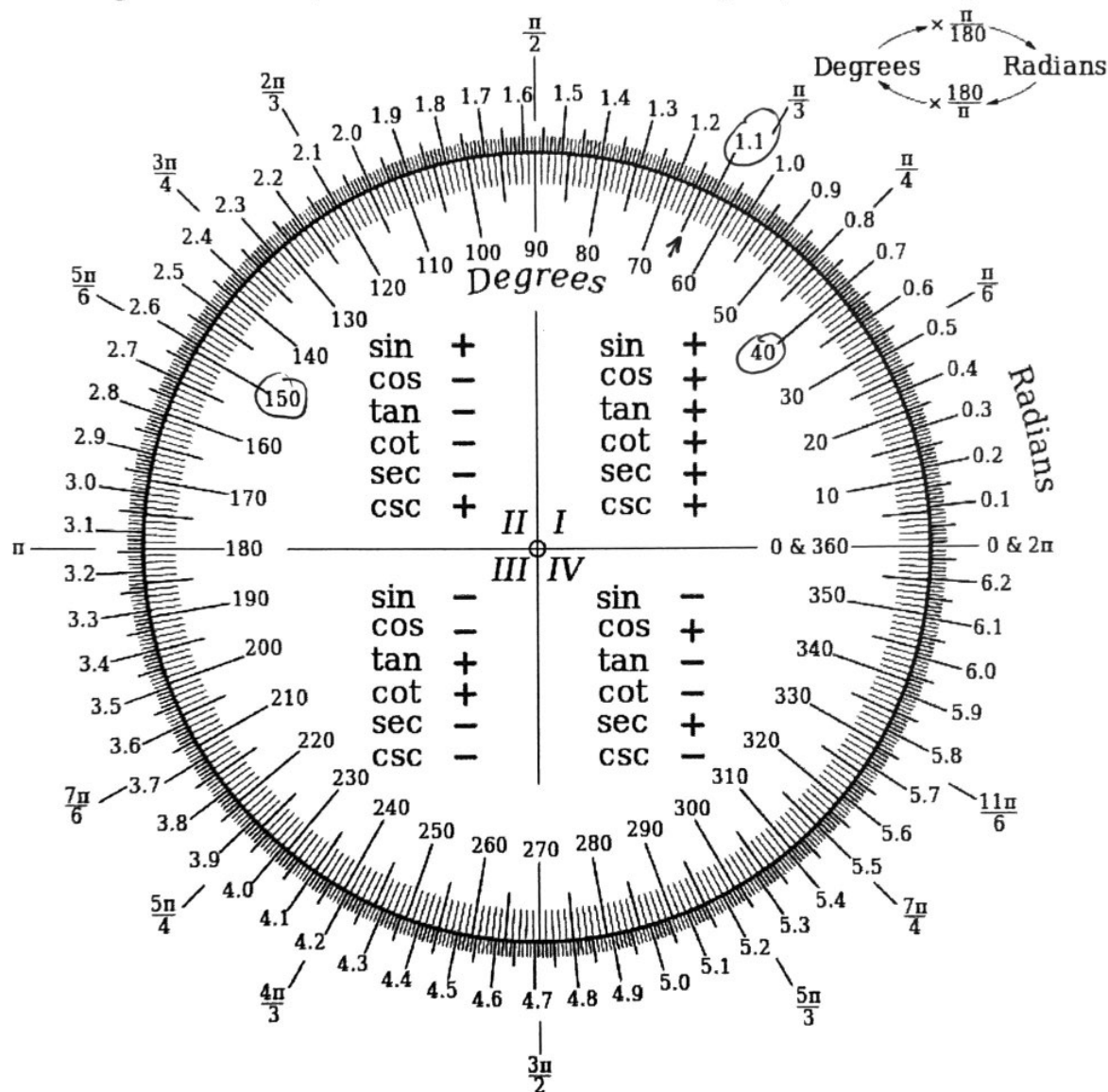
$$h = 26$$



2.5 Extension: Convert between radians and degrees

CCSS.HSG.SRT.C.8

Use this graduated circle, marked in both radians and degrees, to convert angle measures.



1. Convert radians and degrees. (nearest whole degree, nearest hundredth radian).

(a) $40^\circ = 0.70$

(d) $1.1 = 63^\circ$

(b) $65^\circ = 1.13$

(e) $0.55 = 31^\circ$

(c) $150^\circ = 2.62$

(f) $2.1 = 120^\circ$

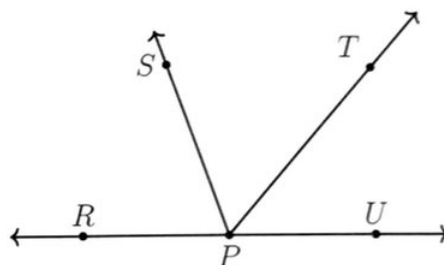
2.6 PreTest: Angle measures

1. Given the situation in the diagram, answer each question. Circle True or False.

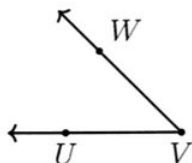
(a) T or F: \overrightarrow{PR} and \overrightarrow{PU} are opposite rays.

(b) T or F: $\angle TPR$ is an obtuse angle.

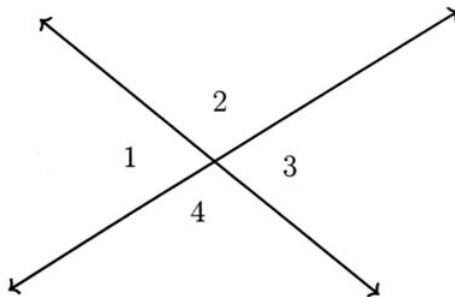
(c) T or F: $\angle RPS$ and $\angle TPU$ are adjacent angles.



2. The given angle $\angle UVW$ is which of the following: acute, obtuse, or right?



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



(a) Given that $m\angle 1 = 75^\circ$, find $m\angle 2 =$ 105°

(b) $\angle 3 \cong$ $\angle 1$

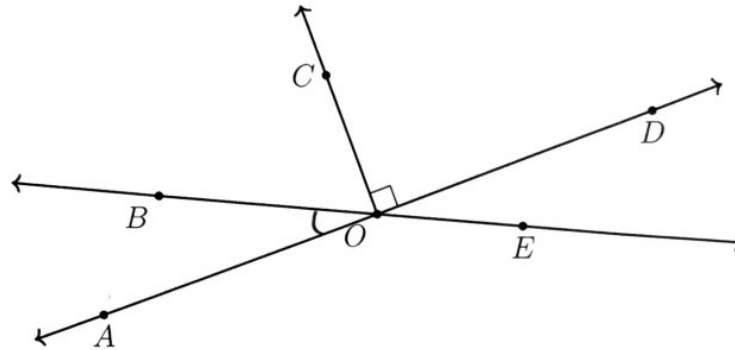
(c) True or false, $\angle 1$ and $\angle 4$ are supplementary angles. True

(d) Which angle is opposite $\angle 1$? $\angle 3$

(e) Name an angle that is adjacent to $\angle 4$. $\angle 1$

(f) True or false, $\angle 2$ and $\angle 4$ are vertical angles. True

4. (a) Given, the diagram below. Name a right angle: $\angle COD$
 (b) Name the angle that is opposite to $\angle AOB$: $\angle DOE$
 (c) Name an angle that is supplementary to $\angle COB$: $\angle COE$



For full credit on these three problems, start with an equation and check your solution.

5. As shown below, two lines intersect making four angles: $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$. Given that $m\angle 1 = x + 30$ and $m\angle 3 = 2x - 10$, find $m\angle 1$.

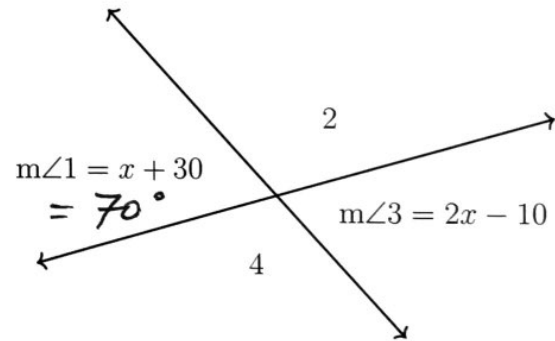
$$x + 30 = 2x - 10$$

$$x = 40$$

$$m\angle 1 = 40 + 30 = 70$$

$$m\angle 3 = 2(40) - 10 = 70$$

$$70 = 70 \checkmark$$



6. Given $m\angle BAC = 5x - 5$ and $m\angle DAC = x$, $m\angle BAD = 115^\circ$. Find $m\angle BAC$.

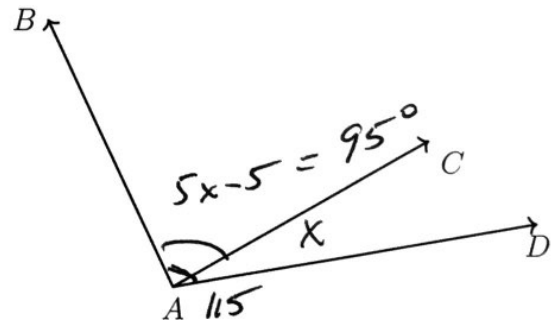
$$(5x - 5) + x = 115$$

$$6x = 120$$

$$x = 20$$

$$m\angle BAC = 5(20) - 5 = \cancel{115} \underline{95}$$

$$95 + 20 = 115 \checkmark$$

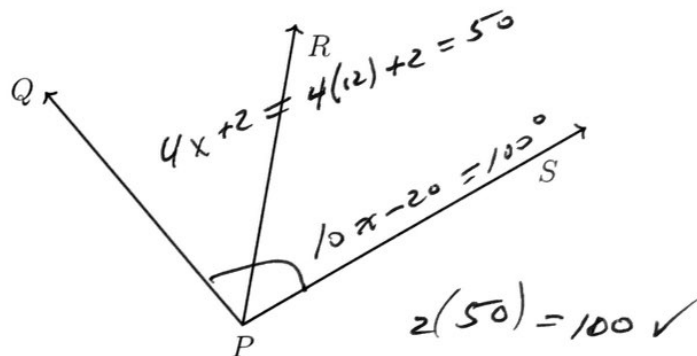


Name: *S. L. Huson*

7. An angle bisector is shown below, with \overrightarrow{PR} bisecting $\angle QPS$. Given $m\angle QPR = 4x + 2$ and $m\angle QPS = 10x - 20$, find $m\angle QPS$.

$$\begin{aligned} 2(4x + 2) &= 10x - 20 \\ 8x + 4 &= 10x - 20 \\ 2x &= 24 \\ x &= 12 \end{aligned}$$

$$m\angle QPS = 10(12) - 20 = 100^\circ$$

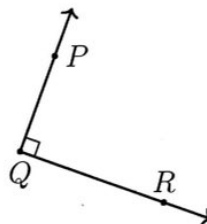


8. Which of the following are true with respect to the angle, $m\angle PQR$?

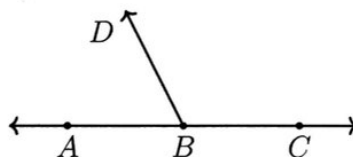
(a) True ~~False~~ It is an acute angle

(b) ~~True~~ False It's measure is 90°

(c) ~~True~~ False $\overrightarrow{QP} \perp \overrightarrow{QR}$



9. What is sum of the degree measures of this linear pair, $\angle ABD$ and $\angle CBD$?



180°

10. 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.

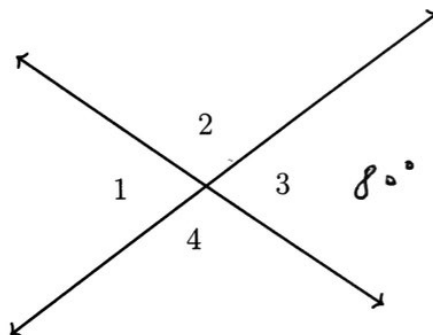
$\angle 1$, $\angle 3$

(b) Given $m\angle 3 = 80^\circ$, write down $m\angle 1$.

80°

(c) Find $m\angle 4$.

100°



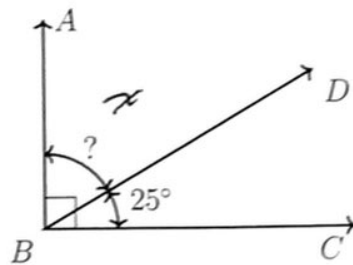
11. Apply the Angle Addition postulate. Write an equation to support your work.

Given $m\angle CBD = 25^\circ$, $m\angle ABC = 90^\circ$.

$$\begin{aligned} x + 25 &= 90 \\ x &= 65^\circ \end{aligned}$$

Find $m\angle ABD$.

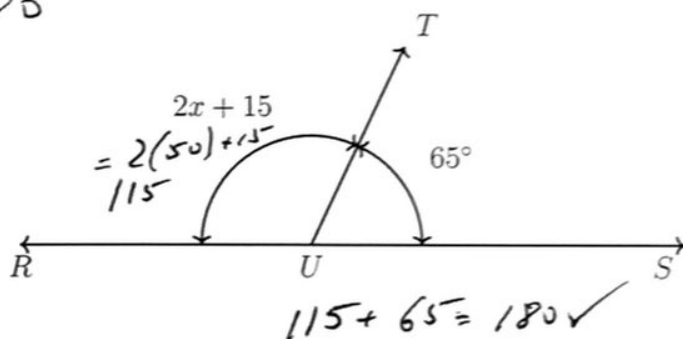
$$65^\circ$$



12. A linear pair is formed by two angles, $m\angle RUT = 2x + 15$ and $m\angle SUT = 65^\circ$.

Write an equation, then solve for x .

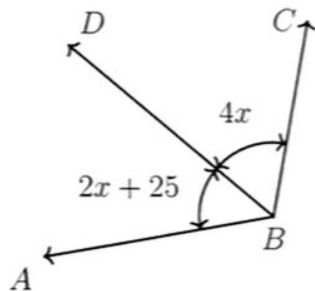
$$\begin{aligned} (2x + 15) + 65 &= 180 \\ 2x &= 100 \\ x &= 50 \end{aligned}$$



13. Given $m\angle ABD = 2x + 25$, $m\angle DBC = 4x$, and $m\angle ABC = 115^\circ$, as shown.

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

$$\begin{aligned} (2x + 25) + 4x &= 115 \\ 6x &= 90 \\ x &= 15 \end{aligned}$$



$$m\angle ABD = 2(15) + 25 = 55$$

$$m\angle CBD = 4(15) = 60$$

$$55 + 60 = 115 \checkmark$$