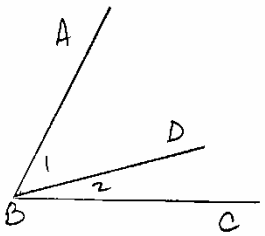
Math 61

Homework #2 - Solutions

SECTION 1.2



(41) Given: $m\angle 1 + m\angle 2 = m\angle ABC$

$m\angle 1 = x$

$m\angle 2 = 2x + 3$

$m\angle ABC = 72°$

Find: $x = ?$

Solution

$m\angle 1 + m\angle 2 = m\angle ABC$

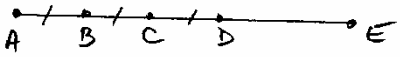
$x + (2x+3) = 72$

$3x + 3 = 72$

$3x = 69$

$\boxed{x = 23°}$

(43)



Given: $\overline{AB} \cong \overline{BC} \cong \overline{CD}$

$AD = 32.7$

Find: $\overline{AB} = ?$

Solution

$AD = AB + BC + CD$ (Addition - Segment Postulate)

$AB = BC = CD$ (definition of congruent segments)

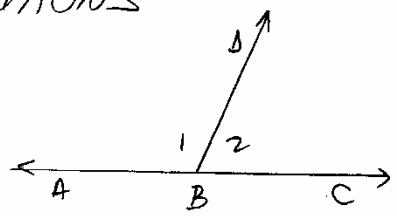
$\Rightarrow 32.7 = AB + AB + AB$ (substitution)

$3AB = 32.7$

$AB = \frac{32.7}{3} = 10.9$

$\boxed{AB = 10.9}$

(45)



Given: $m\angle 1 = x$

$m\angle 2 = y$

$x - y = 24°$

Find $x = ?$

$y = ?$

Solution

$m\angle 1 + m\angle 2 = m\angle ABC$ (Addition - Angle postulate)

$m\angle ABC = 180°$ ($\angle ABC$ = Straight angle)

$\Rightarrow \begin{cases} x + y = 180° & \text{(substitution)} \\ x - y = 24° & \text{(given)} \end{cases}$

(+) $2x = 204$ (Addition property of equality)

$\boxed{x = 102}$ (Multiplication prop. of equality)

$x + y = 180$

$102 + y = 180$

$y = 180 - 102$

$\boxed{y = 78}$

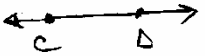
SECTION 1.3

(10) a) $\overleftrightarrow{CD}$ and $\overleftrightarrow{DC}$ no difference (the line CD)

b) $\overline{CD}$ and $\overline{DC}$ no difference (the segment CD)

c) CD and DC no difference (the length of the segment CD)

d) $\overrightarrow{CD}$ and $\overrightarrow{DC}$

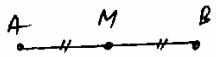


$\overrightarrow{CD}$ = the ray starting at C and going to the right

$\overrightarrow{DC}$ = the ray starting at D and going to the left

(14) Given: M = midpoint of $\overline{AB}$
$AM = 2(X+1)$
$MB = 3(X-2)$

Find: $x = ?$
$AB = ?$



Solution

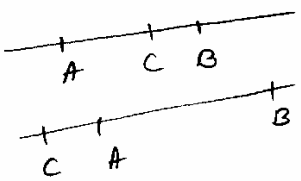
M = midpoint of $\overline{AB}$ $\Rightarrow$ (definition of midpoint)
$\overline{AM} \cong \overline{MB}$ (definition of congruent segments)
$AM = MB$
$2(X+1) = 3(X-2)$ (substitution)
$2x+2 = 3x-6$
$2+6 = 3x-2x$
$\boxed{x=8}$

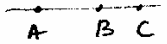
$AB = AM + MB$
$AB = 2AM$
$= 2\cdot(2(x+1))$
$= 4(x+1)$
$= 4(8+1) = 4\cdot 9 = 36$
$\boxed{AB = 36}$

(16) No; yes; yes; No.

(18) $C \in$ plane X
$D \in$ plane X
$\Rightarrow \overleftrightarrow{CD} \subset$ plane X
($\overleftrightarrow{CD}$ is included in the plane)

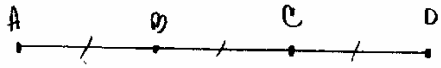
(22) A, B, C - collinear
$AB > AC$



B cannot lie between A and C
(if it does,  then $AB < AC$)

(26) Given: B = midpoint of $\overline{AC}$
C = midpoint of $\overline{BD}$

Find the relation between
a) $\overline{AB}$ and $\overline{CD}$
b) $\overline{AC}$ and $\overline{BD}$
c) $\overline{AC}$ and $\overline{CD}$



Solution

B = midpoint of $\overline{AC}$ $\Rightarrow AB = BC$
C = midpoint of $\overline{BD}$ $\Rightarrow BC = CD$ $\Rightarrow$

$\Rightarrow \boxed{AB = BC = CD}$

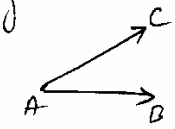
Therefore, $\boxed{\overline{AB} \cong \overline{CD}}$ (a)

$AC = 2AB$
$BD = 2BC = 2AB$
$\Rightarrow AC = BD$
$\boxed{\overline{AC} \cong \overline{BD}}$ (b)

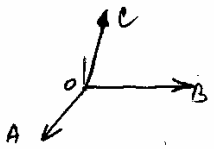
$\boxed{AC = 2CD}$ (c)

SECTION 1.4

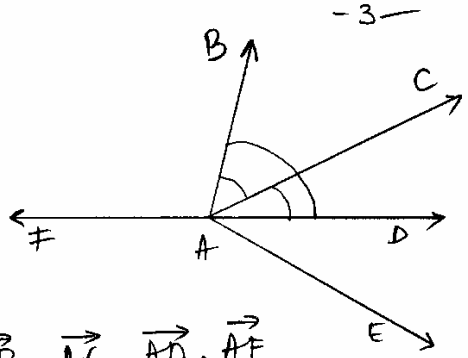
(9) a) Yes, two rays with a common endpoint are coplanar because two intersecting lines determine a plane



b) No



(10)



Given: $\overrightarrow{AB}, \overrightarrow{AC}, \overrightarrow{AD}, \overrightarrow{AF}$ are coplanar

a) $m\angle BAC + m\angle CAD = m\angle BAD$ (Addition-Angle Postulate) true

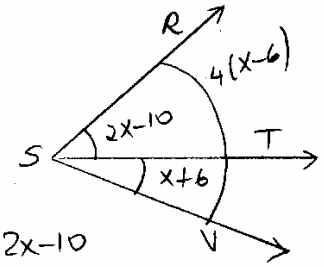
b) $\angle BAC \cong \angle CAD$ false

c) $m\angle BAE - m\angle DAE = m\angle BAC$ false

d) $\angle BAC$ and $\angle DAE$ are adjacent false

e) $m\angle BAC + m\angle CAD + m\angle DAE = m\angle BAE$ true

(17)



Given: $m\angle RST = 2x-10$
$m\angle TSV = x+6$
$m\angle RSV = 4(x-6)$

Find: $x = ?$
$m\angle RSV = ?$

Solution

$m\angle RST + m\angle TSV = m\angle RSV$ (Addition-Angle Postulate)

$\Rightarrow -(2x-10) + (x+6) = 4(x-6)$

$3x - 4 = 4x - 24$

$-4 + 24 = 4x - 3x$

$\boxed{x = 20}$

$m\angle RSV = 4(x-6) = 4(20-6) = 4 \cdot 14 = 56°$

$\boxed{m\angle RSV = 56°}$

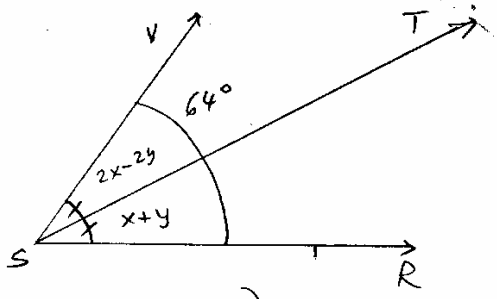
(19) Given: $\overrightarrow{ST}$ bisects $\angle RSV$

$m\angle RST = x+y$

$m\angle TSV = 2x-2y$

$m\angle RSV = 64°$

Find: $x = ?$
$y = ?$



Solution

$\overrightarrow{ST}$ bisects $\angle RSV$ (definition) $\Rightarrow \angle RST \cong \angle VST$

$m\angle RST = m\angle VST$

$\boxed{x+y = 2x-2y}$ (1)

Also, $m\angle RST + m\angle VST = m\angle RSV$ (Addition-Angle Postulate)

$\boxed{(x+y) + (2x-2y) = 64}$ (2)

$$\begin{cases} x+y = 2x-2y & (1) \\ 3x - y = 64 & (2) \end{cases}$$

(1) $\Rightarrow \boxed{x = +3y}$

(2) $\Rightarrow 3(3y) - y = 64$

$8y = 64 \Rightarrow \boxed{y = 8}$

$\boxed{x = 24}$

(20) Given: $\overrightarrow{ST}$ bisects $\angle RSV$

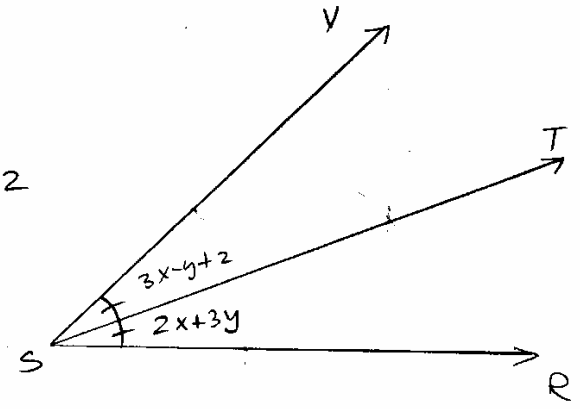
$m\angle RST = 2x + 3y$

$m\angle TSV = 3x - y + 2$

$m\angle RSV = 80°$

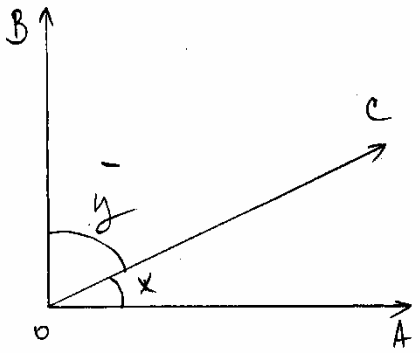
Find: $x = ?$

$y = ?$



Solution

Statements	Reasons
1. $\overrightarrow{ST}$ bisects $\angle RSV$	1. Given
2. $\angle RST \cong \angle VST$	2. Definition of angle bisector
3. $m\angle RST = m\angle VST$	3. Definition of congruent angles
4. $2x+3y = 3x-y+2$	4. Substitution
5. $m\angle RST + m\angle VST = m\angle RSV$	5. Addition-Angle Postulate
6. $(2x+3y) + (3x-y+2) = 80$	6. Substitution
7. From (4): $x - 4y = -2$	7. Addition Property of Equality
8. From (6): $5x + 2y = 78$	8. Addition Property of Equality
9. $\begin{cases} x-4y=-2 \\ 5x+2y=78 \end{cases} \quad \vert -5$ $\begin{cases} -5x+20y=10 \\ 5x+2y=78 \end{cases}$	9. Multiplication Property of Equality
10. $\oplus \quad 22y = 88$	10. Addition Property of Equality
11. $y = \frac{88}{22}$ $\boxed{y = 4}$	11. Division Property of Equality
12. From (7): $x - 4 \cdot 4 = -2$	12. Substitution
13. $\boxed{x = 14}$	13. Addition Property of Equality.



(22) Given (1) $\angle AOC$ and $\angle BOC$ are complementary

(2) $m\angle BOC = m\angle AOC + 12$

Find: $m\angle AOC = ?$

$m\angle BOC = ?$

Solution

Let $m\angle AOC = x$

$m\angle BOC = y$

From given (1) $\Rightarrow x + y = 90$

From given (2) $\Rightarrow y = x + 12$

$$x + (x+12) = 90$$
$$2x + 12 = 90$$
$$2x = 90 - 12$$
$$2x = 78$$
$$\boxed{x = 39}$$

then $y = x + 12$

$y = 39 + 12$

$$\boxed{y = 51}$$

Therefore, $\boxed{\begin{array}{l} m\angle AOC = 39^\circ \\ m\angle BOC = 51^\circ \end{array}}$