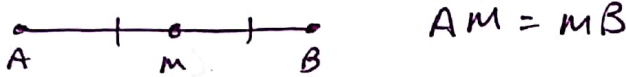


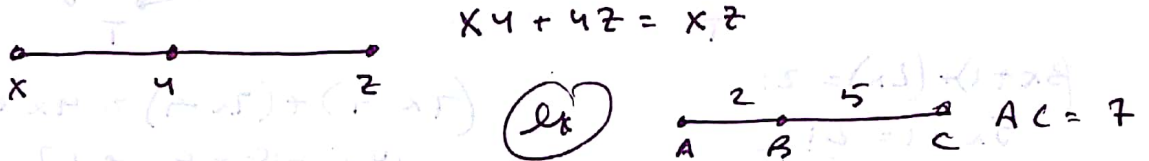
Midpoint, Segment Addition and Angle Addition

GEOMETRY TERMS

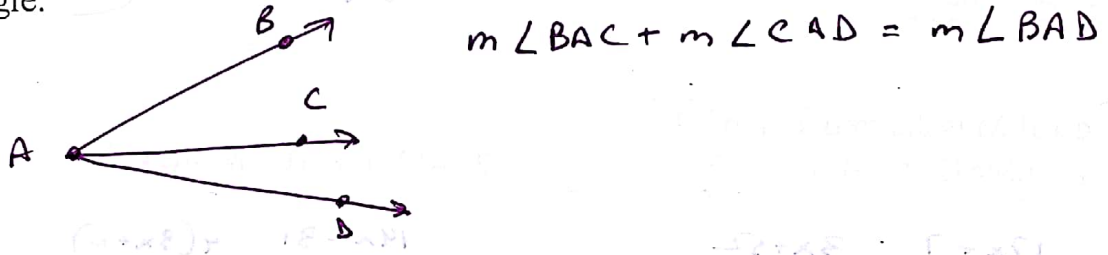
A **midpoint** of a segment is the point that divides a segment into two equal parts.



**Segment Addition** states the sum of the parts of a segment equals the measure of the whole segment.

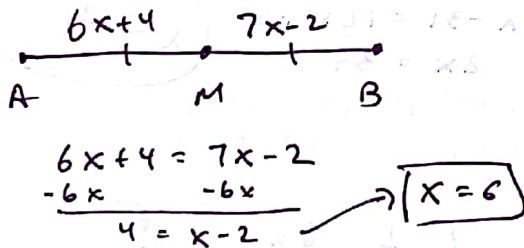


**Angle Addition** states the sum of the parts of an angle equals the measure of the whole angle.

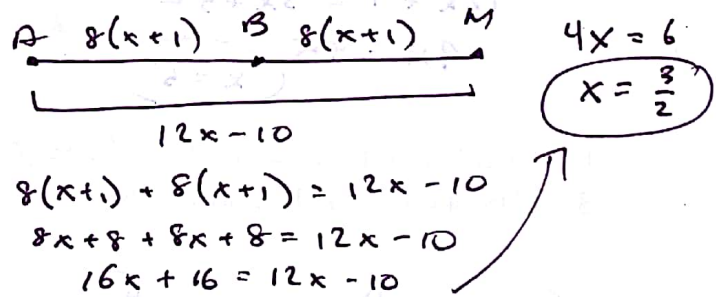


Find  $x$  if  $M$  is the midpoint of  $\overline{AB}$ .

1.  $AM = 6x + 4$ ,  $BM = 7x - 2$

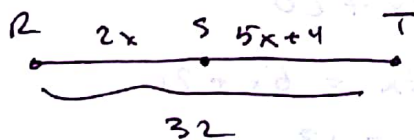


2.  $AM = 12x - 10$ ,  $BM = 8(x + 1)$



Find  $x$  if  $R$  and  $T$  are endpoints of a segment and point  $S$  is between them.

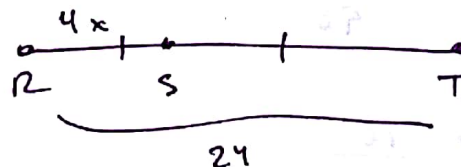
5.  $RS = 2x$ ,  $ST = 5x + 4$  and  $RT = 32$



$$\begin{aligned} (2x) + (5x + 4) &= 32 \\ 7x + 4 &= 32 \\ 7x &= 28 \\ x &= 4 \end{aligned}$$

$x = 4$

4.  $RS = 4x$ ,  $RT = 24$  and  $RS = ST$

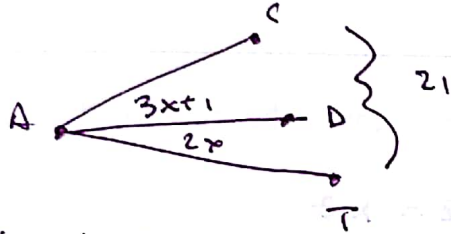


$$\begin{aligned} 4x + 4x &= 24 \\ 8x &= 24 \\ x &= 3 \end{aligned}$$

$x = 3$

Find  $x$  if  $\overline{AD}$  is in the interior of  $\angle CAT$ .

6.  $m\angle CAD = 3x + 1$ ,  $m\angle DAT = 2x$   
and  $m\angle CAT = 21$



$$(3x + 1) + (2x) = 21$$

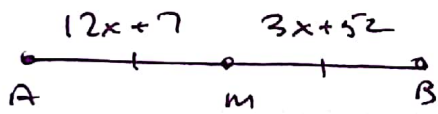
$$5x + 1 = 21$$

$$x = 4$$

APPLICATIONS

Find  $x$  if  $M$  is the midpoint of  $\overline{AB}$ .

1.  $AM = 12x + 7$ ,  $BM = 3x + 52$

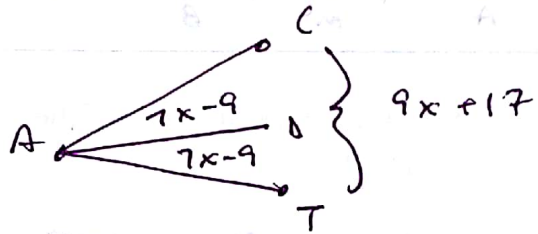


$$12x + 7 = 3x + 52$$

$$9x = 45$$

$$x = 5$$

7.  $m\angle CAD = 7x - 9$ ,  $m\angle DAT = 7x - 9$   
and  $m\angle CAT = 9x + 17$



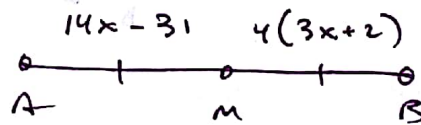
$$(7x - 9) + (7x - 9) = 9x + 17$$

$$14x - 18 = 9x + 17$$

$$5x = 35$$

$$x = 7$$

2.  $AM = 14x - 31$ ,  $BM = 4(3x + 2)$



$$14x - 31 = 4(3x + 2)$$

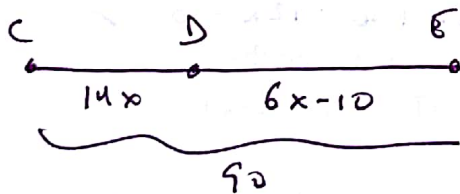
$$14x - 31 = 12x + 8$$

$$2x = 39$$

$$x = \frac{39}{2}$$

Find  $x$  if  $C$  and  $E$  are endpoints of a segment and point  $D$  is between them.

3.  $CD = 14x$ ,  $DE = 6x - 10$  and  $CE = 90$



$$14x$$

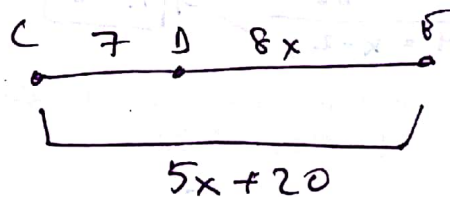
$$6x - 10$$

$$20x - 10 = 90$$

$$20x = 100$$

$$x = 5$$

4.  $CD = 7$ ,  $DE = 8x$  and  $CE = 5x + 20$



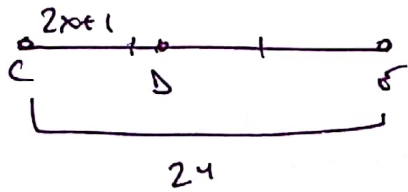
$$7 + 8x = 5x + 20$$

$$3x = 13$$

$$x = \frac{13}{3}$$

1.10

5.  $CD=2x+1$ ,  $CE=24$  and  $CD=DE$



$$(2x+1) + (2x+1) = 24$$

$$4x+2 = 24$$

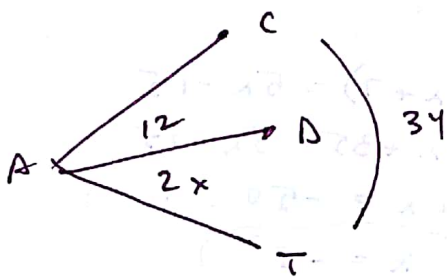
$$4x = 22$$

$$x = \frac{22}{4} = \frac{11}{2}$$

Find  $x$  if  $\overline{AD}$  is in the interior of  $\angle CAT$ .

6.  $m\angle CAD = 12$ ,  $m\angle DAT = 2x$   
and  $m\angle CAT = 34$

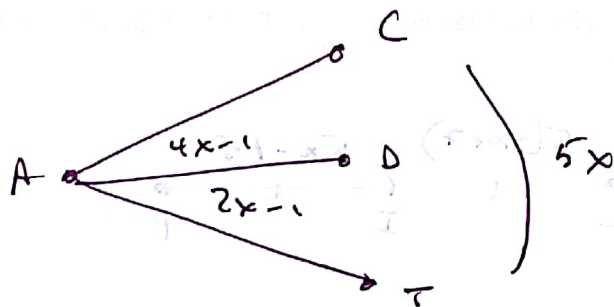
7.  $m\angle CAD = 4x-1$ ,  $m\angle DAT = 2x-1$   
and  $m\angle CAT = 5x$



$$12 + 2x = 34$$

$$2x = 22$$

$$x = 11$$



$$(4x-1) + (2x-1) = 5x$$

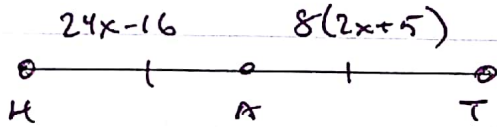
$$6x - 2 = 5x$$

$$x = 2$$

**Geometry: Segment Addition, Angle Addition, Midpoint**

**Short Answer**

1. Find  $x$  if  $A$  is the midpoint of  $\overline{HT}$ .  $HA = 24x - 16$  and  $AT = 8(2x + 5)$

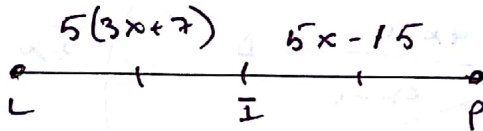


$$24x - 16 = 16x + 40$$

$$8x = 56$$

$$x = 7$$

2. Find  $x$  if  $I$  is the midpoint of  $\overline{LP}$ .  $LI = 5(3x + 7)$  and  $IP = 5x - 15$



$$5(3x + 7) = 5x - 15$$

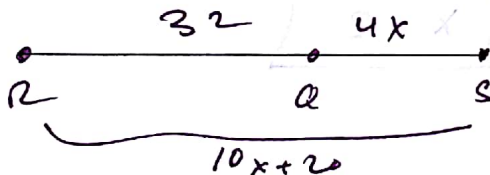
$$15x + 35 = 5x - 15$$

$$10x = -50$$

$$x = -5$$

3. Find  $x$  if  $R$  and  $S$  are endpoints of a segment and point  $Q$  is between them.

$$RQ = 32, QS = 4x, RS = 10x + 20$$



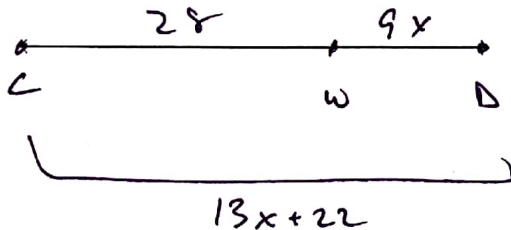
$$32 + 4x = 10x + 20$$

$$12 = 6x$$

$$x = 2$$

4. Find  $x$  if  $C$  and  $D$  are endpoints of a segment and point  $W$  is between them.

$$CW = 28, WD = 9x, CD = 13x + 22$$



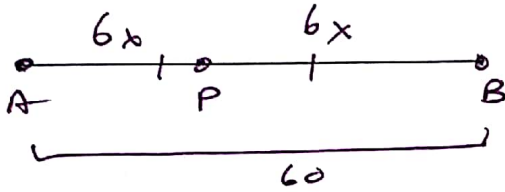
$$13x + 22 = 28 + 9x$$

$$4x = 6$$

$$x = \frac{3}{2}$$

1.12

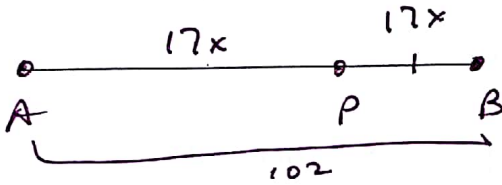
5. Find  $x$  if  $A$  and  $B$  are endpoints of a segment and point  $P$  is between them.  
 $AP = 6x$ ,  $AB = 60$  and  $AP = PB$



$$\frac{12x}{12} = \frac{60}{12}$$

$$x = 5$$

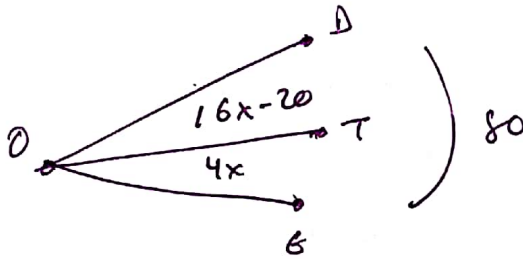
6. Find  $x$  if  $A$  and  $B$  are endpoints of a segment and point  $P$  is between them.  
 $AP = 17x$ ,  $AB = 102$  and  $AP = PB$



$$34x = 102$$

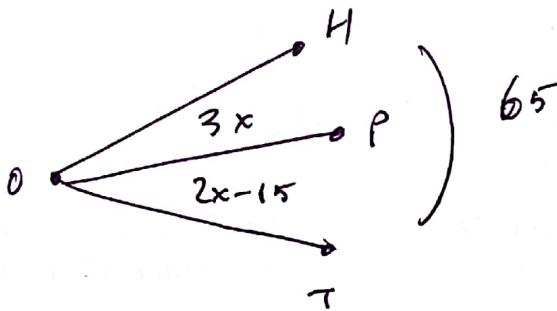
$$x = \frac{102}{34} = \frac{51}{17} = 3$$

7. Find  $x$  if  $\overrightarrow{OT}$  is in the interior of  $\angle DOG$ ,  $m\angle DOT = 16x - 20$ ,  $m\angle TOG = 4x$  and  $m\angle DOG = 80$ .



$$\begin{array}{r} 16x - 20 \\ + 4x \\ \hline 20x - 20 = 80 \\ 20x = 100 \\ x = 5 \end{array}$$

8. Find  $x$  if  $\overrightarrow{OP}$  is in the interior of  $\angle HOT$ ,  $m\angle HOP = 3x$ ,  $m\angle POT = 2x - 15$  and  $m\angle HOT = 65$ .



$$3x + (2x - 15) = 65$$

$$5x + 15 = 65$$

$$5x = 50$$

$$x = 10$$