

Substitution: When two values are equal to one another we say that they are the same. This means that they can be replaced for one another. We call this Substitution.

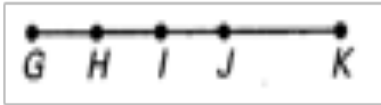
If $x = 5$, then what is $\frac{10}{x} + 4$

$$\frac{10}{5} + 4$$

$$2 + 4 = \boxed{6}$$

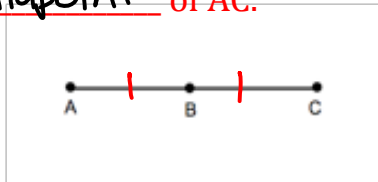
Find $f(-2)$ given $f(x) = 1 - x$

$$1 - (-2) = \boxed{3}$$

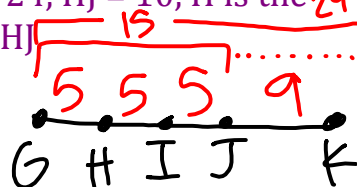
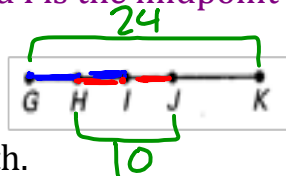


$\text{GH} = \text{HI}$ and $\text{HI} = \text{IJ}$, so $\text{GH} = \text{IJ}$

Midpoint: If B is halfway between A and C , then B is the midpoint of AC , then $AB = BC$. If $AB = BC$, and $AB + BC = AC$, then B is the midpoint of AC .



In the diagram of collinear points, $GK = 24$, $HJ = 10$, H is the midpoint of GI , and I is the midpoint of HJ .



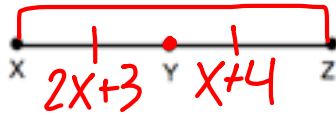
Find each length.

- a. $HI = 5$ b. $IJ = 5$ c. $GH = 5$

- d. $JK = 9$ e. $IG = 10$ f. $IK = 14$

Find the measure of XZ if Y is the midpoint and $XY = 2x+3$ and $YZ = x+4$

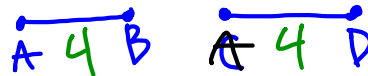
variables



$$\begin{aligned}
 2x+3 &= x+4 \\
 -x &\quad -x \\
 \hline
 x+3 &= 4 \\
 -3 &\quad -3 \\
 \hline
 x &= 1
 \end{aligned}$$

$$\begin{aligned}
 x &= 1 \\
 XZ &= 2x+3 + x+4 \\
 XZ &= 2 \cdot 1 + 3 + 1 + 4 \\
 &= 2 + 3 + 1 + 4 \\
 &\quad \downarrow \quad \downarrow \\
 &\quad 5 \quad \downarrow \\
 &\quad \quad \downarrow \\
 &\quad \quad 6 \\
 &\quad \quad \downarrow \\
 &\quad \quad \boxed{XZ = 10}
 \end{aligned}$$

Congruence: To say that the length of AB and AD are equal we say $AB=AD$



Another way to say that AB and AD are equal is that they are congruent.

We write this as $\overline{AB} \cong \overline{AD}$ ← actual segment

Lengths are equal

$$\begin{aligned}
 AB &= AD \\
 \uparrow \\
 \text{equal}
 \end{aligned}$$

Segments are congruent

$$\begin{aligned}
 \overline{AB} &\cong \overline{AD} \\
 \uparrow \\
 \text{congruent}
 \end{aligned}$$

If $AB = AD$, then $\overline{AB} \cong \overline{AD}$ If $\overline{AB} \cong \overline{AD}$, then $AB = AD$.

Reflection

Reflexive: One property of equality is called reflexive.
It means that any value is equal or congruent to itself.

$$5=5$$

$$b=b$$

$$2x=2x$$

$$CD=CD$$

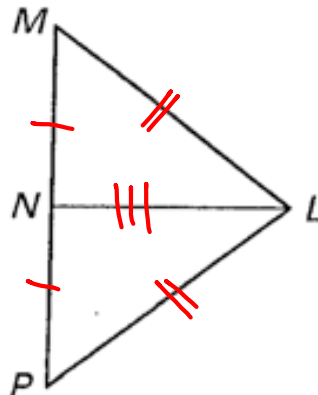
$$\overline{AB} \cong \overline{AB}$$

To show that lines are equal or congruent in a diagram, we can mark them. We can only say that lines are equal or congruent if they are marked the diagram

$$MN \cong NP$$

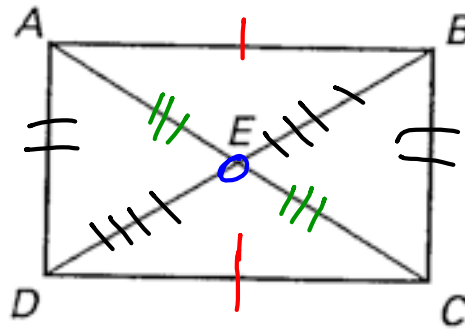
$$ML \cong LP$$

$$NL \cong NL$$

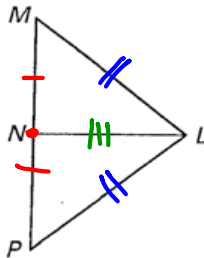


$$AB \cong DC \quad AD \cong BC \quad AE = EC$$

E is the midpoint of DB



From the information marked, what do you **know** about each statement according to the diagram? Explain how you know.



$$MN \cong NP$$

Given

↓
 $MN = NP$
 Congruence

↓
 N is mid pt of \overline{MP}
 Def of mid pt

$$ML \cong LP$$

Given

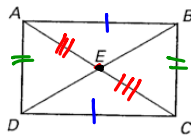
↓
 $ML = LP$
 Congruence

$$NL \cong NL$$

Reflexive

↓
 $NL = NL$
 Congruence

From the information marked, what do you **know** about each statement according to the diagram? Explain how you know.



$AB \cong DC$
Given
↓
 $AB = DC$
Congruence

$AD \cong BC$
Given
↓
 $AD = BC$
Congruence

$AE = EC$

Given

↓
 $\overline{AE} \cong \overline{EC}$
Congruence

↓
E is mid pt \overline{AC}
Def of mid pt

E is the midpoint of DB

Given

↓
 $DE = EB$
def of mid pt

↓
 $\overline{DE} \cong \overline{EB}$
Congruence