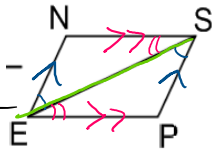
Parallelogram Test Review Name_____

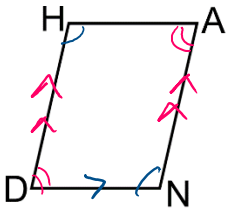
It is recommended that you review all proofs for parallelograms and their converses.

Given: PENS is a parallelogram
Prove: $\overline{PE} \cong \overline{NS}$ and $\overline{EN} \cong \overline{SP}$



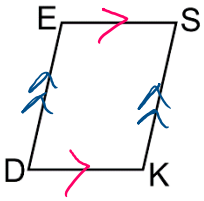
Statement	Reason
PENS is a ▱	Given
$\overline{EN} \parallel \overline{PS}$ & $\overline{NS} \parallel \overline{EP}$	Def. of ▱
$\angle NES \cong \angle PSE$	Alt. Int. ∠'s
$\angle NSE \cong \angle PES$	Alt. Int. ∠'s
$\overline{ES} \cong \overline{SE}$	Reflexive Prop.
$\triangle NES \cong \triangle PSE$	ASA
$\overline{NE} \cong \overline{PS}$ & $\overline{NS} \cong \overline{PE}$	CPCTC

Given that HAND is a parallelogram.
Prove: ∠H and ∠A are supplementary.
∠A and ∠N are supplementary.
∠N and ∠D are supplementary.
∠D and ∠H are supplementary.



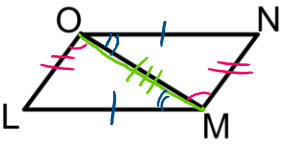
Statement	Reason
HAND is a ▱	Given
$\overline{HA} \parallel \overline{DN}$ & $\overline{HD} \parallel \overline{AN}$	Def. of ▱
∠H & ∠A supp.	Same side Int. ∠'s thm
∠A & ∠N supp.	
∠N & ∠D supp.	
∠D & ∠H supp.	

Given that DESK is a parallelogram.
Prove: ∠D and ∠E are supplementary.
∠E and ∠S are supplementary.
∠S and ∠K are supplementary.
∠K and ∠D are supplementary.



statement	Reason
DESK is a ▱	Given
$\overline{ES} \parallel \overline{DK}$ & $\overline{DE} \parallel \overline{KS}$	Def. of ▱
∠D & ∠E supp.	Same Side Int. ∠'s Thm.
∠E & ∠S supp.	
∠S & ∠K supp.	
∠K & ∠D supp.	

Given: $\overline{ON} \cong \overline{ML}$ and $\overline{LO} \cong \overline{NM}$
Prove: LMNO is a parallelogram



Statement	Reason
$\overline{ON} \cong \overline{ML}$	Given
$\overline{LO} \cong \overline{NM}$	Given
$\overline{OM} \cong \overline{MO}$	Reflexive Prop.
$\triangle MOL \cong \triangle OMN$	SSS
$\angle LOM \cong \angle NMO$	CPCTC
$\angle NOM \cong \angle LMO$	CPCTC
$\overline{LO} \parallel \overline{MN}$	Converse of Alt. Int. ∠'s
$\overline{ON} \parallel \overline{LM}$	Converse of Alt. Int ∠'s
LMNO is a ▱	Def. of ▱

GHIJ is a parallelogram. Find the value of each of the following variables.

. a. $\overline{GH} = 9x - 4$ and $\overline{JI} = 5x + 12$

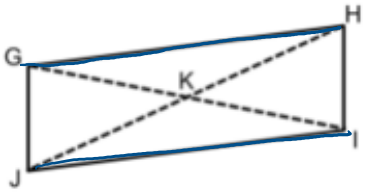
Opposite sides $\cong$

$9x-4 = 5x+12$

$4x-4 = 12$

$4x = 16$

$x = 4$



b. $\angle HGJ = (11y + 68)^o$ and $\angle GHI = (13y + 4)^o$

Consecutive $\angle$'s Supp

$11y + 68 + 13y + 4 = 180$

$24y + 72 = 180$

$24y = 108$

$y = 4.5$

c. $\angle GJI = (3w + 10)^o$ and $\angle IHG = (9w - 98)^o$

opp. $\angle$'s $\cong$

$3w+10 = 9w-98$

$10 = 6w - 98$

$108 = 6w$

$18 = w$

d. $\overline{GK} = 3z + 2$ and $\overline{GI} = z + 34$

$\overline{GK}$ bisected/half; $\overline{GI}$ whole Diagonal

Diagonals bisect each other

$2(\overline{GK}) = (GI)$

$2(3z+2) = z+34$

$6z+4 = z+34$

$6z+4 = z+34$

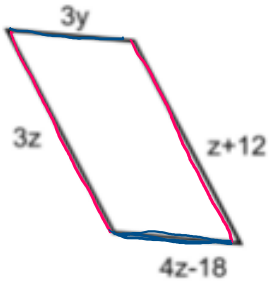
$6z = z+30$

$5z = 30$

$z = 6$

9. Determine the value of each variable that would make the following a parallelogram. Explain which converse property would make it a parallelogram.

a.



$3z = z+12$

$2z = 12$

$z = 6$

$3y = 4z - 18$

$3y = 4(6) - 18$

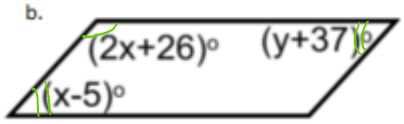
$3y = 6$

$y = 2$

Converse Prop.

If opp. sides $\cong$ $\rightarrow$

b.



$2x+26+x-5 = 180$

$3x+21 = 18$

$3x = 159$

$x = 53$

$2x+26+y+37 = 180$

$2(53)+26+y+37 = 180$

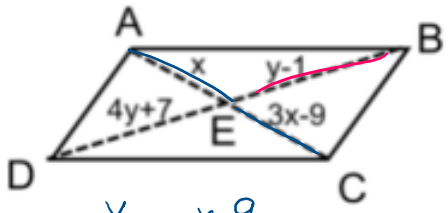
$y+169 = 180$

$y = 11$

Converse Prop

If 1 angle is supplementary to both consecutive $\angle$'s $\rightarrow$

c.



$x = x-9$

$0 = 2 - 9$

$9 = 2x$

$4.5 = x$

$4y+7 = y-1$

$3y+7 = -1$

$3y = -8$

$y = -8/3$

Converse prop.

If Diagonals bisect each other $\rightarrow$

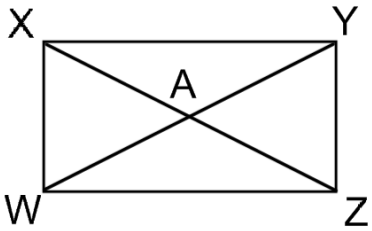
10. The following figure is a rectangle. Find the value of the given variable.

a. $\overline{XA} = 2x + 4$ and $\overline{WA} = 3x - 2$ Diagonals $\cong$ in a rectangle

$2x+4 = 3x-2$

$x-2$

$= x$



b. $\overline{XZ} = 6x - 5$ and $\overline{YW} = 2x + 19$ Diagonals $\cong$ in a Rectangle

$6x-5 = 2x+19$

$4x-5 = 19$

$4x = 24$

$x = 6$

c. $\overline{YA} = x + 3$ and $\overline{XZ} = 5x - 9$ Diagonals $\cong$ in a Rectangle

half diagon; whole diagonal

$2(\overline{YA}) = \overline{XZ}$

$2(x+3) = 5x-9$

$2x+6 = 5x-9$

$6 = 3x-9$

$15 = 3x$

$5 = x$