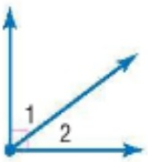
Geometry 1.5
Identify and use special pairs of angles
Identify perpendicular lines
Interpret diagrams
Construct perpendiculars

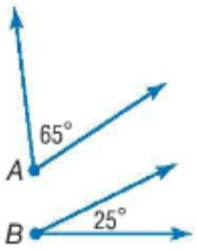
adjacent angles
linear pair
vertical angles
complementary angles
supplementary angles
perpendicular
assumptions

2 constructions

Complementary angles are two angles with measures that have a sum of 90.

Examples $\angle 1$ and $\angle 2$ are complementary.
$\angle A$ is complementary to $\angle B$.





$x + y = 90$

$x = 2y$

$2y + y = 90$

$\frac{3y}{3} = \frac{90}{3}$

$y = 30$

$x + 30 = 90$

$-30 \quad -30$

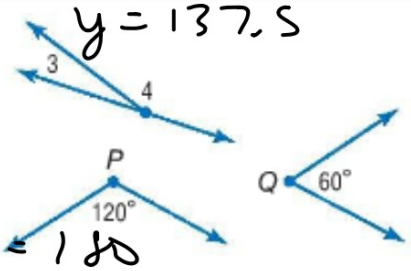
$x = 60$

$x + y = 180$ $42.5 + y = 180$

Supplementary angles are two angles with measures that have a sum of 180.

$y = 137.5$

Examples $\angle 3$ and $\angle 4$ are supplementary.
$\angle P$ and $\angle Q$ are supplementary.



$x + 95 = y$

$x + x + 95 = 180$

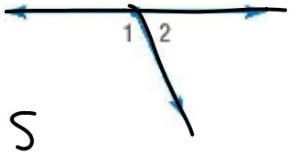
$2x + 95 = 180$

$2x = 85$

$x = 42.5$

The angles in a linear pair are supplementary.

Example $m\angle 1 + m\angle 2 = 180$



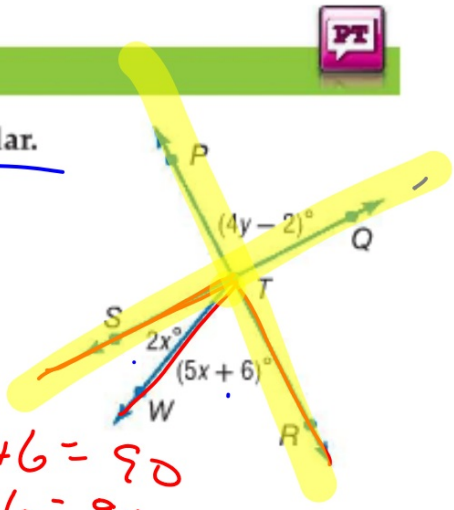
90 | 90
90 | 90

$\angle = 90^\circ$

Example 3 Perpendicular Lines

ALGEBRA Find x and y so that $\overleftrightarrow{PR}$ and $\overleftrightarrow{SQ}$ are perpendicular.

90°



$4y - 2 = 90$
$+2 \quad +2$
$4y = 92$

$y = 23$

$2x + 5x + 6 = 90$
$7x + 6 = 90$
$-6 \quad -6$
$7x = 84$
$7 \quad 7$

$x = 12$

2 constructions PSS

p49 help

KeyConcept Interpreting Diagrams

CAN be Assumed

All points shown are coplanar.

G, H, and J are collinear.

$\overrightarrow{HM}$, $\overrightarrow{HL}$, $\overrightarrow{HK}$, and $\overleftrightarrow{GJ}$ intersect at H.

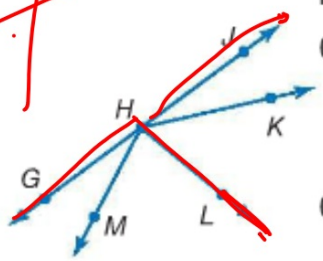
H is between G and J.

L is in the interior of $\angle MHK$.

$\angle GHM$ and $\angle MHL$ are adjacent angles.

$\angle GHL$ and $\angle LHJ$ are a linear pair.

$\angle JHK$ and $\angle KHG$ are supplementary.



CANNOT be Assumed

Perpendicular lines: $\overrightarrow{HM} \perp \overrightarrow{HL}$

Congruent angles: $\angle JHK \cong \angle GHM$

$\angle JHK \cong \angle KHL$

$\angle KHL \cong \angle LHM$

Congruent segments: $\overline{GH} \cong \overline{HJ}$

$\overline{HJ} \cong \overline{HK}$

$\overline{HK} \cong \overline{HL}$

$\overline{HL} \cong \overline{HG}$

The list of statements that can be assumed is not a complete list.
There are more special pairs of angles than those listed.

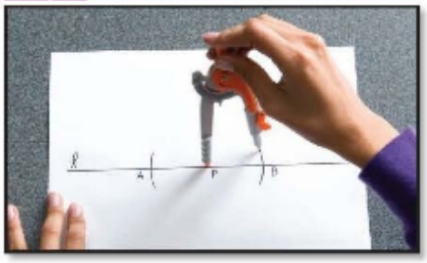
At a specific point on the line...

Mathematical Practices 5

Activity Construct a Perpendicular

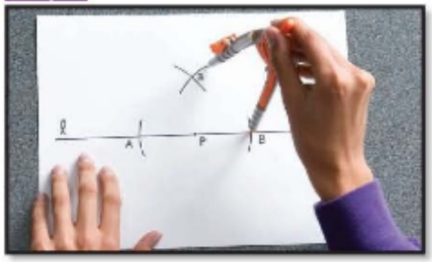
a. Construct a line perpendicular to line ℓ and passing through point P on ℓ.

Step 1



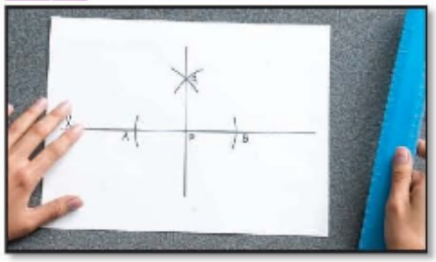
Place the compass at P. Draw arcs to the right and left of P that intersect line ℓ using the same compass setting. Label the points of intersection A and B.

Step 2



With the compass at A, draw an arc above line ℓ using a setting greater than AP. Using the same compass setting, draw an arc from B that intersects the previous arc. Label the intersection Q.

Step 3

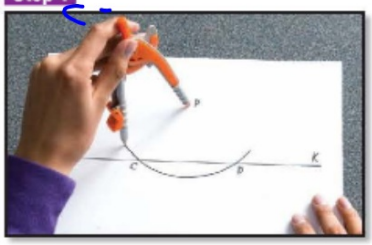


Use a straightedge to draw $\overleftrightarrow{QP}$.

Through a specific point not on the line...

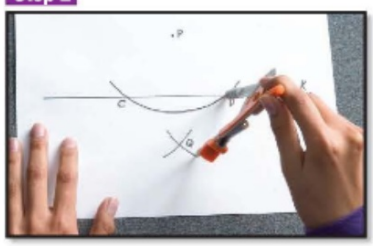
b. Construct a line perpendicular to line ℓ and passing through point P *not* on ℓ.

Step 1



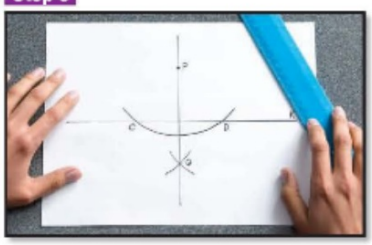
Place the compass at P. Draw an arc that intersects line ℓ in two different places. Label the points of intersection C and D.

Step 2



With the compass at C, draw an arc below line ℓ using a setting greater than $\frac{1}{2}CD$. Using the same compass setting, draw an arc from D that intersects the previous arc. Label the intersection Q.

Step 3



Use a straightedge to draw $\overleftrightarrow{PQ}$.