Key

1.1 Points, Lines, and Planes

- Point – single "location" • A ← capital letter
- Line – straight and continues forever $\overleftrightarrow{AB}$
- Collinear – 2 pts on same line
- Ray – endpt and continues forever $\overrightarrow{AD}$
- Line Segment – part of line $\overline{LM}$
- Plane – 2-Dimensional surface
- Coplanar – 2 items in same plane

3 pts not on same line →

Example

Use the figure to name each of the following.

a) a line containing point K

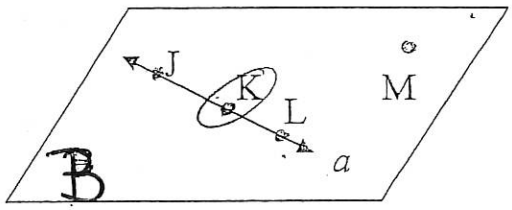
$\overleftrightarrow{JK}$ $\overleftrightarrow{KL}$ $\overleftrightarrow{JL}$ line a

b) A plane containing point L

Plane JLM

Plane B cursive

Plane JKM



~~Plane JKL~~ no straight line

Example

Name the geometric shape modeled by each object

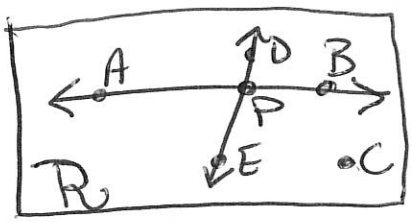
a) A pencil line segment

b) A 10 X 12 patio plane

c) The location where the corner of a driveway meets the road point

- Undefined Terms – explained w/ pictures & descriptions

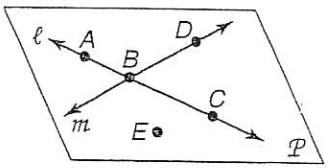
Examples



Draw and label a figure for the relationship

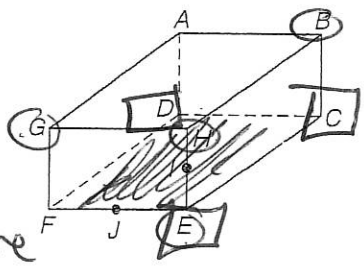
1) plane *R* contains line AB and line DE, which intersect at point P. Add point C on plane *R* so that it is not collinear with line AB or line DE

Refer to the figure.



1. Name a line that contains point *A*. $\overleftrightarrow{AB}$
2. What is another name for line *m*? $\overleftrightarrow{BD}$
3. Name a point not on $\overline{AC}$. E D
4. Name the intersection of $\overline{AC}$ and $\overline{DB}$. B
5. Name a point not on line ℓ or line *m*. E

Refer to the figure.



4. How many planes are shown in the figure? 6
5. Are points *B*, *E*, *G*, and *H* coplanar? Explain. No & B diff. plane
6. Name a point coplanar with *D*, *C*, and *E*. F

1.2 Linear Measure and Precision

➢ Line Segment – part of line

Can you measure the length of a line? No, forever

Example

Use a metric ruler to draw each segment.

a) Draw line segment LM that is 42 millimeters long

1 cm = 10 mm

L M

b) Draw line segment QR that is 5 centimeters long

Use a customary ruler to draw each segment.

a) Draw line segment DE that is 3 inches long.

b) Draw line segment FG that is 2 ¾ inches long.

F G

Measure the following line segments in the unit indicated. Be precise.

(mm) 90mm

(cm) 11 7/10 (11.7)

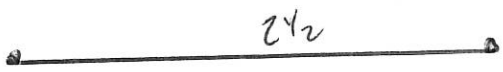
(in) 4 1/4 in

(in)

(mm)

(cm)

➢ **Precision** – depends on the smallest unit available for measuring. It is within ½ unit of measure.



2 3 ½ · unit

Example

Find the precision for each measurement. Explain its meaning.

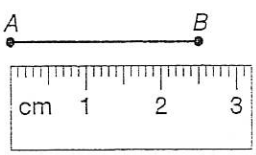
a) 5 millimeters ½ · 1 = ½ off by 4½ → 5½

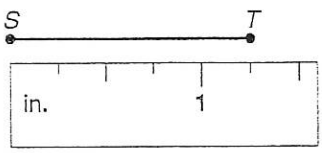
b) 8.5 inches ½ · ½ = ¼ 8.25 → 8.75

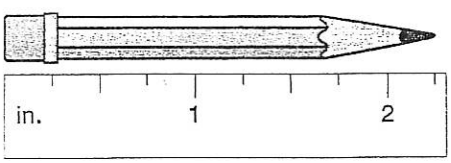
c) 32 ¾ inches ½ · ¼ = ⅛ 32⅝ → 32⅞

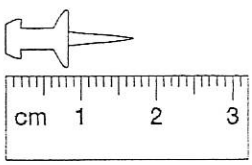
d) 15 millimeters ½ · 1 = ½ 14½ → 15½

Find the length of each line segment or object.

1. 

2. 

3. 

4. 

Find the precision for each measurement.

5. 10 in. ½ · 1 = ½ 9½ → 10½

6. 32 mm ½ · 1 = ½ 31½ → 32½

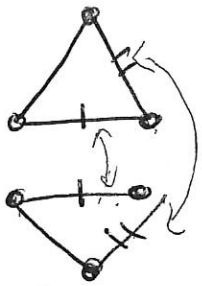
7. 44 cm ½ · 1 = ½ 43½ → 44½

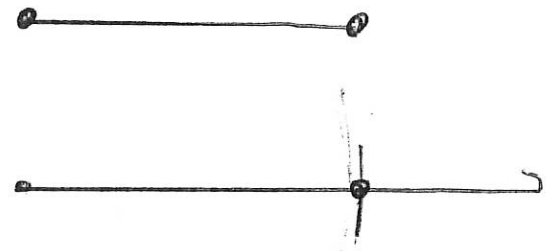
8. 2 ft ½ · 1 = ½ 1.5ft → 2.5ft

9. 3.5 mm ½ · ½ = ¼ 3.25 → 3.75

10. $2\frac{1}{2}$ yd ½ · ½ = ¼ 2¼ → 2¾

➢ Congruent – same



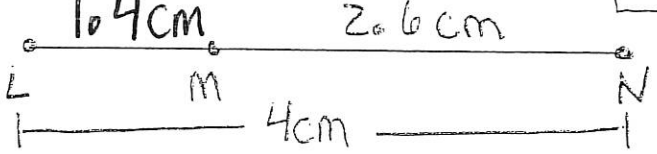


Copy a Segment

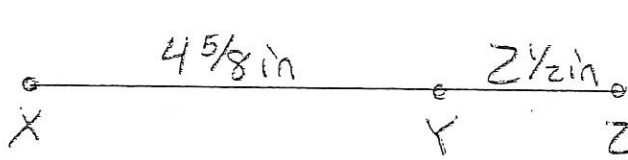
4-2.6

Example

a) Find LM.



b) Find XZ



6

+ 1.125

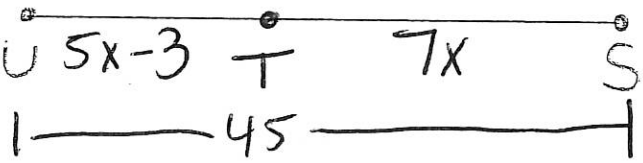
7.125 or 7 1/8 in

c) Find x and ST if T is between S and U, ST = 7x, SU = 45, and TU = 5x – 3.

5x-3 +7x = 45

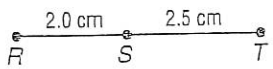
12x-3 = 45

12x = 48 x=4

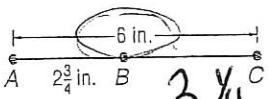


Find the measurement of each segment. Assume that the art is not drawn to scale.

$\overline{RT}$

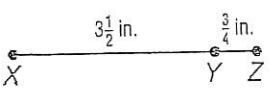


$\overline{BC}$

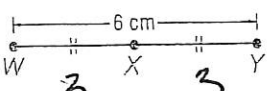


3 1/4

$\overline{XZ}$



$\overline{WX}$



3 3

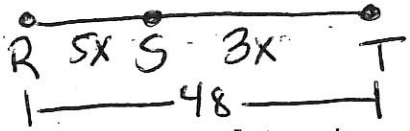
Find x and RS if S is between R and T.

$RS = 5x$, $ST = 3x$, and $RT = 48$.

8x = 48

x = 6

RS = 30



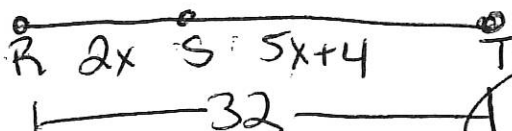
$RS = 2x$, $ST = 5x + 4$, and $RT = 32$.

7x + 4 = 32

7x = 28

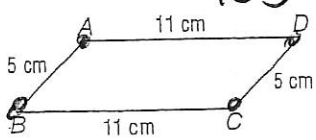
x = 4

RS = 8

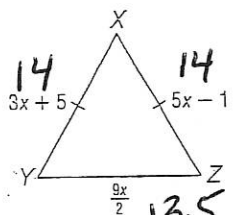


Use the figures to determine whether each pair of segments is congruent.

$\overline{AB}$ and $\overline{CD}$ Yes



$\overline{XY}$ and $\overline{YZ}$ NO



3x+5 = 5x-1

-3x -3x

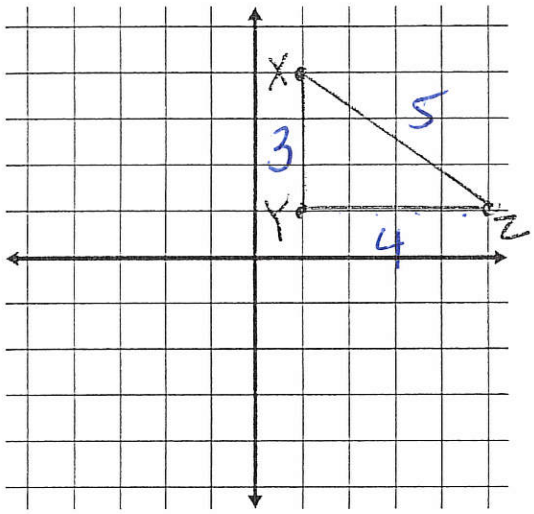
5 = 2x-1

6 = 2x

x = 3

1.3 Distance and Midpoints

- **Situation: Find the distance between X and Z without using a ruler.**



- **The Distance Formula** $= \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

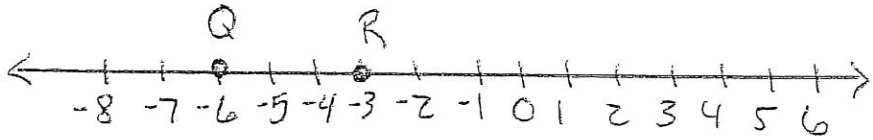
Example

Find the distance between E(-4, 1) and F(3, -1).

Find the distance between R(5, 1) and S (-3, -3).

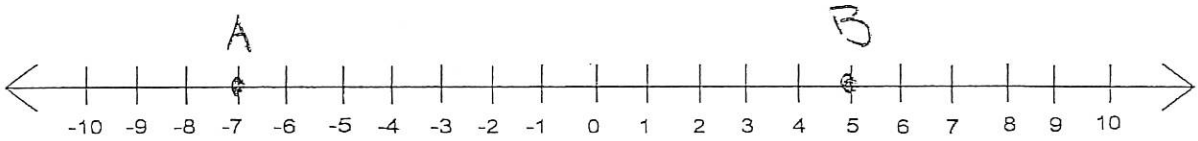
How do you find distance on a number line?

Example
Use the number line to find QR.

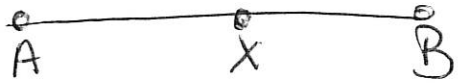


2 Methods:
1) Jump Count
2) |A − B|

Use the number line to find AB.



➢ Midpt. – is the point halfway between the endpoints of the segment. Example: if X is the midpoint of line segment AB, then AX = BX.



Example
Find the midpoint:

a) The coordinates on a number line of J and K are -12 and 16. Find the coordinate of the midpoint of line segment JK.

2

b) Find the coordinates of the midpoint of $\overline{GH}$ for G(8, -6) and H(-14, 12). (-3, 3)

Example

Find the coordinates of D if E(-6, 4) is the midpoint of $\overline{DF}$ and F has coordinates (-5, -3).

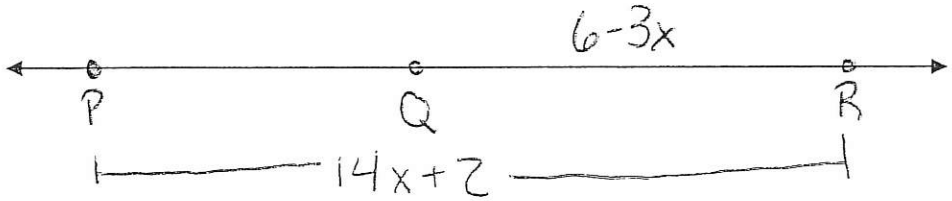
$-6 = \frac{x + -5}{2}$ $\quad 4 = \frac{y + -3}{2}$

$-12 = x - 5$ $\quad 8 = y - 3$

$x = -7$ $\quad y = 11$

Example

What is the measure of $\overline{PR}$ if Q is the midpoint of $\overline{PR}$?



9

➢ **Segment Bisector** - Cuts segment in ½

Construction - pg. 24

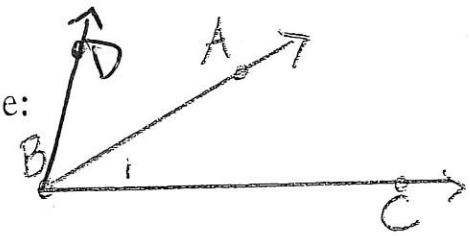
1.4 Angle Measure

- Ray – 
- Opposite Rays formed by two noncollinear rays that have a common endpoint
- Vertex - common endpoint

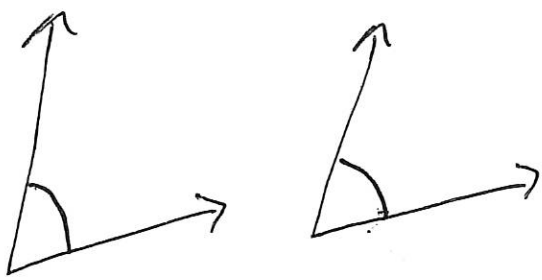
Ways to name an angle:

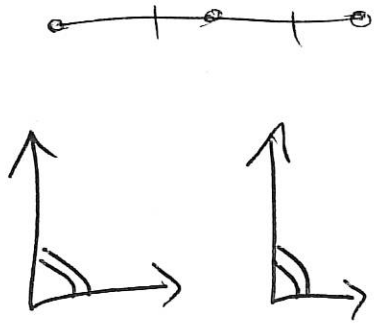
∠1 ∠CBA

∠ABC ∠B

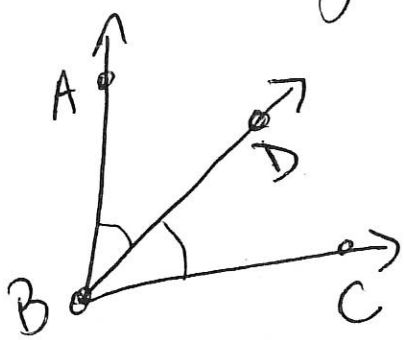


- Acute angle – less than 90°
- Right Angle – 90° 
- Obtuse Angle – an angle less than 180 degrees and more than 90°
- Congruent Angles angles with the same measure





- Angle Bisector – a ray that divides an angle into 2 congruent angles

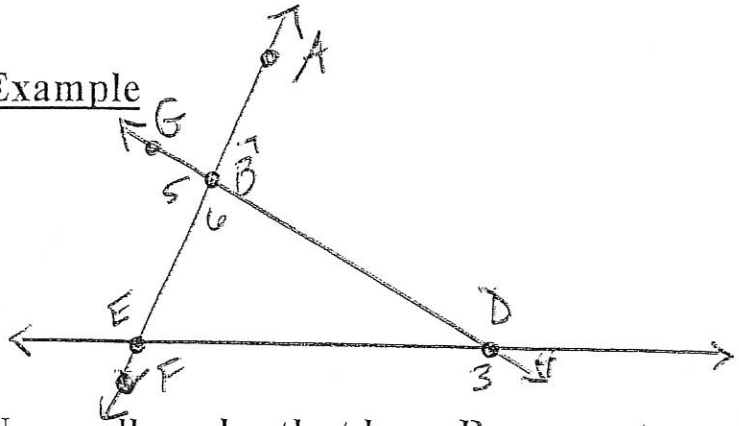


$\overrightarrow{BD}$ is bisector

$\angle ABD \cong \angle DBC$

congruent

Example



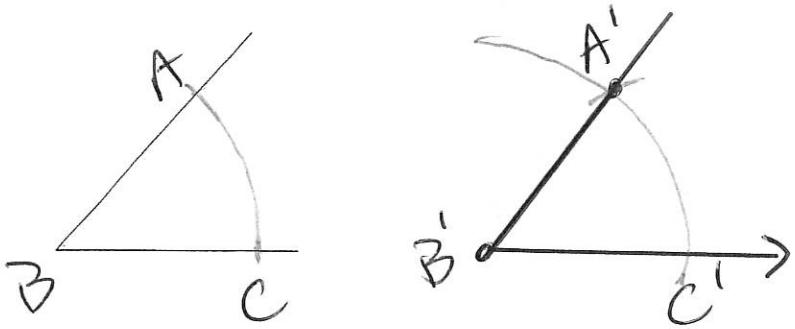
Name all angles that have B as a vertex. ∠7 ∠GBA, ∠5 (∠ABD) ∠GBE

Name the sides of angle 5. $\overrightarrow{BG}$ $\overrightarrow{BE}$

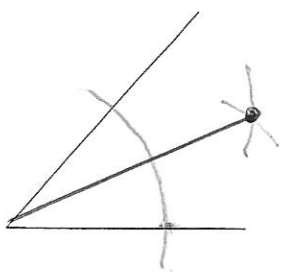
Write another name for angle 6. ∠6 ∠FBD ∠EBD

Example

Copy an angle (pg. 31)



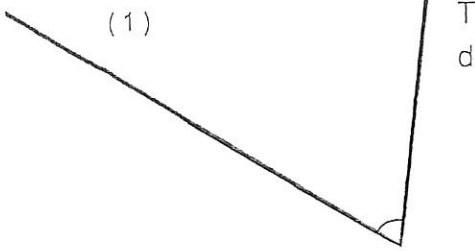
Bisect an angle (pg. 33)



Measuring Angles

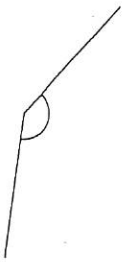
Name: _____ Date: _____

Use your protractor to extend the lines and measure each angle.

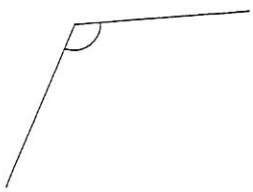
(1) 

This angle is 64° degrees.

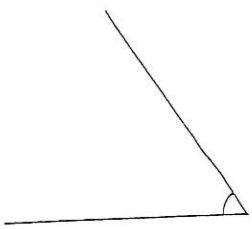
64°
116°

(2) 

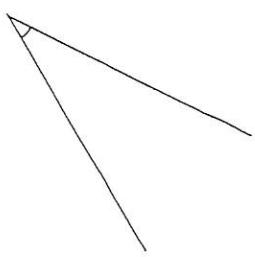
This angle is _____ degrees.

(3) 

This angle is _____ degrees.

(4) 

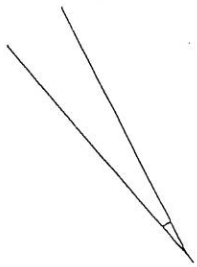
This angle is _____ degrees.

(5) 

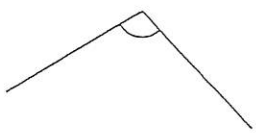
This angle is _____ degrees.

(6) 

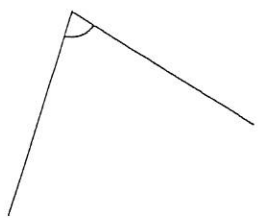
This angle is _____ degrees.

(7) 

This angle is _____ degrees.

(8) 

This angle is _____ degrees.

(9) 

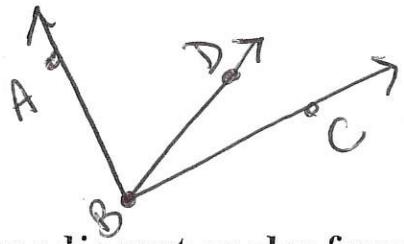
This angle is _____ degrees.

(10) 

This angle is _____ degrees.

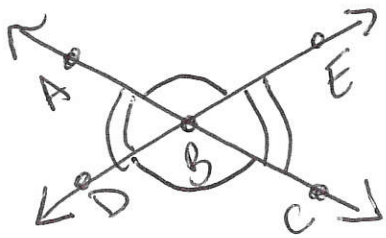
1.5 Angle Relationships

- Adjacent Angles two angles that lie in the same plane, have a common vertex, and a common side, but not common interior points.

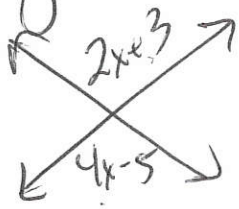


∠ABD
∠DBC

- Vertical – two nonadjacent angles formed by two intersecting lines.

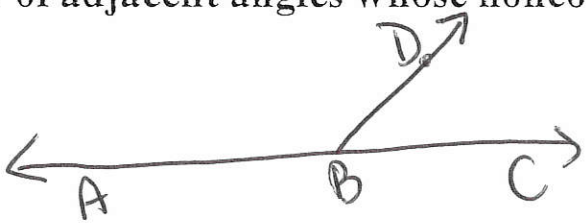


Congruent!



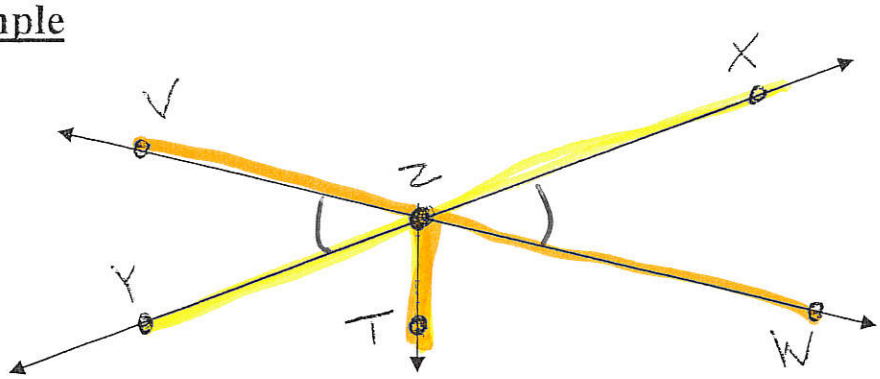
- Linear Pair – pair of adjacent angles whose noncommon sides form a line

+ 180°



∠ABD
∠DBC

Example



Name two angles that form a linear pair

∠YZT
∠XZT

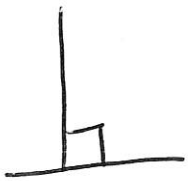
∠VZT
∠WZT

Name two acute vertical angles

∠90

∠XZW
∠VZY

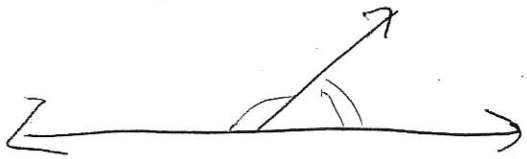
- Complementary – two angles whose measures add up to 90 degrees



Ex $\angle A = 3x+5$
$\angle B = 2x-2$

$3x+5+2x-2=90$
$5x+3=90$
$5x=87$

- Supplementary – two angles whose measures have a sum of 180 degrees



Example

Find the measures of two supplementary angles if the measure of one angle is 6 less than five times the measure of the other angle.

180

$\angle 1 = x = 31°$
$\angle 2 = 5x-6 = 149°$

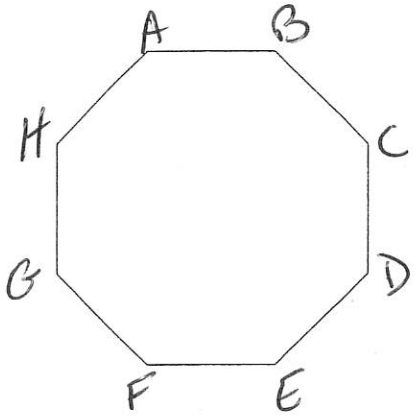
$x+5x-6 = 180$
$6x-6=180$
$+6 \quad +6$
$\frac{6x}{6} = \frac{186}{6}$
$x=31$

- Perpendicular Lines lines that form right angles

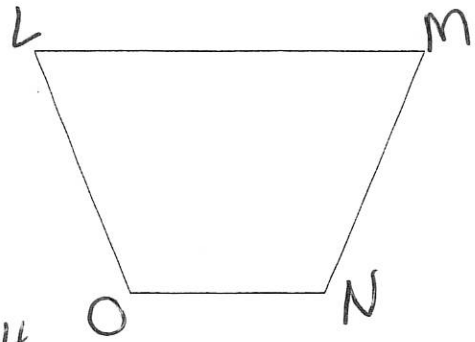
$\perp$ ← Symbol

1.6 Polygons

- Polygon – a closed figure whose sides are all segments. Polygons are named vertices



polygon ABCDEFGH



polygon LMNO

Types of Polygons

- Concave – a polygon for which there is a line containing a side of the polygon that also contains a point on the interior of the polygon
- Convex – a polygon with no line that contains both a side and a point in the interior of the polygon

Polygons

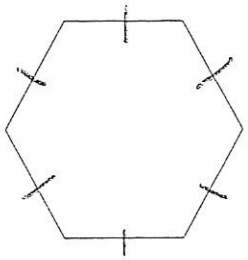
Number of Sides	Polygon
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
7	Heptagon
8	Octagon
9	Nonagon
10	Decagon
12	Dodecagon
n	n-gon

▷ Regular Polygons - all sides same length

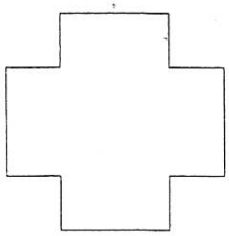
Equilateral = same size lengths
Equiangular = same size angles

Example

Name the following polygons and classify them as concave or convex.



Regular Hexagon Convex



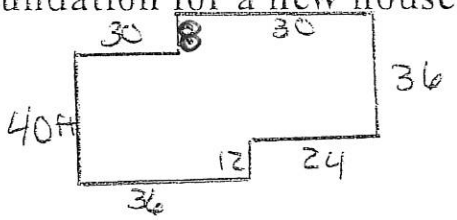
Concave dodecagon

➢ Perimeter – sum of sides (unit)

➢ Circumference – $2\pi r$

Example

A masonry company is contracted to lay three layers of decorative brick along the foundation for a new house given the dimensions below.



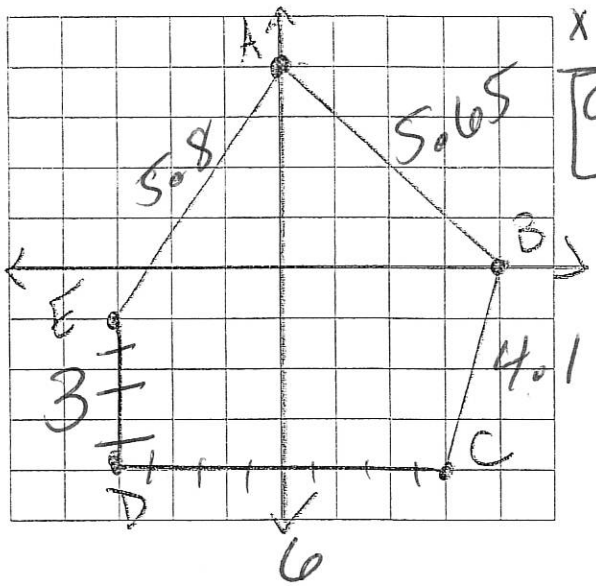
P = 216 ft
× 12
2592 in

Find the perimeter of the foundation and determine how many bricks the company will need to complete the job. Assume that one brick is 8 inches long.

2592/8
324
× 3 layers
972 bricks

Example

Find the perimeter of pentagon ABCDE with A(0, 4), B(4, 0), C(3, -4), D(-3, -4), and E(-3, -1).



$d = \sqrt{(x-x)^2 + (y-y)^2}$

$AB = \sqrt{(0-4)^2 + (4-0)^2}$

$\sqrt{(-4)^2 + (4)^2}$

$\sqrt{32} = 5.65$

$CB = 4.1$

$AE = 5.8$

Perimeter = 24.55 units