Name: Notes

Geometry WS 1.2: Clock Problems

$$\text{angle} = \begin{pmatrix}\text{child's}\\ \text{angle}\end{pmatrix} \pm \left(\frac{\text{minutes}}{60}\right)30°$$

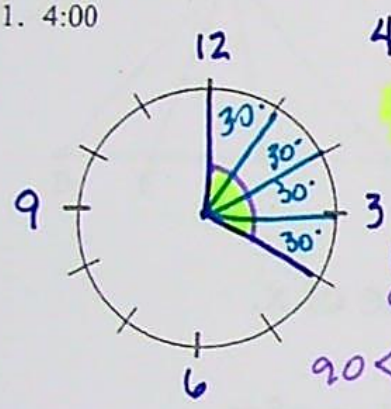
Or use the equation:

$$m\angle = \left(30h + \frac{6m}{12}\right) - 6m$$

*Assume all angles are less than or equal to 180°.

Find the angle formed by the hands of the clock at each specified time.
In some problems, a clock has been drawn for you; for the other problems, draw your own clock.

1. 4:00




4(30°)

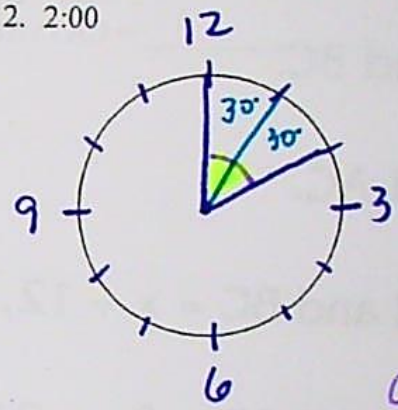
120°

obtuse

between 90 and 180°

$90 < m\angle < 180$

2. 2:00




2(30°)

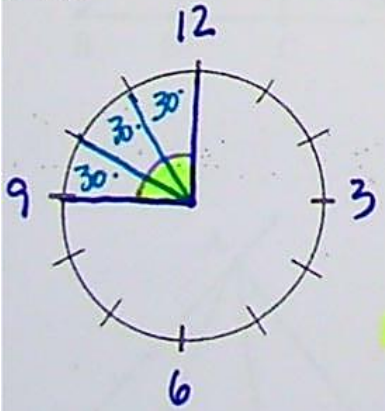
60°

acute

between 0 and 90

$0 < m\angle < 90$

3. 9:00




3(30°)

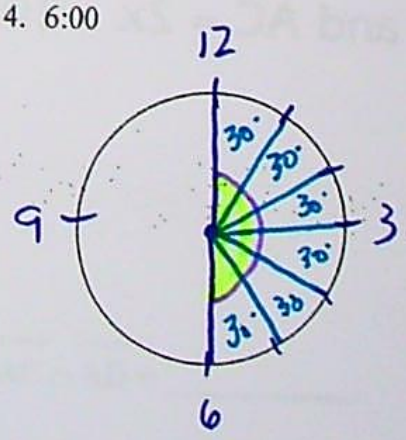
90°

right

exactly 90

$m\angle = 90$

4. 6:00




6(30°)

180°

straight

exactly 180

$m\angle = 180$

(* classification of angles by size)

Name: Notes Date:

Geometry: Worksheet 1.2

1. *Defn:* **Protractor** - instrument used to measure angles in degrees of rotation

2. *Defn:* **Degrees** - basic unit of rotation used for angle measure

Classification of angles

3. *Defn:* **acute angle** - $0 < \text{acute angle} < 90$ between 0 & 90

4. *Defn:* **right angle** - angle $= 90$ angle is 90

5. *Defn:* **obtuse angle** - $90 < \text{obtuse angle} < 180$ between 90 & 180

6. *Defn:* **straight angle** - angle $= 180$ angle is 180

Parts of a degree

A degree is made up of smaller units called **minutes.** (′)

A degree is made up of 60 minutes and is notated in the following way: $1° = 60'$

A minute is made up of smaller units called **seconds.** (″)

A minute is made up of 60 seconds and is notated in the following way: $1' = 60''$

Converting to degrees, minutes, and seconds (DMS)

Rule: multiply fraction or decimal by 60

D → DMS Lg → Sm (*)

(a) $24\frac{1}{3}° =$ $24°\,20'$ ($\frac{1}{3}$ of 60) (b) $101.2° =$ $101°\,12'$ (.2 = $\frac{1}{5}$ of 60) (c) $78\frac{4}{5}° =$ $78°\,48'$ ($\frac{4}{5}$ of 60)

Converting to decimal degrees

Rule: divide minutes by 60 – express as either a decimal or a fraction

DMS → D Sm → Lg (÷)

(d) $172°35' =$ $172\frac{7}{12}°$ ($\frac{35}{60}$) (e) $39°25' =$ $39\frac{5}{12}°$ ($\frac{25}{60}$) (f) $8°36' =$ $8\frac{3}{5}°$ ($\frac{36}{60}$)

Operations with DMS and borrowing

Rules: your final answer should not contain minutes or second greater than 60

(g) $123°\,45'\,37'' + 28°\,6'\,17''$ = $151°51'54''$

(h) $102°\,34'\,41'' + 3°\,45'\,37''$ = $105°79'78''$ → $80' - 60 = 18''$, $-60$ → $106°20'18''$

(i) $12\overset{2}{\cancel{3}}°\,\overset{1}{6}0' - 48°\,45'$ = $74°15'$

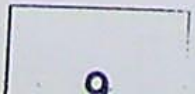
(j) $12\overset{2}{\cancel{3}}°\,\overset{1}{5}9'\,60'' - 19°\,26'\,37''$ = $103°33'23''$

*Defn:* **congruent segments** – have the same measure (length)

*Defn:* **congruent angles** – have the same measure (degrees of rotation)

*Defn:* **tick marks** – indicate relative lengths (segments) or measures (angles)

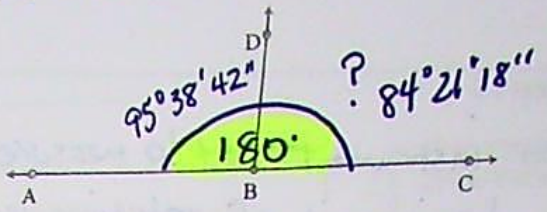
(Used to determine congruence)



$180° \rightarrow 179°60' \rightarrow 179°59''60''$

1. Given: $\angle ABC$ is a straight angle
   $m\angle ABD = 95° 38' 42''$

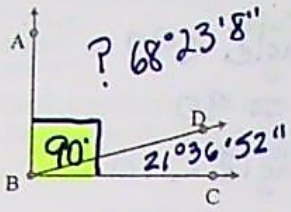
   Find $m\angle DBC$




$$\begin{array}{r} 179°\,59'\,60'' \\ -\ 95°\,38'\,42'' \\ \hline 84°\,21'\,18'' \end{array}$$

2. Given: $\angle ABC$ is a right angle
   $m\angle DBC = 21° 36' 52''$

   Find $m\angle ABD$

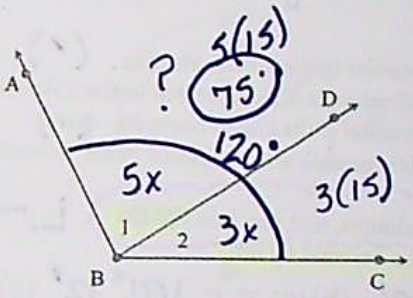



$90° = 89°60' = 89°59'60''$

$$\begin{array}{r} 89°\,59'\,60'' \\ -\ 21°\,36'\,52'' \\ \hline 68°\,23'\,8'' \end{array}$$

3. Given: $m\angle ABC = 120°$
   The ratio of $\angle 1$ to $\angle 2$ is 5:3

   Find $m\angle ABD$




5 : 3

$\angle 1 + \angle 2 = 120$

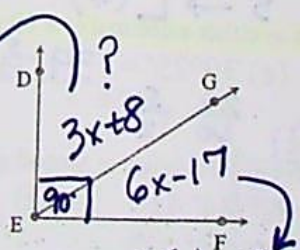
$5x + 3x = 120$

$\frac{8x}{8} = \frac{120}{8}$

$\boxed{x = 15}$

4. Given: $\angle DEF$ is a right angle
   $m\angle DEG = (3x + 8)°$
   $m\angle GEF = (6x - 17)°$

   Find the $m\angle DEG$.




$m\angle DEG = 3(11) + 8$
$33 + 8$
$41°$

$6(11) - 17$
$66 - 17$
$49°$

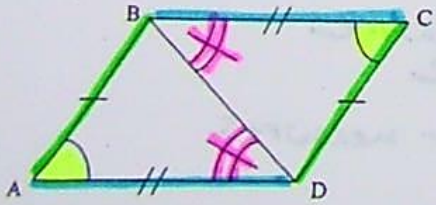
$3x + 8 + 6x - 17 = 90$

$9x - 9 = 90$
$+9 \quad +9$

$\frac{9x}{9} = \frac{99}{9}$

$\boxed{x = 11}$

5. According to the tick marks, which segments and angles are congruent?




$\overline{AB} \cong \overline{CD}$ $\qquad$ $\overline{AD} \cong \overline{BC}$

$\angle A \cong \angle C$ $\qquad$ $\angle ADB \cong \angle DBC$