Section 1.1 - Angles

COMPLEMENTARY AND SUPPLEMENTARY ANGLES

1. Find the complement and supplement of an angle measuring 38°.

Complement:

Need to find x so

$x + 38° = 90°$

$\Rightarrow x = 90° - 38° = \boxed{52°}$

Supplement:

Need to find x so

$x + 38° = 180°$

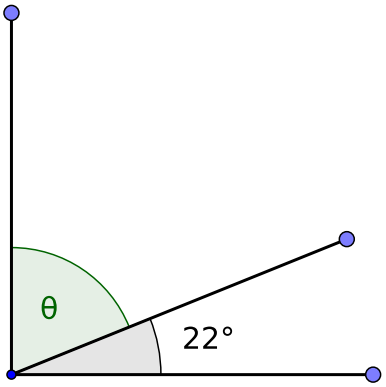
$\Rightarrow x = 180° - 38° = \boxed{148°}$

2. Find θ in the picture below.

Need to find θ so

$22° + \theta = 90°$

$\Rightarrow \theta = 90° - 22° = \boxed{68°}$



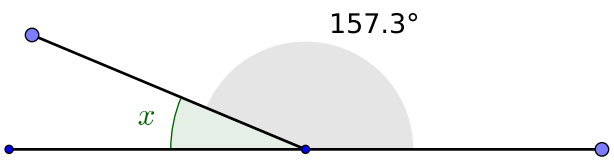
3. Find x in the picture below.

Need to find x so

$x + 157.3° = 180°$

$\Rightarrow x = 180° - 157.3°$

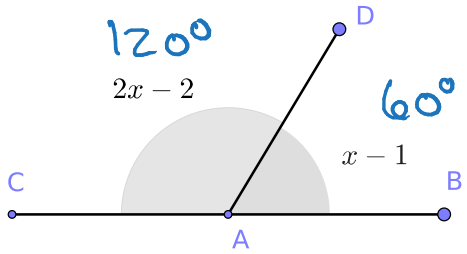
$= \boxed{22.7°}$



4. Find x in the picture below. Then find the angles $\angle DAB$ and $\angle DAC$.

Need to find x so:

$$(2x-2)+(x-1)=180^\circ$$
$$\Rightarrow 3x-3=180^\circ$$
$$\Rightarrow 3x=183^\circ$$
$$\Rightarrow x=61^\circ$$



$$x-1=61^\circ-1=\boxed{60^\circ}$$
$$2x-2=2\cdot 61-2$$
$$=122-2=\boxed{120^\circ}$$

Degrees, Minutes, and Seconds

In this section, we will gain practice on converting DMS angles to Decimal Degrees (DD) and vice-versa Decimal Degrees to DMS angles. We will also practice adding and subtracting angles in DMS.

5. Convert $99^\circ 22' 47''$ to DD.

$$99^\circ 22' 47'' = 99^\circ + \frac{22}{60}^\circ + \frac{47}{3600}^\circ$$
$$= 99^\circ + 0.3667^\circ + 0.0130^\circ$$
$$= \boxed{99.3797^\circ}$$

6. $157^\circ 48' 39'' + 95^\circ 36' 42'' =$

$$\begin{array}{r} 157^\circ 48' 39'' \\ +\ 95^\circ 36' 42'' \\ \hline 252^\circ 84' 81'' \end{array}$$
$$\Rightarrow 252^\circ 85' 21''$$

$$\boxed{253^\circ 25' 21''}$$

7. Find the complement of an angle measuring $38^\circ 12' 18''$.

$$\begin{array}{r} 89 \quad 59 \quad 60 \\ 90^\circ\ 00'\ 00'' \\ -\ 38^\circ 12'\ 18'' \\ \hline \boxed{51^\circ 47' 42''} \end{array}$$

8. Convert 22.128° to DMS.

$22.128^\circ = 22^\circ + 0.128^\circ$

$= 22^\circ + 0.128 \cdot 60'$

$= 22^\circ + 7.68'$

$= 22^\circ + 7' + 0.68 \cdot 60''$

$= 22^\circ + 7' + 40.8''$

$22^\circ 07' 40.8''$

Coterminal Angles

9. Find the coterminal angle of the least possible positive measure for an angle of 1106°.

$1106^\circ - 360^\circ = 746^\circ$

$-360^\circ = 386^\circ$

$-360^\circ = \boxed{26^\circ}$

10. Find the coterminal angle of least possible positive measure for an angle for an angle of −650°.

$-650^\circ + 360^\circ = -290^\circ$

$+360^\circ = \boxed{70^\circ}$

Revolutions per Second Applications

11. If a record spins at 33 1/3 revolutions per minute, through how many degrees does it rotate in 17 seconds?

$\frac{33\frac{1}{3}\ \text{REV}}{1\ \text{MIN}} \times \frac{360^\circ}{1\ \text{REV}} \times \frac{1\ \text{MIN}}{60\ \text{SEC}} = \frac{33\frac{1}{3} \times 360^\circ}{60\ \text{sec}} = \frac{12000^\circ}{60\ \text{SEC}}$

$= 200\ \frac{\text{deg}}{\text{sec}}$

$17\ \text{sec} \times 200\ \frac{\text{deg}}{\text{sec}} = \boxed{3400^\circ}$

12. If a gear rotates through 187° in 30 seconds, how many rotations does it make in an hour?

$\frac{187^\circ}{30\ \text{SEC}} \times \frac{1\ \text{REV}}{360^\circ} \times \frac{3600\ \text{SEC}}{1\ \text{hr}} = \frac{673{,}200\ \text{Rev}}{30\ \text{hr}}$

$= \boxed{22{,}440\ \frac{\text{REV}}{\text{hr}}}$