Learning Target: I will be able to apply trig functions to real-world problems to include finding:

- Arc length
- Area of a circular sector
- Area of any triangle

A. Arc Length
1. Formula: \( \text{arclength} = \theta \cdot r \), where \( \theta \) is in radians

B. Area of a Circular Sector
1. Formula: \( \text{sector area} = \frac{1}{2} \theta \cdot r^2 \), where \( \theta \) is in radians

C. Area of a Triangle
1. Formula: \( \text{triangle area} = \frac{1}{2} \cdot ab \cdot \sin C \), where \( A, B \) & \( C \) are in degrees.

D. Examples
1. A circle has a radius of 4 inches. Find the length to two decimal places of the arc intercepted by a central angle of 235°.  
   \[ \text{arclength} = \theta \cdot r \]
2. Find the area of the sector intercepted by a central angle of 30° in a circle with radius 10 m:
   a) exactly
       __________________
   b) approximately to two decimal places
       __________________

3. Find the area to the nearest whole number of a triangular lot having two sides of length 90 meters and 52 meters and an included angle of 102°13'.
   __________________
ASSIGNMENT 9.1
TRIG APPLICATIONS (1)
Show all work for credit

1. Find the degree measure in DMS form of the central angle of a circle with radius 14.5 centimeters and arc length 25 centimeters.

2. Find the length of the arc intercepted by an angle with measure \( \frac{3\pi}{4} \) on a circle with radius 6 meters:
   a) exactly ____________
   b) approximately ____________

3. Find the area of a sector with radius 15 ft and arc length 12 ft.

4. Find the area of the triangle to the nearest whole number if \( A = 43^\circ 45', b = 57m, \) and \( c = 85m \)

5. The area of a circular sector with radius 5.6 feet is 231.7 ft\(^2\). Find the arc length of the circle to the nearest tenth foot.

(over)
6. Find $a$, $b$, $c$, and $d$ such that the equation $y = a \sin b(x - c) + d$ matches the graph of the function where $a$, $b$, $c$, & $d \neq 0$. Show work for $b$.

\[
\begin{align*}
a &= \underline{\phantom{0}} \\
b &= \underline{\phantom{0}} \\
c &= \underline{\phantom{0}} \\
d &= \underline{\phantom{0}} 
\end{align*}
\]

7. Find the equation of the parabola with vertex (-2, 4) that contains the point (2, 1)

\[
\underline{\phantom{0}}
\]

8. Given: $f(x) = \frac{4x^3 - 8x^2 - 12x}{2x^2 - 2}$. Find:

\[
\begin{align*}
a) \quad \text{The zeros of the function} & \quad \underline{\phantom{0}} \\
b) \quad \text{The slant asymptote of the graph of the function} & \quad \underline{\phantom{0}}
\end{align*}
\]

9. Solve for $x$: $\frac{1}{9} = 27^{3x+2}$

\[
\underline{\phantom{0}}
\]
PRE-IB ANALYSIS
TRIG APPLICATIONS (2)

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Learning Target: I will be able to solve any triangle using the:
- Law of Sines
- Law of Cosines
********************************************************************************

A. Law of Sines: ________________________________
   1. Used for ________________________________
   2. Formula: ________________________________

   \[ \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \]

   \[ \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \]

3. Given: \( \angle B = 28^\circ \), \( \angle C = 102^\circ \), and \( AC = 5 \) inches. Solve \( \triangle ABC \)
   \[ A = \square \]
   \[ a = \square \]
   \[ c = \square \]
4. SSA -

a) No triangle: \( a = 15 \text{ cm}, b = 25 \text{ cm}, \) and \( m \angle a = 85^\circ \)

b) One triangle: \( a = 22 \text{ cm}, b = 12 \text{ cm}, \) and \( m \angle A = 42^\circ \)

\[ c = \underline{\text{________}} \]
\[ B = \underline{\text{________}} \]
\[ C = \underline{\text{________}} \]
c) Two triangles: \( a = 9 \text{ cm}, \ b = 17 \text{ cm}, \) and \( m \angle A = 29^\circ \)

\[
\begin{align*}
c &= \underline{\phantom{0}} \\
B &= \underline{\phantom{0}} \\
C &= \underline{\phantom{0}}
\end{align*}
\]
B. Law of Cosines: ____________________________

1. Used for ____________________________

2. Formulas: ____________________________
   ______________________________________
   ______________________________________
   ______________________________________

3. If use the Law of Cosines once, ____________________________

4. \( a = 8 \) miles, \( b = 19 \) miles, & \( c = 14 \) miles. Solve \( \Delta ABC \)            

   \( A = \) ________  
   \( B = \) ________  
   \( C = \) ________  

5. A ship travels 60 miles due east, then adjusts its course 15° northward. After travelling 80 miles in the new direction, how far is the ship from its point of departure to the nearest mile? 
   ____________________________
ASSIGNMENT 9.2
TRIG APPLICATIONS (2)

Show all work for credit

Use the Law of Sines or Law of Cosines to solve the following triangles. Give all values to one decimal place.

1. \( B \)

2. \( B = 62^\circ, a = 4, c = 5 \)

3. \( B = 60^\circ, b = 14, c = 15 \)
4. A yacht starts from a harbour and sails for a distance of 11 km in a straight line. The yacht then makes a turn to port (left) of 38° and sailed for 7 km in a straight line in this new direction until it arrives at a small island. Calculate the distance from the harbour to the island to the nearest tenth km.

__________________

5. A car park is in the shape of a parallelogram as shown in the following diagram. What is the area of the car park to the nearest whole number?

320m

275m

__________________

6. Solve for $x$ algebraically to 2 decimal places over the interval $[0, 2\pi]$:

$3\sin^2 x - 2\sin x - 4 = 0$

__________________

7. Sketch the graph of $y = 3\sin\left(2x - \frac{\pi}{2}\right) + 4$ over the interval $[0, 2\pi]$. Show all work for significant points.
Give all answers to one decimal place unless directed otherwise.

1. In the triangle ABC, AB = 6.2 cm, BC = 7.7 cm and angle CAB = 93°.
   a) Calculate the size of angle ABC. _____________
   b) Hence, calculate the area of triangle ABC. _____________

2. A van travels due north from a point X to point Y for a distance of 9 miles. The van then makes an 85° turn to the west and travels 6 miles to point Z. Calculate the direct distance of the van from point X to point Z to the nearest mile. _____________

3. The sector of a circle of radius 3 cm subtends a central angle of \( \frac{5\pi}{18} \). Find:
   a) the exact area of the sector _____________
   b) the exact perimeter of the sector _____________

(over)
4. If the area of a circular sector with arc length 52.6 m is 326.2 m², find the radius to the nearest tenth meter.

5. In triangle ABC, AB = 8 cm, BC = 10 cm and angle ACB = 42°. Calculate the two possible lengths for AC.

6. Given: \( g(x) = 4 + 3e^{2x} \)
   a) Sketch the graph by finding two significant points. Sketch the asymptote, and label the significant points with their coordinates and the asymptote with its equation.

   Work:

   ![Graph](image)

   b) Give the domain & range of the function: \( D = \) ____________ \( R = \) ____________

   c) Find \( x \) exactly such that \( g(x) = 10 \). ____________
7. Solve for \( x \) exactly in the interval \([0, 2\pi]\) \( 2\sin x - 8\sin x\cos^2 x = 0 \)

8. Solve for \( x \) exactly in the interval \([0, 2\pi]\) \( \sqrt{2}\sin(2x - \pi) + 1 = 0 \)

9. Consider an investment of $23 450. Determine the interest to the nearest hundredth percent if the investor wants to realize a profit of $10 000 in 10 years compounded continuously.