Unit 7 – Trigonometry

1a) AB = 6.7 cm, <C = 48°, <A = 42°
b) <E = 60°, d = 8.1 cm, f = 16.2 cm

2a) <B = 47°, <C = 51°, c = 6.7 cm
b) <D = 76°, <E = 64°, <F = 40°

3) In small triangle, b = 17.9 cm
In big triangle, b = 21.3 cm
<A = 15°

4) 81 cm
5) $\sin\theta = 0.4963$, $\cos\theta = 0.8685$

6) Since the adjacent side and the hypotenuse are involved, we use the cosine function:

$$\cos 50^\circ = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{BC}{15}$$

$$BC = 15\cos 50^\circ = 15(0.642) \approx 9.6 \text{ cm}$$

Since the opposite side and the hypotenuse are involved, we use the sine function:

$$\sin 50^\circ = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{AC}{15}$$

$$AC = 15\sin 50^\circ \approx 15(0.766) \approx 11.5 \text{ cm}$$

7) $a \sin C = 25 \sin 70^\circ$
$a \sin C \approx 23.5$
Since 23.5 24 25, there are two solutions for the triangle.
Using the Law of Sines,

$$\frac{a}{\sin A} = \frac{c}{\sin C}$$

$$\frac{25}{\sin A} = \frac{24}{\sin 70^\circ}$$

Solving for sin *A*,

$$\sin A = \frac{25\sin 70^\circ}{24}$$

$$A = \sin^{-1}\left(\frac{25\sin 70^\circ}{24}\right)$$

$A \approx 78.194143$
So, $A \approx 78.2^\circ$
Since there are two solutions, there must be another possible measurement for *A*.
Therefore another measure of *A* is $180^\circ - 78.2^\circ$ or 101.8°.
Find $m<B$ for the first measure of *A*.
Use the fact that the sum of the angle measures of a triangle is 180°.
$\approx 180^\circ - (78.2^\circ + 70^\circ)$
Using the Law of Sines,

$$\frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{b}{\sin 31.8^\circ} \approx \frac{24}{\sin 70^\circ}$$

Solving for *b*,

$$b \approx \frac{24\sin 31.8^\circ}{\sin 70^\circ}$$

$b \approx 13.458591$
To the nearest tenth, one solution of this triangle is $A = 78.2^\circ$, $B = 31.8^\circ$, and $b = 13.5$.
Find $m < B$ for the second measure of *A*.
Use the fact that the sum of the angle measures of a triangle is 180°.
$M<B = 180^\circ - (m<A + m<C)$
$\approx 180^\circ - (101.8^\circ + 70^\circ)$
$= 8.2^\circ$
Using the Law of Sines,

$$\frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{b}{\sin 8.2^\circ} \approx \frac{24}{\sin 70^\circ}$$

Solving for *b*,

$$b \approx \frac{24\sin 8.2^\circ}{\sin 70^\circ}$$

$b \approx 3.642781$
To the nearest tenth, the second solution of this triangle is $A = 101.8^\circ$, $B = 8.2^\circ$, and $b = 3.6$.

8) Since 12 < 14 There are no solutions for the triangle.

9) Since *c* is the longest side, *C* is the angle with the greatest measure, and therefore a possible obtuse angle.
Use Law of Cosines that contains cos *C*,
$c^2 = a^2 + b^2 - 2ab\cos C$

Substitute 32 for *a*, 38 for *b*, and 46 for *c*.
$46^2 = 32^2 + 38^2 - 2(32)(38)\cos C$

Solving for cos *C*,

$$\cos C = \frac{32^2 + 38^2 - 46^2}{2(32)(38)}$$

$$C = \cos^{-1}\left(\frac{32^2 + 38^2 - 46^2}{2(32)(38)}\right)$$

$C \approx 81.677959$
So, $C \approx 81.7^\circ$.

= 31.8°

Using the Law of Sines,

$$\frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{38}{\sin B} = \frac{46}{\sin 81.7^\circ}$$

$$\sin B = \frac{38\sin 81.7^\circ}{46}$$

$$B = \sin^{-1}\left(\frac{38\sin 81.7^\circ}{46}\right)$$

$B \approx 54.828781$

So, $B \approx 54.8^\circ$.

Find $m<A$.

Use the fact that the sum of the angle measures of a triangle is 180°.

$\approx 180^\circ - (54.8^\circ + 81.7^\circ)$

$\approx 43.5^\circ$

To the nearest tenth, the solution of this triangle is $A = 43.5^\circ$, $B = 54.8^\circ$, and $C = 81.7^\circ$.

10) Selecting the formula from the Law of Cosines that contains cos *A*,

$a^2 = b^2 + c^2 - 2bc\cos A$

$20^2 = 30^2 + 40^2 - 2(30)(40)\cos A$

Solving for cos *A*,

$$\cos A = \frac{30^2 + 40^2 - 20^2}{2(30)(40)}$$

$$A = \cos^{-1}\left(\frac{30^2 + 40^2 - 20^2}{2(30)(40)}\right)$$

$A \approx 29.0^\circ$

We know *b*, *c*, and *A*. So use the formula

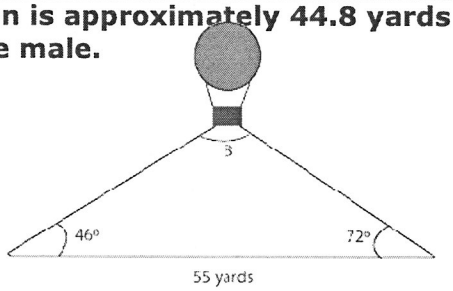
$$K = \frac{1}{2}bc\sin A$$

$$K \approx \frac{1}{2}(30)(40)\sin 29.0^\circ$$

$K \approx 290.474$

Therefore, to the nearest tenth, the area of the triangle is 290.5 units^2.

11) **The balloon is approximately 44.8 yards away from the male.**



Unit 8 – Graphing Trig Functions

1) Period = 6 units Amplitude = 1.5 units

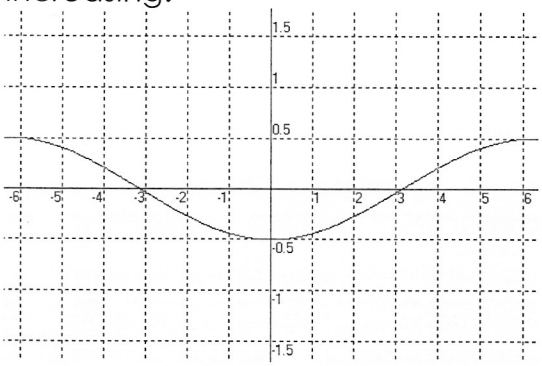
2) Period = 180° Amplitude = 3

3) Period = 120° Amplitude = -1/3

4) Period = 720° Amplitude = -1/2

X – int:

Increasing:



5) Amplitude = 1/6 Period = 60°

6) $y = 30\sin(360/135)(x-90^\circ) - 25$

7) $y = 3.5\cos 4(x - 45^\circ) + 9$

8) Shift all coordinates of the graph of $y = \sin x$ up 7 units

9) Amplitude = 0.5 Period = 1/349

10) $y = 2\cos \frac{1}{4}x$

11) Amplitude = 6 Period = 1800° or 10π