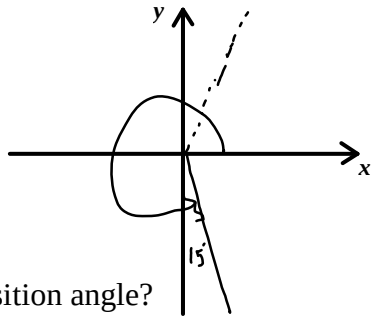
Practice Test

A. Answer the following questions and be sure to read the instructions carefully

1. Draw $S15°E$ in standard position.



a) In which quadrant do we find the terminal side? 4
b) What is the reference angle of $S15°E$? 75°
c) What is the measure of the standard position angle for $S15°E$? 285°
d) If the reference angle is reflected in the *x*-axis, what is the standard position angle?

75°

2. If the point $P(-6,\ 8)$ lies on the terminal side of $\angle\theta$, find all three trigonometric ratios.

$x = -6$
$y = 8$
$r = \sqrt{36+64} = 10$

$\sin\theta = \frac{8}{10} = \frac{4}{5}$

$\cos\theta = \frac{-6}{10} = \frac{-3}{5}$

$\tan\theta = \frac{8}{-6} = -\frac{4}{3}$

3. If $\angle\theta$ lies in quadrant III, and $\tan\theta = \frac{7}{5}$, find the other two trigonometric ratios.

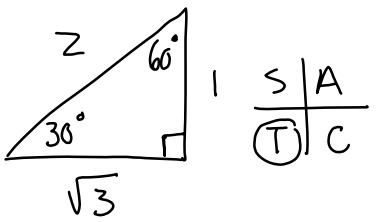
$x = -5$
$y = -7$
$r = \sqrt{25+49} = \sqrt{74}$

$\sin\theta = \frac{-7}{\sqrt{74}}$

$\cos\theta = \frac{-5}{\sqrt{74}}$

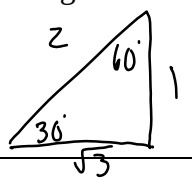
4. If θ lies in quadrant II, and has a reference angle of 27°, find θ. 153°

5. Given that $\sin\theta = -\frac{\sqrt{3}}{2}$ and $\tan\theta = \sqrt{3}$,



a) in which quadrant does $\angle\theta$ terminate in? 3,
b) what is the reference angle? 60° and
c) what is the principle angle? 240°

For each equation below, determine the value(s) of angle θ to the nearest degree. Assume that $0^\circ \le \theta < 360^\circ$. Draw a diagram for each situation.



Calculator assisted side Non-calculator side

a) $\cos\theta = 0.8325$

$\theta_R = 34^\circ$

$\theta = 34^\circ$

$\theta = 326^\circ$

b) $\tan\theta = -\frac{1}{\sqrt{3}}$

$\theta_R = 30^\circ$

$\theta = 150^\circ$

$\theta = 210^\circ$

c) $\tan\theta = -0.4325$

$\theta = 157^\circ$

$\theta = 337^\circ$

$\theta_R = 23^\circ$

d) $\sin\theta = \frac{\sqrt{3}}{2}$

$\theta_R = 60^\circ$

$\theta = 60^\circ$

$\theta = 120^\circ$

e) $\cos^2\theta = \frac{49}{100}$

$\theta_R = 46^\circ$

$\cos\theta = \pm\frac{7}{10}$

$\theta = 46^\circ, 134^\circ, 226^\circ, 314^\circ$

f) $\cos^2\theta = \frac{1}{4}$

$\theta_R = 60^\circ$

$\cos\theta = \pm\frac{1}{2}$

$\theta = 60^\circ, 120^\circ, 240^\circ, 300^\circ$

g) $\tan^2\theta - 7\tan\theta + 12 = 0$

$(\tan\theta - 4)(\tan\theta - 3) = 0$

$\tan\theta = 4 \quad \tan\theta = 3$

$\theta = 76^\circ \quad \theta = 72^\circ$

$\theta = 256^\circ \quad \theta = 252^\circ$

h) $2\sin^2 x - 5\sin x + 2 = 0$

$(2\sin x - 1)(\sin x - 2) = 0$

$\sin x = \frac{1}{2} \quad \sin x = 2$

$x = 30^\circ \quad \varnothing$

$x = 150^\circ$

The Sine Law and the Cosine Law: <u>Solve for the unknown sides or angles indicated.</u>

1. $\frac{\sin 47°}{145} = \frac{\sin 37°}{b} = \frac{\sin C}{c}$

C = 96

b = 119.3 c = 197.2

2. $\frac{\sin 135°}{2534} = \frac{\sin B}{1756} = \frac{\sin C}{c}$

B = 29° C = 16° c = 987.8

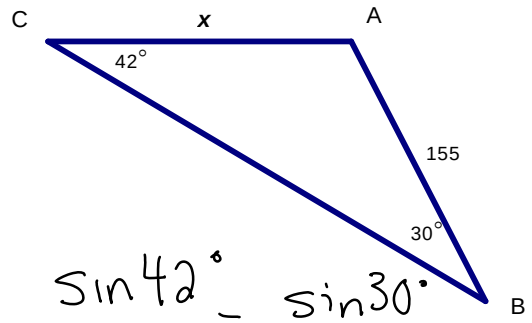
3. $c^2 = 45^2 + 65^2 - 2(45)(65)\cos 37°$

c = 39.7

4. $\cos \angle C = \frac{124^2 - 100^2 - 73.3^2}{-2(100)(73.3)}$

C = 90°

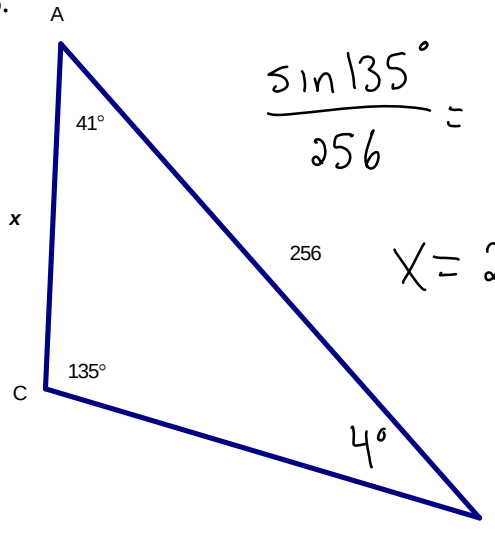
5.



$\frac{\sin 42°}{155} = \frac{\sin 30°}{x}$

x = 115.8

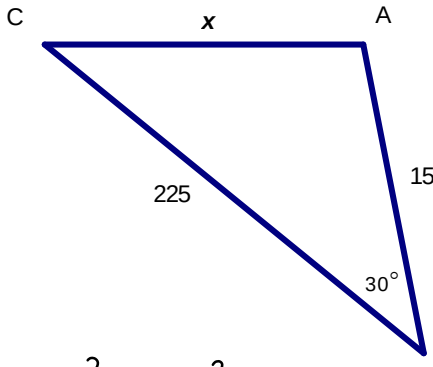
6.



$\frac{\sin 135°}{256} = \frac{\sin 4°}{x}$

x = 25.3

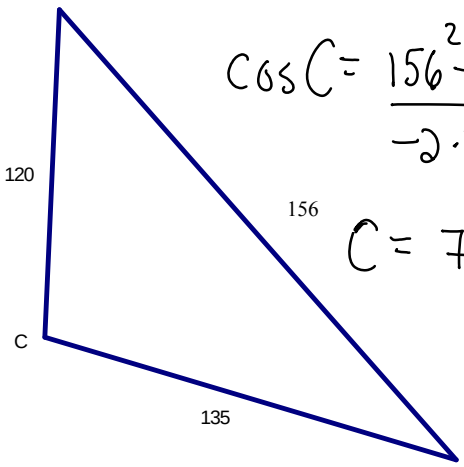
7.



$x^2 = 225^2 + 155^2 - 2 \cdot 225 \cdot 155 \cos 30°$

x = 119.4

8.



$\cos C = \frac{156^2 - 120^2 - 135^2}{-2 \cdot 120 \cdot 135}$

C = 75°

9. Solve for ΔABC

$\angle A = 25^\circ$	a = 12
$\angle B = 32^\circ / 148^\circ$	b = 15
$\angle C = 123^\circ / 7^\circ$	c = 23.8 / 3.4

$$\frac{\sin 25^\circ}{12} = \frac{\sin B}{15}$$

$$B = 32^\circ \text{ or } 148^\circ$$

$$c^2 = 12^2 + 15^2 - 2 \cdot 12 \cdot 15 \cos 123^\circ$$

$$c^2 = 12^2 + 15^2 - 2 \cdot 12 \cdot 15 \cos 7^\circ$$

10. Solve for ΔABC

$\angle A = 25^\circ$	a = 20
$\angle B = 100^\circ$	b = 46.6
$\angle C = 55^\circ$	c = 38.8

$$\frac{\sin 25^\circ}{20} = \frac{\sin 100^\circ}{b}$$

$$c^2 = 20^2 + 46.6^2 - 2 \cdot 20 \cdot 46.6 \cos 55^\circ$$

11. Solve for ΔABC

$\angle A = 70^\circ$	a = 50
$\angle B = 34^\circ$	b = 30
$\angle C = 76^\circ$	c = 51.6

$$\frac{\sin 70^\circ}{50} = \frac{\sin B}{30} = \frac{\sin 76^\circ}{c}$$

12. Solve for ΔABC

$\angle A = 30^\circ$	a = 29.2
$\angle B = 125^\circ$	b = 48
$\angle C = 25^\circ$	c = 25

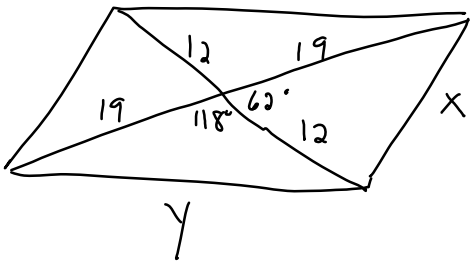
$$a^2 = 48^2 + 25^2 - 2 \cdot 48 \cdot 25 \cos 30^\circ$$

$$\cos B = \frac{48^2 - 25^2 - 29.2^2}{-2 \cdot 25 \cdot 29.2}$$

Avoid Sine Law for the biggest angle!

B. Sine and Cosine Law Application Questions

1. The diagonals of a parallelogram are 24 cm and 38 cm long respectively. If the measure of the angle between the diagonals is 62 degrees, find the perimeter of the parallelogram to the nearest tenth.



$X^2 = 12^2 + 19^2 - 2 \cdot 12 \cdot 19 \cos 62°$

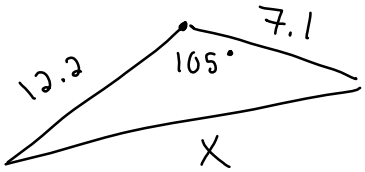
$X = 17.056$

$Y^2 = 12^2 + 19^2 - 2 \cdot 12 \cdot 19 \cos 118°$

$Y = 26.8156$

Perimeter = 87.7 cm

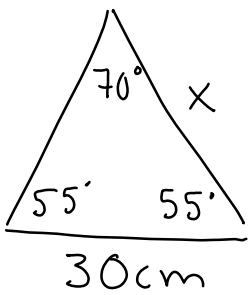
2. A radar tracking station locates a speedboat at a distance of 12.2 km and a tugboat at a distance of 7.1 km. At the station the angle between the lines of sight to the two boats is 105º. How far apart are the boats?



$X^2 = 7.1^2 + 12.2^2 - 2(7.1)(12.2)\cos 105°$

$X = 15.6 \text{ km}$

3. An isosceles triangle has a base of 30 cm and a vertex angle of 70°. What is the perimeter of the triangle?

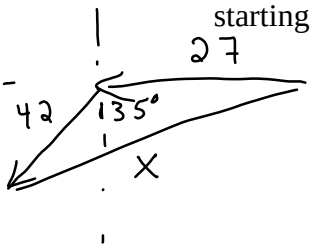


$\frac{\sin 70°}{30} = \frac{\sin 55°}{X}$

$X = 26.152$

Perimeter = 82.3m

4. A ship sails due west at a speed of 18 knots for 1.5 hours. The ship then changes course and heads directly south-west at a speed of 14 knots for 3 hours. How far is the ship from its starting point?



$X^2 = 42^2 + 27^2 - 2 \cdot 27 \cdot 42 \cdot \cos 135°$

$X = 64.0$ nautical miles