Foundations of Math 11
Unit Test – Trigonometry (Version #2)

Name: Key **April 2018**

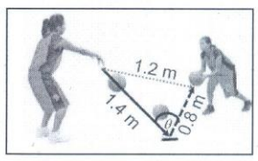
$\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$ $\quad \frac{\sin A}{a}=\frac{\sin B}{b}=\frac{\sin C}{c}$ $\quad a^2=b^2+c^2-2bc\cos A$ $\quad \cos A=\frac{b^2+c^2-a^2}{2bc}$ $\quad alt=b\sin A$

PART A – Multiple Choice (15 Marks)
Shade in the letter corresponding to the correct solution on the scantron sheet that is provided.

1. For ΔABC, ∠A=53° and ∠C=61°, which side of the triangle is the **smallest**? $\angle B = 66°$

A [A] a [B] b [C] c [D] not enough information

2. In a basketball game, a player executing a bounce pass needs to know how the ball should be directed toward the floor so that it will bounce up into the hands of the intended receiver. In the diagram below, the **measure of the angle** θ to the nearest degree is…



$\cos\theta = \frac{1.4^2+0.8^2-1.2^2}{2(1.4)(0.8)}$

$\cos\theta = \frac{1.16}{2.24}$

$\theta = \cos^{-1}\left(\frac{1.16}{2.24}\right)$

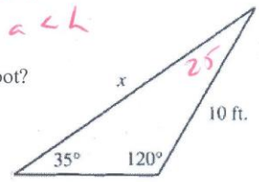
D [A] 31° [B] 35° [C] 52° [D] 59°

3. Which set of measurements **will not** produce a triangle?

A [A] $\angle A = 25°$, $a = 5.0$ m, $b = 12.0$ m
[B] $\angle A = 25°$, $a = 9.2$ m, $b = 12.0$ m
[C] $\angle A = 25°$, $a = 12.0$ m, $b = 12.0$ m
[D] $\angle A = 25°$, $a = 14.5$ m, $b = 12.0$ m

$h = 12\sin 25°$
$h = 5.07$
Need $a < h$

4. Determine the **length of side** x, to the nearest tenth of a foot?



B [A] 17.4 ft [B] 15.1 ft [C] 12.2 ft [D] 6.6 ft

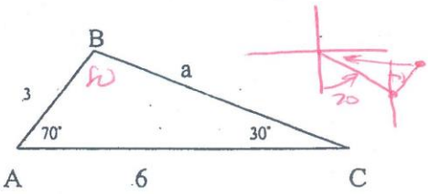
$\frac{x}{\sin 120°} = \frac{10\sin 120°}{\sin 35°}$

$x = 15.1$

5. Malia leaves her campsite and hikes 4 km in a $S70°E$ direction. She then turns and hikes 3 km in a $N25°E$ direction. How would you determine her distance from the campsite?

B [A] the sine law [B] the cosine law [C] primary trig ratios [D] not possible

6. In the diagram below, which of the following could be used to find **side** a?



D [A] $\tan 70° = \frac{a}{3}$ [B] $\frac{a}{\sin 70°}=\frac{6}{\sin 30°}$
[C] $a^2 = 3^2+6^2-(3)(6)\cos 70°$ [D] $\frac{a}{\sin 70°}=\frac{6}{\sin 80°}$

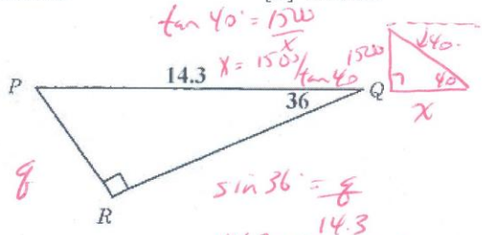
7. A search helicopter with an altitude of 1500m above ground spots a lost boy huddled on a beach at an angle of depression of 40°. Horizontally, how far is the helicopter from the boy?

A [A] 1787.6m [B] 1258.6m [C] 2333.6m [D] 1958.1m

$\tan 40° = \frac{1500}{x}$

$x = \frac{1500}{\tan 40°}$

8. In the diagram shown, what is the **length of** q to the nearest tenth?

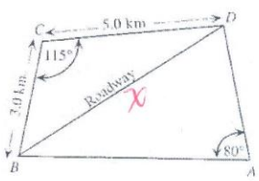


A [A] 8.4 [B] 8.9 [C] 10.4 [D] 11.6

$\sin 36° = \frac{q}{14.3}$

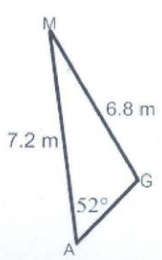
$14.3\sin 36° = q$

9. The course manager needed to clear the snow on a roadway used to transport people and equipment between checkpoints labeled B and D of a biathlon course, as shown below. An equation that could be used to determine the length of the roadway, BD, is…



B [A] $BD = \frac{5.0\sin 115°}{\sin 80°}$ [B] $BD = \sqrt{3.0^2+5.0^2-2(3.0)(5.0)\cos 115°}$
[C] $BD = \frac{3.0\sin 115°}{\sin 80°}$ [D] $BD = \sqrt{3.0^2+5.0^2+2(3.0)(5.0)\cos 115°}$

10. In the obtuse triangle shown, what is the **measure of angle G**?



A [A] 123° [B] 57° [C] 5° [D] 132°

SSA
acute
acb
$h = 7.2\sin 52$
$h = 5.7$
$a > h$
2 solutions

$\frac{7.2}{\sin G} = \frac{7.2}{\sin 52}$

$\frac{7.2}{6.8}$

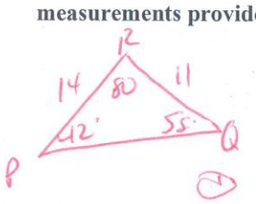
$\sin^{-1}\sin G = (0.8344)\sin^{-1}$

$\angle G = 57°$ OK

$\angle G = 123°$

PART B – Open Response (25 Marks)
Show all your work in the space that is provided.

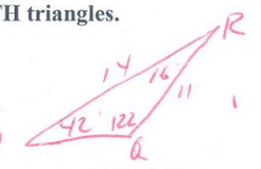
1. Solve ΔPQR, given that $p = 11\ cm$, $q = 14\ cm$ and $\angle P = 42°$. **If there is more than one triangle possible for the measurements provided, sketch both triangles and solve BOTH triangles.** [8]



SSA
acute
a < b
$h = 14\sin 42°$
$h = 9.4$
$a > h$
2 solutions
Ambiguous ①

$\frac{14}{\sin Q} = \frac{14}{\sin 42°}$
$\frac{14}{14} \quad \frac{11}{11}$
$\sin Q = (0.8516)$ ①
$\angle Q = 58°$ ①
$\angle R = 80°$ ①
$\frac{r}{\sin 80°} = \frac{11}{\sin 42°}$
$r = 16.2$ ①

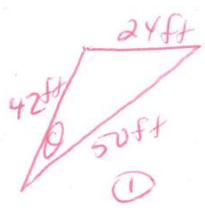
OR



$\angle Q = 122°$ ①
$\angle R = 16°$ ①
$\frac{r}{\sin 16°} = \frac{11}{\sin 42°}$
$r = 4.5$ ①

8

2. The posts of a soccer goal are 24 ft apart. A player is standing at a point 50 ft from one post and 42 ft from the other. Within what angle must the player kick the ball to score a goal? **(Must include a detailed sketch)** [3]



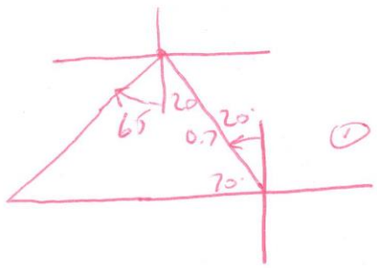
①

$\cos\theta = \frac{42^2 + 50^2 - 24^2}{2(42)(50)}$ ①
$\cos\theta = \frac{3658}{4200}$
$\theta = \cos^{-1}\left(\frac{3658}{4200}\right)$
$\theta = 29°$ ①

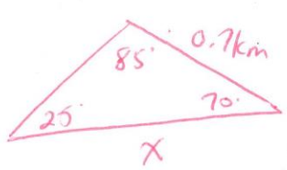
Angle = 29°

3

3. A hiker leaves base camp in Fundy National Park and travels $N20°W$ for 0.7 km. The hiker then travels $S65°W$ until he is directly west of the camp. How far is the hiker from the camp, to the nearest tenth of a kilometer? **(Must include a detailed sketch)** [4]



①



①

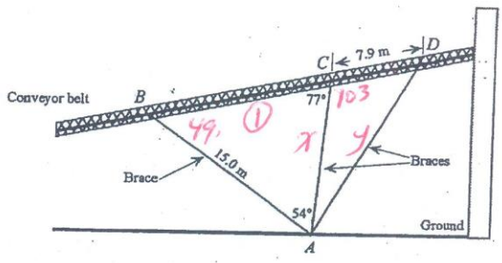
$\frac{X}{\sin 85°} = \frac{0.7\sin 85°}{\sin 25°}$ ①
$X = 1.65\ km$ ①

4

Distance from Camp = 1.65 km

15

4. An engineer is working with a cross-section diagram that represents a conveyor belt is used to move pulp into the plant. Two braces, AC and AD, have to be replaced. **Determine the lengths of the two braces to the nearest tenth of a meter.** [5]



$\frac{x \sin 49}{\sin 49} = \frac{15 \sin 49}{\sin 77}$ ①

$x = 11.6$ ①

$y^2 = 11.6^2 + 7.9^2 - 2(11.6)(7.9)\cos 103$ ①

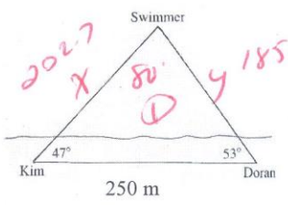
$y = \sqrt{238.69}$

$y = 15.4$ ①

5

Length of AC = 11.6 **Length of AD =** 15.4

5. Two lifeguards, Doran and Kim, are stationed 250 m apart on the shore of Parlee Beach in Shediac. They both spot a swimmer in distress. Who is closer to the swimmer and by how much? [5]



202.7 x 80° y 185.7

$\frac{x \sin 53}{\sin 53} = \frac{250 \sin 53}{\sin 80}$ ①

$x = 202.7$

$\frac{y \sin 47}{\sin 47} = \frac{250 \sin 47}{\sin 80}$ ①

$y = 185.7$

$202.7 - 185.7 = 17$ ①

5

Closest Swimmer is Doran **by** 17.0 **meters.**

10