TRIGONOMETRY EXAM 2A

Calculators and formula sheet are permitted. [Round to nearest hundredth, or tenth] Show all work as necessary (partial credit) on separate paper.

1. Solve the triangle with right angle at C and $a = 6.1$, $B = 64°$.

In 2–6, identify the triangle as SSS, SSA, SAS, or ASA, and solve the triangle completely. (both cases or "no solution" as

2. $a = 12$, $b = 8$, $c = 15$

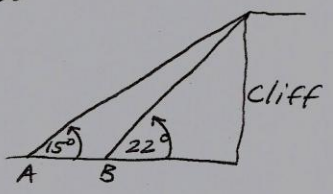
3. $A = 22°$, $B = 110°$, $c = 13.4$

4. $a = 125$, $b = 150$, $A = 54°$

5. $a = 3$, $b = 5$, $C = 120°$

6. From the top of a lighthouse that is 84.5 ft high, the angle of depression to a boat is 32.4°. How far is the boat from the base of the lighthouse?

8. To find the height of a cliff, two sightings are made from points A and B which are 500 meters apart. (See figure) How tall is the cliff.



9. Let $\vec{A} = 3\vec{i} - 2\vec{j}$ and $\vec{B} = \vec{i} + \vec{j}$

a) Find $3\vec{A} - 2\vec{B}$

b) Find $|\vec{A}| + |\vec{B}|$. Does this equal $|\vec{A} + \vec{B}|$?

c) Find $|\vec{A} + \vec{B}|$.

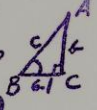
10. Prove the identities:

a) $1 + \tan^2 x = \sec^2 x$

b) $1 - \cos^2 x = \cos^2 x \tan^2 x$

TRIG EXAM 2A Solutions

1. $a = 6.1$, $B = 64.7°$



$A = 25.3°$

$\tan 64.7° = \frac{b}{6.1}$

$b = 6.1 \tan 64.7°$

$b = 12.90$

$\sec 64.7° = \frac{c}{6.1}$

$c = 6.1 \sec 64.7°$

$c = 14.27$

2. $a = 12$, $b = 8$, $c = 15$ SSS

$c^2 = a^2 + b^2 - 2ab\cos C$

or $\cos C = \frac{a^2+b^2-c^2}{2ab}$

$= \frac{144 + 64 - 225}{2(12)(8)}$

$= -\frac{17}{192}$

$C = 95.1°$

$\frac{\sin 95.1°}{15} = \frac{\sin A}{12} = \frac{\sin B}{8}$

$A = 52.8°$ $B = 32.1°$

[Do NOT use Law of Sines to find $\angle C$.]

3. $A = 22°$, $B = 110°$, $c = 13.4$ ASA $C = 180° - (110° + 22°)$

$C = 48°$

$\frac{\sin 22°}{a} = \frac{\sin 110°}{b} = \frac{\sin 48°}{13.4}$

$a = \frac{13.4 \sin 22°}{\sin 48°} = 6.75$

$b = \frac{13.4 \sin 110°}{\sin 48°} = 16.94$

4. $a = 125$ $b = 150$ $A = 54°$

SSA – May use Law of Sines or Law of Cosines, but be careful – May be two cases.

$\frac{\sin 54°}{125} = \frac{\sin B}{150} = \frac{\sin C}{c}$

$\sin B = \frac{150 \sin 54°}{125}$

$B_1 = 76.1°$ or $B_2 = 180 - 76.1°$

$B_2 = 103.9°$

$+ 54°$

$130.1°$ $157.9°$

$\angle C_1 = 180 - 130.1°$ $\angle C_2 = 180 - 157.9$

$\angle C_1 = 49.9°$ $\angle C_2 = 22.1°$

$\frac{\sin 54°}{125} = \frac{\sin 49.9}{c_1}$ $\frac{\sin 54°}{125} = \frac{\sin 22.1°}{c_2}$

$c_1 = \frac{125 \sin 49.9}{\sin 54°}$ $c_2 = \frac{125 \sin 22.1°}{\sin 54°}$

$c_1 = 118.15$ $c_2 = 58.2$

5. $a = 3$ $b = 5$ $C = 120°$

SAS

$c^2 = a^2 + b^2 - 2ab\cos C$

$= 3^2 + 5^2 - 30\cos 120°$

$C = 7$

$\frac{\sin A}{3} = \frac{\sin B}{5} = \frac{\sin 120°}{7}$

$\sin A = \frac{3 \sin 120°}{7}$

$A = 21.8°$

$B = 38.2°$

6. $a = 500$, $b = 300$, $B = 42.8°$ SSA

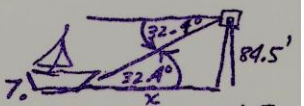
$\frac{\sin 42.8°}{300} = \frac{\sin A}{500}$

$\sin A = \frac{500 \sin 42.8°}{300}$

$= 1.1324$

NO SOLUTION

7.

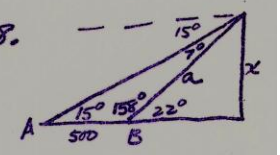


$\tan 32.4° = \frac{84.5}{x}$

$x = \frac{84.5}{\tan 32.4°}$

$= 133.15'$

8.



$\frac{\sin 15°}{a} = \frac{\sin 7°}{500}$

$a = \frac{500 \sin 15°}{\sin 7°}$

$= 1061.87$

$\sin 22° = \frac{x}{1061.87}$

$x = 397.78$ m.

9a) $3\vec{A} - 2\vec{B} = 3(3\vec{i} - 2\vec{j}) - 2(\vec{i} + \vec{j})$

$= 9\vec{i} - 6\vec{j} - 2\vec{i} - 2\vec{j}$

$= 7\vec{i} - 8\vec{j}$

b) $|\vec{A}| = \sqrt{3^2 + 2^2} = \sqrt{13}$

$|\vec{B}| = \sqrt{1^2 + 1^2} = \sqrt{2}$

$|\vec{A}| + |\vec{B}| = \sqrt{13} + \sqrt{2}$

9c) $\vec{A} + \vec{B} = 4\vec{i} - \vec{j}$

$|\vec{A} + \vec{B}| = \sqrt{4^2 + (-1)^2}$

$= \sqrt{17}$

10a) $1 + \tan^2 x = \sec^2 x$

LHS. $= 1 + \frac{\sin^2 x}{\cos^2 x}$

$= \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$

$= \frac{1}{\cos^2 x}$

$= \sec^2 x = RHS.$

b) $1 - \cos^2 x = \cos^2 x \tan^2 x$

LHS. $= 1 - \cos^2 x$

$= \sin^2 x$

$= \frac{\sin^2 x \cdot \cos^2 x}{\cos^2 x}$

$= \tan^2 x \cos^2 x = RHS.$