

M\$6 Exam 4 Review Sheet

Exam 4 will be given on Tuesday, May 20, 2008 and will focus on the following topics: law of cosines, law of sines, area of a triangle formula, applications of law of cosines and law of sines, the ambiguous case (determining the number of distinct triangles), force problems, and “double-triangle” problems.

The following formulas will be given to you during the exam, so you do not need to memorize them, but you should be able to apply them to problems.

Calculators are required on this exam.

Formulas

Area of Triangle

$$K = \frac{1}{2}ab \sin C$$

Functions of the Sum of Two Angles

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

Functions of the Difference of Two Angles

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

Law of Sines

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

Law of Cosines

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

Functions of the Double Angle

$$\sin 2A = 2 \sin A \cos A$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$\cos 2A = 2 \cos^2 A - 1$$

$$\cos 2A = 1 - 2 \sin^2 A$$

Functions of the Half Angle

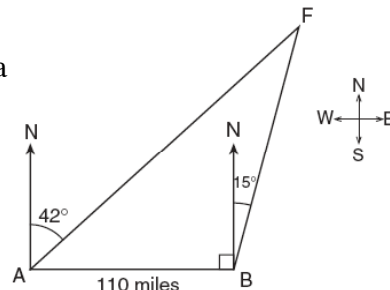
$$\sin \frac{1}{2}A = \pm \sqrt{\frac{1 - \cos A}{2}}$$

$$\cos \frac{1}{2}A = \pm \sqrt{\frac{1 + \cos A}{2}}$$

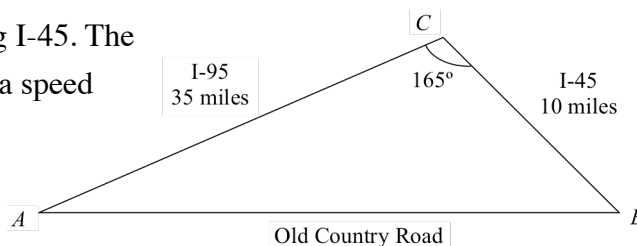
1. In $\triangle JKL$, $JL = 16$, $KL = 12$, and $\cos L = \frac{\sqrt{2}}{2}$. Find the area of $\triangle JKL$ to the *nearest tenth of a square unit*.
2. How many distinct triangles can be formed if $a = 20$, $b = 30$ and $m\angle A = 30^\circ$?
3. The members of the Delta Delta Delta Sorority want to take a picture of themselves standing in a triangle formation. They determined that the three sides of the triangle must measure 20 feet, 22 feet, and 24 feet. To the nearest hundredth of a degree, what is the measure of the smallest angle of the triangle?

4. The owner of an amusement park wants to add a screening room to the Haunted House attraction, but he does not want the movie screen to be a rectangular one. Instead he has asked the designer to create a 22-foot by 12-foot screen in the shape of a parallelogram with a longer diagonal equal to 28 feet.
- Find the measure of the angles, both acute and obtuse, between adjacent sides of the parallelogram, to the nearest tenth of a degree.
 - Find, to the nearest tenth of a square foot, the area the special-order screen will fill.

5. As shown in the accompanying diagram, two tracking stations, A and B , are on an east-west line 110 miles apart. A forest fire is located at F , on a bearing 42° northeast of station A and 15° northeast of station B . How far, to the *nearest mile*, is the fire from station A ?



6. Bryan is traveling from town A to town B . As the accompanying map indicates, Bryan could drive directly from A to B along Old Country Road at an average speed of 30 miles per hour or travel on the interstates, 35 miles along I-95 and 10 miles along I-45. The interstates intersect at an angle of 165° at C and have a speed limit of 55 miles per hour.



How much time will Bryan save by traveling along the interstates at an average speed of 55 miles per hour?

7. A glass-walled skyscraper has an elevator that is visible from outside. John is standing on the sidewalk 100 feet from the base of the skyscraper when he sees that the elevator is stuck. The angle of elevation from John's location to the elevator is 43° . A few minutes later, the elevator begins to move down, but then it gets stuck again. Now, the angle of elevation is 36° . Find, to the *nearest tenth of a foot*, the distance that the elevator has moved.
8. Two forces are applied to an object. The measure of the angle between the 30.2-pound applied force and the 50.1-pound resultant is 25° .
- Find the magnitude of the second applied force to the *nearest tenth of a pound*.
 - Find the measure of the angle between the second applied force and the resultant to the *nearest degree*.