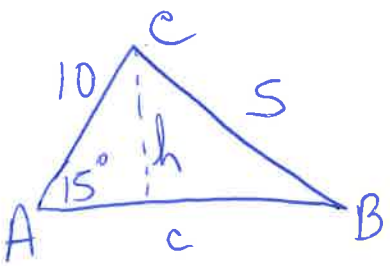
Name: Beta

HansenMath Pre-Calc: Chapter 6 big REVIEW

Directions: Use what you've learned in Chapter 6 - and prior - to solve each exercise. Please keep calculations in calculator or use 3 decimal places as you solve. Please round final answers to tenths place.
[Note: This study guide has been arranged by section for organizational purposes. On the Test, the exercises will be in a random, scrambled order.]

Section 6.1- Law of Sines

1.) Sketch and find the remaining sides and angles of the oblique triangle given by : A = 15°, a = 5, b = 10
(If there's no triangle, explain. If there's two possible triangles, solve both cases clearly.)



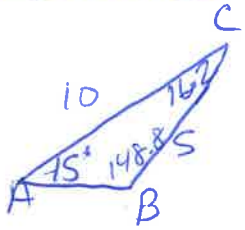
$\sin 15° = \frac{h}{10} \rightarrow h = 2.6$ since $5 \geq 2.6$ 2 Δ case

$\frac{10}{\sin B} = \frac{5}{\sin 15°}$ $B = 31.2°$ $C = 133.8$

$\frac{c}{\sin 133.8} = \frac{5}{\sin 15}$ $c = 13.9$

$B_2 = 148.8°$ $C_2 = 16.2°$

$\frac{c_2}{\sin 16.2} = \frac{5}{\sin 15}$ $c_2 = 5.4$

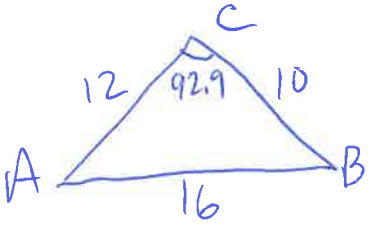


2.) Find the area of the oblique triangle, given C =100°, a = 120km, b = 74km

$Area = \frac{1}{2}(120)(74)\sin 100° = 4372.5\ Km^2$

Section 6.2 - Law of Cosines

3.) Sketch and find the angles of the oblique triangle given by : a = 10, b = 12, c = 16



$16^2 = 10^2 + 12^2 - 2(10)(12)\cos C$

$\cos C = -.05$

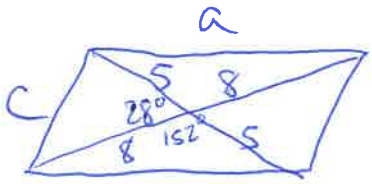
$C = 92.9°$

$\frac{12}{\sin B} = \frac{16}{\sin 92.9}$

$B = 48.5°$

$A = 38.6°$

4.) The lengths of the diagonals of a parallelogram are 10 feet and 16 feet. Find the lengths of the sides of the parallelogram if the diagonals intersect at an angle of 28°. [Sketch and use Law of Cos to solve]



$c^2 = 5^2 + 8^2 - 2(5)(8)\cos 28° \rightarrow c = 4.3\ Ft$

$a^2 = 5^2 + 8^2 - 2(5)(8)\cdot\cos 152° \rightarrow a = 12.6\ Ft$

5.) Use Heron's Area Formula to find the area of a triangle given by: a = 64.8, b = 49.2, c = 24.1

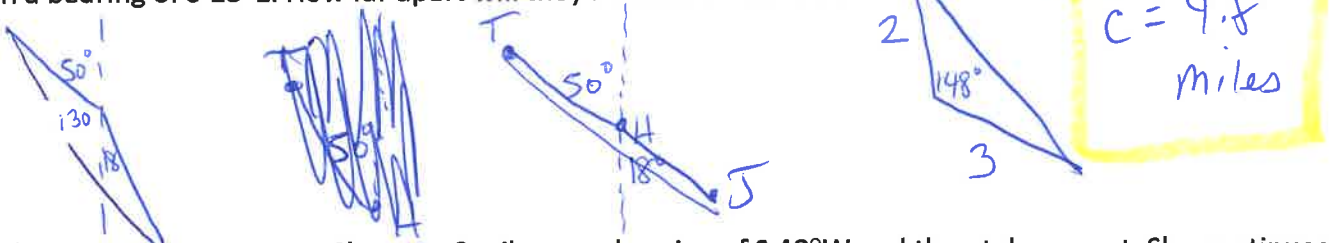
$S = 69.05$ $Area = \sqrt{69.05(69.05-64.8)(69.05-49.2)(69.05-24.1)}$

$= 511.7\ u^2$

Section 6.2b - Bearings Applications

$c^2 = 2^2 + 3^2 - 2(2)(3)\cdot\cos 148^\circ$

6.) From their house, Tom runs at a rate of 4mph on a bearing of N 50°W and Jerry runs at a rate of 6mph on a bearing of S 18°E. How far apart will they be after 30 minutes?

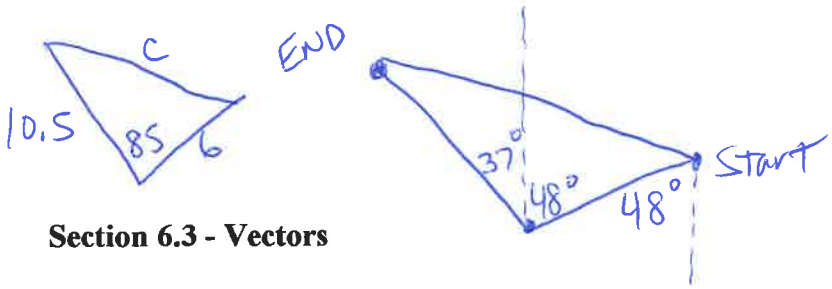


$c = 4.8$ miles

7.) Whitney is running a race. She runs 6 miles on a bearing of S 48°W and then takes a rest. She continues to run 10.5 more miles on a bearing of N37°W. She then runs back to the starting point. What is the total length of the course Whitney runs?

$c^2 = 6^2 + 10.5^2 - 2(6)(10.5)\cos 85$

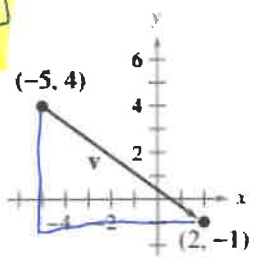
$c = 11.6$



TOTAL: 28.1 mi

Section 6.3 - Vectors

8.) Find the component form of the vector, **v**, as given by the image to the right:



$\langle +7, -5 \rangle$

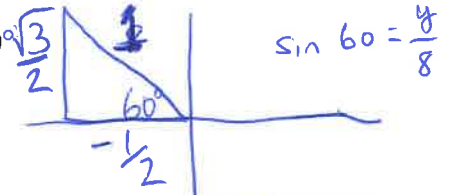
9.) Find the component form of the vector, **v**, as given by $\|8\|$ and $\theta = 120°$

$\|v\|\langle \cos\theta, \sin\theta \rangle$

$8\langle \cos 120, \sin 120 \rangle$

$8\left\langle -\frac{1}{2}, \frac{\sqrt{3}}{2} \right\rangle$

$\langle -4, 4\sqrt{3} \rangle$



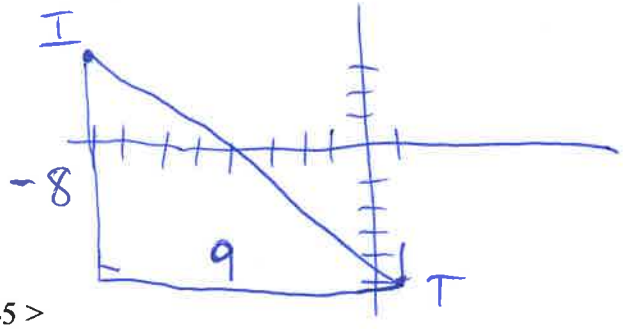
10.) Find a unit vector in the direction of $\mathbf{v} = 5\mathbf{i} - 2\mathbf{j}$

$\|v\| = \sqrt{5^2 + (-2)^2} = \sqrt{29}$

$\frac{1}{\sqrt{29}}(5i - 2j) = \frac{5}{\sqrt{29}}i - \frac{2}{\sqrt{29}}j$ OR $\frac{5\sqrt{29}}{29}i - \frac{2\sqrt{29}}{29}j$

11.) Write a *linear combination* of the standard unit vectors **i** and **j** for the given initial and terminal points: Initial (-8, 3). Terminal: (1, -5)

$9i - 8j$



Section 6.4 - Vectors and Dot Product

Given: $\mathbf{u} = \langle 3, 7 \rangle$ $\mathbf{v} = \langle -8, -5 \rangle$

12.) Find $\mathbf{u} \bullet \mathbf{v}$

$3\cdot -8 + 7\cdot -5$

$-24 + -35 = -59$

13.) Find $\mathbf{v}(\mathbf{u} \bullet 10\mathbf{v})$

$\langle 3, 7 \rangle \bullet \langle -80, -50 \rangle$

$-240 + -350$

$= -590$

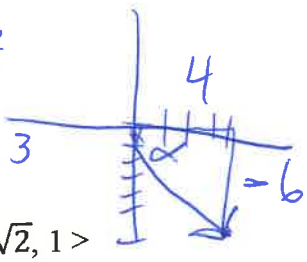
$\langle -8, -5 \rangle - 590$

$\langle 4720, 2950 \rangle$

14.) Find the magnitude and direction angle of the vector **v = 4i - 6j**

$\|v\| = \sqrt{4^2 + (-6)^2} = \sqrt{52} \rightarrow 2\sqrt{13}$, $\theta = 303.7^\circ$

$\tan\alpha = \frac{-6}{4}$, $\alpha = 56.3$



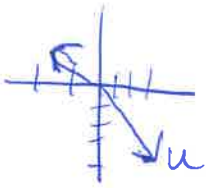
15.) Find the angle θ between the two vectors given by: $\mathbf{u} = \langle 2\sqrt{2}, -4 \rangle$ and $\mathbf{v} = \langle -\sqrt{2}, 1 \rangle$

$u \cdot v = -4 + -4 = -8$

$\|u\| = \sqrt{(2\sqrt{2})^2 + (-4)^2} = \sqrt{24} \rightarrow 2\sqrt{6}$

$\|v\| = \sqrt{(-\sqrt{2})^2 + 1^2} = \sqrt{3}$

$\cos\theta = \frac{-8}{(2\sqrt{18})} \rightarrow \theta = 160.5^\circ$



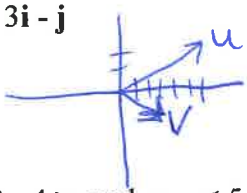
16.) Find the angle θ between the two vectors given by: **u = 6i + 2j** and **v = 3i - j**

$u \cdot v = 18 + -2 = 16$

$\|u\| = \sqrt{40} \rightarrow 2\sqrt{10}$

$\|v\| = \sqrt{10} \rightarrow \sqrt{10}$

$\cos\theta = \frac{16}{20} \rightarrow 36.9^\circ$

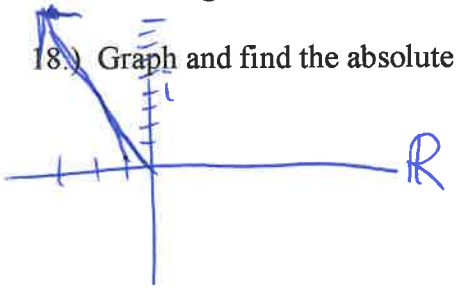


17.) What does the dot product tell you about the following vectors, $\mathbf{u} = \langle 8, -4 \rangle$ and $\mathbf{v} = \langle 5, 10 \rangle$

$40 + -40 = \emptyset$ perp. or orthogonal

Section 6.5 - Trigonometric form of complex numbers

18.) Graph and find the absolute value of the complex number: -3 + 9i



$|z| = \sqrt{(-3)^2 + (9)^2} = \sqrt{9 + 81} = \sqrt{90} = 3\sqrt{10}$

Write the following complex numbers in trigonometric form:

19.) $-\sqrt{3} + i$

$|z| = \sqrt{(\sqrt{3})^2 + 1^2} = \sqrt{4} = 2$

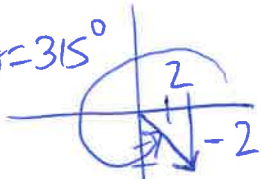
$\tan\alpha = \frac{-\sqrt{3}}{3}$

$z = 2(\cos 150^\circ + i \sin 150^\circ)$ OR $\frac{5\pi}{6}$

20.) 2 - 2i

$|z| = \sqrt{2^2 + 2^2} = \sqrt{8} = 2\sqrt{2}$

$\theta = 315^\circ$



$z = 2\sqrt{2}(\cos 315^\circ + i \sin 315^\circ)$

$\frac{7\pi}{4}$

Perform the given operation and write the result in a + bi form

21.) $[\,2(\cos\frac{2\pi}{3} + i \sin\frac{2\pi}{3})][\,3(\cos\frac{\pi}{6} + i \sin\frac{\pi}{6})]$

$(2)(3)\left[\cos\left(\frac{2\pi}{3} + \frac{\pi}{6}\right) + i \sin\left(\frac{2\pi}{3} + \frac{\pi}{6}\right)\right]$

$6\left[\cos\left(\frac{5\pi}{6}\right) + i \sin\left(\frac{5\pi}{6}\right)\right]$

$6\left[-\frac{\sqrt{3}}{2} + \frac{1}{2}i\right]$

$= -3\sqrt{3} + 3i$

22.) $\frac{20(\cos 320^\circ + i \sin 320^\circ)}{5(\cos 80^\circ + i \sin 80^\circ)}$

$\frac{20}{5}\left[\cos(320 - 80) + i \sin(320 - 80)\right]$

$4\left[\cos(240) + i \sin(240)\right]$

$4\left[-\frac{1}{2} - \frac{\sqrt{3}}{2}i\right]$

$= -2 - 2\sqrt{3}i$