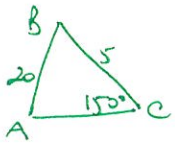
Key

2nd Semester Review – Pre-Calculus **Chapter 6**

Solve the triangles.

1. $C=150°, a=5, c=20$



$\frac{\sin 150°}{20} = \frac{\sin A}{5}$

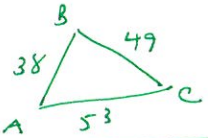
$A = 7° \rightarrow A' = 173°$

$\frac{\sin 23°}{b} = \frac{\sin 150°}{20}$

$b = 15.6$

$A = 7°$
$B = 23°$
$b = 15.6$

2. $a=49, b=53, c=38$

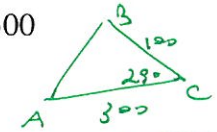


$53^2 = 49^2 + 38^2 - 2 \cdot 49 \cdot 38 \cdot \cos B$

$49^2 = 53^2 + 38^2 - 2 \cdot 53 \cdot 38 \cdot \cos A$

$B = 74°$
$A = 63°$
$C = 43°$

3. $C=29°, a=100, b=300$



$c^2 = 100^2 + 300^2 - 2 \cdot 100 \cdot 300 \cdot \cos 29$

$c = 218$

$100^2 = 218^2 + 300^2 - 2 \cdot 218 \cdot 300 \cdot \cos A$

$A = 13°$

$\frac{\sin 29°}{218} = \frac{\sin B}{300}$

$B = 42°$ not right!

$C = 218$
$A = 13°$
$B = 138°$

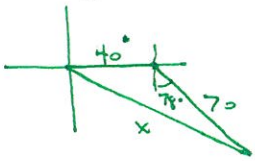
4. How many solutions for the triangle: $a=10, b=35, A=22.5°$

$\frac{\sin 22.5°}{10} = \frac{\sin B}{35}$

$\sin B = 1.33$

No Δ

5. A ship travels 40 miles due east, then adjusts its course to a bearing of S 78°E. After traveling 70 miles in that direction, how far is the ship from its point of departure?



$x^2 = 40^2 + 70^2 - 2 \cdot 40 \cdot 70 \cdot \cos 168°$

$x = 109.4$ miles

Find the area of each triangle.

6. $a=3, b=6, C=130°$

$A = \frac{1}{2} \cdot 3 \cdot 6 \cdot \sin 130°$

$A = 6.9 \text{ u}^2$

7. $a=4.1, b=6.8, c=5.5$

$A = \sqrt{8.2(8.2-4.1)(8.2-6.8)(8.2-5.5)}$

$A = 11.3 \text{ u}^2$

8. **v** is a vector of magnitude 4 making an angle of 30° with the positive x-axis. Find the <u>exact</u> value of vector v.

$\langle 4\cos 30°, 4\sin 30° \rangle$

$\langle 4 \cdot \frac{\sqrt{3}}{2}, 4 \cdot \frac{1}{2} \rangle$

$\langle 2\sqrt{3}, 2 \rangle$

9. Give the polar form of z = 5 – 5i.

$r = \sqrt{5^2+5^2} = \sqrt{50} = 5\sqrt{2}$

$\tan\theta = \frac{-5}{5} = -1$ Q IV

$\theta = \frac{7\pi}{4}$ or $-\frac{\pi}{4}$

$z = 5\sqrt{2}\,\text{cis}\,\frac{7\pi}{4}$

10. Give the rectangular form of $z = 6(\cos 225° + i\sin 225°)$.

$6\cos 225° + 6\sin 225°\, i$

$6\cdot -\frac{\sqrt{2}}{2} + 6\cdot -\frac{\sqrt{2}}{2}\, i$

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

11. Use DeMoivre's Theorem to evaluate [7(cos23° + isin23°)][4(cos7° + isin7°)].

$7\cdot 4\,\text{cis}(23°+7°)$

$28\,\text{cis}\,30°$

12. Use DeMoivre's Theorem to evaluate $(2+2i)^8$.

$r = \sqrt{2^2+2^2} = 2\sqrt{2}$

$\tan\theta = \frac{2}{2} = 1$ Q I

$\theta = \frac{\pi}{4}$

$\left(2\sqrt{2}\,\text{cis}\,\frac{\pi}{4}\right)^8 = (2\sqrt{2})^8\,\text{cis}\left(8\cdot\frac{\pi}{4}\right)$

$= 4096\,\text{cis}\,2\pi$

13. Find the cube roots of $8(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3})$.

$\sqrt[3]{8}\,\text{cis}\left(\frac{\frac{\pi}{3}+2\pi h}{3}\right)$

$h=0 \rightarrow 2\,\text{cis}\,\frac{\pi}{9}$

$h=1 \rightarrow 2\,\text{cis}\,\frac{7\pi}{9}$

$h=2 \rightarrow 2\,\text{cis}\,\frac{13\pi}{9}$

14. Find all four solutions to $x^4 + i = 0$

$x^4 = -i$

$x = \sqrt[4]{-i} = \sqrt[4]{1\,\text{cis}\,\frac{3\pi}{2}} \rightarrow \sqrt[4]{1}\,\text{cis}\left(\frac{\frac{3\pi}{2}+2\pi h}{4}\right)$

$h=0 \quad 1\,\text{cis}\,\frac{3\pi}{8}$

$h=1 \quad 1\,\text{cis}\,\frac{7\pi}{8}$

$h=2 \quad 1\,\text{cis}\,\frac{11\pi}{8}$

$h=3 \quad 1\,\text{cis}\,\frac{15\pi}{8}$