

Math Analysis
Review 6.1, 6.2, 6.5

Name Key

Find the remaining angles and sides.

1. $a=12$ meters, $b=31$ meters, $\angle A=20^\circ$

ASS case, acute $a < b$, 2 triangles



$$\frac{12}{\sin 20^\circ} = \frac{31}{\sin B}$$

$$\sin B = .88355$$

$$\boxed{B = 62^\circ}$$

$$\boxed{C = 98^\circ}$$

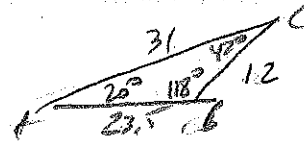
$$\frac{c}{\sin 98^\circ} = \frac{12}{\sin 20^\circ}$$

$$\boxed{C = 34.7}$$

B also $= 180 - 62^\circ$

$$\boxed{B = 118^\circ}$$

$$\boxed{C = 42^\circ}$$

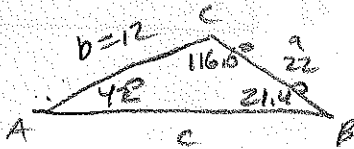


$$\frac{c}{\sin 42^\circ} = \frac{12}{\sin 20^\circ}$$

$$\boxed{C = 23.5}$$

2. $a=22$ inches, $b=12$ inches, $\angle A=42^\circ$

ASS case, acute, $a > b$, 1 triangle



$$\frac{22}{\sin 42^\circ} = \frac{12}{\sin B}$$

$$\sin B = .35478$$

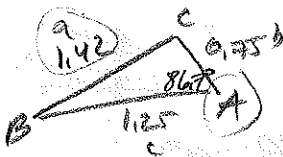
$$\boxed{B = 21.4^\circ}$$

$$\boxed{C = 116.6^\circ}$$

$$\frac{c}{\sin 116.6^\circ} = \frac{22}{\sin 42^\circ}$$

$$\boxed{C = 29.4}$$

3. $a=1.42$ cm, $b=0.75$ cm, $c=1.25$ cm



find A first

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

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

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

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc} = \frac{.75^2 + 1.25^2 - 1.42^2}{2(.75)(1.25)}$$

$$\cos A = .05792$$

$$\boxed{A = 86.7^\circ}$$

law of sines:

$$\frac{1.42}{\sin 86.7^\circ} = \frac{0.75}{\sin B}$$

$$\sin B = .52721$$

$$\boxed{B = 31.8^\circ}$$

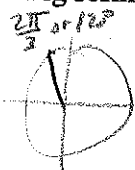
$$C = 180 - 31.8 - 86.7$$

$$\boxed{C = 61.5^\circ}$$

4. Write the complex number in trig form: $-1 + \sqrt{3}i$

$$r = \sqrt{1+3} = 2$$

$$\tan \theta = \frac{\sqrt{3}}{-1} = -\frac{\sqrt{3}}{1}$$



$$2\left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3}\right) \text{ or } 2(\cos 120^\circ + i \sin 120^\circ)$$

5. Find the standard form $(a+bi)$ of the number. $5(\cos 135^\circ + i \sin 135^\circ)$

$$-3.536 + 3.536i$$

6. Perform the indicated operation. (Leave in trig form)

(a) $\left[\frac{3}{2}\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)\right] \left[6\left(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4}\right)\right]$

$$\left(\frac{3}{2}\right)(6) \left[\cos\left(\frac{\pi}{2} + \frac{\pi}{4}\right) + i \sin\left(\frac{\pi}{2} + \frac{\pi}{4}\right)\right]$$

$$9\left[\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4}\right]$$

(b) $\frac{5(\cos 4.3 + i \sin 4.3)}{4(\cos 2.1 + i \sin 2.1)} = \frac{5}{4}[\cos(4.3-2.1) + i \sin(4.3-2.1)] = \frac{5}{4}[\cos 2.2 + i \sin 2.2]$

7. Use De Moivre's Theorem to find the indicated power: $(1-i)^{12}$



$$\left[\sqrt{2}(\cos 315^\circ + i \sin 315^\circ)\right]^{12}$$

$$= (\sqrt{2})^{12} (\cos 3780^\circ + i \sin 3780^\circ)$$

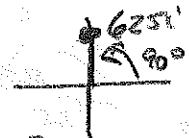
$$= 64 + 0i$$

$$= \boxed{64}$$

8. Use De Moivre's Theorem to find the indicated roots: 4th roots of $625i$

$$625i = 625(\cos 90^\circ + i \sin 90^\circ)$$

$$\text{spacing} = \frac{360}{4} = 90^\circ$$



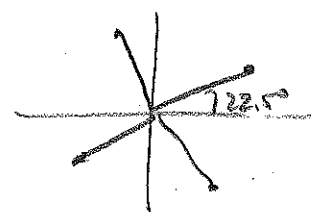
1st: $\sqrt[4]{625}(\cos \frac{90^\circ}{4} + i \sin \frac{90^\circ}{4})$

$$= 5(\cos 22.5^\circ + i \sin 22.5^\circ) = \boxed{4.6 + 1.9i}$$

+90° ↻ 2nd: $5(\cos 112.5^\circ + i \sin 112.5^\circ) = \boxed{-1.9 + 4.6i}$

+90° ↻ 3rd: $5(\cos 202.5^\circ + i \sin 202.5^\circ) = \boxed{-4.6 - 1.9i}$

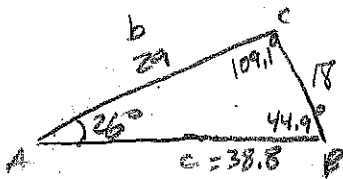
+90° ↻ 4th: $5(\cos 292.5^\circ + i \sin 292.5^\circ) = \boxed{1.9 - 4.6i}$



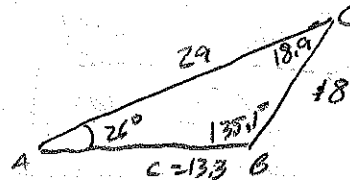
Show all work for credit. Please circle your answers.

1. Find all the remaining sides and angles given $a = 18, b = 29, \angle A = 26^\circ$.

ASS case, acute $a < b$, 2 triangles possible



$$B = 44.9^\circ \text{ or } 135.1^\circ$$



$$\frac{18}{\sin 26^\circ} = \frac{29}{\sin B}$$

$$B = 44.9^\circ$$

$$\frac{c}{\sin 109.1^\circ} = \frac{18}{\sin 26^\circ}$$

$$\sin B = .70626 \dots, C = 180 - 26 - 44.9$$

$$C = 109.1^\circ$$

$$c = 38.8$$

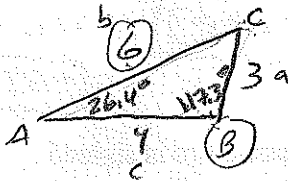
$$C = 180 - 26 - 135.1$$

$$C = 18.9^\circ$$

$$\frac{c}{\sin 18.9^\circ} = \frac{18}{\sin 26^\circ}$$

$$C = 13.3^\circ$$

2. Find all the angles given $a = 3, b = 6, c = 4$.



$$\cos B = \frac{a^2 + c^2 - b^2}{2ac}$$

$$\cos B = \frac{3^2 + 4^2 - 6^2}{2(3)(4)}$$

$$\cos B = -.4583$$

$$B = 117.3^\circ$$

$$\frac{6}{\sin 117.3^\circ} = \frac{3}{\sin A}$$

$$\sin A = .4443$$

$$A = 26.4^\circ$$

$$C = 180 - 117.3 - 26.4$$

$$C = 36.3^\circ$$

3. Find the area of the triangle if $a = 13, b = 20, c = 27$.

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$A = \sqrt{30(30-13)(30-20)(30-27)}$$

$$s = \frac{a+b+c}{2} = \frac{13+20+27}{2} = 30$$

$$A = 123.7 \text{ u}^2$$

4. Convert to trigonometric form and sketch: $z = -1 - 3i$

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

$$\tan \theta = \frac{b}{a}$$

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

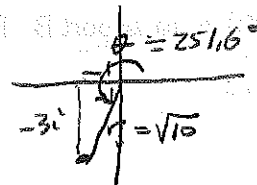
$$\tan \theta = \frac{-3}{-1} = 3$$

$$r = \sqrt{1+9}$$

$$\theta = \tan^{-1}(3) = 71.6^\circ$$

$$r = \sqrt{10}$$

$$71.6^\circ \text{ or } 71.6^\circ + 180^\circ = 251.6^\circ$$



$$\sqrt{10} (\cos 251.6^\circ + i \sin 251.6^\circ)$$

5. Multiply and put in standard form: $5(\cos 25^\circ + i \sin 25^\circ) 7(\cos 95^\circ + i \sin 95^\circ)$

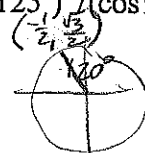
$$z_1 z_2 = r_1 r_2 (\cos(\theta_1 + \theta_2) + i \sin(\theta_1 + \theta_2))$$

$$= 5 \cdot 7 (\cos(25^\circ + 95^\circ) + i \sin(25^\circ + 95^\circ))$$

$$= 35 (\cos 120^\circ + i \sin 120^\circ)$$

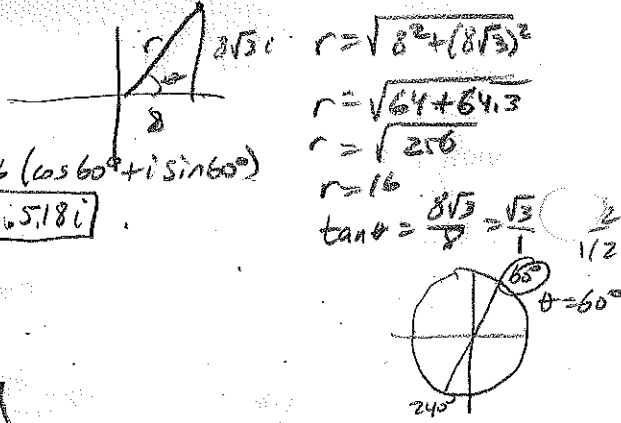
$$= 35 \left(-\frac{1}{2} + i \frac{\sqrt{3}}{2} \right)$$

$$= -\frac{35}{2} + \frac{35\sqrt{3}}{2} i$$



$$-\frac{35}{2} + \frac{35\sqrt{3}}{2} i$$

spacing: $\frac{360^\circ}{4} = 90^\circ$



6. Find the fourth roots of:

$8 + 8\sqrt{3}i = 16 (\cos 60^\circ + i \sin 60^\circ)$

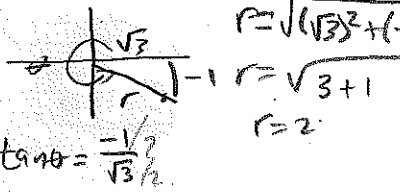
1st root: $\sqrt[4]{16} (\cos \frac{60^\circ}{4} + i \sin \frac{60^\circ}{4}) = 2 (\cos 15^\circ + i \sin 15^\circ) = 1.932 + 0.518i$

2nd root: $2 (\cos 105^\circ + i \sin 105^\circ) = -0.518 + 1.932i$

3rd root: $2 (\cos 195^\circ + i \sin 195^\circ) = -1.932 - 0.518i$

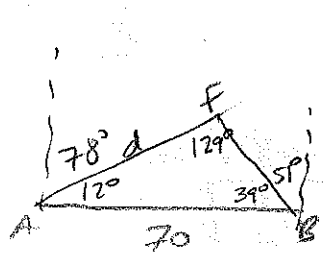
4th root: $2 (\cos 285^\circ + i \sin 285^\circ) = 1.518 - 1.932i$

7. Evaluate (exact answer and standard form). Draw a diagram. $(\sqrt{3} - i)^6$



$(\sqrt{3} - i)^6 = [2 (\cos 330^\circ + i \sin 330^\circ)]^6$
 $= 2^6 [\cos (6 \cdot 330^\circ) + i \sin (6 \cdot 330^\circ)]$
 $= 64 [\cos 1980^\circ + i \sin 1980^\circ]$
 $= 64 [\cos 180^\circ + i \sin 180^\circ] = 64 [-1 + i0]$
 $= -64$

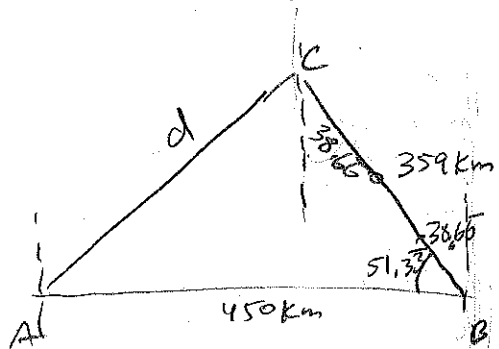
8. From firetower A, a fire with bearing $N78^\circ E$ is sighted. The same fire is sighted from tower B at $N51^\circ W$. Tower B is 70 miles east of tower A. How far is it from A to the fire? Draw a diagram.



$\frac{70}{\sin 129^\circ} = \frac{d}{\sin 39^\circ}$
 $d = 56.7 \text{ miles}$

9. Airports A and B are 450 km apart on an east-west line. Sandy flies in a northeast direction from airport A to airport C. From C he flies 359 km on a bearing of $S38^\circ 40' E$ to airport B. How far is C from A? Draw a diagram.

38.66



$d^2 = 450^2 + 359^2 - 2(450)(359) \cos 57.33^\circ$
 $d = 359.9 \text{ km}$

Math Analysis
Review 6.1, 6.2, 6.5

Name _____

Find the remaining angles and sides.

1. $a = 12$ meters, $b = 31$ meters, $\angle A = 20^\circ$

2. $a = 22$ inches, $b = 12$ inches, $\angle A = 42^\circ$

3. $a = 1.42$ cm, $b = 0.75$ cm, $c = 1.25$ cm

4. Write the complex number in trig form: $-1 + \sqrt{3}i$

5. Find the standard form $(a + bi)$ of the number. $5(\cos 135^\circ + i \sin 135^\circ)$

6. Perform the indicated operation. (Leave in trig form)

(a) $\left[\frac{3}{2} \left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2} \right) \right] \left[6 \left(\cos \frac{\pi}{4} + i \sin \frac{\pi}{4} \right) \right]$

(b) $\frac{5(\cos 4.3 + i \sin 4.3)}{4(\cos 2.1 + i \sin 2.1)}$

7. Use Demoivre's Theorem to find the indicated power: $(1 - i)^{12}$

8. Use Demoivre's Theorem to find the indicated roots: 4^{th} roots of $625i$

Show all work for credit. Please circle your answers.

1. Find all the remaining sides and angles given $a = 18$, $b = 29$, $\angle A = 26^\circ$.

2. Find all the angles given $a = 3$, $b = 6$, $c = 4$.

3. Find the area of the triangle if $a = 13$, $b = 20$, $c = 27$.

4. Convert to trigonometric form and sketch: $z = -1 - 3i$

5. Multiply and put in standard form: $5(\cos 25^\circ + i \sin 25^\circ) 7(\cos 95^\circ + i \sin 95^\circ)$

6. Find the fourth roots of: $8 + 8\sqrt{3}i$

7. Evaluate (exact answer and standard form). Draw a diagram. $(\sqrt{3} - i)^6$

8. From firetower A, a fire with bearing $N78^\circ E$ is sighted. The same fire is sighted from tower B at $N51^\circ W$. Tower B is 70 miles east of tower A. How far is it from A to the fire? Draw a diagram.

9. Airports A and B are 450 km apart on an east-west line. Sandy flies in a northeast direction from airport A to airport C. From C he flies 359 km on a bearing of $S38^\circ 40' E$ to airport B. How far is C from A? Draw a diagram.