Chapter 6 Practice Exercises (*Optional)

6-01 Law of Sines

1. How many solutions are in ΔABC where A = 50°, a = 18, b = 20?

Solve the triangle.

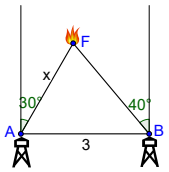
2. ΔABC where $A = 30°$, $B = 75°$, $a = 10$
3. *ΔDFG where $F = 70°$, $G = 30°$, $d = 15$
4. *ΔHJK where $H = 100°$, $J = 25°$, $h = 20$
5. ΔLMN where $L = 120°$, $N = 20°$, $m = 5$
6. ΔPQR where $P = 80°$, $p = 5$, $q = 7$
7. *ΔSTU where $T = 120°$, $t = 11$, $u = 9$
8. ΔVWX where $X = 35°$, $w = 40$, $x = 30$
9. ΔCAR where $C = 25°$, $R = 110°$, $c = 80$
10. ΔSUM where $M = 48°$, $s = 100$, $m = 80$
11. *ΔTRY where $T = 59°$, $t = 50$, $r = 70$

Find the area of the triangle.

12. ΔABC where $A = 30°$, $b = 17$, $c = 20$
13. ΔSUN where $U = 80°$, $s = 80$, $n = 76$
14. ΔCOW where $C = 120°$, $o = 13$, $w = 15$

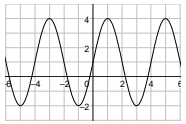
Problem Solving

15. A fire spotter in a tower sees smoke in the distance. A second tower is 3 miles due east of his tower. The first tower measures the smoke at N 30° E. The second tower measures the smoke at N 40° W. How far is the fire from the first tower?



Mixed Review

16. (5-07) Find the exact value of cos 105° sin 15°.
17. (5-04) Find all the solutions on the interval [0, 2π): $2\sin 2\theta = \sqrt{2}$.
18. (4-10) Solve ΔABC where $C = 90°$, $a = 4$, $c = 5$.
19. (4-06) Determine the amplitude, midline, period, and an equation involving the sine function for the graph.



20. (2-04) Simplify $(x^3 + 2x^2 - x + 10) \div (x - 2)$.

6-02 Law of Cosines

1. When should you use the law of sines? Law of cosines? The simple sine, cosine, and tangent ratios?

Solve the given triangles.

2. ΔABC where $A = 109°$, $b = 31$, and $c = 28$
3. ΔDFG where $d = 102$, $f = 96$, and $g = 57$
4. ΔHJK where $h = 18$, $j = 15$, and $k = 28$
5. *ΔLMN where $L = 61°$, $m = 7$, and $n = 13$

Solve the given triangles using the law of sines or law of cosines.

6. ΔPQR where $R = 34°$, $p = 43$, and $q = 51$
7. ΔSTU where $T = 124°$, $t = 63$, and $u = 36$

Find the area of the triangle.

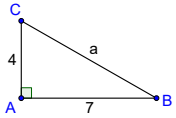
8. ΔDFG where $d = 102$, $f = 96$, and $g = 57$
9. ΔHJK where $h = 18$, $j = 15$, and $k = 28$
10. ΔWXY where $w = 3$, $x = 4$, $y = 6$

Problem Solving

11. To approximate the length of an impassible swamp, a surveyor finds a point midway along the side of the swamp but at a distance where he can measure the distance to each end. He measures one distance as 235 m and the other as 290 m. The angle between the distance lines is 110°. How far across is the swamp?

Mixed Review

12. (6-01) Find the area of ΔMXD where $M = 78°$, $x = 20$, $d = 24$.
13. (6-01) Solve triangle ΔCUP where $C = 63°$, $c = 68$, and $p = 71$.
14. (4-10) Solve the right triangle.



15. (4-01) For the angle 165° a) draw the angle in standard position, b) convert it to the other angle unit, c) find a positive coterminal angle, d) find a negative coterminal angle, e) find the complementary angle, and f) find the supplementary angle.
16. (3-03) Condense $\log_3 x + \log_3 (x + 1) - \log_3 y$.

6-03 Vectors

1. What is a vector? Give an example of a vector not mentioned in the lesson.

(a) Graph the vector, (b) write it in component form, (c) find the magnitude.

2. Initial point at (−3, 5) and terminal point at (0, 3).
3. Initial point at (0, −4) and terminal point at (1, 2).
4. Horizontal component of 7 and vertical component of 12 (Hint: start the graph at (0, 0).)

Given $\vec{m} = \langle 0, 4 \rangle$, $\vec{n} = \langle -2, 2 \rangle$, and $\vec{p} = \langle -1, -3 \rangle$, evaluate the following (a) graphically and (b) algebraically.

5. $-\vec{m}$
6. $2\vec{n}$
7. $-3\vec{p}$
8. $\vec{m} + \vec{p}$
9. $\vec{n} + \vec{m}$
10. $\vec{p} + 2\vec{m}$
11. $2\vec{m} - \vec{n}$

Find a unit vector, $\hat{u}$, in the direction of the given vector.

12. $\vec{v} = \langle 3, 0 \rangle$
13. $\vec{w} = \langle -3, 4 \rangle$
14. $\vec{c} = 5\hat{i} - 12\hat{j}$
15. $\vec{r} = -5\hat{i} + 3\hat{j}$

Given $\vec{v} = 2\hat{i} - 4\hat{j}$ and $\vec{s} = -\hat{i} - 3\hat{j}$, evaluate the following.

16. $\vec{v} + \vec{s}$ both (a) graphically and (b) algebraically
17. $2\vec{v}$ both (a) graphically and (b) algebraically
18. $-\vec{v} + 2\vec{s}$ both (a) graphically and (b) algebraically
19. $\|\vec{s}\|$
20. Write $\langle 5, -8 \rangle$ in linear combination form.

Mixed Review

21. (6-02) Given ΔABC with $A = 45°$, $b = 17$, $c = 14$; find a.
22. (6-02) Given ΔQRP with $q = 20$, $r = 24$, $p = 30$; find R.
23. (6-01) Given ΔSTU with $S = 20°$, $T = 100°$, $t = 31$; find s.
24. (5-03) Verify $\cos\alpha(\cos\alpha + 2\sin\alpha) = 1 - \sin^2\alpha + \sin 2\alpha$.
25. (2-07) Find all the asymptotes of $y = \frac{x+1}{x^2-4}$.

6-04 Write Vectors in Trigonometric Form

1. How do you convert a vector in component form into trigonometric form?

Write the following vectors in trigonometric form.

2. ⟨4, 3⟩
3. ⟨24, −7⟩
4. ⟨−6, 8⟩
5. 25 ft at S 25° W

Write the following vectors in component form.

6. 18⟨cos 60°, sin 60°⟩
7. 12⟨cos 315°, sin 315°⟩
8. 24⟨cos 120°, sin 120°⟩

9. 40 m at N 30° E

Add the following pairs of vectors. Write the result in trigonometric form.

10. $4\langle\cos 45°, \sin 45°\rangle + 12\langle\cos 135°, \sin 135°\rangle$

11. $10\langle\cos 240°, \sin 240°\rangle + 16\langle\cos 60°, \sin 60°\rangle$

12. (4 km/h at N 15° E) + (6 km/h at N 30° E)

13. (14 m/s at E 40° S) + (11 m/s at S 10° W)

Problem Solving

14. A boat leaves the pier and travels 20 miles due west. Then it turns and sails 15 miles at N 20° W. What is the boat's final distance and direction from the pier?

15. A hiker in the woods hikes 3 miles at N 30° E, then turns and hikes 2.5 miles at E 10° N. Where is the hiker from his starting point?

Mixed Review

16. (6-03) Given $\vec{u} = \langle 2, -1\rangle$ and $\vec{v} = \langle 0, 4\rangle$, evaluate $\vec{u} - 2\vec{v}$ (a) graphically and (b) algebraically.

17. (6-03) Find a unit vector in the direction of $\vec{w} = \langle -2, 3\rangle$.

18. (6-02) Find the area of ΔABC where $a = 2$, $b = 5$, and $c = 4$.

19. (6-01) How many solutions are there for ΔVWX where X = 20°, w = 40, x = 25?

20. (4-02) Evaluate all six trigonometric functions for the angle $\frac{7\pi}{6}$ using the unit circle.

6-05 Dot Products

Evaluate the dot product.

1. $\langle 0, 3\rangle \cdot \langle -2, 5\rangle$

2. $\langle -2, 5\rangle \cdot \langle 10, 0\rangle$

3. $\langle 6, -3\rangle \cdot \langle 5, 3\rangle$

4. $10\langle\cos 30°, \sin 30°\rangle \cdot 12\langle\cos 90°, \sin 90°\rangle$

Find the angle between the vectors.

5. $\langle 0, -4\rangle \cdot \langle 1, 5\rangle$

6. $\langle 1, 2\rangle \cdot \langle -2, 3\rangle$

7. $\langle -3, 4\rangle \cdot \langle 4, -2\rangle$

Are vectors parallel, orthogonal, or neither?

8. $\langle 2, 6\rangle, \langle -9, 3\rangle$

9. $\langle 6, -3\rangle, \langle 2, 4\rangle$

10. $\langle 12, 3\rangle, \langle -4, -1\rangle$

Find orthogonal components of $\vec{u}$ where one component is orthogonal to $\vec{v}$.

11. $\vec{u} = \langle 3, 2\rangle$, $\vec{v} = \langle 8, 10\rangle$

12. $\vec{u} = \langle -1, 3\rangle$, $\vec{v} = \langle -4, 5\rangle$

13. $\vec{u} = \langle -4, -7\rangle$, $\vec{v} = \langle -10, -10\rangle$

Problem Solving: In physics, work is the dot product of force and distance. Calculate the work for each situation.

14. A mother applies 200 N of force at angle of 20° below horizontal while pushing a baby stroller 300 m along a horizontal path.

15. A student uses 18 lbs of force at an angle of 40° above the horizontal to pull a backpack 75 ft down the hall.

Mixed Review

16. (6-04) Add: (20 m at E 30° N) + (25 m E 60° S).

17. (6-04) Write $\langle 8\sqrt{3}, 8\rangle$ in trigonometric form.

18. (6-03) Given $\vec{u} = 2\hat{i} + \hat{j}$ and $\vec{v} = -3\hat{i} - 2\hat{j}$, evaluate the $-\vec{u} + \vec{v}$ both (a) graphically and (b) algebraically

19. (6-02) In ΔABC where $A = 82°$, $b = 41$, and $c = 28$, find a.

20. (6-01) In ΔRST where $R = 80°$, $r = 5$, $s = 7$, find S.

6-06 Trigonometric Form of a Complex Number

1. In your own words, explain why i is not part of the absolute value of a complex number formula.

2. How do you calculate the absolute value of a complex number in trigonometric form?

Graph the following complex numbers.

3. $-3 - 4i$

4. $2 + 5i$

5. 4

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

Find the absolute value of the complex numbers.

7. $-3 - 4i$

8. $2 + 5i$

9. $3(\cos 35° + i \sin 35°)$

Write the following complex numbers in standard form.

10. $88(\cos\pi + i\sin\pi)$

11. $5\left(\cos\frac{5\pi}{4} + i\sin\frac{5\pi}{4}\right)$

12. $12\left(\cos\frac{11\pi}{6} + i\sin\frac{11\pi}{6}\right)$

Write the following complex numbers in trigonometric form.

13. $3i$

14. $-7\sqrt{2} + 7\sqrt{2}i$

15. $24 - 7i$

Mixed Review

16. (6-05) Are the vectors parallel, orthogonal, or neither: $\langle -1, 2\rangle$ and $\langle 4, 2\rangle$?

17. (6-05) Find the angle between the vectors $\langle -1, 2\rangle$ and $\langle -2, -4\rangle$.

18. (6-04) A hiker in the woods hikes 1.5 miles at N 20° W, then turns and hikes 5 miles due east. Where is the hiker from his starting point?

19. (6-03) Write $\langle 6, 2\rangle$ in linear combination form.

20. (6-02) Find the area of ΔBCD where $b = 25$, $c = 7$, and $d = 24$.

6-07 Trigonometric Form of a Complex Number Operations

1. Derive the exponent formula when $n = 2$.

Multiply the complex numbers. If they are in standard form, first convert to trigonometric form. Write the product in standard form rounded to 4 decimal places.

2. $\left(4\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)\right)\left(5\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)\right)$

3. $\left(3\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)\right)\left(10\left(\cos\frac{3\pi}{2} + i\sin\frac{3\pi}{2}\right)\right)$

4. (2 + i)(−3 + 4i)

Divide the complex numbers. If they are in standard form, first convert to trigonometric form. Write the quotient in standard form rounded to 4 decimal places.

5. $\frac{4\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)}{2\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)}$

6. $\frac{12\left(\cos\frac{5\pi}{3} + i\sin\frac{5\pi}{3}\right)}{3\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)}$

7. $\frac{2+2i}{1-\sqrt{3}i}$

8. $\frac{3}{4-i}$

Evaluate the exponents of complex numbers. If they are in standard form, first convert to trigonometric form. Write the result in standard form rounded to 4 decimal places.

9. $\left(3\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)\right)^2$

10. $\left(2\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)\right)^3$

11. $\left(2\sqrt{3} + 2i\right)^4$

Find all the roots of the complex numbers. Write the result in standard form rounded to 4 decimal places.

12. $\sqrt[3]{64\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)}$

13. $\sqrt[4]{81\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)}$

14. $\sqrt{3+4i}$

15. $\sqrt[4]{3i}$

Mixed Review

16. (6-06) Find $|2 + 5i|$.

17. (6-06) Write $5 - 5\sqrt{3}i$ in trigonometric form.

18. (6-05) Evaluate $\langle 2, 5\rangle \cdot \langle -3, 4\rangle$.

19. (6-04) Write 30 m at S 60° E in trigonometric form.

20. (6-03) Evaluate $\langle 2, 5\rangle + \langle -3, 4\rangle$.

6-Review

Take this test as you would take a test in class. When you are finished, check your work against the answers. On this assignment round your answers to three decimal places unless otherwise directed.

1. How many triangles are formed with the given information: $A = 50°$, $a = 70$, $b = 100$?

Solve the triangle with the given information. Round to two decimal places if necessary.

2. $A = 76°$, $B = 17°$, $c = 14$

3. $A = 50°$, $a = 50$, $b = 60$

4. $a = 6$, $b = 9$, $c = 10$

5. $A = 31°$, $b = 21$, $c = 32$

6. This triangle has two solutions. Find angle B in the second solution: $A = 80°$, $a = 69$, $b = 70$.

7. Find the area of the triangle with $a = 7$, $b = 13$, $c = 11$. Round to two decimal places.

8. Find the component form of a vector with initial point at (10, 13) and terminal point at (0, 17).

9. Find a unit vector in the direction of $\langle 13, 84 \rangle$.

Let $\vec{u} = \langle 20, 15 \rangle$ and $\vec{v} = \langle -10, 11 \rangle$, find the following.

10. $\vec{u} + \vec{v}$

11. $2\vec{v}$

12. $6\vec{u} - 3\vec{v}$

13. $\vec{u} \cdot \vec{v}$

14. Find the angle between $\vec{u}$ and $\vec{v}$.

15. Are the vectors $\langle -2, 4 \rangle$ and $\left\langle \frac{1}{2}, -1 \right\rangle$ orthogonal, parallel, or neither?

16. A lawn mower is pushed by exerting a force of 42 pounds on a handle that makes a 30° angle with the horizontal ground. Find the work done by pushing the lawn mower 100 feet.

17. Write $z = -9 + 9\sqrt{3}i$ in trigonometric form.

18. Write $z = 25\left(\cos\frac{11\pi}{6} + i\sin\frac{11\pi}{6}\right)$ in standard form.

Given $m = 10(\cos 115° + i \sin 115°)$ and $n = 2(\cos 25° + i \sin 25°)$, find the following and express your solutions in standard form rounded to two decimal places.

19. $m \div n$

20. $m \cdot n$

21. n^2

22. Find the 2nd roots of $81\left(-\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right)$. Express your answers in standard form rounded to two decimal places.

Answers

6-01

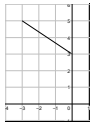
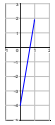
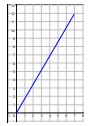
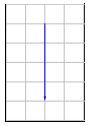
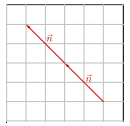
1. 2 solutions
2. $b = 19.32$, $c = 19.32$, $C = 75°$
3. $f = 14.31$, $g = 7.62$, $D = 80°$
4. $j = 8.58$, $k = 16.64$, $K = 55°$
5. $\ell = 6.74$, $n = 2.66$, $M = 40°$
6. No solution
7. $s = 3.26$, $S = 14.88°$, $U = 45.12°$
8. Solution #1: $v = 52.10$, $V = 95.11°$, $W = 49.89°$; Solution #2: $v = 13.44$, $V = 14.89°$, $W = 130.11°$
9. $a = 133.85$, $r = 177.88$, $A = 45°$
10. Solution #1: $u = 96.53$, $S = 68.27°$, $U = 63.73°$; Solution #2: $u = 37.29$, $S = 111.73°$, $U = 20.27°$
11. No solution
12. 85
13. 2993.82
14. 84.44
15. 2.45 miles
16. $\frac{\sqrt{3}-2}{4}$
17. $\frac{\pi}{8}$, $\frac{3\pi}{8}$, $\frac{9\pi}{8}$, $\frac{11\pi}{8}$
18. $b = 3$, $A = 53.13°$, $B = 36.87°$
19. Amplitude: 3, midline: $y = 1$, Period: 4, Equation: $y = 3\sin\left(\frac{\pi}{2}\right) + 1$
20. $x^2 + 4x + 7 + \frac{24}{x-2}$

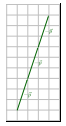
6-02

1. Law of Sines: AAS, ASA, SSA; Law of Cosines: SSS, SAS; Tangent Ratios: Right triangles
2. $a = 48.06$, $B = 37.58°$, $C = 33.42°$
3. $D = 79.15°$, $F = 67.57°$, $G = 33.29°$
4. $H = 35.37°$, $J = 28.84°$, $K = 115.80°$
5. $\ell = 11.39$, $M = 32.51°$, $N = 86.49°$
6. $r = 28.53$, $P = 57.44°$, $Q = 88.56°$
7. $s = 35.35$, $S = 27.72°$, $U = 28.28°$
8. 2687.05
9. 121.55
10. 5.33
11. 431.21 m
12. 234.76
13. 1st Solution: $u = 57.17$, $U = 48.52°$, $P = 68.48°$; 2nd Solution: $u = 7.29$, $U = 5.48°$, $P = 111.52°$
14. $a = 8.06$, $B = 29.75°$, $C = 60.26°$
15. 

; $\frac{11\pi}{12}$; 525°; -195°; none; 15°
16. $\log_3 \frac{x(x+1)}{y}$

6-03

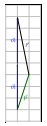
1. Directed line segment or a measurement with direction; velocity, acceleration, force
2. 
; $\langle 3, -2 \rangle$; $\sqrt{13}$
3. 
; $\langle 1, 6 \rangle$; $\sqrt{37}$
4. 
; $\langle 7, 12 \rangle$; $\sqrt{193} \approx 13.89$
5. 
; $\langle 0, -4 \rangle$
6. 

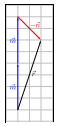
; $\langle -4, 4 \rangle$
7. 

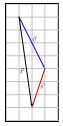
; $\langle 3, 9 \rangle$

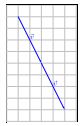
8. 

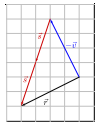
; $\langle -1, 1 \rangle$
9. 

; $\langle -2, 6 \rangle$
10. 

; $\langle -1, 5 \rangle$
11. 

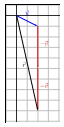
; $\langle 2, 6 \rangle$
12. $\langle 1, 0 \rangle$
13. $\left\langle \frac{-3}{5}, \frac{4}{5} \right\rangle$
14. $\frac{5}{13}\hat{i} - \frac{12}{13}\hat{j}$
15. $-\frac{5\sqrt{34}}{34}\hat{i} + \frac{3\sqrt{34}}{34}\hat{j}$
16. 

; $\hat{i} - 7\hat{j}$
17. 

; $4\hat{i} - 8\hat{j}$
18. 

; $-4\hat{i} - 2\hat{j}$
19. $\sqrt{10}$
20. $5\hat{i} - 8\hat{j}$
21. 12.18
22. 52.89°
23. 10.77
24. $\cos\alpha(\cos\alpha + 2\sin\alpha) = \cos^2\alpha + 2\sin\alpha\cos\alpha = 1 - \sin^2\alpha + \sin 2\alpha$
25. VA: $x = -2$, $x = 2$; HA: $y = 0$

6-04

1. Find r with $\sqrt{v_x^2 + v_y^2}$ and the angle with $\tan\theta = \frac{v_y}{v_x}$.
2. 5(cos 36.9°, sin 36.9°)
3. 25(cos 343.7°, sin 343.7°)
4. 10(cos 126.9°, sin 126.9°)
5. 25(cos 245°, sin 245°)
6. $\langle 9, 9\sqrt{3} \rangle$
7. $\langle 6\sqrt{2}, -6\sqrt{2} \rangle$
8. $\langle -12, 12\sqrt{3} \rangle$
9. $\langle 20, 20\sqrt{3} \rangle$
10. $4\sqrt{10}\langle \cos 116.6^\circ, \sin 116.6^\circ \rangle$
11. 6(cos 60°, sin 60°)
12. 9.92(cos 66.0°, sin 66.0°)
13. 21.7(cos 294.0°, sin 294.0°)
14. 28.8 miles at W 29.3° N
15. 4.99 miles at E 37.4° N
16. 

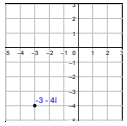
; $\langle 2, -9 \rangle$
17. $\left\langle \frac{-2\sqrt{13}}{13}, \frac{3\sqrt{13}}{13} \right\rangle$
18. 3.8
19. 2 solutions
20. $\sin\frac{7\pi}{6} = -\frac{1}{2}$, $\cos\frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$, $\tan\frac{7\pi}{6} = \frac{\sqrt{3}}{3}$, $\csc\frac{7\pi}{6} = -2$, $\sec\frac{7\pi}{6} = -\frac{2\sqrt{3}}{3}$, $\cot\frac{7\pi}{6} = \sqrt{3}$

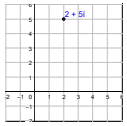
6-05

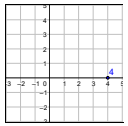
1. 15
2. −20
3. 21
4. 60
5. 168.7°
6. 60.3°
7. 153.4°
8. orthogonal
9. orthogonal
10. parallel
11. $\vec{w_1} = \left\langle \frac{88}{41}, \frac{110}{41} \right\rangle$, $\vec{w_2} = \left\langle \frac{35}{41}, -\frac{28}{41} \right\rangle$
12. $\vec{w_1} = \left\langle -\frac{76}{41}, \frac{95}{41} \right\rangle$, $\vec{w_2} = \left\langle \frac{35}{41}, \frac{28}{41} \right\rangle$
13. $\vec{w_1} = \left\langle -\frac{11}{2}, -\frac{11}{2} \right\rangle$, $\vec{w_2} = \left\langle \frac{3}{2}, -\frac{3}{2} \right\rangle$
14. 56382 J
15. 1034 ft·lbs
16. 32.0 m at E 21.3° S
17. $16\langle \cos\frac{\pi}{6}, \sin\frac{\pi}{6} \rangle$
18. 

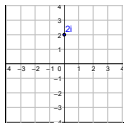
; $-5\hat{i} - 3\hat{j}$
19. 46.32
20. No triangle

6-06

1. Absolute value is the distance from the origin, so you have to use the distance formula. The horizontal and vertical distances for the distance formula are real, not imaginary.
2. $|z| = r$ (the modulus)
3. 

4. 

5. 

6. 

7. 5
8. $\sqrt{29}$
9. 3
10. −88
11. $-\frac{5\sqrt{2}}{2} - \frac{5\sqrt{2}}{2}i$
12. $6\sqrt{3} - 6i$
13. $3\left(\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}\right)$
14. $14\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$
15. 25(cos 6.00 + i sin 6.00)
16. orthogonal
17. 126.87°
18. 4.70 mi at E 17.44° N
19. $6\hat{i} + 2\hat{j}$
20. 84

6-07

1. Let $z = r(\cos\theta + i\sin\theta)$ be a complex number. Squaring is multiplying by itself, so use the multiplication rule. $z_1 z_2 = r_1 r_2(\cos(\theta_1+\theta_2) + i\sin(\theta_1+\theta_2))$ but let z_1 and z_2 both simply be z. $z^2 = z\cdot z = r\cdot r(\cos(\theta+\theta) + i\sin(\theta+\theta))$ $= r^2(\cos(2\theta) + i\sin(2\theta))$
2. $-19.3185 + 5.1764i$
3. 30
4. $-10 + 5i$
5. $-2i$
6. $-4i$
7. $-0.3660 + 1.3660i$
8. $0.7059 + 0.1765i$
9. $4.5 + 7.7942i$
10. 8
11. $-128 + 221.7025i$
12. $3.8637 + 1.0353i$, $-2.8284 + 2.8284i$, $-1.0353 - 3.8637i$
13. $2.5981 + 1.5i$, $-1.5 + 2.5981i$, $-2.5981 - 1.5i$, $1.5 - 2.5981i$
14. $2 + i$, $-2 - i$
15. $1.2159 + 0.5036i$, $-0.5036 + 1.2159i$, $-1.2159 - 0.5036i$, $0.5036 - 1.2159i$
16. $\sqrt{29}$
17. $10\left(\cos\frac{5\pi}{3} + i\sin\frac{5\pi}{3}\right)$
18. 14
19. $30\langle\cos 330°, \sin 330°\rangle$
20. $\langle -1, 9\rangle$

6-Review

1. No triangle
2. $a = 13.60$, $b = 4.10$, $C = 87°$
3. $B_1 = 66.82°$, $C_1 = 63.18°$, $c_1 = 58.25$; $B_2 = 113.18°$, $C_2 = 16.82°$, $c_2 = 18.88$
4. $A = 36.34°$, $B = 62.72°$, $C = 80.94°$
5. $B = 37.69°$, $C = 111.31°$, $a = 17.69$
6. 92.46°
7. 38.50
8. $\langle -10, 4\rangle$
9. $\langle \frac{13}{85}, \frac{84}{85}\rangle$
10. $\langle 10, 26\rangle$
11. $\langle -20, 22\rangle$
12. $\langle 150, 57\rangle$
13. -35
14. 95.40°
15. Parallel
16. 3637.31 ft·lbs
17. $18\left(\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right)$
18. $\frac{25\sqrt{3}}{2} - \frac{25}{2}i$
19. $5i$
20. $-15.32 + 12.86i$
21. $2.57 + 3.06i$
22. $3.44 + 8.31i$; $-3.44 - 8.31i$