

Do the following as indicated.

- Solve each $\triangle ABC$ with given information. Also, find area of $\triangle ABC$.
 - $a = 86$ in, $b = 253$ in, $c = 242$ in
 - $A = 61.7^\circ$, $a = 78.9$ m, $b = 86.4$ m
 - $a = 6.9$ ft, $b = 10.2$ ft, $C = 35^\circ 15'$
 - $a = 165$ m, $A = 100.2^\circ$, $B = 25.8^\circ$
- A ship is sailing due north. At a certain point the bearing of a lighthouse 12.5 km distant is N 38.8° E. Later on, the captain notices that the bearing of the lighthouse has become S 44.2° E. How far did the ship travel between the two observations of the lighthouse?
- Two ships leave a harbor together, traveling on courses that have an angle of 140° between them. If they each travel 402 miles, how far apart are they?
- Two forces act at a point in the plane. The angle between the two forces is given. Find the magnitude of the resultant force.
 - forces of 75.6 and 98.2 pounds, forming an angle of 83.4°
 - forces of 230 and 450 newtons, forming an angle of 112°
- Two forces of 128 pounds and 253 pounds act at a point. The equilibrant is 320 pounds. Find the angle between the forces.
- A force of 500 pounds is required to pull a boat up a ramp inclined at 18° with the horizontal. How much does the boat weigh?
- A pilot wants to fly on a bearing of 75° . By flying due east, he finds that a 42-mph wind, blowing from the south, puts him on course. Find the airspeed and the groundspeed.
- A plane is headed due south with an airspeed of 192 mph. A wind from a direction of 78° is blowing at 23 mph. Find the groundspeed and resulting bearing of the plane.
- A 186-pound force just keeps a 2800-pound car from rolling down a hill. What angle does the hill make with the horizontal?
- Write each complex number in rectangular form.
 - $\sqrt{6}(\cos 315^\circ + i \sin 315^\circ)$
 - $8 \operatorname{cis} 240^\circ$
 - $12 \operatorname{cis} \frac{3\pi}{2}$
 - $\operatorname{cis} \frac{\pi}{6}$
- Write each complex number in trigonometric form.
 - $-2 + 2i\sqrt{3}$
 - $8 + 8i$
 - -12
 - $6i$
 - $-5i$

12. Find each product and quotient and write final answer in rectangular form.

a. $(\sqrt{10} \operatorname{cis} 62^\circ)(\sqrt{5} \operatorname{cis} 88^\circ)$

d. $\frac{3 \operatorname{cis} 15^\circ}{12 \operatorname{cis} 135^\circ}$

b. $(4 \operatorname{cis} 110^\circ)(6 \operatorname{cis} 115^\circ)$

e. $\frac{4 \operatorname{cis} 305^\circ}{16 \operatorname{cis} 65^\circ}$

c. $\frac{24 \operatorname{cis} 297^\circ}{8 \operatorname{cis} 27^\circ}$

13. Find each power. Write final answer in rectangular form.

a. $(3 \operatorname{cis} 60^\circ)^5$

c. $(-4 + 4i)^4$

b. $(2\sqrt{3} + 2i)^6$

d. $(-\sqrt{3} - i)^3$

14. Find the indicated n th roots.

a. four 4th roots of $-2 + 2i\sqrt{3}$

b. five 5th roots of 32

c. three cube roots of $-8i$

15. Convert to polar equation.

a. $x^2 + y^2 = 16$

b. $3x - 2y = 5$

c. $y = 10$

16. Convert to Cartesian equation.

a. $r = 2 \cos \theta$

b. $r = \frac{3}{1 - \sin \theta}$

c. $r = 3 \sec \theta$

17. Graph each polar equation.

a. $r = 1 + \cos \theta$

b. $r = 4 \sin 3\theta$

c. $r^2 = 9 \cos 2\theta$