Section 8.2:

Given the magnitude and direction angle of a vector, find its components.

For each of these, use $a = |v| \cdot \cos\theta$ and $b = |v| \cdot \sin\theta$

Write the answer as a vector in component form $\langle a, b \rangle$

5. $|\mathbf{K}| = 40$ and $\theta = 78.5°$

$a = |K| \cdot \cos\theta = 40 \cdot \cos(78.5°)$

$a = 7.9747$

$a \approx 8.0$

$b = |K| \cdot \sin\theta = 40 \cdot \sin(78.5°)$

$b = 39.1969$

$b \approx 39.2$

$\boxed{K = \langle 8.0, 39.2 \rangle}$

6. $|\mathbf{L}| = 8$ and $\theta = 164°$

$a = 8 \cdot \cos(164°) = -7.6901$

$a \approx -7.7$

$b = 8 \cdot \sin(164°) = 2.2051$

$b \approx 2.2$

$\boxed{L = \langle -7.7, 2.2 \rangle}$

7. $|\mathbf{M}| = 15$ and $\theta = 199°$

$a = 15 \cdot \cos(199°) = -14.1828$

$a \approx -14.2$

$b = 15 \cdot \sin(199°) = -4.8835$

$b \approx -4.9$

$\boxed{m = \langle -14.2, -4.9 \rangle}$

8. $|\mathbf{N}| = 56$ and $\theta = 333°$

$a = 56 \cdot \cos(333°) = 49.8964$

$a \approx 49.9$

$b = 56 \cdot \sin(333°) = -25.4235$

$b \approx -25.4$

$\boxed{N = \langle 49.9, -25.4 \rangle}$

Find the **direction angle**, θ, of the given vector. Round θ to the nearest tenth of a degree.

a) Identify the quadrant in which the vector lies in standard position.

b) Find the magnitude of the vector: $|V| = \sqrt{a^2+b^2}$

c) Find $\hat{\theta}$ using either $\cos\hat{\theta} = \frac{|a|}{|V|}$ or $\sin\hat{\theta} = \frac{|b|}{|V|}$

d) Find θ (the direction angle) by adding or subtracting $\hat{\theta}$ with either $180°$ or $360°$, depending on the quadrant:

(i) If V is in QI, then $\theta = \hat{\theta}$; (ii) if V is in QII, the $\theta = 180° - \hat{\theta}$;
(iii) If V is in QIII, then $\theta = 180° + \hat{\theta}$; (iv) if V is in QIV, $\theta = 360° - \hat{\theta}$.

9. $\mathbf{A} = \langle 9, 2 \rangle$ QI

$|A| = \sqrt{9^2+2^2} = \sqrt{81+4} = \sqrt{85} = 9.2195$

$\cos\hat{\theta} = \frac{|9|}{9.2195} = .9762$

$\hat{\theta} = \cos^{-1}(.9762) = 12.5288°$

$\hat{\theta} \approx 12.5°$

In QI $\theta = \hat{\theta}$

$\boxed{\theta = 12.5°}$

10. $\mathbf{B} = \langle -6, 7 \rangle$ QII

$|B| = \sqrt{36+49} = \sqrt{85} = 9.2195$

$\cos\hat{\theta} = \frac{|-6|}{9.2195} = .6508$

$\hat{\theta} = \cos^{-1}(.6508) = 49.3985°$

$\hat{\theta} \approx 49.4°$

In QII $\theta = 180° - \hat{\theta}$

$\theta = 180° - 49.4°$

$\boxed{\theta = 130.6°}$

11. $\mathbf{C} = \langle -3, -2 \rangle$ QIII

$|C| = \sqrt{9+4} = \sqrt{13} = 3.60555$

$\cos\hat{\theta} = \frac{|-3|}{3.60555} = .83205$

$\hat{\theta} = \cos^{-1}(.83205) = 33.69007°$

$\hat{\theta} \approx 33.7°$

$\theta = 180° + 33.7°$

$\boxed{\theta = 213.7°}$

12. $\mathbf{D} = \langle 6, -11 \rangle$ QIV

$|D| = \sqrt{6^2+11^2} = \sqrt{157} = 12.53$

$\cos\hat{\theta} = \frac{|6|}{12.53} = .47885$

$\hat{\theta} = \cos^{-1}(.47885) = 61.3895°$

$\hat{\theta} \approx 61.4°$

$\theta = 360° - 61.4°$

$\boxed{\theta = 298.6°}$