

Review: Angelica rides her magical bike at a rate of 120 miles per hour. The angular speed of each wheel is 528 revolutions per minute. What is the radius of a wheel, in inches?

$$V = r\omega \quad ; \quad r = \frac{V}{\omega}$$

$$V = \frac{120 \text{ mi}}{\text{h}} \quad ; \quad \omega = \frac{528 \text{ rev}}{\text{min}} \quad ; \quad r = ? \text{ in} \quad = \frac{V}{\omega} = \frac{V}{1} \cdot \frac{1}{\omega}$$

$$r = \frac{120 \cancel{\text{mi}}}{\cancel{\text{h}}} \cdot \frac{1 \cancel{\text{min}}}{528 \cancel{\text{rev}}} \cdot \frac{1 \cancel{\text{h}}}{60 \cancel{\text{min}}} \cdot \frac{5280 \cancel{\text{ft}}}{1 \cancel{\text{mi}}} \cdot \frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \cdot \frac{1 \cancel{\text{rev}}}{2\pi}$$

$$= \boxed{\frac{120}{\pi} \text{ in}}$$

Homework questions?

7.5

27.

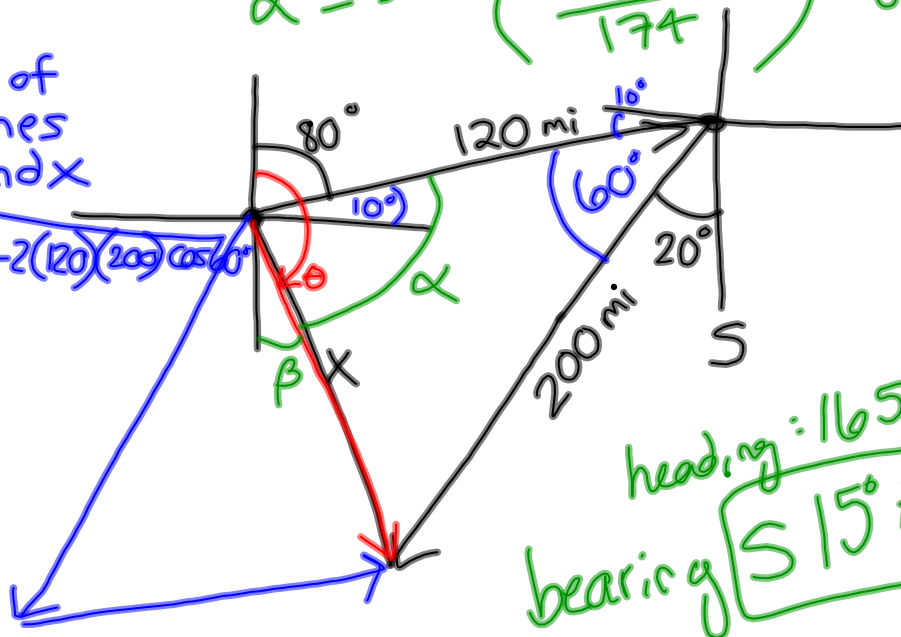
$$\frac{\sin \alpha}{200} = \frac{\sin 60^\circ}{174}$$

$$\alpha = \sin^{-1} \left(\frac{200 \sin 60^\circ}{174} \right) = 85^\circ$$

SAS \Rightarrow law of cosines to find x

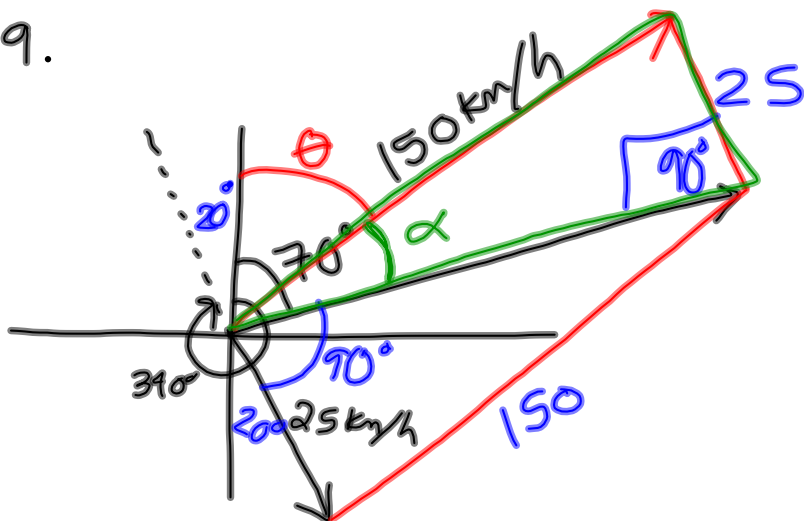
$$x = \sqrt{120^2 + 200^2 - 2(120)(200)\cos 60^\circ}$$

$$= 174 \text{ mi}$$



heading: 165°
 bearing: $\boxed{\text{S } 15^\circ \text{ E}}$

29.



$$\sin \alpha = \frac{25}{150}$$

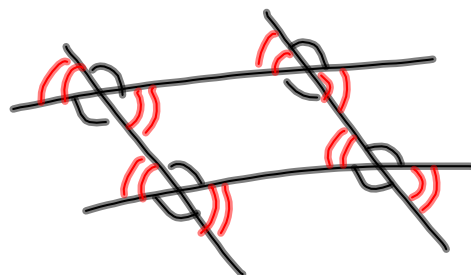
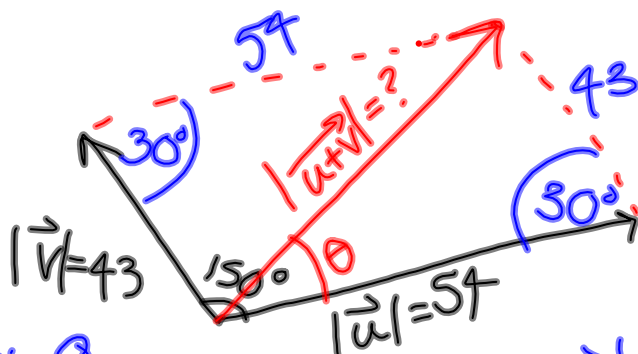
$$\alpha = \sin^{-1}\left(\frac{25}{150}\right) = 10^\circ$$

$$\theta = 70^\circ - 10^\circ$$

$$= \boxed{60^\circ}$$

Applications from section 7.5

18. Find $|\vec{u} + \vec{v}|$ and the angle that $\vec{u} + \vec{v}$ makes with \vec{u} , given $|\vec{u}| = 54$, $|\vec{v}| = 43$, & the angle θ between \vec{u} & \vec{v} is 150° .



$$\frac{\sin \theta}{43} = \frac{\sin 30^\circ}{27}$$

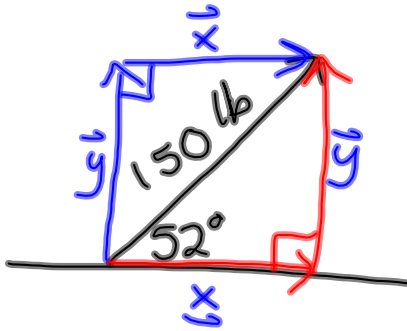
$$\theta = \sin^{-1}\left(\frac{43 \sin 30^\circ}{27}\right) = \boxed{53^\circ}$$

$$|\vec{u} + \vec{v}| = \sqrt{43^2 + 54^2 - 2(43)(54)\cos 30^\circ}$$

$$= \boxed{27}$$

Resolving a vector into horizontal and vertical components

32. $|\vec{u}| = 150$ lb, inclined upward to the right at 52° from the horizontal. Resolve \vec{u} into horizontal and vertical components.



horizontal:
 $\cos 52^\circ = \frac{|\vec{x}|}{150}$

$|\vec{x}| = 150 \cos 52^\circ$
 $\approx \boxed{92 \text{ lb}}$

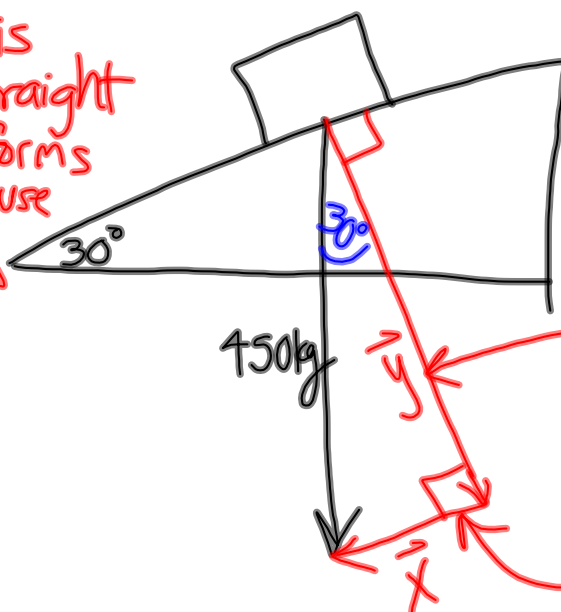
vertical:
 $\sin 52^\circ = \frac{|\vec{y}|}{150}$

$|\vec{y}| = 150 \sin 52^\circ = \boxed{118 \text{ lb}}$

The object on a ramp problem

40. If a 450kg object is at rest on a ramp with a 30° incline, find the components of the force of the object's weight parallel and perpendicular to the ramp.

* weight is always straight down & forms the hypotenuse of right Δ



$\sin 30^\circ = \frac{|\vec{x}|}{450}$

$|\vec{x}| = 450 \sin 30^\circ = \boxed{225 \text{ kg}}$

$\cos 30^\circ = \frac{|\vec{y}|}{450}$

$|\vec{y}| = 450 \cos 30^\circ = \boxed{225\sqrt{3} \text{ kg}}$

perpendicular to ramp

parallel to ramp

Homework:

Already assigned:

Ch 5 Test (book), Ch 6 Test (book);

7.5 #27,29; 7.6 #1-7odd

7.5# 19,21,31,33,39,41

7.3 Handout: #37-44 all

Due Friday