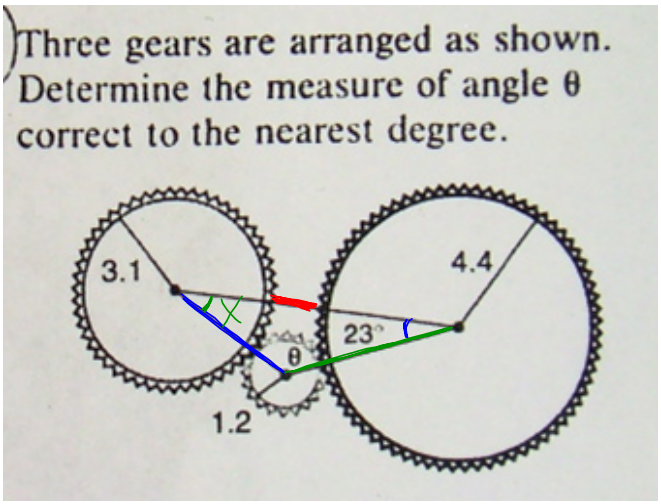
Warm up

1. Three gears are arranged as shown. Determine the measure of angle θ correct to the nearest degree.

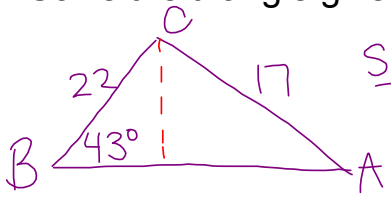


$\frac{\sin 23}{4.3} = \frac{\sin X}{5.6}$

$X = 30.5°$

For problems 2 and 3 round your answer to the nearest tenth.

2. Solve the triangle given B = 43, a = 22, b = 17.



$\frac{\sin 43}{17} = \frac{\sin A}{22}$

$A = 62°$ $a = 22$ $A = 118°$

$B = 43°$ $b = 17$ $B = 43°$

$C = 75°$ $c =$ $C = 19°$

$h = 22 \sin 43$

$h = 15.$

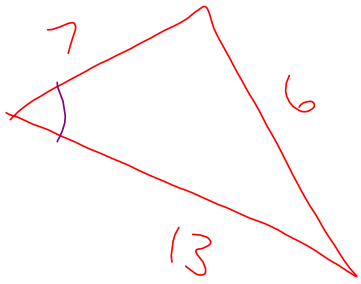
3. Find the area of a triangle with sides a = 6, b = 12, c = 7.

$a = 22$

$b = 17$

$c =$

$S = \frac{a+b+c}{2}$ $A = \sqrt{S(S-a)(S-b)(S-c)}$



GO COUGARS!

Homework Questions

In Exercises 1–4, find the dot product of u and v.

1. $\mathbf{u} = \langle 6, 3 \rangle$, $\mathbf{v} = \langle 2, -4 \rangle$
2. $\mathbf{u} = \langle -4, 1 \rangle$, $\mathbf{v} = \langle 2, -3 \rangle$
3. $\mathbf{u} = 5\mathbf{i} + \mathbf{j}$, $\mathbf{v} = 3\mathbf{i} - \mathbf{j}$
4. $\mathbf{u} = 3\mathbf{i} + 2\mathbf{j}$, $\mathbf{v} = -2\mathbf{i} + \mathbf{j}$

In Exercises 5–10, use the vectors $\mathbf{u} = \langle 2, 2 \rangle$, $\mathbf{v} = \langle -3, 4 \rangle$, and $\mathbf{w} = \langle 1, -4 \rangle$ to find the indicated quantity. State whether the result is a vector or a scalar.

5. $\mathbf{u} \cdot \mathbf{u}$
6. $\mathbf{v} \cdot \mathbf{w}$
7. $\mathbf{u} \cdot 2\mathbf{v}$
8. $4\mathbf{u} \cdot \mathbf{v}$
9. $(3\mathbf{w} \cdot \mathbf{v})\mathbf{u}$
10. $(\mathbf{u} \cdot 2\mathbf{v})\mathbf{w}$

In Exercises 11–16, use the dot product to find the magnitude of u.

11. $\mathbf{u} = \langle -5, 12 \rangle$
12. $\mathbf{u} = \langle 2, -4 \rangle$
13. $\mathbf{u} = 20\mathbf{i} + 25\mathbf{j}$
14. $\mathbf{u} = 6\mathbf{i} - 10\mathbf{j}$
15. $\mathbf{u} = -4\mathbf{j}$
16. $\mathbf{u} = 9\mathbf{i}$

In Exercises 17–24, find the angle θ between the vectors.

17. $\mathbf{u} = \langle -1, 0 \rangle$, $\mathbf{v} = \langle 0, 2 \rangle$
18. $\mathbf{u} = \langle 4, 4 \rangle$, $\mathbf{v} = \langle -2, 0 \rangle$
19. $\mathbf{u} = 3\mathbf{i} + 4\mathbf{j}$, $\mathbf{v} = -2\mathbf{i} + 3\mathbf{j}$
20. $\mathbf{u} = 2\mathbf{i} - 3\mathbf{j}$, $\mathbf{v} = \mathbf{i} - 2\mathbf{j}$
21. $\mathbf{u} = 2\mathbf{i}$, $\mathbf{v} = -3\mathbf{j}$
22. $\mathbf{u} = 4\mathbf{j}$, $\mathbf{v} = -3\mathbf{i}$
23. $\mathbf{u} = \cos\left(\frac{\pi}{3}\right)\mathbf{i} + \sin\left(\frac{\pi}{3}\right)\mathbf{j}$, $\mathbf{v} = \cos\left(\frac{3\pi}{4}\right)\mathbf{i} + \sin\left(\frac{3\pi}{4}\right)\mathbf{j}$

In Exercises 25–28, graph the vectors and find the degree measure of the angle between the vectors.

25. $\mathbf{u} = 2\mathbf{i} - 4\mathbf{j}$, $\mathbf{v} = 3\mathbf{i} - 5\mathbf{j}$
26. $\mathbf{u} = -6\mathbf{i} - 3\mathbf{j}$, $\mathbf{v} = -8\mathbf{i} + 4\mathbf{j}$
27. $\mathbf{u} = 6\mathbf{i} - 2\mathbf{j}$, $\mathbf{v} = 8\mathbf{i} - 5\mathbf{j}$
28. $\mathbf{u} = 2\mathbf{i} - 3\mathbf{j}$, $\mathbf{v} = 4\mathbf{i} + 3\mathbf{j}$

In Exercises 29 and 30, use vectors to find the interior angles of the triangle with the given vertices.

29. $(1, 2), (3, 4), (2, 5)$
30. $(-3, 0), (2, 2), (0, 6)$

In Exercises 31 and 32, find $\mathbf{u} \cdot \mathbf{v}$, where θ is the angle between u and v.

31. $\|\mathbf{u}\| = 9, \|\mathbf{v}\| = 36, \theta = \frac{3\pi}{4}$

Chapter 6 Review Topics

Formulas you need to know:

6.1

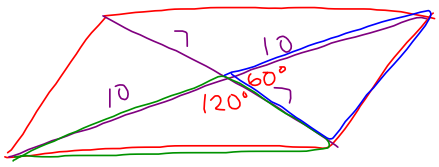
Law of Sines	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
Area using sin	$\frac{1}{2}ab\sin C$ "two sides and the angle in between"

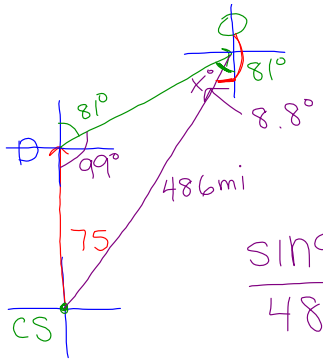
6.2

Law of Cosines	$a^2 = b^2 + c^2 - 2bc\cos A$ "used to find a side length"
	$\frac{a^2-b^2-c^2}{-2bc} = \cos A$ "used to find and angle"
Area using all sides	$\sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{a+b+c}{2}$

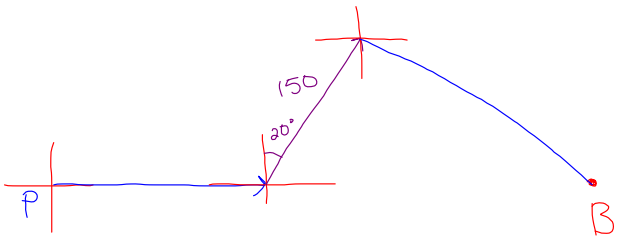
6.3 Vectors

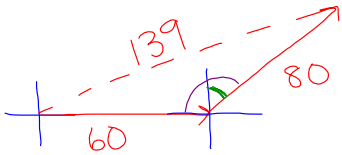
Component Form	$\langle v_1, v_2 \rangle$
Standard Form	$v_1 i + v_2 j$
Trig Component Form	$\langle \|\|v\|\| \cos\theta, \|\|v\|\| \sin\theta \rangle$
Standard Trig Form	$\|\|v\|\| i \cos\theta + \|\|v\|\| j \sin\theta$
Magnitude	$\|\|v\|\| = \sqrt{{v_1}^2 + {v_2}^2}$
Unit Vector	$\langle \frac{v_1}{\|\|v\|\|} \frac{v_2}{\|\|v\|\|} \rangle$
Bearing	"starts from North"
Trig Angle	"starts from positive x axis"


7
10
60°
10
120°
7

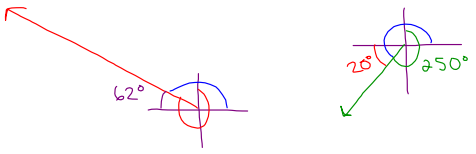
② 

$$\frac{\sin 99}{486} = \frac{\sin X}{75}$$

③ 

⑦ 

$$\frac{139^2 - 80^2 - 60^2}{-2(80)(60)}$$

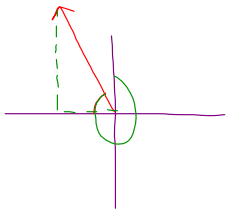
⑧ 

$\|v\| = 580$ $\theta = 118°$

$\|v\| = 60$ $\theta = 200°$

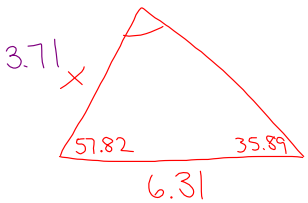
$\langle 580\cos 118°, 580\sin 118° \rangle - \langle 60\cos 200°, 60\sin 200° \rangle$

$\langle -215.91, 532.63 \rangle$



574.73mph

$\tan\theta = \frac{y}{x}$

⑨ 

$$\frac{\sin 86.29}{6.31} = \frac{\sin 35.89}{x}$$

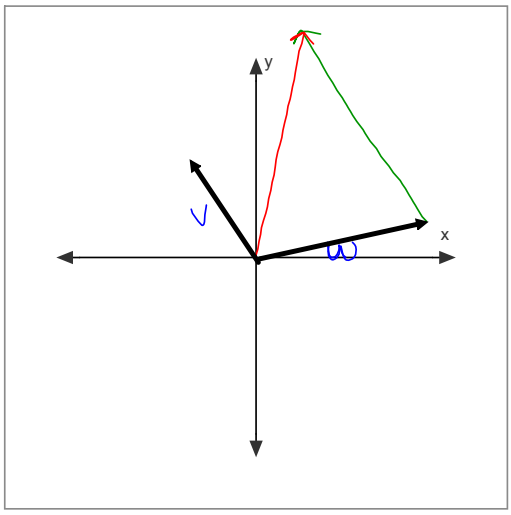
9.898

Review Practice Problems

1. Use the given vectors for the following: $v = \langle -2, 3 \rangle$ $w = \langle 5, 1 \rangle$

   a. sketch w - v

   $w + 2v$



   b. find the unit vector for vector v

$||u|| = 8$ $\left\langle \frac{-2}{\sqrt{13}}, \frac{3}{\sqrt{13}} \right\rangle$

   c. find the trig component form of vector w (calc ok)

$\vec{w} = \langle 5, 1 \rangle$

$\langle \sqrt{26}\cos 11.3, \sqrt{26}\sin 11.3 \rangle$

$\tan^{-1}\left(\frac{1}{5}\right) = 11.3°$

2. How many triangles with given information can be formed?
   Do not solve.
   a. $A = 61^\circ$, $a = 8$, $b = 21$

   b. $A = 112^\circ$, $a = 15$, $b = 17$

   c. $B = 18^\circ$, $C = 65^\circ$, $c = 12$

3. Solve the triangle to two decimal places.

$a = 7, b = 15, c = 19$

4. Twelve horses are equally spaced on a merry-go-round. If the chord connecting the center of each horse is 18 feet long, what is the diameter of the merry-go-round? What is the length of the arc between each horse?

5.

6.

HOMEWORK

p 461 1-73 odd, 79-90, 93, 95

p 465 1-15

Workbook p 133 1-12

p 445 2, 10, 28, 30, 32

1. Solve the triangle.

   B = 35, b = 12 , c = 15

1. Solve the triangles given the following information.

   a. C = 75 , b = 49, c = 48