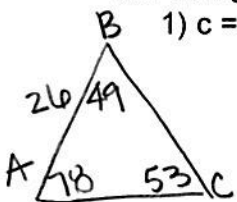


Review for Test 6.1 - 6.3

Solve each triangle. Make sure to be on the lookout for triangles that are not possible or cases where two triangles are possible.



1) $c = 26$, $\angle B = 49^\circ$, and $\angle C = 53^\circ$

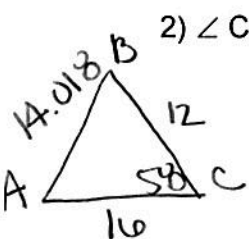
$$\frac{\sin 53}{26} \neq \frac{\sin 49}{a}$$

$$a = 31.844$$

$$A = 78^\circ, a = 31.844, b = 24.569$$

$$\frac{\sin 53}{26} \neq \frac{\sin 49}{b}$$

$$b = 24.569$$



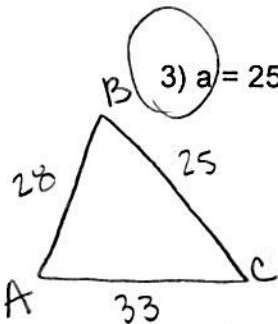
2) $\angle C = 58^\circ$, $a = 12$ and $b = 16$

$$c = \sqrt{12^2 + 16^2 - 2(12)(16)\cos 58}$$

$$c = 14.018$$

$$\angle B = \cos^{-1} \left(\frac{16^2 - 14.018^2 - 12^2}{-2(14.018)(12)} \right) \angle B = 75.452$$

$$c = 14.018, A = 40.548^\circ, B = 75.452^\circ$$



3) $a = 25$, $b = 33$, and $c = 28$

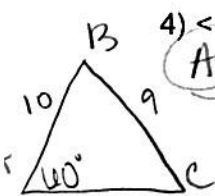
$$\angle B = \cos^{-1} \left(\frac{33^2 - 28^2 - 25^2}{-2(28)(25)} \right)$$

$$\angle B = 74.037^\circ$$

$$A = 50.271^\circ, B = 74.037^\circ, c = 55.692^\circ$$

$$\angle C = \cos^{-1} \left(\frac{28^2 - 33^2 - 25^2}{-2(33)(25)} \right)$$

$$\angle C = 55.692^\circ$$



4) $\angle A = 60^\circ$, $a = 9$, $c = 10$

ASS

$$b = \sqrt{10^2 + 9^2 - 2(10)(9)\cos 45.794}$$

$$b = 7.449$$

$$B = 45.794^\circ, C = 74.206^\circ, b = 7.449$$

$$\angle B = 14.206^\circ, \angle C = 105.794^\circ, b = 2.550$$

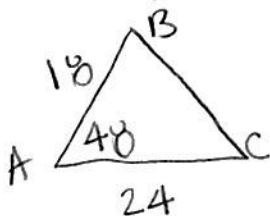
$$\frac{\sin 60}{9} = \frac{\sin C}{10}$$

$$\angle C = 74.206, \angle B = 45.794$$

2nd Δ New $\angle C$
 $180 - 74.206 = 105.794$
 $\angle B = 14.206$

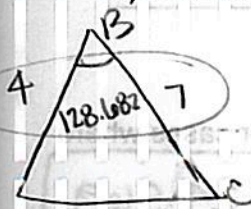
$$b = \sqrt{9^2 + 10^2 - 2(9)(10)\cos 14.206} = 2.550$$

5) Find the area of the triangle where $b = 24$, $c = 18$ and $\angle A = 48^\circ$.



$$\text{Area} = \frac{1}{2}(18)(24)\sin 48 = 160.519$$

6) Find the area of the triangle with sides of 4ft, 7ft and 10ft.

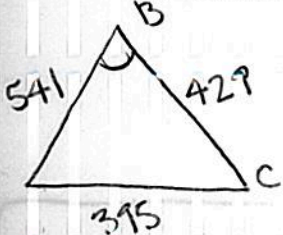


$$\angle B = \cos^{-1} \left(\frac{10^2 - 4^2 - 7^2}{-2(4)(7)} \right)$$

$$\text{Area} = \frac{1}{2}(4)(7)\sin 128.682$$

$$\text{Area} = 10.923 \text{ ft}^2$$

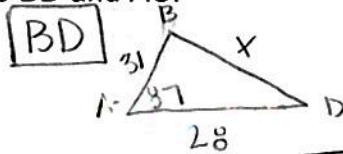
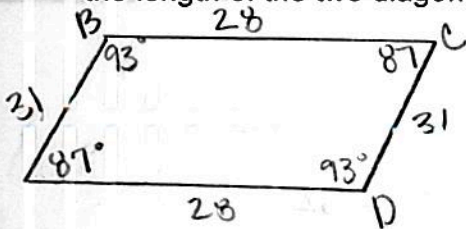
7) A triangular parcel of land has sides of 541 feet, 429 feet, and 395 feet. What is the measure of the smallest angle?



$$\angle B = \cos^{-1} \left(\frac{395^2 - 541^2 - 429^2}{-2(541)(429)} \right)$$

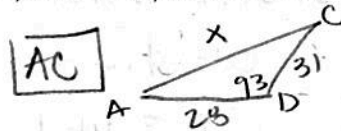
$$\angle B = 46.299^\circ$$

8) Parallelogram ABCD has the following measurements: AB = 31, BC = 28, and $\angle A = 87^\circ$. Find the length of the two diagonals BD and AC.



$$BD = \sqrt{28^2 + 31^2 - 2(28)(31)\cos 87}$$

$$BD = 40.671$$



$$AC = \sqrt{28^2 + 31^2 - 2(28)(31)\cos 93}$$

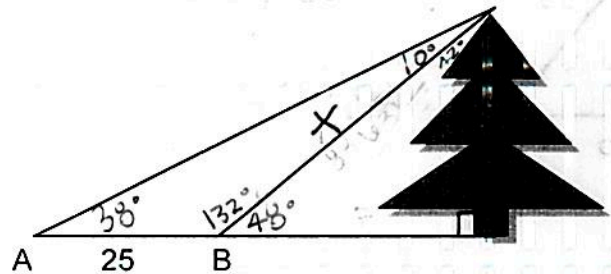
$$AC = 42.846$$

9) From a point A, the angle of elevation to the top of a tree is 38° . From a point B 25 feet closer to the tree, the angle of elevation to the top of the tree is 48° . How far is it from point B to the top of the tree?

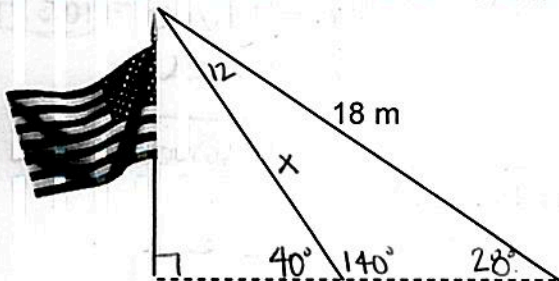
$$\frac{\sin 10}{25} = \frac{\sin 38}{X}$$

$$X = \frac{25 \sin 38}{\sin 10}$$

$$X = 88.636 \text{ ft}$$



10) A flagpole is being braced from the top with a wire that is 18 m long with an angle of elevation of 28° . For added support a new wire will be placed from the top closer to the base of the pole. How much wire will be needed for this new support if the angle of elevation is 40° ?

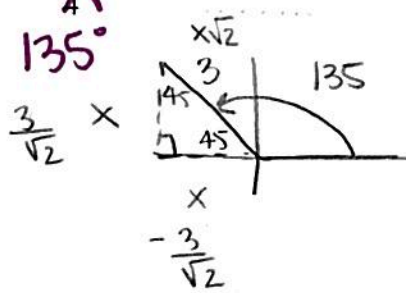


$$\frac{\sin 140}{18} = \frac{\sin 28}{X}$$

$$X = \frac{18 \sin 28}{\sin 140}$$

$$X = 13.146 \text{ m}$$

- 11) The magnitude of $v = 3$ and the angle for vector v that it makes with the positive x-axis is 135° . Draw a picture of this and write the vector in $ai + bj$ form.

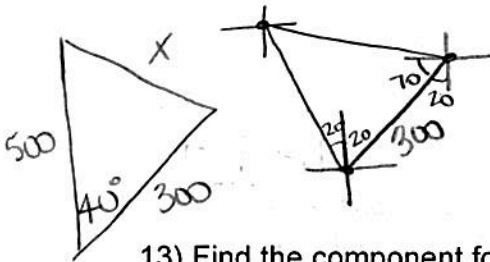


$$\frac{3\sqrt{2}}{\sqrt{2}} = \frac{3}{\sqrt{2}}$$

$$x = \frac{3}{\sqrt{2}}$$

$$\vec{v} = -\frac{3}{\sqrt{2}}i + \frac{3}{\sqrt{2}}j$$

- 12) After leaving an airport, a plane flies for 1.5 hours at a speed of 200 km/h on a course of 200° . Then, on a course of 340° , the plane flies for 2 hours at a speed of 250 km/h. At this time, how far from the airport is the plane?



$$x = \sqrt{500^2 + 300^2 - 2(500)(300)\cos 40^\circ}$$

$$x = 331.943 \text{ km}$$

- 13) Find the component form of the vector that has initial point C and terminal point D. Then find the magnitude of \vec{CD} .

a) C (2,3) D (7,15)

$$\vec{CD} = \langle 5, 12 \rangle$$

$$\|\vec{CD}\| = 13$$

$$\sqrt{5^2 + 12^2} = \sqrt{169} = 13$$

b) C (-2,8) D (4,12)

$$\vec{CD} = \langle 6, 4 \rangle$$

$$\|\vec{CD}\| = 2\sqrt{13}$$

$$\sqrt{6^2 + 4^2} = \sqrt{52} = 2\sqrt{13}$$

- 14) Find a component vector to represent u in each equation if $v = \langle 2, -5 \rangle$ and $w = \langle 3, -1 \rangle$.

a) $u = v + w$

$$\vec{u} = \langle 2, -5 \rangle + \langle 3, -1 \rangle$$

$$\vec{u} = \langle 5, -6 \rangle$$

b) $u = v - w$

$$\vec{u} = \langle 2, -5 \rangle - \langle 3, -1 \rangle$$

$$\vec{u} = \langle -1, -4 \rangle$$

c) $u = 2v - 3w$

$$\vec{u} = 2\langle 2, -5 \rangle - 3\langle 3, -1 \rangle$$

$$\vec{u} = \langle 4, -10 \rangle - \langle 9, -3 \rangle$$

$$\vec{u} = \langle -5, -7 \rangle$$

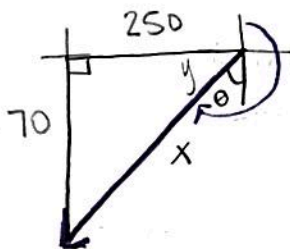
- 15) A plane flies due west at 250 km/h while the wind blows south at 70 km/h. Find the plane's resultant velocity and direction.

$$\tan y = \frac{70}{250}$$

$$y = \tan^{-1}\left(\frac{70}{250}\right)$$

$$y = 15.642$$

$$90 - 15.642 = 74.358$$



$$70^2 + 250^2 = x^2$$

$$x = \sqrt{67400}$$

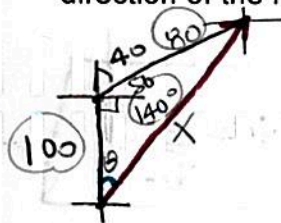
$$x = 259.615 \text{ km/h}$$

$$254.358^\circ$$

or

$$S 74.358^\circ W$$

- 16) One force of 100 units acts on an object in a direction due North. Another force of 80 units acts on the object at a bearing of 40° angle from the first force. Find the magnitude and direction of the resultant force on the object.



$$X = \sqrt{100^2 + 80^2 - 2(100)(80)\cos 140^\circ}$$

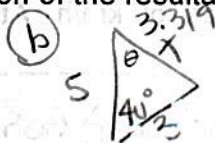
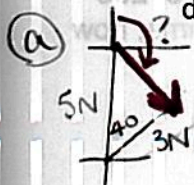
$$X = 169.282 \text{ units}$$

$$\frac{\sin 140}{169.282} = \frac{\sin \theta}{80}$$

$$\theta = \sin^{-1} \left(\frac{80 \sin 140}{169.282} \right)$$

$$\theta = 17.684^\circ$$

- 17) F_1 is a force of 5 N pulling an object south and F_2 is a force of 3 N pulling an object in the compass direction of 40° . a) Sketch the resultant vector force and b) find the magnitude and direction of the resultant vector.



$$X = \sqrt{3^2 + 5^2 - 2(3)(5)\cos 40^\circ}$$

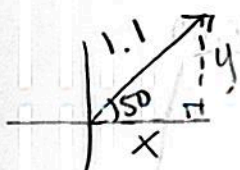
$$X = 3.319 \text{ N}$$

$$\frac{\sin 40}{3.319} = \frac{\sin \theta}{3}$$

$$\theta = \sin^{-1} \left(\frac{3 \sin 40}{3.319} \right) = 35.521^\circ$$

$$= 144.479^\circ$$

- 18) Vector v has a magnitude of 1.1 cm and a direction of 50° from the positive x-axis. Find the magnitude of the vertical and horizontal components of this vector. Then write vector v in terms of its horizontal and vertical components.



$$\cos 50 = \frac{x}{1.1}$$

$$x = 0.707$$

$$\sin 50 = \frac{y}{1.1}$$

$$y = 0.842$$

$$\langle 0.707, 0.842 \rangle$$

19)

- a) Let u be the vector with initial point $(-5, 7)$ and terminal point $(6, -1)$. Write u in component form.

$$\vec{u} = \langle 11, -8 \rangle$$

- b) Find a unit vector having the same direction as u and write it in $ai + bj$ form.

$$11i - 8j$$

- 20) Let $u = 3\sqrt{2}i + 8j$ and $v = 4\sqrt{2}i - 5j$. Find each of the following.

a) $2u - 3v$

$$2\langle 3\sqrt{2}, 8 \rangle - 3\langle 4\sqrt{2}, -5 \rangle$$

$$\langle 6\sqrt{2}, 16 \rangle - \langle 12\sqrt{2}, -15 \rangle$$

$$\langle -6\sqrt{2}i + 31j \rangle$$

b) $u + v$

$$\langle 3\sqrt{2}, 8 \rangle + \langle 4\sqrt{2}, -5 \rangle$$

$$\langle 7\sqrt{2}i + 3j \rangle$$

c) $u - v$

$$\langle 3\sqrt{2}, 8 \rangle - \langle 4\sqrt{2}, -5 \rangle$$

$$\langle -\sqrt{2}i + 13j \rangle$$

$$\vec{u} = \langle 3\sqrt{2}, 8 \rangle$$

$$\vec{v} = \langle 4\sqrt{2}, -5 \rangle$$

d) $-4v + u$

$$-4\langle 4\sqrt{2}, -5 \rangle + \langle 3\sqrt{2}, 8 \rangle$$

$$\langle -16\sqrt{2}, 20 \rangle + \langle 3\sqrt{2}, 8 \rangle$$

$$\langle -13\sqrt{2}i + 28j \rangle$$

- 21) Find the magnitude of both u and v .

$$\|\vec{u}\| = \sqrt{(3\sqrt{2})^2 + 8^2}$$

$$\sqrt{18 + 64} = \sqrt{82}$$

$$\|\vec{v}\| = \sqrt{(4\sqrt{2})^2 + (-5)^2}$$

$$= \sqrt{32 + 25} = \sqrt{57}$$