

What month is your birthday ?

What are the first 2 digits of your address ?

What are the last 2 digits of your zip code ?

What are the last 2 digits of your social security number ?

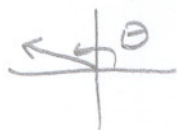
[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER,
USE YOUR STUDENT ID NUMBER]

SCORE: ___ / 20 POINTS

SCORE: ___ / 6 POINTS

SHOW SUPPORTING WORK FOR FULL CREDITLet $\mathbf{u} = -3\mathbf{i} + \mathbf{j}$ and $\mathbf{w} = -\mathbf{i} - 4\mathbf{j}$.

$$\vec{u} = \langle -3, 1 \rangle \quad \vec{w} = \langle -1, -4 \rangle$$

[a] Find the magnitude and direction angle of vector $\mathbf{u}$.

$$|\vec{u}| = \sqrt{(-3)^2 + 1^2} = \sqrt{10}$$

$$\cos \theta = \frac{-3}{\sqrt{10}}$$

$$\theta = \cos^{-1}\left(-\frac{3}{\sqrt{10}}\right) = 161.57^\circ$$

[b] Find the dot product of the vectors $\mathbf{u}$ and $\mathbf{w}$.

$$(-3)(-1) + (1)(-4) = -1$$

[c] Find the angle between the vectors $\mathbf{u}$ and $\mathbf{w}$.

$$\cos^{-1} \frac{\vec{u} \cdot \vec{w}}{|\vec{u}| |\vec{w}|} = \cos^{-1} \frac{-1}{\sqrt{10} \sqrt{17}} = 94.4^\circ$$

Find the component form of the vector with magnitude 4 and direction angle 211° .

SCORE: ___ / 2 POINTS

$$\langle 4 \cos 211^\circ, 4 \sin 211^\circ \rangle = \langle -3.43, -2.06 \rangle$$

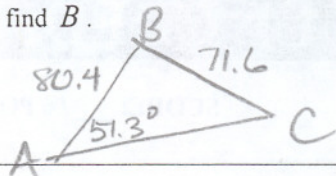
Solve for the requested part of $\triangle ABC$ in each case below. Round all final answers to 1 decimal place.

SCORE: ___ / 12 POINTS

If no such triangle exists, write NO TRIANGLE.

If more than 1 possible answer exists, find all possible answers.

- [a] If $A = 51.3^\circ$, $c = 80.4$ and $a = 71.6$,
find B .



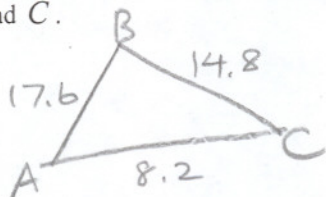
$$\frac{\sin C}{80.4} = \frac{\sin 51.3^\circ}{71.6}$$

$$\sin C = \frac{80.4 \sin 51.3^\circ}{71.6} = 0.8763$$

$$C = \sin^{-1} 0.8763 = 61.2^\circ \rightarrow B = 180^\circ - (51.3^\circ + 61.2^\circ) = 67.5^\circ$$

$$\text{or } C = 180^\circ - 61.2^\circ = 118.8^\circ \rightarrow B = 180^\circ - (51.3^\circ + 118.8^\circ) = 9.9^\circ$$

- [b] If $a = 14.8$, $b = 8.2$ and $c = 17.6$,
find C .

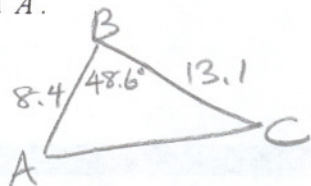


$$17.6^2 = 8.2^2 + 14.8^2 - 2(8.2)(14.8) \cos C$$

$$\cos C = \frac{8.2^2 + 14.8^2 - 17.6^2}{2(8.2)(14.8)} = -0.0967$$

$$C = \cos^{-1}(-0.0967) = 95.6^\circ$$

- [c] If $B = 48.6^\circ$, $c = 8.4$ and $a = 13.1$,
find A .



$$b^2 = 8.4^2 + 13.1^2 - 2(8.4)(13.1) \cos 48.6^\circ = 96.6285$$

$$b = 9.83$$

$$\frac{\sin C}{8.4} = \frac{\sin 48.6^\circ}{9.83}$$

$$\sin C = \frac{8.4 \sin 48.6^\circ}{9.83} = 0.641$$

$$C = \sin^{-1}(0.641) = 39.87^\circ \quad A = 180^\circ - (48.6^\circ + 39.87^\circ) = 91.5^\circ$$