Exercise 1: (1.25 points) Find the value of the unknowns:
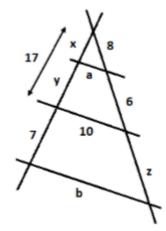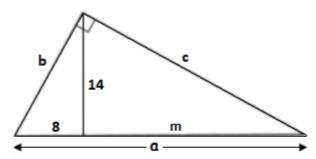

$$x = 9.71$$
$$y = 7.29$$
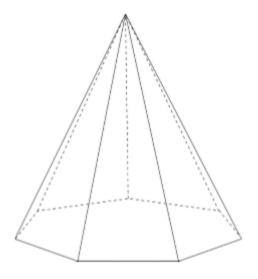$$z = 5.76$$
$$a = 5.71$$
$$b = 14.12$$

Exercise 2: (1 point) Find the values of the indeterminates in the following figure without using Pythagoras' theorem

$$m = 24.5$$
$$a = 32.5$$
$$b = 16.12$$
$$c = 28.22$$

Exercise 3: (1.25 points) Find the area of a heptagonal pyramid with altitude of length 12 cm if the side of the base measures 14 cm and the edge has a length of 16 cm

$$A_{LAT} = 704.98 \text{ cm}^2$$
$$A_B = 388.26 \text{ cm}^2$$
$$A_P = 1093.24 \text{ cm}^2$$

Exercise 4: (1 point)

a) Turn into radians $105°$ and $300°$
$$105° = \frac{7\pi}{12}$$
$$300° = \frac{5\pi}{3}$$

b) Turn into degrees $\dfrac{2\pi}{3}$ and $\dfrac{5\pi}{4}$
$$\frac{2\pi}{3} = 120°$$
$$\frac{5\pi}{4} = 225°$$

Exercise 5: (1 point) Given the vectors $\vec{u} = (-3, 7)$, $\vec{v} = (2, -1)$ and $\vec{w} = (-21, 38)$

a) Find the length of the vector $\vec{u}$
$$|\vec{u}| = \sqrt{58}$$

b) Express $\vec{w}$ as a linear combination of $\vec{u}$ and $\vec{v}$
$$\vec{w} = 5\vec{u} - 3\vec{v}$$

c) Are $\vec{u}$ and $\vec{v}$ perpendicular vectors?
$$\vec{u} \cdot \vec{v} = -13 \neq 0 \;\rightarrow\; \text{Nope}$$

Exercise 6: (1 point)

a) If $\vec{u} = (2, -3)$ and $\vec{v} = (4, 1)$ find a third vector $\vec{w}$ so that $\vec{w} \cdot \vec{v} = 2$ and $\vec{w} \perp \vec{u}$
$$\vec{w} = \left(\frac{3}{7}, \frac{2}{7} \right)$$

b) Indicate a direction vector and a point of the straight line $7x + 2y - 9 = 0$
$$P(1,1) \qquad \vec{u} = (2, -7)$$

Exercise 7: (1 point) Given the straight line $r \equiv \dfrac{x-2}{3} = \dfrac{y+7}{2}$

a) Find the general equation of a parallel line r' that goes through the point $P(1, -4)$
$$2x - 3y - 14 = 0$$

b) Find the general equation a perpendicular line r'' that goes through the point $Q(5, -2)$
$$3x + 2y - 11 = 0$$

Exercise 8: (1.25 points)

a) Work out the coordinates of the symmetric point of $A(-3, 7)$ with respect to $Q(-1, -2)$
$$A'(1, -11)$$

b) Find the parametric and continuous equations of the straight line $2x - 5y + 10 = 0$
$$\frac{x}{5} = \frac{y-2}{2} \;\rightarrow\; \begin{cases} x = 5t \\ y = 2 + 2t \end{cases}$$

Exercise 9: (1.25 points) Find the value of k so that the triangle $A(k+2, 5)$, $B(6, 4)$ and $C(2k+1, 6)$ is isosceles
$$k = 2$$