

**Question 1**

(a)

(I)

$$(1) \quad 5x^2 - 21x + 29 = 0$$

organise our equation:

$$a = 5 \quad b = -21 \quad c = 29$$

The Discriminant:

$$D = b^2 - 4ac$$

Multiply the brackets:  $(-21)^2 - 4(5)(29)$

$$441 - 580$$

Simplify:  $441 - 580$

$$\boxed{= -139}$$

(ii) in the case of question (a)(I) there is no real solution since the discriminant is negative

(iii) since the discriminant  $D < 0$  or it is negative, it means has 2 imaginary root numbers

(b)

(I)

(ii)

(11)

The formula to find the Y-intercept is;

$$y = ax^2 + bx + c$$

y-int when  $x=0$

The equation is:  $y = x^2 - 4x - 45$

Plug x into the  
equation to find  
the y-intercept:

simplify :

$$y = -45$$

The y-intercept is -45

(iii)

organise the equation :

$$y = ax^2 + bx + c \quad \leftarrow \text{How to...}$$
$$\downarrow \quad y = x^2 - 4x - 45$$

$a = 1 \quad b = -4 \quad c = -45$

Formula for  
The axis of Symmetry is  $\frac{-b}{2a}$

$$\frac{-4}{2(1)} = \frac{-4}{2} = \boxed{-2}$$

The axis of symmetry is  $\boxed{-2}$

(iv)

The vertex

The formula is:  $y = \left(\frac{-b}{2a}\right)^2 - \frac{4ac}{4a}$

multiply out brackets:

simplify:

so The vertex is:  $y = -33$

$$y = \left(\frac{-b}{2a}\right)^2 - \frac{4ac}{4a}$$
$$y = 4 - 4(-2) - 45$$
$$y = 4 + 8 - 45$$
$$y = 12 - 45$$
$$y = -33$$

(c)

(I)

$\boxed{ax^2 + bx + c}$

(C)      (I)       $y = x^2 + 14x + 36 = 0$   
 $a = 1 \quad b = 14 \quad c = 36$

① subtract 36 both sides :  $x^2 + 14x + 36 - 36 = -36$   
 simplify :  $x^2 + 14x = -36$

② use the  $\left(\frac{b}{2}\right)^2$  formula on both sides :  
 $x^2 + 14x + \left(\frac{14}{2}\right)^2 = -36 + \left(\frac{14}{2}\right)^2$   
 simplify :  $x^2 + 14x + 49 = -36 + 49$   
 $x^2 + 14x + 49 = 13$

③ Factorise :  $x^2 + 14x + 49 = 13$   
 $(x+7)(x+7) = 13$   
 $x^2 + 14x + 49 = 13$

check to see if it works  
 simplify :  $(x+7)^2 = 13$   
 $x+7 = \pm\sqrt{13}$   
 $x = -7 \pm \sqrt{13}$

since it's positive it will become negative

so the solution is  $\boxed{x = -7 \pm \sqrt{13}}$

(ii)

(11)

Check :

$$(-7 + \sqrt{13})^2 + 14(-7 + \sqrt{13}) + 36 = 0$$

$$(-7 - \sqrt{13})^2 + 14(-7 - \sqrt{13}) + 36 = 0$$

So it proves that the  
answer is correct

(c)

(I)

(i)  $y = ax^2 + bx + c$   
 $y = x^2 + 14x + 36 = 0$   
 $a = 1 \quad b = 14 \quad c = 36$

(ii) subtract 36 both sides :  $x^2 + 14x + 36 - 36 = -36$   
 Simplify :  $x^2 + 14x = -36$

(iii) use the  $(\frac{b}{2})^2$  formula on both sides :  
 $x^2 + 14x + (\frac{14}{2})^2 = -36 + (\frac{14}{2})^2$   
 Simplify :  $x^2 + 14x + 49 = -36 + 49$   
 $x^2 + 14x + 49 = 13$

(iv) Factorise :  $x^2 + 14x + 49 = 13$   
 Check to see if it works :  $(x+7)(x+7) = 13$   
 Simplify :  $(x+7)^2 = 13$   
 Since it's positive it will become negative  
 $\rightarrow x+7 = \pm\sqrt{13}$   
 $x = -7 \pm \sqrt{13}$

So the solution is  $x = -7 \pm \sqrt{13}$

(ii)

(11)

Check:

$$(-7 + \sqrt{13})^2 + 14(-7 + \sqrt{13}) + 36 = 0$$

$$(-7 - \sqrt{13})^2 + 14(-7 - \sqrt{13}) + 36 = 0$$

So it proves that the  
answer is correct

(iii)

Find the coordinates of the vertex  
of the parabola defined by:

$$\textcircled{1} \quad Y = x^2 + 14x + 36 \\ a = 1 \quad b = 14 \quad c = 36$$

$$h = \frac{-b}{2a}$$

$$= \frac{-14}{2 \cdot 1}$$

$$= \frac{-14}{2}$$

$$\boxed{h = -7}$$

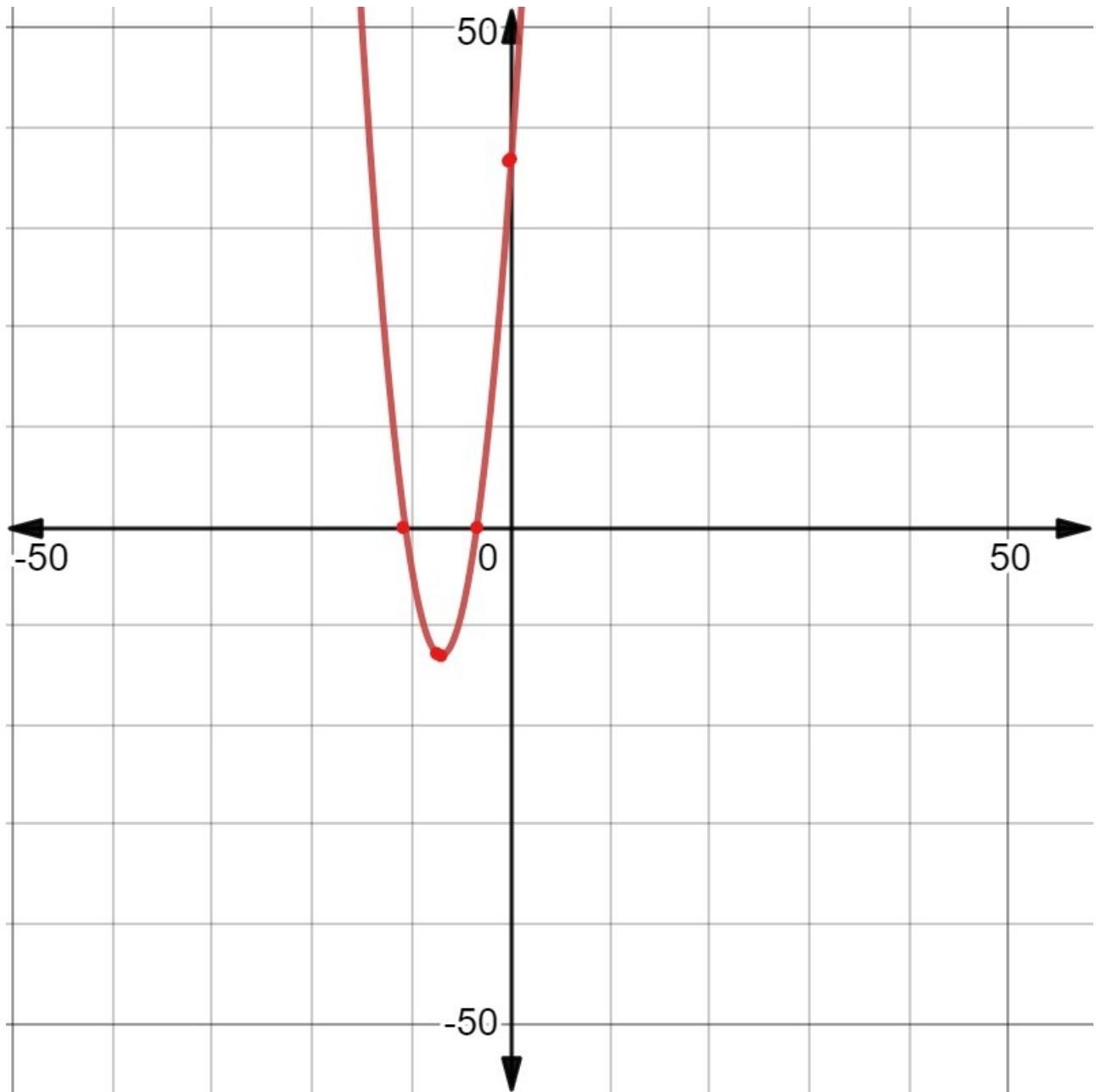
$$\textcircled{2} \quad Y = x^2 + 14x + 36$$

when  $x = -7$ :

$$\begin{aligned} Y &= (-7)^2 + 14(-7) + 36 \\ &= 49 - 98 + 36 \\ &= -49 + 36 \\ \boxed{Y &= -13} \end{aligned}$$

$$(-7, -13)$$

(iv)  $y = x^2 + 14x + 36$



**Question 2**

(a)

(I) the y-intercept represents a constant

(ii)

$$(II) \quad y = -0.08x^2 + 2.15x + 0.38$$

$$a = -0.08 \quad b = 2.15 \quad c = 0.38$$

The formula is  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$x = \frac{-2.15 \pm \sqrt{2.15^2 - 4(-0.08)(0.38)}}{2(-0.08)}$$

$$x = \frac{-2.15 \pm \sqrt{4.6225 + 0.1216}}{2(-0.08)}$$

$$= \frac{-2.15 \pm \sqrt{4.6225 + 0.1216}}{-0.16}$$

$$x = \frac{-2.15 + \sqrt{4.7441}}{-0.16} = \boxed{-0.18}$$

or

$$x = \frac{-2.15 - \sqrt{4.7441}}{-0.16} = \boxed{27.05}$$

(iii) because the x-intercept is 27.05 so it pass the x-intercept

(iv) I believe it will pass over the line

### Question 3

(a) Is not a good idea to include every single value in a picture representing a dataset, since this dataset is large.

A better idea would be to use a graphical representation of some key values from the dataset instead.

(b) Three ways that she could improve her presentation are:

1. give a title and source to the dataset
2. give a name to the dataset
3. display an image of the boxplot and the summary values

(c) by looking at the range or even the line number

(d)

(I) True, the distance from the **new golf ball** was 292, which was lower than the **current golf ball** which was 293.5

(ii) True, the range on the **current golf ball** was 31 as opposed to the **new golf ball** which was 38

(iii) True, the **current golf ball** that travels at a greater distance than average was exactly 10 balls which were the numbers (294, 295, 296, 297, 297, 300, 302, 305, 309, 311) half **the current golf ball**

(e) The **current golf ball** dataset is skewed to the right because its tail is longer on the right.

(f)

(I) figure 3 represents the **current golf ball** because the minimum value in the histogram is 280

(ii) Unlike the boxplot, histograms are easier to read and identify the frequency distribution

(iii) A good aspect of the boxplot is that it provides data's skewness, symmetry and outliers.

**Question 4**

(a)

The diagram shows a right-angled triangle with a horizontal base labeled "adjacent" and a vertical height labeled "opposite". The hypotenuse is labeled "11.6 cm". The angle at the top vertex is labeled  $39^\circ$ . A small square at the bottom-left corner indicates a right angle.

The formula is:

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

① Multiply  $\tan 39^\circ = \frac{11.6}{x}$   
by  $(x)$   
to clear  
fraction:  $(x)\tan 39^\circ = \frac{11.6}{x} (\cancel{x})$

② divide both  
side to  $\tan 39^\circ$   $\frac{(x)\tan 39^\circ}{\tan 39^\circ} = \frac{11.6}{\tan 39^\circ}$

③ Simplify:  $x = 14.3 \text{ cm}$

(b)

Diagram (b) shows a right-angled triangle EDF with the right angle at vertex E. The vertical side DE is labeled "opposite", and the horizontal side EF is labeled "adjacent". The hypotenuse DF is labeled "hypotenuse" and has a length of 10.2 cm. A circled question mark (?) is placed above the triangle.

Calculate the area

$$5.8 \text{ cm}^2 + x \text{ cm}^2 = 10.2 \text{ cm}^2$$

Square the numbers

$$33.64 \text{ cm}^2 + x \text{ cm}^2 = 104.04 \text{ cm}^2$$

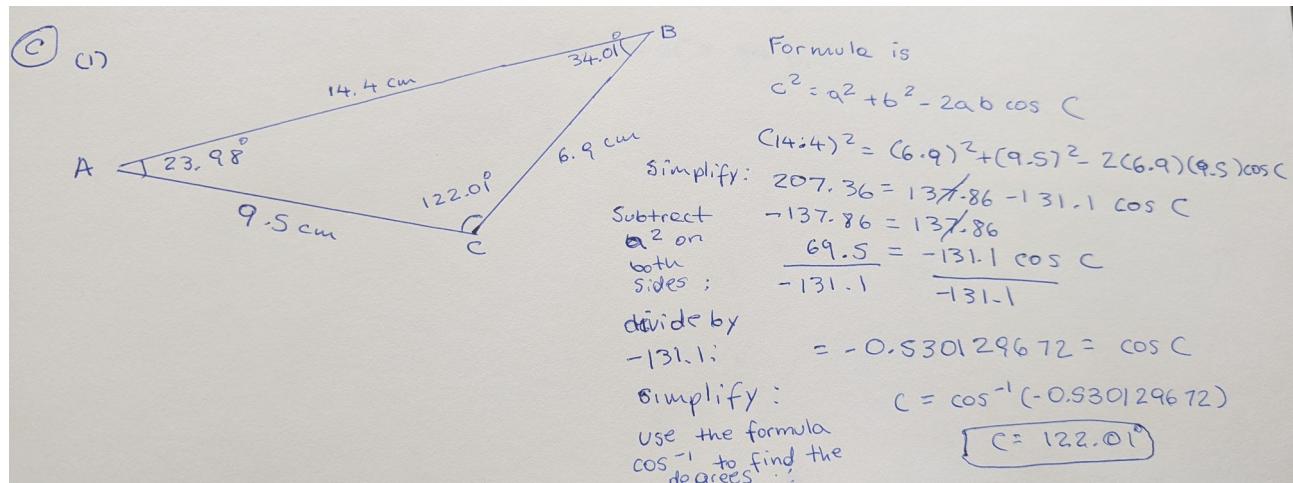
Subtract  $33.64 \text{ cm}^2$

$$\begin{array}{r} 33.64 \text{ cm}^2 + x \text{ cm}^2 = 104.04 \text{ cm}^2 \\ - 33.64 \\ \hline -33.64 \end{array}$$

The Area is  $\boxed{x = 70.4 \text{ cm}^2}$

(c)

(I)



(i) Find The degrees to A

The formula is  $\frac{6.9}{\sin A} = \frac{14.4}{\sin 122.01}$

Simplify:  $\sin A = \frac{6.9 \sin 122.01}{14.4}$

$\sin A = 0.4063563794$

use The  $\sin^{-1}$  formula =  $\sin^{-1}(0.4063563794)$

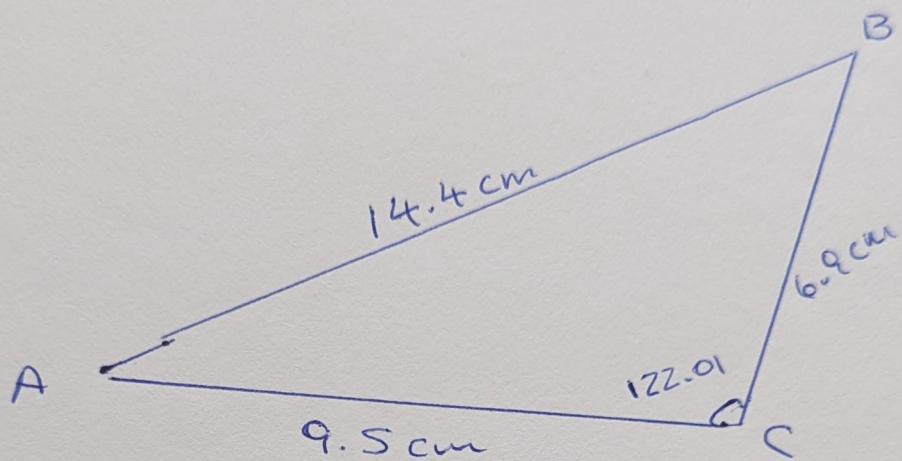
$A = 23.97^\circ$

To find B Subtract all the numbers and  $180^\circ$

$B = 180^\circ - 23.97^\circ - 122.01^\circ = 34.01^\circ$

$B = 34.01^\circ$

(ii)



The formula for the area is

$$A = \frac{1}{2} ab \sin C$$

$$A = \frac{1}{2} (6.9)(9.5) (\sin 122.01)$$

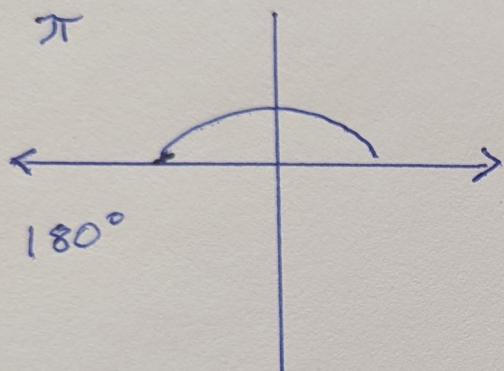
$$A = 28 \text{ cm}^2$$

The area is of  $28 \text{ cm}^2$

(d)

(I)

(i)

Convert  $42^\circ$  to radians

$$42^\circ \frac{\pi}{180}$$

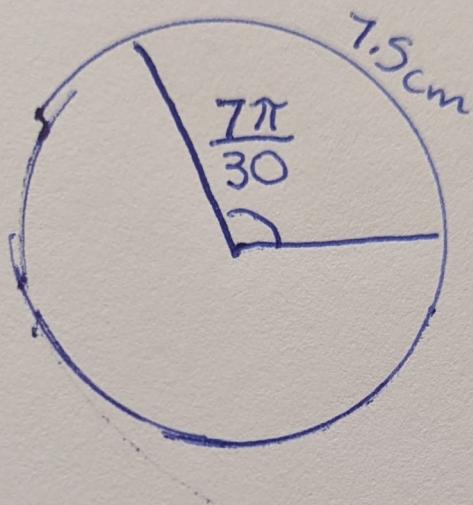
$$\frac{42 \times \pi}{180} \text{ radian}$$

divide  $42^\circ$  by  $180^\circ$ 

$$\frac{42\pi}{180^\circ}$$

$$\boxed{\frac{7}{30}\pi}$$

(ii)



$$A = \frac{1}{2} r^2 \theta$$

$$A = \frac{1}{2} (7.5\text{cm})^2 \left(\frac{7\pi}{30}\right) =$$

$$\boxed{\frac{105}{16} \pi}$$

Questions 5 and 6 I wasn't able to finish on time unfortunately

## Question 7

(a)

There are two topics related to the area I am studying which is the **Information of technology**, the first one is **Statistics summaries** from unit 4, and the second is **Graphs** from unit 6, these two topics are very relevant to the data science field.

Being able to interpret data from a graph is an important skill for an analyst data scientist professional.

(62 words)

(b)

I don't feel very confident at moment, however, I am starting to understand Statistics more as I am studying it, I didn't know anything about graphs before I started MU123, now I know the basics such as the slope, y-intercept, mean, median and mode and so on.

One step to maintaining my confidence would be to continue to study Math and don't stop practising math, it can be very challenging, it is hard, I have even thought about giving up sometimes when it gets more difficult.

One step to make me more confident about the topics I have chosen is to keep doing the

Activities from the book and the MU123 module,

**(112 words)**