

(a) (i) 

X	37	42	54	74	76	82	91	Y
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(ii) Median: 74

Explanation: Half the students scored more than 74 and half scored less

(iii)  $x = 36$

Range: 61

$$36 + 61 = y = 97$$

(b)  $\frac{15+16+19+t+26}{5} = 19.6$

$$76 + t = 98$$

$$t = 22$$

(a)

<i>G</i> 1	<i>G</i> 2	<i>G</i> 3	<i>G</i> 4	<i>G</i> 5	<i>G</i> 6	<i>G</i> 7
<i>R</i> 1	<i>R</i> 2	<i>R</i> 3	<i>R</i> 4	<i>R</i> 5	<i>R</i> 6	<i>R</i> 7

(b)  $\frac{6}{14} = \frac{3}{7}$

(c)  $\frac{7}{13}$

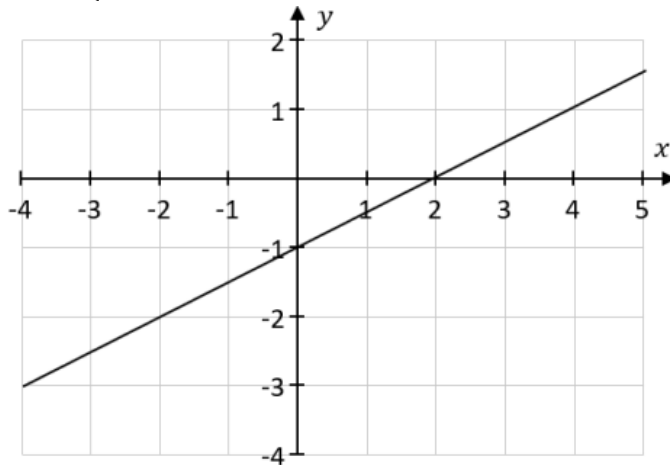
(d)  $\frac{6}{13}$

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

$$1 = 2 - 1$$

$$1 = 1 \text{ QED}$$

(ii)



(b)

Line	Slope
$d$	3
$a$	-1
$c$	$\frac{1}{2}$
$b$	0

(c) Slope formula:  $\frac{y_2 - y_1}{x_2 - x_1} \rightarrow \frac{9 - 6}{2 - 0} = \frac{3}{2}$

Equation of the line formula:  $y - y_1 = m(x - x_1)$

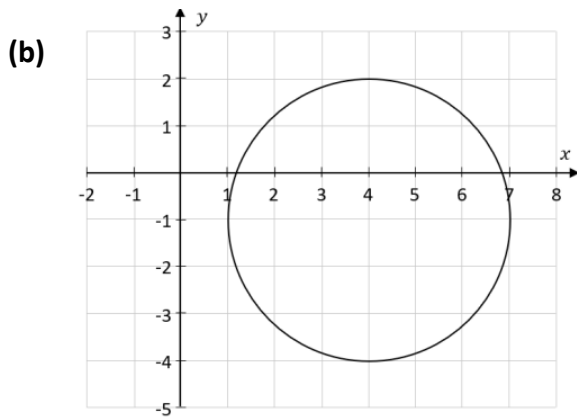
$$y - 6 = \frac{3}{2}(x - 0)$$

(a) (i) Centre:  $(5, -3)$   
Radius: 5

(ii)  $(9 - 5)^2 + (2 + 3)^2 = 25$

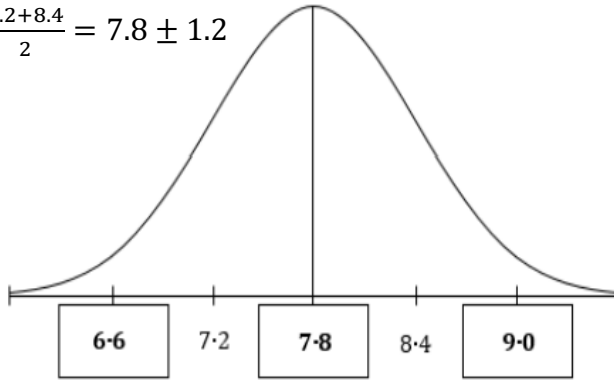
$$16 + 25 = 25$$

$41 > 25$ , therefore outside of the circle



(c) Radius: 2  
Centre:  $(2, 3)$

(a) (i)  $\frac{7.2+8.4}{2} = 7.8 \pm 1.2$



(ii)  $100 - 97.5 = 2.5\%$

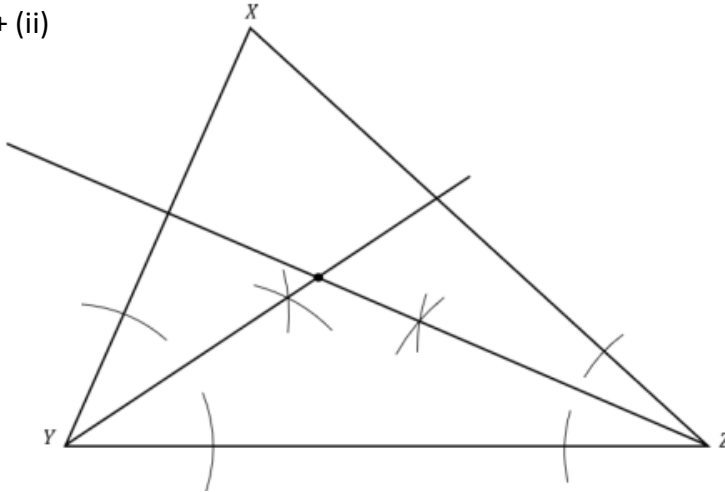
(b) (i)  $1 - 0.1 = 0.9$

90%

(ii)  $0.9 \times 0.9 \times 0.1 = 0.081$

8.1%

(a) (i) + (ii)



(b) (i)  $\frac{|DE|}{|BC|} = \frac{14}{4} = 3.5$

(ii)  $|AE|: 6 \times 3.5 = 21$

$|CE|: 21 - 6 = 15$

(iii)  $11 \times (3.5)^2 = 134.75 \text{units}^2$

(a) (i)

Heart Rate (before exercise)					Heart Rate (after exercise)			
8	7	5	0	6				
	7	6	0	7	1	9		
				8	1	3	7	
				9	1			
				10	2	8		
				11	3	8		
Key: 0   6 = 60 bpm					Key: 7   1 = 71 bpm			

(ii) Mean: 93.3

Standard deviation: 15.1

(iii) The standard deviation has increased following exercise

Reason: There is a greater spread in the data

(iv)  $r = 0.9$

Reason: Strong positive correlation

(b) (i) Margin of error:  $\frac{1}{\sqrt{n}} \rightarrow \frac{1}{\sqrt{355}} = 0.053 \rightarrow 5.3\%$

(ii)  $\frac{96}{355} \times 100 = 27\%$

(iii)  $\hat{p} \pm \frac{1}{\sqrt{n}}$

$$27 - 5.3 \leq p \leq 27 + 5.3$$

$$21.7 \leq p \leq 32.3$$

Conclusion: No change to the population percentage

Reason: 24% is inside the range found. Within the CI.

(a) (i)  $a^2 + b^2 = c^2$

$$1.4^2 + 3^2 = l^2$$

$$l = \sqrt{10.96}$$

$$l = 3.3m$$

(ii)  $Tan\theta = \frac{\textit{opposite}}{\textit{adjacent}}$

$$Tan\theta = \frac{3}{1.4}$$

$$\theta = \tan^{-1} \frac{3}{1.4} = 65^\circ$$

(iii) Answer: No

$$Tan\theta = \frac{1.5}{1.4}$$

$$\theta = \tan^{-1} \frac{1.5}{1.4} = 47^\circ$$

$$47 = \frac{1}{2}(65)$$

$$(b) (i) \frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{12}{\sin X} = \frac{10}{\sin 37}$$

$$\frac{12 \sin 37}{10} = \sin X$$

$$\sin X = 0.7222$$

$$X = \sin^{-1}(0.7222) = 46^\circ$$

$$(ii) a^2 = b^2 + c^2 - 2bc \cos A$$

$$|CE|^2 = 22^2 + 11.8^2 - 2(22)(11.8)\cos 110$$

$$|CE|^2 = 800.8$$

$$|CE| = 28.3 \text{ cm}$$

$$(iii) \text{Area: } \frac{1}{2} ab \sin C$$

$$\frac{1}{2} (22)(11.8) \sin 110 = 121.972$$

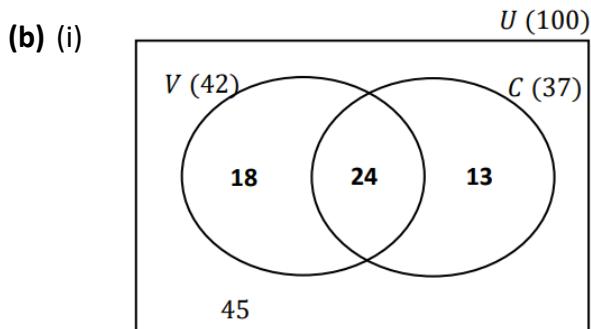
$$2 \times 121.972 = 244 \text{ cm}^2$$

(a) (i)  $7 \times 4 \times 2 = 56$

(ii) Answer: extra topping

Extra topping:  $7 \times 5 \times 2 = 70$

Extra flavour:  $8 \times 4 \times 2 = 64$



Bought vanilla and a cone:  $42 + 37 - 55 = 24$

(ii)  $\frac{13}{100}$

(c)  $150(0.3) + 200(0.45) + 450(0.25) = \text{€}247.50$

(d) (i)  $\theta = 360 - 70 - 70 = 220^\circ$

Arc length:  $\frac{\theta}{360}(2\pi r)$

$\frac{220}{360}(2\pi(20)) = 76.8\text{cm}$

(ii)  $\text{Tan}X = \frac{\text{opposite}}{\text{adjacent}}$

$\text{Tan}70 = \frac{l}{20}$

$l = 20\text{Tan}70 = 55\text{cm}$

(a) (i)  $121 \times 1.6 = 194.81km$

(ii)  $1 \text{ hour} = 60 \times 60 = 3,600 \text{ seconds}$

(iii)  $194,810m$

$3,600 \text{ seconds}$

$$\frac{194,810}{3,600} = 54.11m/s$$

(b) Surface area formula:  $4\pi r^2$

$$4\pi(3.27^2) = 134.37cm^2$$

(c) Volume of a sphere:  $\frac{4}{3}\pi r^3$

$$\frac{4}{3}\pi(3.4)^3 = 164.636$$

$$\frac{4}{3}\pi(3.1)^3 = 124.788$$

$$164.636 - 124.788 = 39.85cm^3 \quad (\text{rounded to two decimal places})$$

(d) (i)  $3.4 \times 6 = 20.4$

(ii) Volume of cylinder formula:  $\pi r^2 h$

$$\pi(3.4)^2(20.4) = 741cm^3$$

(iii) Bottom and top faces:  $2 \times (6.8)(6.8) = 92.48$

4 side faces:  $4 \times (6.8)(20.4) = 554.88$

$$92.48 + 554.88 = 647.36cm^2$$