(a) (i) Slope formula: $\frac{y_2-y_1}{x_2-x_1}$

$\frac{8-2}{1-4} = -\frac{6}{3} = -2$

(ii) Distance formula: $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

$\sqrt{(1-4)^2 + (8-2)^2}$

$\sqrt{3^2 + 6^2} = \sqrt{9+36}$

$\sqrt{45}$

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

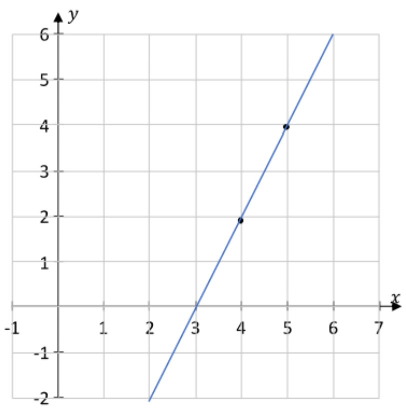
$(-2\,,7)$, $m = \frac{1}{3}$

$y - 7 = \frac{1}{3}(x-(-2))$

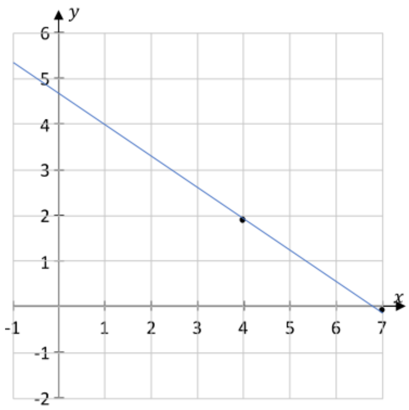
$3y - 21 = x + 2$

$x - 3y + 23 = 0$

(c) (i)



(ii)



(a) (i) Centre: $(0\,,0)$

Radius: $\sqrt{25} = 5$

(ii) Sub in the point: $(3\,,-4)$

$(3)^2 + (-4)^2 = 25$

$9 + 16 = 25$

$25 = 25$ therefore on the circle

(iii) Sub in any x-value: $(0)^2 + y^2 = 25$

$y^2 = 25$

$y = 5 \quad or \quad y = -5$

$(0\,,5)\,,\ (0\,,-5)$

(b) $5x - y = 13$ (put y in terms of x)

$x^2 + y^2 = 13$

$y = 5x - 13$ (now sub in to the second equation)

$x^2 + (5x - 13)^2 = 13$

$x^2 + 25x^2 - 130x + 169 = 13$

$26x^2 - 130x + 156 = 0$

$x^2 - 5x + 6 = 0$

$(x - 3)(x - 2) = 0$

$x = 3\,, x = 2$

(sub back in for y)

$y = 5(3) - 13 = 2$ $(3\,,2)$

$y = 5(2) - 13 = -3$ $(2\,,-3)$

(a) (i) $7! = 5{,}040$

(ii) $5! \times 4 = 480$

(iii) $\binom{7}{3} = 210$

(b) (i)

Correlation coefficient	0·95	0·6	−0·95
Scatterplot (A, B, or C)	B	C	A

(ii) Strong positive linear correlation so as x goes up, y goes up

(a) (i) $0.7 \times 0.7 \times 0.7 = 0.343$

(ii) $0.7 \times 0.7 \times 0.3 = 0.147$

$0.7 \times 0.3 \times 0.7 = 0.147$

$0.3 \times 0.7 \times 0.7 = 0.147$

$0.147 + 0.147 + 0.147 = 0.441$

(iii) Previous performances may affect his future performances

(b) Mean: $\frac{sum\ of\ answers}{total\ number\ of\ events}$

$\frac{4(0)+5(6)+4(8)+2(10)+3(12)+1(16)}{4+5+4+2+3+1} = 7.05$

(a) $\frac{12}{2} = 6$ cm

(b) Area of a circle: $\pi r^2 \rightarrow \pi(6)^2 = 113.10$ cm^2

(c) Area of the square: $l^2 \rightarrow 12^2 = 144$

Percentage of square taken up by circle: $\frac{113.10}{144} \times 100 = 79\%$

(d) Pythagoras theorem: $a^2 + b^2 = c^2$

$12^2 + 12^2 = d^2$

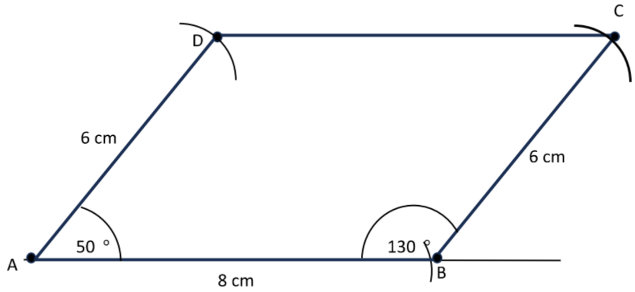
$d^2 = 288$

$d = \sqrt{288}$

$r = \frac{\sqrt{288}}{2} = 8.49$ cm

(e) Circumference formula: $2\pi r \rightarrow 2\pi(8.49) = 53.34$ cm

(a)



(b) $2x - 30 = 100$ (opposite angles)

$2x = 130$

$x = 65°$

Now sum all angles and find y

$(2(65) - 30) + 100 + 2((65) + 3y) = 360$

$200 + 2(65) + 6y = 360$

$200 + 130 + 6y = 360$

$6y = 360 - 330$

$6y = 30$

$y = 5°$

(c) True

Justification: opposites are parallel and equal in length

(a) (i) $\frac{24}{135} \times 100 = 18\%$

(ii) $\frac{16}{x} = 0.12$

$16 = 0.12x$

$x = \frac{16}{0.12} = 133$

(iii) Pythagoras theorem: $a^2 + b^2 = c^2$

$27^2 + |AC|^2 = 105^2$

$|AC|^2 = 11{,}025 - 729$

$|AC|^2 = 10{,}296$

$|AC| = \sqrt{10{,}296} = 101$ m

(iv) $tanx = \frac{opposite}{adjacent}$

$\frac{opposite}{adjacent} =$ gradient

$tanx = 0.09$

$x = tan^{-1}(0.09) = 5°$

(b) Find angle O: $180 - 88 - 87 = 5°$

Sine rule : $\frac{a}{SinA} = \frac{b}{SinB}$

$\frac{20}{Sin(5)} = \frac{y}{Sin(87)}$

$\frac{20}{Sin(5)}\left(Sin(87)\right) = y$

$y = 229$ m

(c) Cosine rule: $a^2 = b^2 + c^2 - 2bcCosA$

$(550)^2 = (700)^2 + (800)^2 - 2(700)(800)Cosx$

$302{,}500 = 490{,}000 + 640{,}000 - (1{,}120{,}000)Cosx$

$(1{,}120{,}000)Cosx = 827{,}500$

$Cosx = \frac{827{,}500}{1{,}120{,}000}$

$x = cos^{-1}\left(\frac{8{,}275}{11{,}200}\right) = 42.4°$

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

$\pi(1.2)^2(0.75) = 3.39m^3$

(b) (i) Volume of cube: l^3

$0.5^3 = 0.125$

$3 \times 0.125 = 0.375$ m^3

(ii) $0.375 = \pi r^2 h$ (volume of 3 cubes is the volume increase of the water)

$0.375 = \pi(1.2)^2 h$

$h = \frac{0.375}{(1.2)^2\pi} = 0.08$ m

(c) (i) Pythagoras theorem: $a^2 + b^2 = c^2$

$(0.8)^2 + (1.3)^2 = l^2$

$l^2 = 2.33$

$l = \sqrt{2.33} = 1.53$ m

(ii) Formula for curved surfaced area: πrl

$\pi(1.3)(1.53) = 6.25$ m^2

(iii) $x = 1.53$ m

$\frac{\theta}{360}\pi r^2 =$ Curved surface area

$\frac{\theta}{360}\pi(1.53)^2 = 6.25$

$\frac{\theta}{360}\pi = \frac{6.25}{(1.53)^2}$

$\theta = \frac{6.25(360)}{\pi(1.53)^2} = 306°$

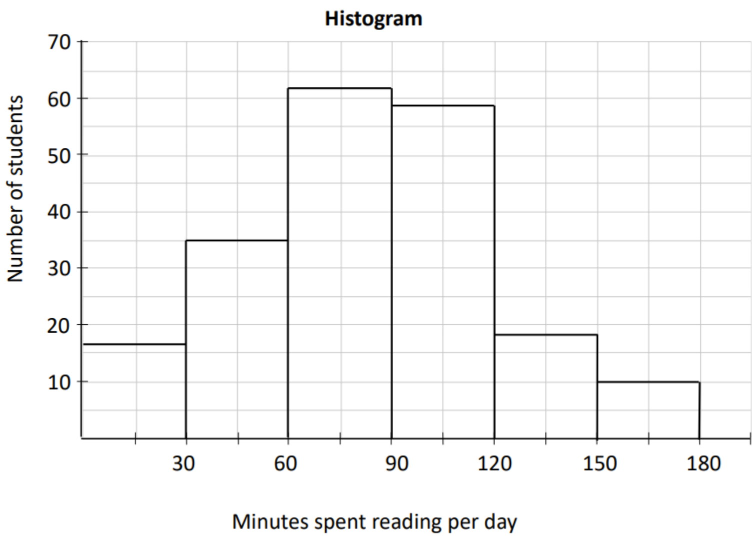
(a) (i) $59 + 18 + 10 = 87$

(ii) 75 minutes

Justification: $60 - 90$ minute range is where the median is

(iii) Might not be representative

(iv)



(b) (i) $\frac{61}{500} \times 100 = 12.2\%$

(ii) Margin of error: $\frac{1}{\sqrt{n}}$

$\frac{1}{\sqrt{500}} = 0.04472$

$0.0447 \times 100 = 4.47\% \rightarrow 4.5\%$

(iii) $12.2 - 4.5 \leq \hat{p} \leq 12.2 + 4.5$

$7.7 \leq \hat{p} \leq 16.7$

Conclusion: no difference between Cork and rest of population proportion

Reason: 10% is within range found

(a) $CBO: \frac{180-72}{2} = 54°$

$CBA: 54 \times 2 = 108°$

(b) Area of a triangle: $\frac{1}{2}abSinC$

$\frac{1}{2}(6)(6)Sin(72) = 17.1$ cm^2

Area of pentagon: $17.1 \times 5 = 85.6$ cm^2

(c) (i)

	1	2	3	4	5
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)

(ii) Maximum: 10

Minimum: 2

(iii) $P(4\ or\ 5)\frac{3}{25} + \frac{4}{25} = \frac{7}{25}$

(d) Expected value: $0.3(1) + 0.2(0.5) + 0.4(0) + 0.1(5) = €0.90$

Not a fair game as the entry cost of €1 is higher than the expected value of return of €0.90

Why: if the game was fair, the expected valye of return would equal the same as the entry cost