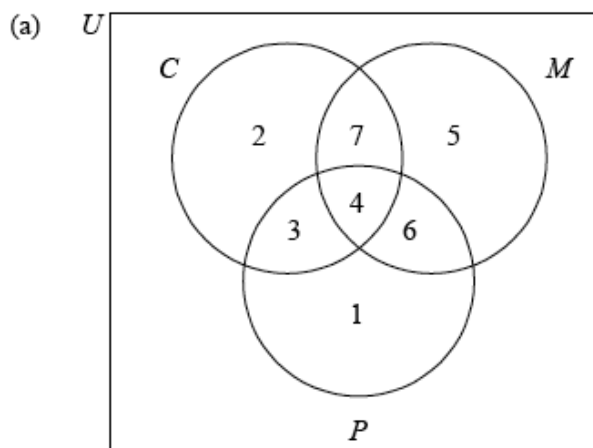


Studies P2 Mock Answers

1)



(A1)(A1)(A1)(A1) [4 marks]

Award *(A1)* for 3 intersecting circles and rectangle, *(A1)* for 1, 3, 4 and 7, *(A1)* for 2, *(A1)* for 6 and 5.

- (b) (i) 2 *(A1)(ft)*
 (ii) 6 *(A1)(ft)*
 (iii) $40 - (1 + 6 + 2 + 3 + 4 + 7 + 5)$ *(M1)*

Note: Award *(M1)* for subtracting all their values from 40.

=12

(A1)(ft)(G2) [4 marks]

Note: Follow through from their Venn diagram for parts (i), (ii) and (iii).

(c) (i) $\frac{16}{40} \left(\frac{2}{5}, 0.4, 40\% \right)$ (A1)(A1)(G2)

Note: Award (A1) for numerator, (A1) for denominator. Answer must be less than 1 otherwise award (A0)(A0). Award (A0)(A0) if answer is given as incorrect reduced fraction without working.

(ii) $\frac{20}{40} \left(\frac{1}{2}, 0.5, 50\% \right)$ (A1)(ft) (A1) (G2)

Note: Award (A1)(ft) for numerator, (A1) for denominator. Follow through from their Venn diagram. Answer must be less than 1 otherwise award (A0)(A0). Award (A0)(A0) if answer is given as incorrect reduced fraction without working.

(iii) $\frac{6}{40} \left(\frac{3}{20}, 0.15, 15\% \right)$ (A1)(ft)(A1)(G2)

Note: Award (A1)(ft) for numerator, (A1) for denominator. Follow through from their Venn diagram. Answer must be less than 1 otherwise award (A0)(A0). Award (A0)(A0) if answer is given as incorrect reduced fraction without working.

(iv) $\frac{11}{16} (0.6875, 68.75\%)$ (A1)(ft)(A1)(G2) [8 marks]

Note: Award (A1)(ft) for numerator, (A1) for denominator. Follow through from their Venn diagram. Answer must be less than 1 otherwise award (A0)(A0). Award (A0)(A0) if answer is given as incorrect reduced fraction without working.

(d) $\frac{16}{40} \times \frac{15}{39}$ (A1)(A1)(ft)

Note: Award (A1) for multiplication of their probabilities, (A1)(ft) for their correct probabilities.

$\frac{240}{1560} \left(\frac{2}{13}, 0.153846\dots, 15.4\% \right)$ (A1)(ft)(G2) [3 marks]

Note: Follow through from their answer to part (c)(i).
Answer must be less than 1 otherwise award at most (A1)(A1)(A0)(ft).

Total [19 marks]

2)

(a) $\frac{\sin \text{BCA}}{35} = \frac{\sin 105^\circ}{80}$ (M1)(A1)

Note: Award (M1) for correct substituted formula, (A1) for correct substitutions.

$\hat{\text{BCA}} = 25.0^\circ$ (A1)(G2) [3 marks]

(b) Length BD = 40m (A1)
Angle ABC = $180^\circ - 105^\circ - 25^\circ = 50^\circ$ (A1)(ft)

Note: (ft) from their answer to (a).

$\text{AD}^2 = 35^2 + 40^2 - (2 \times 35 \times 40 \times \cos 50^\circ)$ (M1)(A1)(ft)

Note: Award (M1) for correct substituted formula, (A1)(ft) for correct substitutions.

(UP) AD = 32.0m (A1)(ft)(G3) [5 marks]

Notes: If 80 is used for BD award at most (A0)(A1)(ft)(M1)(A1)(ft)(A1)(ft) for an answer of 63.4 m.
If the angle ABC is incorrectly calculated in this part award at most (A1)(A0)(M1)(A1)(ft)(A1)(ft).
If angle BCA is used award at most (A1)(A0)(M1)(A0)(A0).

(c) length of fence = $35 + 40 + 32$ (M1)
(UP) = 107 m (A1)(ft)(G2) [2 marks]

Note: (M1) for adding $35 + 40 +$ their (b).

(d) cost per metre = $\frac{802.50}{107}$ (M1)

Note: Award (M1) for dividing 802.50 by their (c).

cost per metre = 7.50 USD (7.5 USD) (USD not required) (A1)(ft)(G2) [2 marks]

(e) Area of ABD = $\frac{1}{2} \times 35 \times 40 \times \sin 50^\circ$ (M1)
= 536.2311102 (A1)(ft)
(UP) = 536m² (A1)(ft)(G2) [3 marks]

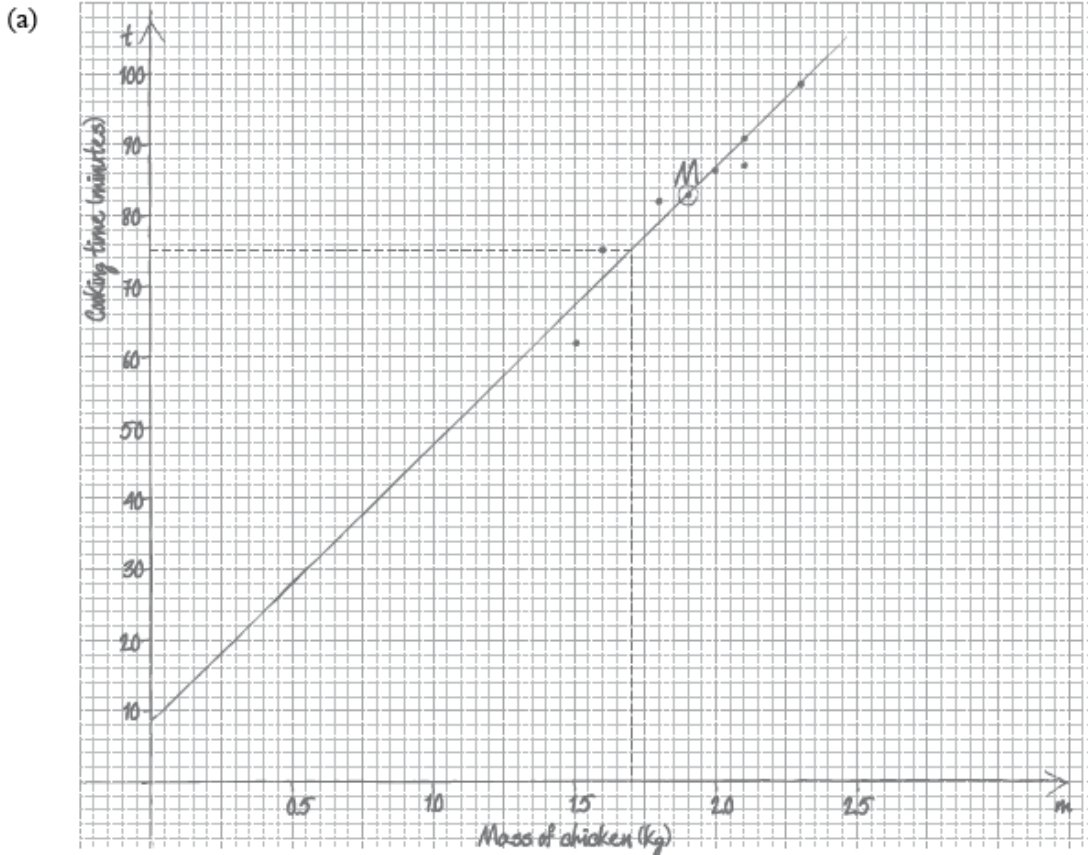
Note: Award (M1) for correct substituted formula, (A1)(ft) for correct substitution, (ft) from their value of BD and their angle ABC in (b).

(f) Volume = 0.03×536 (A1)(M1)
= 16.08 (A1)(ft)(G2) [3 marks]
= 16.1

Note: Award (A1) for 0.03, (M1) for correct formula. (ft) from their (e).
If 3 is used award at most (A0)(M1)(A0).

Total [18 marks]

3)



(A1) for correct scales and labels (mass or m on the horizontal axis, time or t on the vertical axis)

(A3) for 7 or 8 correctly placed data points

(A2) for 5 or 6 correctly placed data points

(A1) for 3 or 4 correctly placed data points, (A0) otherwise.

(A4) [4 marks]

Note: If axes reversed award at most (A0)(A3)(ft). If graph paper not used, award at most (A1)(A0).

(b) (i) 1.91 (kg) (1.9125 kg)

(G1)

(ii) 83 (minutes)

(G1) [2 marks]

(c) Their mean point labelled.

(A1)(ft) [1 mark]

Note: Follow through from part (b). Accept any clear indication of the mean point. For example: circle around point, (m , t), M , etc.

(d) Line of best fit drawn on scatter diagram.

(A1)(ft)(A1)(ft) [2 marks]

Notes: Award (A1)(ft) for straight line through their mean point, (A1)(ft) for line of best fit with intercept $9(\pm 2)$. The second (A1)(ft) can be awarded even if the line does not reach the t -axis but, if extended, the t -intercept is correct.

continued...

(e) 75 (M1)(A1)(ft)(G2) [2 marks]

Notes: Accept 74.77 from the regression line equation.
Award (M1) for indication of the use of their graph to get an estimate
OR for correct substitution of 1.7 in the correct regression line equation $t = 38.5m + 9.32$.

(f) 0.960 (0.959614...) (G2) [2 marks]

Note: Award (G0)(G1)(ft) for 0.95, 0.959

(g) Strong and positive (A1)(ft)(A1)(ft) [2 marks]

Note: Follow through from their correlation coefficient in part (f).

(h) (i) Cooking time is much larger (or smaller) than the other eight (A1)

(ii) The gradient of the new line of best fit will be larger (or smaller) (A1) [2 marks]

Note: Some acceptable explanations may include but are not limited to:

*The line of best fit may be further away from the plotted points
It may be steeper than the previous line (as the mean would change)
The t-intercept of the new line is smaller (larger)*

Do not accept vague explanations, like:

*The new line would vary
It would not go through all points
It would not fit the patterns
The line may be slightly tilted*

4)

Part A

(a) $1024r^3 = 128$ (M1)

$r^3 = \frac{1}{8}$ or $r = \sqrt[3]{\frac{1}{8}}$ (M1)

$r = \frac{1}{2}$ (0.5) (AG) [2 marks]

Notes: Award at most (M1)(M0) if last line not seen.
Award (M1)(M0) if 128 is found by repeated multiplication (division) of 1024 by 0.5 (2)

(b) 1024×0.5^{10} (M1)

Notes: Award (M1) for correct substitution into correct formula.
Accept an equivalent method.

1 (A1)(G2) [2 marks]

(c) $S_8 = \frac{1024 \left(1 - \left(\frac{1}{2} \right)^8 \right)}{1 - \frac{1}{2}}$ (M1)(A1)

Note: Award (M1) for substitution into the correct formula, (A1) for correct substitution.

OR

(A1) for complete and correct list of eight terms (A1)
(M1) for their eight terms added (M1)

$S_8 = 2040$ (A1)(G2) [3 marks]

Question 3 continued

(d) $\frac{1024 \left(1 - \left(\frac{1}{2} \right)^n \right)}{1 - \frac{1}{2}} > 2047.968$ (M1)(M1)(ft)

Notes: Award (M1) for correct substitution into the correct formula for the sum, (M1) for comparing to 2047.968
Accept equation. Follow through from their expression for the sum used in part (c).

OR

If a list is used: $S_{15} = 2047.9375$ (M1)

$S_{16} = 2047.96875$ (M1)

$n = 16$ (A1)(ft)(G2)

Note: Follow through from their expression for the sum used in part (c).

[3 marks]

Part B

- (a) common difference = 3 (may be implied) (A1)
 $u_{11} = 31$ (A1)(G2) [2 marks]

- (b) (i) $\frac{100}{2}(3 \times 100 - 1)$ OR $\frac{100(2 + 99 \times 3)}{2}$ (M1)
14 950 (A1)(G2)

- (ii) (a) $\frac{n}{2}(3n - 1) = 477$ OR $\frac{n}{2}(2 + 3(n - 1)) = 477$ (M1)
 $3n^2 - n = 954$ (M1)
 $3n^2 - n - 954 = 0$ (AG)

Notes: Award second (M1) for correct removal of denominator or brackets and no further incorrect working seen.
Award at most (M1)(M0) if last line not seen.

- (b) 18 (G2) [6 marks]

Note: If both solutions to the quadratic equation are seen and the correct value is not identified as the required answer, award (G1)(G0).

Total [18 marks]

5)

- (a) (i) $A(0, 4)$ *Accept* $x = 0, y = 4$ (AI)
(ii) $B(8, 0)$ *Accept* $x = 8, y = 0$ (AI)(ft) [2 marks]

Note: Award (A0) if coordinates are reversed in (i) and (AI)(ft) in (ii).

- (b) $AB = \sqrt{8^2 + 4^2} = \sqrt{80}$ (MI)
 $AB = 8.944$ (AI)
 $= 8.94$ (AG) [2 marks]

- (c) (i) $y = -0.5x + 4$ (MI)
Gradient $AB = -0.5$ (AI)

Note: Award (A2) if -0.5 seen.

OR

$$\text{Gradient } AB = \frac{(0-4)}{(8-0)} \quad (MI)$$
$$= -\frac{1}{2} \quad (AI)$$

Note: Award (MI) for correct substitution in the gradient formula. Follow through from their answers to part (a).

$$\text{Gradient } CN = 2 \quad (AI)(ft)(G2)$$

Note: Special case: Follow through for gradient CN from their gradient AB.

- (ii) CN: $y = 2x + c$
 $7 = 2(4) + c$ (MI)

Note: Award (MI) for correct substitution in equation of a line.

$$y = 2x - 1 \quad (AI)(ft)(G2)$$

[5 marks]

Note: Accept alternative forms for the equation of a line including $y - 7 = 2(x - 4)$. Follow through from their gradient in (i).

Note: If $c = -1$ seen but final answer is not given, award (AI)(d).

continued...

Question 4 continued

- (d) $x + 2(2x - 1) = 8$ or equivalent (M1)
 $N(2, 3) (x = 2, y = 3)$ (A1)(A1)(ft)(G3) [3 marks]

Note: Award (M1) for attempt to solve simultaneous equations or a sketch of the two lines with an indication of the point of intersection.

- (e) Cosine rule: $\cos(\hat{A}CB) = \frac{5^2 + 8.06^2 - 8.944^2}{2 \times 5 \times 8.06}$ (M1)(A1)

Note: Award (M1) for use of cosine rule with numbers from the problem substituted, (A1) for correct substitution.

$$\hat{A}CB = 82.9^\circ \quad (A1)(G2) \quad [3 \text{ marks}]$$

Note: If alternative right-angled trigonometry method used award (M1) for use of trig ratio in both triangles, (A1) for correct substitution of their values in each ratio, (A1) for answer.

Note: Accept 82.8° with use of 8.94.

- (f) Area $ACB = \frac{5 \times 8.06 \sin(82.9)}{2}$ (M1)(A1)(ft)

Note: Award (M1) for substituted area formula, (A1) for correct substitution. Follow through from their angle in part (e).

OR

$$\text{Area } ACB = \frac{AB \times CN}{2} = \frac{8.94 \times \sqrt{(4-2)^2 + (7-3)^2}}{2} \quad (M1)(M1)(ft)$$

Note: Award (M1) substituted area formula with their values, (M1) for substituted distance formula. Follow through from coordinates of N.

$$\text{Area } ACB = 20.0 \quad (A1)(ft)(G2)$$

Note: Accept 20

[3 marks]
 Total [18 marks]