

1. (a) (i) $N = 24$
 $I\% = 14$
 $PV = -14000$
 $FV = 0$
 $P/Y = 4$
 $C/Y = 4$ **(M1)(A1)**

Note: Award **M1** for an attempt to use a financial app in their technology, award **A1** for all entries correct. Accept $PV = 14000$.

- $(€)871.82$ **A1**
- (ii) $4 \times 6 \times 871.82$ **(M1)**
 $(€)20923.68$ **A1**
- (iii) $20923.68 - 14000$ **(M1)**
 $(€)6923.68$ **A1**
- [7 marks]**
- (b) (i) $0.9 \times 14000 (= 14000 - 0.10 \times 14000)$ **M1**
 $(€)12600.00$ **A1**
- (ii) $N = 72$
 $PV = 12600$
 $PMT = -250$
 $FV = 0$
 $P/Y = 12$
 $C/Y = 12$ **(M1)(A1)**

Note: Award **M1** for an attempt to use a financial app in their technology, award **A1** for all entries correct. Accept $PV = -12600$ provided $PMT = 250$.

- $12.56(\%)$ **A1**
- [5 marks]**

continued...

Question 1 continued

(c) **EITHER**

Bryan should choose Option A
no deposit is required

A1
R1

Note: Award **R1** for stating that no deposit is required. Award **A1** for the correct choice from that fact. Do not award **R0A1**.

OR

Bryan should choose Option B
cost of Option A (6923.69) > cost of Option B ($72 \times 250 - 12600 = 5400$)

A1
R1

Note: Award **R1** for a correct comparison of costs. Award **A1** for the correct choice from that comparison. Do not award **R0A1**.

[2 marks]

(d) $14000\left(1 - \frac{25}{100}\right)^6$

(M1)(A1)

Note: Award **M1** for substitution into compound interest formula. Award **A1** for correct substitutions.

= 2491.70 (USD)

A1

OR

N = 6

I% = -25

PV = ±14000

P/Y = 1

C/Y = 1

(A1)(M1)

Note: Award **A1** for PV = ±14000, **M1** for other entries correct.

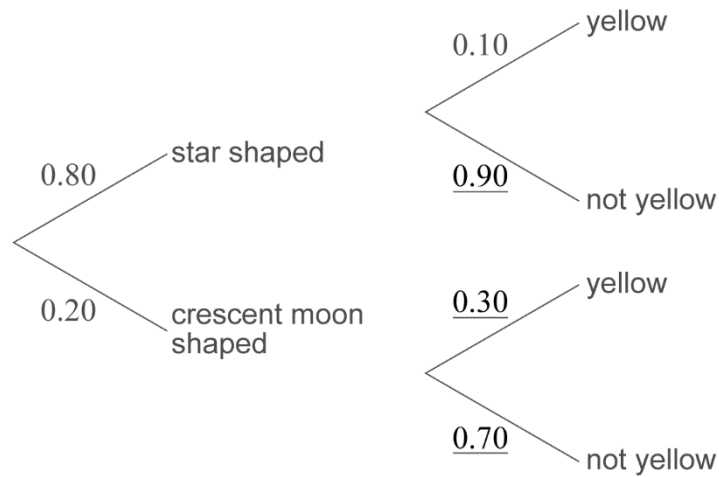
2491.70 (USD)

A1

[3 marks]

Total [17 marks]

2. (a)



A1A1

Note: Award **A1** for each correct pair of branches. Accept decimal or percentage responses as equivalent forms on branches.

[2 marks]

(b) (i) $P(Y) = 0.8 \times 0.1 + 0.2 \times 0.3$
 $= 0.14$

M1

A1

(ii) $P(\text{Star} | Y) = \frac{0.8 \times 0.1}{0.14}$
 $= 0.571 \left(\frac{4}{7}, 0.571428... \right)$

M1

A1

[4 marks]

(c) the colours of the sweets are distributed according to manufacturer specifications

A1

[1 mark]

(d)

Colour	Brown	Red	Green	Orange	Yellow	Purple
Expected Frequency	12	20	16	16	8	8

A2

Note: Award **A2** for all 6 correct expected values, **A1** for 4 or 5 correct values, **A0** otherwise.

[2 marks]

(e) 5

A1

[1 mark]

(f) 0.469 (0.4688117...)

A2

[2 marks]

continued...

Question 2 continued

(g) since $0.469 > 0.05$

R1

fail to reject the null hypothesis. There is insufficient evidence to reject the manufacturer's specifications

A1

Note: Award **R1** for a correct comparison of their correct p -value to the test level, award **A1** for the correct result from that comparison. Do not award **ROA1**.

[2 marks]

Total [14 marks]

- 3. (a) (i) 0.909 (0.909181...) A2
- (ii) (very) strong and positive A1A1

Note: Award **A1** for (very) strong **A1** for positive.

[4 marks]

- (b) $y = 1.14x + 0.578$ ($y = 1.14033... x + 0.578183...$) A1A1

Note: Award **A1** for 1.14x, **A1** for 0.578. Award a maximum of **A1A0** if the answer is not an equation in the form $y = mx + c$.

[2 marks]

- (c) (i) $1.14 \times 10 + 0.578$ M1
- 12.0 (11.9814...) A1
- (ii) no the estimate is not reliable A1
- outside the known data range R1
- OR**
- a score greater than 10 is not possible R1

Note: Do not award **A1R0**.

[4 marks]

(d)

Competitors	A	B	C	D	E	F	G	H
Stan's rank	7	8	6	4	2	4	1	4
Minsun's rank	7	8	6	4.5	3	2	1	4.5

A1A1

Note: Award **A1** for correct ranks for Stan. Award **A1** for correct ranks for Minsun.

[2 marks]

- (e) (i) 0.933 (0.932673...) A2
- (ii) Stan and Minsun strongly agree on the ranking of competitors. A1A1

Note: Award **A1** for "strongly agree", **A1** for reference to a rank order.

[4 marks]

- (f) decreasing the score to 9.1, does not change the rank of competitor G A1

[1 mark]

Total [17 marks]

4. (a) $2(8 \times 4 + 3 \times 4 + 3 \times 8)$ **M1**
 $= 136 \text{ (cm}^2\text{)}$ **A1**
[2 marks]

(b) $\sqrt{8^2 + 4^2 + 3^2}$ **M1**
 (AG =) 9.43 (cm) (9.4339..., $\sqrt{89}$) **A1**
[2 marks]

(c) $-2x + 220 = 0$ **M1**
 $x = 110$ **A1**
 110 000 (boxes) **A1**
[3 marks]

(d) $P(x) = \int -2x + 220 \text{ dx}$ **M1**

Note: Award **M1** for evidence of integration.

$P(x) = -x^2 + 220x + c$ **A1A1**

Note: Award **A1** for either $-x^2$ or $220x$ award **A1** for both correct terms and constant of integration.

$1700 = -(20)^2 + 220(20) + c$ **M1**
 $c = -2300$
 $P(x) = -x^2 + 220x - 2300$ **A1**
[5 marks]

(e) $-x^2 + 220x - 2300 = 0$ **M1**
 $x = 11.005$ **A1**
 11 006 (boxes) **A1**

Note: Award **M1** for their $P(x) = 0$, award **A1** for their correct solution to x . Award the final **A1** for expressing their solution to the minimum number of boxes. Do not accept 11 005, the nearest integer, nor 11 000, the answer expressed to 3 significant figures, as these will not satisfy the demand of the question.

[3 marks]

Total [15 marks]

5. (a) (i) $p(10)^2 + q(10) = 60$
 $10p + q = 6$ ($100p + 10q = 60$)
- (ii) $p = 1, q = -4$

M1

A1

A1A1

Note: If p and q are both incorrect then award **M1A0** for an attempt to solve simultaneous equations.

[4 marks]

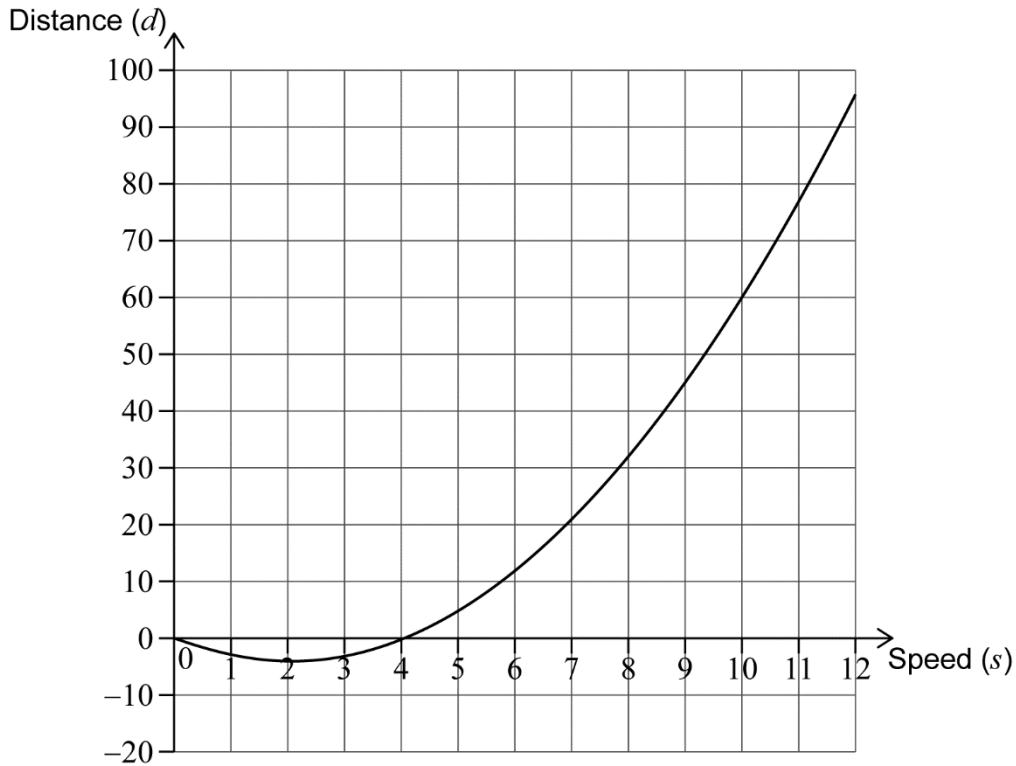
- (b) $(2, -4)$

A1A1

Note: Award **A1** for each correct coordinate.
Award **A0A1** if parentheses are missing.

[2 marks]

- (c)



A3

Note: Award **A1** for smooth quadratic curve on labelled axes and within correct window. Award **A1** for the curve passing through $(0, 0)$ and $(10, 60)$. Award **A1** for the curve passing through their vertex. Follow through from part (b).

[3 marks]

- (d) the graph indicates there are negative stopping distances (for low speeds)

R1

Note: Award **R1** for identifying that a feature of their graph results in negative stopping distances (vertex, range of stopping distances...).

[1 mark]

continued...

Question 5 continued

(e) $0.95 \times 20^2 - 3.92 \times 20$ **(M1)**
 $= 302 \text{ (m) (301.6...)}$ **A1**
[2 marks]

(f) $\left| \frac{301.6 - 320}{320} \right| \times 100$ **M1**
 $= 5.75 \text{ (%)}$ **A1**
[2 marks]

(g) $330 = 1.6 \times s + 0.95 \times s^2 - 3.92 \times s$ **M1A1**

Note: Award **M1** for an attempt to find an expression including stopping distance (model B) and reaction distance, equated to 330.
 Award **A1** for a completely correct equation.

$19.9 \text{ (ms}^{-1}\text{) (19.8988...)}$ **A1**
[3 marks]

Total [17 marks]
