

Question 1 – The Party Factory (5 marks)

1(a)

Maximum rate for small simple items = **1000 items/hour** 8 hours →

$$1000 \times 8 = 8000$$

Answer: 8000 items

- **B1** for 8000

1(b)

5 days × 8 hours = 40 hours Rate = 480 items/hour

$$480 \times 40 = 19200$$

Answer: 19 200 items

- **M1** multiply 5×8 or get 40 hours
- **A1** correct total 19 200

1(c)

Small simple items at max rate = 1000/hour Decoration machine = 1200/hour $1200 > 1000$ → decoration machine is fast enough.

Answer: Yes, it is fast enough because $1200 > 1000$.

- **B1** comparison idea
- **B1** correct conclusion

Question 2 – Stratified Sampling (4 marks)

2(a)

Total students = $210 + 195 + 180 + 165 = 750$ Year 9 proportion:

$$180/750 \times 50 = 12$$

Answer: 12 students

- **M1** correct proportion calculation
- **A1** 12

2(b)

Any one valid advantage, e.g.:

- Ensures all year groups are represented
- More representative than simple random sampling
- Reduces bias

B1 for any valid advantage.

2(c)

Favourite subject = a category → **qualitative**

B1 qualitative

Question 3 – Cardboard Crowns (5 marks)

Sheet size = 40 cm × 30 cm Roll size = 1.5 m × 100 m = 150 cm × 10 000 cm

3(a)

Fit along width:

$$150 \div 40 = 3 \text{ sheets}$$

Fit along length:

$$10000 \div 30 = 333.3\overline{3} \Rightarrow 333 \text{ sheets}$$

Total crowns:

$$3 \times 333 = 999$$

Answer: 999 crowns

- **M1** convert units correctly
- **M1** number of sheets along each dimension
- **A1** 999

3(b)

5000 crowns needed

$$5000 \div 999 = 5.005\ldots$$

→ need **6 rolls**

B1 for 6

3(c)

Any valid assumption, e.g.:

- No waste / perfect cutting
- Sheets fit exactly with no gaps
- Cardboard has no defects
- Orientation does not matter

B1 any valid assumption

Question 4 – Currency Exchange (5 marks)

4(a)

Commission = 2% of £850

$$0.02 \times 850 = 17$$

Money exchanged =

$$850 - 17 = 833$$

Convert to JPY:

$$833 \times 190 = 158\,270$$

Answer: 158 270 JPY

- **M1** commission
- **M1** subtract commission
- **A1** 158 270

4(b)

Convert back at £1 = 200 JPY

$$45000 \div 200 = 225$$

Answer: £225

- **M1** correct division
- **A1** 225

Question 5 – Student Loans (6 marks)

Plan 2 threshold = £28 470 Anna earns £32 000

5(a)

Income above threshold:

$$32000 - 28470 = 3530$$

Repayment = 9%:

$$0.09 \times 3530 = 317.7$$

Answer: £317.70

- **M1** subtract threshold
- **A1** repayment

5(b)

Interest rate = RPI + 1.5%

$$4.3\% + 1.5\% = 5.8\%$$

Answer: 5.8%

- **B1** RPI + 1.5%
- **B1** 5.8%

5(c)

One advantage + one disadvantage:

Advantages (any one):

- Reduces long-term interest
- Reduces total repayment time
- Lowers future monthly repayments

Disadvantages (any one):

- Less disposable income now
- Loan may be written off anyway
- Money could be used for savings/investment instead
- **B1** valid advantage
- **B1** valid disadvantage

Question 6 – Race Times Histogram (6 marks)

6(a) Histogram

Class widths:

- 40–50 → width 10

- 50–60 → width 10
- 60–70 → width 10
- 70–80 → width 10
- 80–100 → width 20

Frequency densities:

$FD = fw$

- $8 \div 10 = \mathbf{0.8}$
- $24 \div 10 = \mathbf{2.4}$
- $32 \div 10 = \mathbf{3.2}$
- $12 \div 10 = \mathbf{1.2}$
- $4 \div 20 = \mathbf{0.2}$

Marks:

- **M1** correct widths
- **M1** correct FD formula
- **A1** at least 3 correct heights
- **A1** fully correct histogram

6(b)

Less than 55 minutes includes:

- All of 40–50: 8
- Half of 50–60 (because 55 is halfway):

$$510 \times 24 = 12$$

Total:

$$8 + 12 = 20$$

Answer: 20 runners

- **M1** proportional method
- **A1** 20

Question 7 – Income Tax & NI (9 marks)

7(a) Income tax

Personal allowance = £12 570 Taxable income:

$$58000 - 12570 = 45430$$

All within basic rate (20%):

$$0.20 \times 45430 = 9086$$

Answer: £9 086

- **M1** taxable income
- **M1** apply 20%
- **A1** 9086

7(b) National Insurance

8% between £12 570 and £50 270 2% above £50 270

1.

$$50270 - 12570 = 37700$$

$$0.08 \times 37700 = 3016$$

2.

$$58000 - 50270 = 7730$$

$$0.02 \times 7730 = 154.6$$

Total NI:

$$3016 + 154.6 = 3170.6$$

Answer: £3 170.60

- **M1** correct bands
- **M1** correct %
- **A1** 3170.6

7(c)

Net annual salary:

$$58000 - 9086 - 3170.6 = 45743.4$$

Monthly:

$$45743.4 \div 12 = 3811.95$$

Answer: Yes, because £3812 > £3800.

- **M1** net annual
- **M1** divide by 12
- **A1** correct conclusion

Question 8 – Comparing Schools (5 marks)

Comparison using one average + one spread

Average: Oak mean = 64.2 Beech mean = 58.7 → Oak performed better on average.

Spread: Oak SD = 8.4 Beech SD = 12.1 → Beech has more variation; Oak more consistent.

Conclusion: Oak has higher average scores and more consistent performance.

Marks:

- **B1** correct comparison of means
- **B1** correct comparison of medians (optional alternative)
- **B1** correct comparison of SD or IQR
- **M1** correct interpretation
- **A1** overall justified conclusion

Question 9 – Compound Interest (6 marks)

9(a)

Balance after 1 month = £5020.83 Monthly rate r:

$$5000(1+r)=5020.83$$

$$1+r=5020.83/5000=1.004166$$

$$r=0.004166$$

Answer: 0.4166%

- **B1** correct rate

9(b) AER

$$(1+r)^{12}-1$$

$$(1.004166)^{12}-1=0.0512$$

$$\text{AER}=5.12\%$$

Answer: 5.12%

- **M1** correct formula
- **M1** correct substitution
- **A1** 5.12%

9(c)

Amount after 1 year at 5.12%:

$$5000 \times 1.0512 = 5256$$

At 4.5% AER:

$$5000 \times 1.045 = 5225$$

Difference:

$$5256 - 5225 = 31$$

Answer: £31 more

- **M1** both amounts
- **A1** £31