

**Mark scheme — AQA Level 3 Certificate MATHEMATICAL STUDIES
Paper 2A (Predicted 2026)**

Total marks: 60

1. Overview and general marking guidance

- **Award method marks** where correct working is shown even if the final answer is slightly off due to rounding.
- **Accept equivalent methods** (e.g., logs for CAGR) if working is correct and consistent.
- **Rounding:** follow the question's instruction; otherwise accept answers within a reasonable rounding tolerance.
- **Units:** answers involving money must include \$ and the correct scale (billion) where appropriate.
- **Explanations:** award marks for relevant, concise points; do not penalise minor wording differences if the idea is correct.

2. Questions 1-3 (Pages 1-3) — marks and worked solutions

Question 1 (6 marks)

(a) Percentage increase 2015 → 2021. **[2]**

- **Method (1):** $\frac{94.3 - 62.2}{62.2} \times 100$.
- **Calculation (1):** $\frac{32.1}{62.2} \times 100 \approx 51.6\%$. **Answer: 51.6%** (award 2 marks).

(b) Percentage increase 2023F → 2026F. **[2]**

- **Method (1):** $\frac{13.4}{94.0} \times 100$.
- **Calculation (1):** $\frac{13.4}{94.0} \times 100 \approx 14.26\%$. **Answer: 14.26%** (to 2 d.p.) (award 2 marks).

(c) Meaning of CAGR 4.5% in context. **[2]**

- **1 mark** for definition: "the constant annual growth rate that would produce the total increase over the period."
- **1 mark** for context: "about 4.5% growth each year from 2023F to 2026F." (Award 2 marks for both points; 1 mark for partial.)

Question 2 (6 marks)

Given: 2026F console players = 664 million; total increase 9.3% over 3 years.

(a) Estimate 2023F players. **[2]**

- **Method (1):** $2023 F = \frac{664}{1.093}$.

- **Calculation (1):** $664 / 1.093 \approx 607.0 \rightarrow$ **607 million.** (Award 2 marks.)

(b) CAGR for 9.3% over 3 years. [2]

- **Method (1):** $\text{CAGR} = (1.093)^{1/3} - 1.$
- **Calculation (1):** $(1.093)^{1/3} - 1 \approx 0.03013 \Rightarrow 3.01\%.$ **Answer: 3.01%** (to 2 d.p.) (award 2 marks).

(c) Comment on growth speed. [2]

- **1 mark** for correct interpretation (e.g., “about 3% p.a. is modest/moderate, not rapid”).
- **1 mark** for justification (e.g., “steady but much lower than double-digit growth”). (Award up to 2 marks.)

Question 3 (8 marks)

(a) Absolute change 2021 $\rightarrow$ 2026F. [1]

- $107.4 - 94.3 = 13.1.$ **Answer: \$13.1 billion.** (1 mark)

(b) Plausible explanation for short-term fall 2021 $\rightarrow$ 2023F. [1]

- Accept: economic downturn, supply issues, delayed releases, market correction, regulatory changes. (1 mark)

(c) Describe overall trend and implication for developers. [3]

- **2 marks** for trend: e.g., “overall upward trend from 2015 to 2026F with rapid growth to 2021, small dip to 2023F, then recovery to 2026F.”
- **1 mark** for implication: e.g., “developers should invest in long-term content/live services or plan for continued growth in consoles.” (Award up to 3 marks.)

(d) One reason consoles may grow faster. [1]

- Accept: exclusives, stronger monetisation, hardware cycle, larger installed base, subscription/platform integration. (1 mark)

3. Questions 4-6 (Pages 3-6)

Question 4 (6 marks) — Pie charts (PC and Console revenue sources)

Given: PC: Premium 56%, Micro 30%, Subscription 12%, Other 2%. Console: Premium 57%, Micro 33%, Subscription 8%, Other 2%.

(a) Why premium larger on console. [1]

- Accept: consoles sell more full-price packaged games; console players more likely to buy premium titles; exclusives. (1 mark)

(b) If PC total = \$40bn, microtransaction revenue (30%). [2]

- **Method (1):** $0.30 \times 40.$
- **Calculation (1):** **\$12.0 billion.** (2 marks)

(c) Two reasons developers value recurring revenue. [3]

- Award up to 3 marks (1 mark per valid reason, 1 extra mark for clear explanation): examples:
 - **Predictable cash flow / budgeting.**
 - **Higher lifetime value / ongoing monetisation.**
 - **Funds live-ops and updates** (keeps game active). (Award up to 3 marks.)

Question 5 (6 marks) — Survey preferences

Given: sample 1500; F2P 53%; premium 39%; subscription 9%.

(a) Number preferring F2P. [2]

- $0.53 \times 1500 = 795$. **Answer: 795.** (2 marks)

(b) How many more preferred premium than subscription. [2]

- Premium: $0.39 \times 1500 = 585$. Subscription: $0.09 \times 1500 = 135$. Difference $585 - 135 = 450$. **Answer: 450.** (2 marks)

(c) One limitation when generalising. [2]

- Accept: sampling bias, non-representative sample, limited geography, self-selection, platform bias, survey wording. (1 mark for limitation, 1 mark for brief explanation) (2 marks)

Question 6 (8 marks) — Line trends

(a) Which type shows highest growth by 2026? [1]

- **Cloud gaming.** (1 mark)

(b) Trend for physically sold games 2018–2026. [2]

- 1 mark: description (decline).
- 1 mark: detail/implication (digital distribution replacing physical). (2 marks)

(c) Compare downloaded vs cloud 2018–2024. [2]

- 1 mark: downloaded shows steady/moderate growth.
- 1 mark: cloud shows rapid acceleration (faster growth). (2 marks)

(d) One technological factor for cloud growth. [1]

- Accept: faster broadband, 5G, lower latency, improved streaming tech, better data centres. (1 mark)

4. Questions 7–9 (Pages 6–8)

Question 7 (8 marks) — PAYG vs subscription

Given: PAYG \$0.35/hr; hours 14, 22, 9.

(a) Total PAYG cost. [2]

- Total hours = $14 + 22 + 9 = 45$. Cost = $45 \times 0.35 = 15.75$. **Answer: \$15.75.** (2 marks)

(b) Compare with subscription \$9.99/month for 3 months. [3]

- Subscription total = $3 \times 9.99 = 29.97$.
- Difference $29.97 - 15.75 = 14.22$. **Answer: PAYG cheaper by \$14.22.** (3 marks: 1 for subscription total, 1 for comparison, 1 for difference)

(c) One advantage for players and one disadvantage for developers. [3]

- Player advantage (1): pay only when you play; cheaper for light users.
- Developer disadvantage (1): revenue less predictable; lower guaranteed income.
- Additional explanation (1). (Award up to 3 marks)

Question 8 (10 marks) — Cloud gaming growth and CAGR

Given: 2018 = \$28bn; 2023 = \$50bn.

(a) Percentage increase 2018 → 2023. [2]

- $\frac{50 - 28}{28} \times 100 = \frac{22}{28} \times 100 \approx 78.6\%$. **Answer: 78.6%** (2 marks)

(b) CAGR over 5 years. [4]

- **Method (1):** $\text{CAGR} = (50/28)^{1/5} - 1$.
- **Steps (2):** compute ratio $50/28 \approx 1.785714$; take 5th root ≈ 1.1231 .
- **Final (1):** subtract 1 → **12.31%** (to 2 d.p.). (Award 4 marks for method, steps, final)

(c) Estimate revenue in 2026 (3 years after 2023) using CAGR. [3]

- **Method (1):** $50 \times (1 + 0.1231)^3$.
- **Calculation (2):** $(1.1231)^3 \approx 1.4166$; $50 \times 1.4166 \approx 70.83$. **Answer: \$70.8 billion** (nearest \$0.1bn). (3 marks)

(d) One assumption. [1]

- Accept: growth continues at same CAGR; no structural market changes; same market conditions. (1 mark)

Question 9 (9 marks) — JPMorgan 2027F confidence intervals (insert)

Given: PC: $\hat{X}_{PC} = 48.2$, $s_{PC} = 6.5$, $n_{PC} = 64$. Console: $\hat{X}_C = 31.4$, $s_C = 5.8$, $n_C = 64$. Use $z_{0.975} = 1.96$.

(a) z-critical value for two-sided 95% CI. [1]

- **Answer:** $z_{0.975} = 1.96$. (1 mark)

(b) 95% CI for PC mean. [3]

- **SE:** $SE_{PC} = 6.5 / \sqrt{64} = 6.5 / 8 = 0.8125$. (1 mark)
- **ME:** $1.96 \times 0.8125 = 1.5925$. (1 mark)
- **CI:** $48.2 \pm 1.5925 = [46.6075, 49.7925] \rightarrow$ **[46.6, 49.8]** (1 d.p.). (1 mark)

(c) 95% CI for Console mean. [3]

- **SE:** $SE_C = 5.8 / 8 = 0.725$. (1 mark)
- **ME:** $1.96 \times 0.725 = 1.421$. (1 mark)
- **CI:** $31.4 \pm 1.421 = [29.979, 32.821] \rightarrow$ **[30.0, 32.8]** (1 d.p.). (1 mark)

(d)(i) Check observed value \$47.5 against PC CI. [1]

- Show comparison: $46.6 \leq 47.5 \leq 49.8$. **Answer:** inside the 95% CI. (1 mark)

(d)(ii) Does being inside the CI make it the “expected value”? [1]

- **Answer:** No. Award 1 mark for explanation: CI gives a range of plausible values for the population mean; a single observed value inside the interval is consistent with the estimate but is not the expected value (the expected value refers to the population mean). (1 mark)

5. Final examiner notes

- **Partial credit:** award method marks for correct intermediate steps even if final rounding differs.
- **Alternative correct approaches:** accept use of t -distribution for CIs where students justify it (especially for smaller n); award method marks if consistent.
- **Common errors to watch for:** dividing by n instead of $\sqrt{n}$ for SE; using % as decimal errors (e.g., 30 vs 0.30); forgetting to round as requested.
- **Presentation:** encourage students to label units and show working for method marks.