Mark scheme – Level 3 Certificate Mathematical Studies

Paper 2A Statistical Techniques – Predicted June 2026 (Computer Games Market)
Total: 60 marks

Question 1 (6 marks)

Use Report A.

1(a) [1 mark]

Answer: Any one valid reason, e.g.

- **B1:** Forecast growth 2023F–2026F is described as "more conservative" / lower than before 2020 / significantly lower than 2018–2021.
- Or: flat growth trend 2021–2023F suggests slower future growth.
- Or: market already large/mature so percentage growth likely to slow.

(Any one clearly linked to Report A.)

1(b) [2 marks]

2023F revenue = \$94.0 bn Increase = \$13.4 bn

Percentage increase=13.494.0×100≈14.3%

- **M1:** Uses increaseoriginal×100 with 13.4 and 94.0.
- **A1:** 14.3% (accept 14%–14.4%).

1(c) [3 marks]

Key ideas:

- Revenue depends on **spend per player**, not just number of players.
- PC and console may have **different average spend** or pricing models.
- Starting numbers of players differ, so same CAGR in players does not imply same revenue growth.

Award, for example:

- **B1:** States that revenue depends on both number of players and how much each player spends.
- **B1:** Notes that console and PC may have different average spend / monetisation models.
- **B1:** Concludes that a higher player CAGR for consoles does not guarantee faster revenue growth.

(Any three clear, non-repetitive points.)

Question 2 (10 marks)

Use Graph 1.

2(a) [3 marks]

From Graph 1:

- Total revenue 2021 ≈ $94.3 bn
- Total revenue 2023F ≈ $94.0 bn

Change is very small (about $0.3 bn).

- **B1:** Identifies that PC/total revenue changes only slightly between 2021 and 2023F (about $0.3 bn).
- **B1:** States that this is not a “sharp” fall (describes as small / almost flat).
- **B1:** Concludes Journalist A’s claim is not valid / exaggerated.

2(b) [4 marks]

From Graph 1:

- 2022–2023 growth: −$0.3 bn (or a fall of $0.3 bn).
- 2024–2026 growth: +$13.4 bn.

Compare:

- $|-0.3|$ vs 13.4.
- 13.4 is far more than double 0.3.

Marking:

- **M1:** Identifies 2022–2023 change as about −$0.3 bn (or fall of $0.3 bn).
- **M1:** Identifies 2024–2026 change as about +$13.4 bn.
- **M1:** Compares the two (e.g. 13.4 is much larger than 0.3).
- **A1:** States that the claim “more than double” is technically true but misleading because one period is a small fall and the other a large rise, or clearly concludes appropriately.

(Allow full credit if they treat 0.3 as a small positive “growth” but still correctly conclude 13.4 is far more than double.)

2(c) [1 mark]

- **B1:** States that comparing periods of different lengths (e.g. 1 year vs 3 years) is misleading unless adjusted to per-year rates / same time length.

2(d) [2 marks]

Any two sensible improvements, e.g.

- **B1:** Add exact revenue values on the bars / a clear scale.
- **B1:** Separate PC and console bars more clearly or use consistent shading / legend; or show growth per year rather than total over different periods.

(Any two distinct, reasonable suggestions.)

Question 3 (6 marks)

Use Graph 2.

3(a) [2 marks]

From Graph 2:

- PC: Premium 56%, Microtransactions 30%, Downloads 12%, Subscription 2%.
- Console: Premium 57%, Microtransactions 33%, Downloads 8%, Subscription 2%.

Any two differences, e.g.

- **B1:** PC has a higher percentage from downloads (12% vs 8%).
- **B1:** Consoles have a higher percentage from microtransactions (33% vs 30%).

(Allow other correct comparisons; premium and subscription are almost the same, so must be stated accurately.)

3(b) [2 marks]

Premium share = 56% of $62.2 bn.

$0.56 \times 62.2 = 34.832$ bn

- **M1:** Attempts 0.56×62.2.
- **A1:** $34.8 bn (accept $34.83 bn or $34.8 billion).

3(c) [2 marks]

Key ideas:

- More time spent in games → more opportunities for microtransactions.
- Even if premium sales stay strong, players can continue to spend repeatedly in-game.

Award, for example:

- **B1:** States that microtransactions are recurring / can happen many times per player.
- **B1:** Explains that as players spend more time in games, in-game spending can grow as a share of revenue even if premium sales remain high.

Question 4 (8 marks)

Use Report B.

4(a) [2 marks]

Reasons survey may not represent all players globally, e.g.

- Sample may be from one region / platform / age group only.
- Sample size or method may be biased (online survey, self-selection).
- **B1:** Identifies a possible lack of representativeness (e.g. only certain countries / platforms).
- **B1:** Explains why that makes it unrepresentative of all global players.

4(b) [2 marks]

Survey result: 53% prefer F2P.

Claim: “Fewer than half prefer F2P.”

- **M1:** Uses 53% from the survey.
- **A1:** Concludes the claim is not supported / false because 53% > 50%.

4(c) [1 mark]

Subscription preference = 9%.

$0.09 \times 80 = 7.2$

- **B1:** 7 (or 7.2 with clear rounding to 7).

4(d) [3 marks]

Key ideas:

- Larger sample reduces random variation / sampling error.
- Estimates become more stable / closer to true population proportion.

Award, for example:

- **B1:** States that a larger sample reduces the effect of anomalies / random variation.
- **B1:** States that the estimate is more likely to be close to the true population value.
- **B1:** Clear link to reliability (e.g. “results are more reliable / more representative”).

Question 5 (7 marks)

5(a) [3 marks]

Class widths and frequency densities:

- 0–5: width 5 → 12/5=2.4
- 5–10: width 5 → 18/5=3.6
- 10–20: width 10 → 20/10=2.0
- 20–30: width 10 → 7/10=0.7
- 30–50: width 20 → 3/20=0.15

Marking:

- **M1:** Uses frequency density = frequency ÷ class width.
- **B1:** At least three correct densities.
- **B1:** All five correct (allow rounding to 0.15).

5(b) [4 marks]

Histogram:

- Correct class boundaries on horizontal axis: 0, 5, 10, 20, 30, 50.
- Bars with correct widths.
- Heights proportional to densities: 2.4, 3.6, 2.0, 0.7, 0.15.

Marking:

- **B1:** Correct class intervals on the axis.
- **B1:** Bars drawn with correct widths in correct positions.
- **M1:** Heights consistent with their densities from 5(a).
- **A1:** Fully correct histogram (all heights and positions correct).

(If 5(a) wrong but 5(b) consistent with their densities, allow method marks.)

Question 6 (8 marks)

6(a) [2 marks]

From the table, as hours increase, spending increases roughly linearly.

- **B1:** Positive correlation.
- **B1:** Strong (or fairly strong) correlation.

6(b) [3 marks]

Given data:

$$\sum x=74, \sum y=113, \sum x2=830, \sum xy=1279, n=8$$
$$b=n\sum xy-(\sum x)(\sum y)n\sum x2-(\sum x)2=8\times1279-74\times1138\times830-742=18701164\approx1.61$$
$$\bar{x}=9.25, \bar{y}=14.125$$
$$a=\bar{y}-b\bar{x}\approx14.125-1.61\times9.25\approx-0.73$$

Regression line:

$y \approx -0.73 + 1.61x$

Marking:

- **M1:** Correct formula for b with substitution.
- **A1:** $b \approx 1.61$ (3 s.f.).
- **A1:** $a \approx -0.73$ (accept -0.73 to -0.733 s.f.) and equation $y = a + bx$.

(Allow equivalent rounded values.)

6(c) [1 mark]

Use regression line:

$y \approx -0.73 + 1.61 \times 11 \approx -0.73 + 17.71 \approx 16.98$

- **B1:** Approximate answer \$17.0 (accept 16.9–17.0).

6(d) [2 marks]

Key idea: extrapolation.

- **B1:** States that 40 hours is far outside the range of the data (3–16 hours).
- **B1:** Explains that the linear relationship may not hold for such large values, so the estimate may be unreliable.

Question 7 (8 marks)

Weekly spending on cloud gaming subscriptions: $X \sim N(18.5, 6.22)$.

7(a) [1 mark]

- **B1:** $X \sim N(18.5, 6.22)$.

7(b) [3 marks]

$P(X > 25) = 1 - P(Z \leq \frac{25 - 18.5}{6.2}) \approx 1.05$

From tables, $\Phi(1.05) \approx 0.853$.

$P(X > 25) \approx 1 - 0.853 = 0.147$

- **M1:** Standardises correctly: $z = \frac{25 - 18.5}{6.2}$.
- **M1:** Uses normal table to find $\Phi(z)$.
- **A1:** Probability ≈ 0.15 (accept 0.14–0.15).

7(c) [3 marks]

$P(12<X<30)=\Phi(30-18.56.2)-\Phi(12-18.56.2)$
$z1=30-18.56.2=11.56.2\approx1.85$
$z2=12-18.56.2=-6.56.2\approx-1.05$

From tables:

$\Phi(1.85)\approx0.968$, $\Phi(-1.05)\approx1-0.853=0.147$.

$P(12<X<30)\approx0.968-0.147=0.821$

- **M1:** Standardises both bounds correctly.
- **M1:** Uses normal tables for both z-values.
- **A1:** Probability ≈0.82 (accept 0.81–0.83).

7(d) [1 mark]

- **B1:** Explains that the normal distribution is continuous and extends below 0, whereas spending cannot be negative and many players may spend exactly \$0, so the model is poor at that end.

Question 8 (7 marks)

Sample: $n=40$, $\bar{x}=14.20$, $\sigma=5.80$. Assume population standard deviation known.

8(a) [4 marks]

95% confidence interval:

$\bar{x}\pm z_{0.975}\cdot\frac{\sigma}{\sqrt{n}}$
$z_{0.975}=1.96, \frac{\sigma}{\sqrt{n}}=\frac{5.840}{\sqrt{5.86.3249}}\approx0.917$
$\text{Margin}=1.96\times0.917\approx1.80$
$\text{CI}\approx14.20\pm1.80\Rightarrow(12.4, 16.0)$

Marking:

- **M1:** Uses correct CI structure with z and $\sigma/\sqrt{n}$.
- **M1:** Correctly computes $\sigma/\sqrt{n}$.
- **M1:** Multiplies by 1.96 to get margin.
- **A1:** Interval approximately (12.4, 16.0) (accept small rounding differences).

8(b) [3 marks]

Claim: “Average player spends at least \$16 per week.”

From CI:

- Upper limit ≈ \$16.0, lower limit ≈ \$12.4.

Interpretation:

- **B1:** Notes that 16 is at/near the upper end of the interval and values below 16 are plausible.
- **B1:** States that the interval suggests the true mean could be less than $16.
- **B1:** Concludes that the claim is not supported / cannot be confidently accepted based on this sample.