Dr Bennison Maths
MATHEMATICS EDUCATION EXPERT

# AQA Level 3 Mathematical Studies 2026 Practice Paper 2A

Do not turn over the page until instructed to do so.

This assessment is out of 60 marks and you will be given 90 minutes.

When you are asked to by your teacher write your **full name** below

**Name:**

**Total Marks:** **/ 60**

**1** The table below shows the survival information for passengers on the Titanic

| Economic Class | Total Population | | Number of Deaths | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| Class I | 180 | 145 | 118 | 4 |
| Class II | 179 | 106 | 154 | 13 |
| Class III | 510 | 196 | 422 | 106 |
| Crew | 862 | 23 | 670 | 3 |

**a)** What percentage of the total passengers died?

**[2 marks]**

Total Passengers = 2201

Total Deaths = 1490

So % died = $\frac{1490}{2201} \times 100 = 67.7\%$.

**b)** For a passenger in Class I what was the probability of survival if they were

Male: Nº males survived = 180 − 118 = 62

Probability of survival = $\frac{62}{180} = \frac{31}{90} \approx 0.34$

Female:

Nº females survived = 145 − 4 = 141

**[2 marks]**

Probability of survival = $\frac{141}{145}$

$\approx 0.97$

**c)** Write a brief report summarising the information in the table. Your report should include:

- Differences between the economic classes and survival rates.
- The impact of gender on the chance of survival.

**[5 marks]**

**2** Use **The Computer Games Market** from the Preliminary material.

**a)** Use the information in **Graph 1** to calculate the forecast revenue of PC Gaming in 2023?

**[1 mark]**

0.446 × 94 = 41.36 billion

**b)** Freya is reading **Report A** and says that: "the stated absolute increase of console players is incorrect as $3 \times 3\% = 9\%$.

Comment on the accuracy of Freya's claim.

**[2 marks]**

She is wrong, since

$1.03^3 = 1.092727$

$\approx 9.3\%$

**c)** **(i)** Using the formula in the pre-release for CAGR, verify the figure shown **Graph 1** for the CAGR between 2015 and 2016

**[2 marks]**

$CAGR = 100 \times \left[\left(\frac{94.3}{62.2}\right)^{1/6} - 1\right]$

$= 7.185$

$\approx 7.2\%$

**(ii)** Is the overall CAGR between 2015 and the predicted figures for 2026 equal to / less than / more than the CAGR seen between 2015 and 2021.

**[2 marks]**

CAGR 2015 - 2026

$$= 100 \times \left[ \left( \frac{107.4}{62.2} \right)^{1/11} - 1 \right]$$

$$= 5.09\ \%$$

So the overall CAGR using the predicted figures up to 2026 is less than that seen between 2015 and 2021.

**d)** Jess is trying to improve the readability of **Graph 2** before presenting it to some gaming industry journalists.

Suggest two improvements she could make to **Graph 2** as shown in the preliminary material.

**[2 marks]**

Improvement 1: Have the percentages shown as a table or have the pie chart large enough to include the 2% figure inside the pie.

Improvement 2: Make the overall ~~size~~ size of the pie charts proportional to the total revenue

**e)** In **Report B** it is stated that 53 % of players preferred F@P games, 39 % preferred to pay a premium one off charge and 9 % preferred a subscription.

Adam says "$53 + 39 + 9 = 101$ and so this data can't be trusted.

Is their an alternative explanation?

Fully justify your answer.

**[2 marks]**

All figures could have been rounded to the nearest whole number. Eg, the value could have been.

$53 + 38.5 + 8.5 = 100$

38.5 rounds to 39 ; 8.5 round to 9

**f)** Using **Graph 3** describe the growth of revenue in cloud gaming between 2018 and 2026.

**[3 marks]**

In 2018 the growth rate of revenue from cloud gaming was around 12%. The rate of growth increased each year until 2023 at which, even though revenue continued to grow it was growing at a decreasing rate.
In 2026 the revenue is forecast to grow by around 2%.

**e)** Terry claims that in 2022 revenue from cloud gaming was almost 4 times that of revenue from physically sold games.

Does **Graph 3** support this claim?

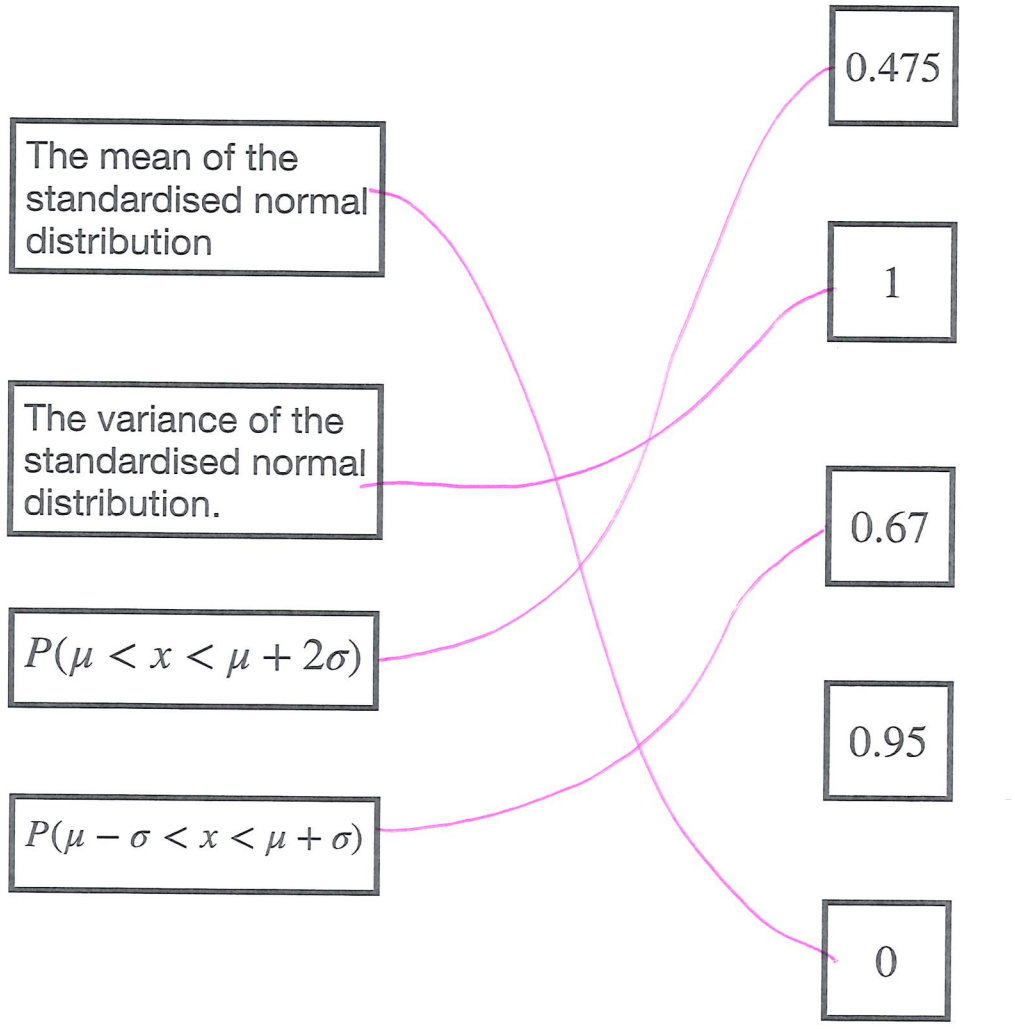
**[2 marks]**

No.
Graph 3 shows the growth rate, it doesn't show the absolute value of the revenue.

**3**

The normal distribution is an important probability distribution in statistics.

Draw a line from each box on the left to the correct values on the right.




**[2 marks]**

4 The weight of a cinnamon bun produced in a small craft bakery is normally distributed with mean 180 grams and standard deviation 10 minutes.

**a)** Calculate the probability that a cinnamon bun sampled off the production line will weigh

**i)** was 185 grams.

**[1 mark]**

Let X be = weight of a cinnamon bun.

$X \sim N(180, 10^2)$

$P(X = 0) = 0$

**ii)** was under 183 minutes

**[2 marks]**

$P(X \leq 183) = 0.617$

**iv)** was not below 85 % of the mean time

**[2 marks]**

85% of 180 = 153

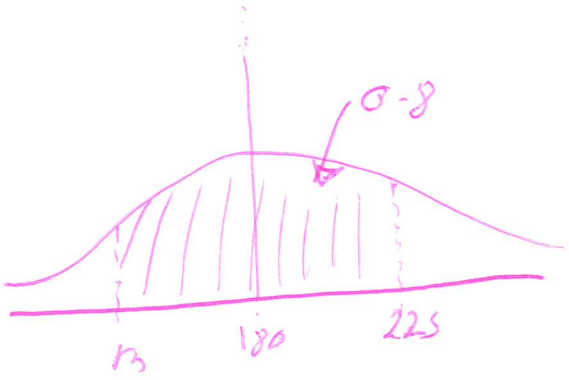
$P(X > 153) = 0.9965$

**b)** The probability a bun weighed between $m$ grams and 225 grams is 0.8.

Work out the value of $m$.

**[3 marks]**

$P(m \leq X \leq 225) = 0.8$




$P(X \leq 225) = 0.999996023$

So $P(X \leq m) = 3.977 \times 10^{-6}$

So $m = 135.3$

**5** Students in Year 11 collect behaviour points when they do something wrong.

Here are three point estimates for the mean score of all the students.

No student is in more than one sample.

| Sample Size | Point Estimate |
|---|---|
| 25 | 22.7 |
| 45 | 26.1 |
| 30 | 18.4 |

**a)** Using this data, what is the best possible estimate of the population mean for for the number of behaviour points per student in Year 11?

**[3 marks]**

$25 \times 22.7 + 45 \times 26.1 + 30 \times 18.4 = 2294$

$25 + 45 + 30 = 100$

So $\frac{2294}{100} = 22.94$

The best possible estimate of the mean is 22.9 to 1dp

**b)** Following the introduction of a new behaviour policy, Mr Barnes, the head of Year 11, wants to investigate whether the mean number of behaviour points per student has decreased.

Describe how he could collect a simple random sample.

**[2 marks]**

Number the students from 1 to n where n is the number of students in year 11.
Generate random numbers and select the corresponding student.
Continue until the required number of students have been selected.

**7** Tess is working with some data for 10 male Adelie penguins.

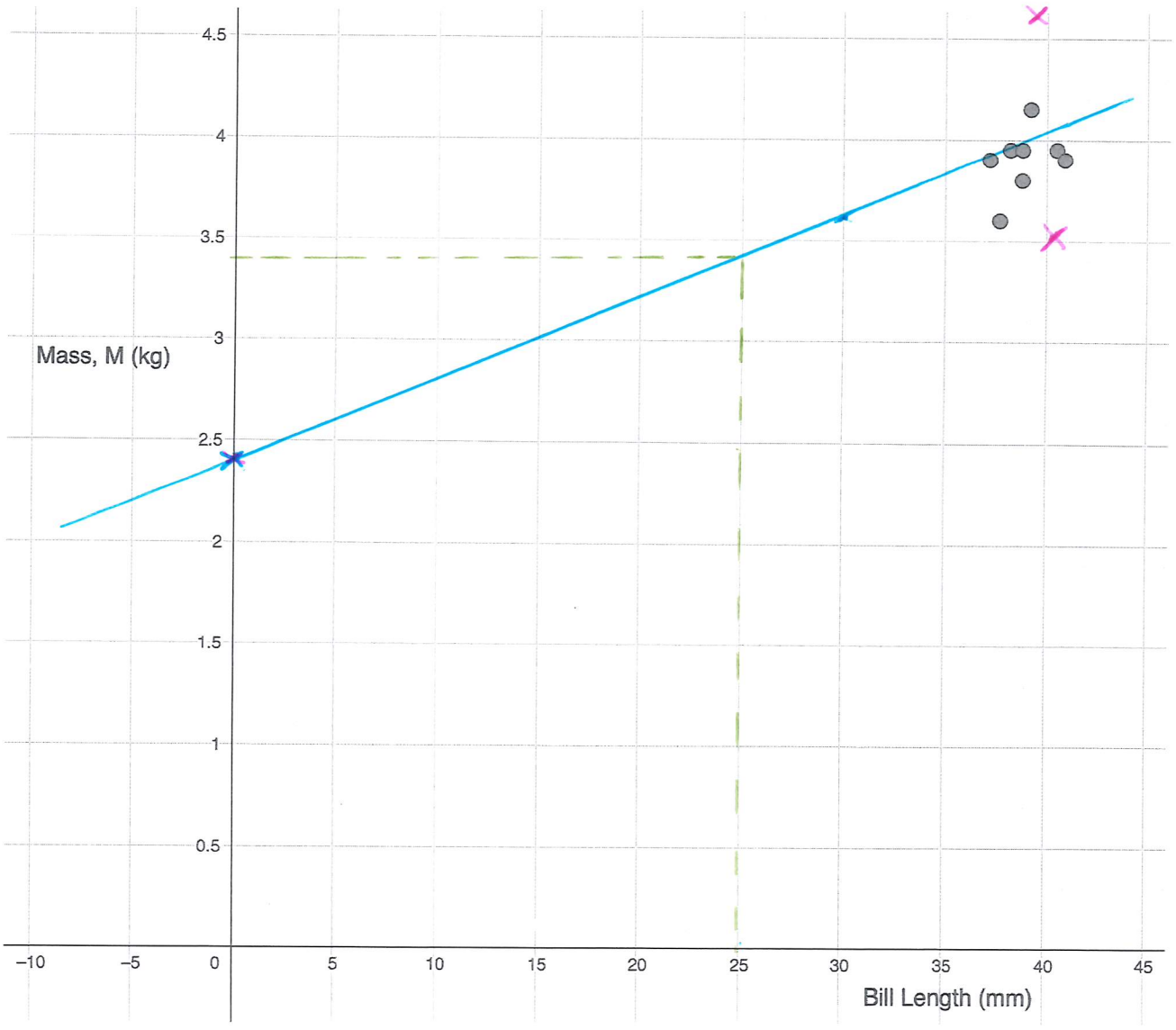
She is looking at the relationship between bill length and mass.

| | | | | | |
|---|---|---|---|---|---|
| **Bill Length (mm)** | 37.7 | 38.2 | 38.8 | 40.5 | 37.2 |
| **Mass (grams)** | 3600 | 3950 | 3800 | 3950 | 3900 |
| **Bill Length (mm)** | 40.9 | 39.2 | 38.8 | 40.6 | 39.8 |
| **Mass (grams)** | 3950 | 4150 | 3950 | 3550 | 4650 |

**a)** Tess plots the scatter diagram shown below.

It shows the mass (in kg) about plotted against bill length.
Complete the diagram by plotting the last two data points.

**[1 mark]**



**b)** How could the graphical representation of this data be improved?

**[1 mark]**

Use a broken axes in both the Bill Length and Mass axes.

**c)** **(i)** Calculate the equation of the regression line of $M$ on $B$.

**[2 marks]**

$M = 37.58B + 2472.84$

**(ii)** Draw the regression line on the scatter diagram.

**[2 marks]**

**d)** Tess measures another male Adelie penguin's bill length as 25 mm.

Calculate an estimate for the mass of this penguin, giving your answer in grams, and comment on its reliability.

**[3 marks]**

3480g.

This may not be reliable since 25 is out of the range of bill lengths used in the calculations of the regression line

e) The data set also contains the flipper length of the penguins as shown below.

| | | | | | |
|---|---|---|---|---|---|
| **Bill Length (mm)** | 37.7 | 38.2 | 38.8 | 40.5 | 37.2 |
| **Flipper Length (mm)** | 180 | 185 | 180 | 180 | 178 |
| **Bill Length (mm)** | 40.9 | 39.2 | 38.8 | 40.6 | 39.8 |
| **Flipper Length (mm)** | 184 | 196 | 190 | 183 | 184 |

Bobby wants to use the bill length to estimate the:

- Mass of a Penguin
- The flipper length

Which of these estimates is likely to be the most reliable?

**[3 marks]**

r for Bill length against mass = 0.15614704

r for Bill length against flipper length = 0.15478

Since r is greater for the bill length against mass this estimate is likely to be the most reliable.

**8** A fishmonger in St Ives is interested in the average weight of a sardine in their catch.

The weight is known to be normally distributed with mean $\mu$ and variance $15^2$ grams.

A sample of $10$ tomatoes are weighed giving the sample data below.

| | | | | |
|---|---|---|---|---|
| 178 | 165 | 120 | 154 | 153 |
| 147 | 148 | 125 | 146 | 178 |

**a)** Construct a $98\ \%$ confidence interval for $\mu$.

**[5 marks]**

98% confidence interval $\Rightarrow z = 2.3263$

$\bar{x} = 151.4$

$\sigma = 15$

98% confidence interval for $\mu = \bar{x} \pm 2.3263 \times \frac{\sigma}{\sqrt{n}}$

$= 151.4 \pm 2.3263 \times \frac{15}{\sqrt{10}}$

So interval is $(140.37, 162.43)$

**b)** Using your answer to **Question 7(a)** comment on the claim that $\mu = 161$.

**[2 marks]**

$\mu = 161$ is within the confidence interval, so the claim is likely to be true.

**c)** How could the conclusion to Question 7(b) change if a $90\ \%$ confidence interval had been used?

**[1 marks]**

If the percentage of the confidence interval decreases, the width of the confidence interval decreases, so it is possible that 161 no longer lies in the interval