Qualification Accredited

OCR
Oxford Cambridge and RSA

LEVEL 3 CERTIFICATE

Examiners' report

CORE MATHS A (MEI)

H868

For first teaching in 2016

H868/02 Summer 2022 series

Version 1

ocr.org.uk/maths

Contents

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate answers is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

Advance Information for Summer 2022 assessments

To support student revision, advance information was published about the focus of exams for Summer 2022 assessments. Advance information was available for most GCSE, AS and A Level subjects, Core Maths, FSMQ, and Cambridge Nationals Information Technologies. You can find more information on our website.

Paper 2 series overview

Candidates demonstrated a good understanding of the specification. Mathematical calculations were presented clearly, and a wide range of diagrams and situations were interpreted correctly. The best responses showed fluency in procedural skills, problem-solving and strategies, applied to both familiar and unfamiliar real-life contexts. Examiners saw many excellent descriptions and interpretations.

Candidates who did well on this paper generally did the following:	Candidates who did less well on this paper generally did the following:
• worked confidently in a range of contexts • structured their calculations clearly • worked accurately throughout • gave clear descriptions which were relevant • demonstrated modelling skills.	• worked confidently in familiar situations • did not present their calculations clearly • made frequent errors in their workings • did not address the relevant feature in their descriptive responses • did not set-up appropriate models.

Question 1 (a)

1 The two charts below show the percentage of people in different age groups who suffer from illnesses that limit their daily activities.
These are called 'disabling illnesses'.

Fig. 1.1 and **Fig. 1.2** show exactly the same data but using different types of chart.

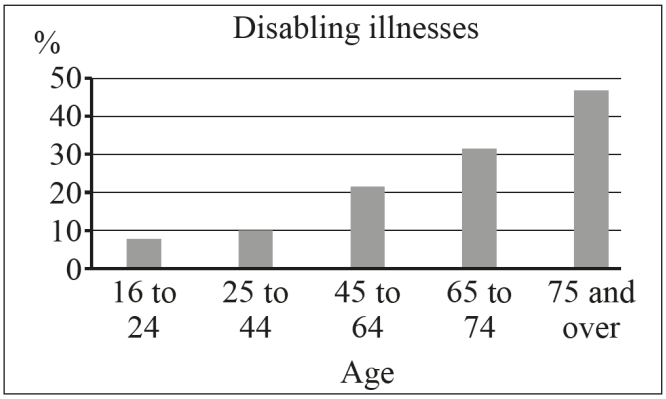


Fig. 1.1

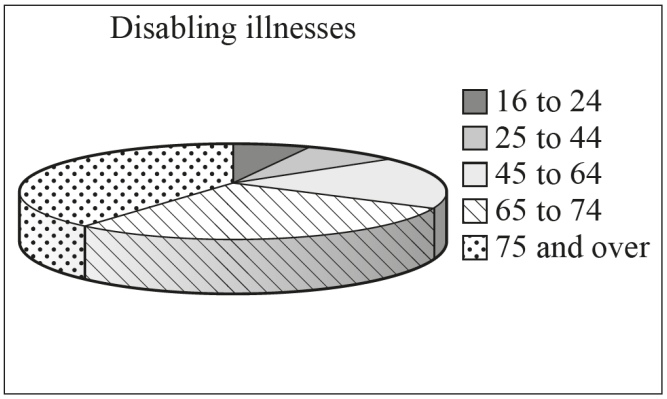


Fig. 1.2

(a) Give **two** reasons why **Fig. 1.1** presents the data more clearly than **Fig. 1.2**. **[2]**

Most candidates gave two clear reasons, usually referring to the vertical scale in the bar chart and the potential for misinterpretation of the 3D pie chart.

Question 1 (b)

(b) Chronic illnesses are illnesses which go on for a long time.

Fig. 1.3 shows the percentages of 16- to 24-year-olds and 65- to 74-year-olds who reported suffering from chronic illnesses and disabling illnesses.

Age	Chronic illness (%)	Disabling illness (%)
16 to 24	15	8
65 to 74	57	32

Fig. 1.3

Older people have an increased risk of suffering from chronic illnesses.
The increase in the risk can be described in two ways.

For chronic illnesses, the proportion of 65- to 74-year-olds is

- 42 percentage points more than for 16- to 24-year-olds
- 280% more than for 16- to 24-year-olds

Calculate the change in the proportions suffering from disabling illnesses in the same two ways. **[3]**

The most successful responses modelled both calculations by first checking the figures presented for chronic illnesses. A common wrong response that earned only partial credit was to state 400%, which is the ratio of 32 to 8, rather than 32 being 300% more than 8.

Question 2 (c)

(c) **Fig. 2** shows there are more people aged 65+ than aged 55–64 in the **UK adult population**.

Explain why you would expect this to be the case. **[1]**

Most gave a correct reason here, by indicating that the 65+ age group is much wider than the 55-64 group, which only includes 9 years. Other incorrect responses referred to life expectancy, which did not directly address the issue of the group widths.

Question 2 (d)

(d) The owners of the online shop are planning an advertising campaign.
They will target the campaign at **either** the 25–34 age group **or** the 55–64 age group.

Give a reason in favour of each of these options. **[2]**

The most successful responses intuited the potential for growth in the 25-34 age group, and the popularity of the online shop with older shoppers. Engagement with social media and technology was another common response that was accepted for targeting the younger age group.

Question 2 (e)

(e) The advertising campaign is targeted at the 25–34 age group.

- The number of customers in this age group doubles.
- The number of customers in each of the other age groups stays the same.

What happens to the **percentages** of customers in the **other** age groups?
Tick the correct box and explain your reasoning. **[2]**

☐	They all go up
☐	They all go down
☐	They all stay the same
☐	There is no pattern to the changes

Most candidates gave a clear justification based on the other groups now taking a smaller proportion of the whole amount.

Question 3 (a)

3 Nina is getting a new mobile phone.
She can insure it against theft and damage for £5 a month.

- If she does **not** have the insurance, it will cost her £300 if the phone is stolen and £60 if the phone is damaged.
- If she has the insurance, it will cover these costs.

2% of phones are stolen each year.
1.5% of phones are damaged each year.
Assume that the phone will **not** be stolen or damaged more than once in a year.

(a) Explain why theft is a higher risk for Nina than damage. **[1]**

Nearly all candidates gave a good response, referring either to the higher chance of theft or the greater cost of replacement.

Question 3 (b)

(b) If the phone is **not** insured, what will be the average cost of theft and damage for one year? **[2]**

Examiners saw very few correct responses here, with many candidates taking the mean of £300 and £60. The correct response of £6.90 was obtained by some more successful candidates, who used the probabilities along with the costs, to determine the average cost for a year.

Question 3 (d)

(d) Give a reason why Nina might choose to buy the insurance for the phone. **[1]**

Most candidates were able to give an appropriate justification for purchasing the insurance, to gain peace of mind or to limit the cost when a phone is stolen.

Question 3 (e)

(e) Give a reason why the insurance company needs to charge more than the expected payout for the insurance. **[1]**

There were many good responses that developed the idea of a company making profit on its activities.

Question 4 (a)

4 A market researcher is interviewing people in a busy town in the UK on a Saturday morning to find out whether they approve of government policy.

The researcher wants to know how likely it is that the next person they meet is one of the following types of person.

A. An adult female
B. A female aged over 25 who has a university degree
C. A female aged over 25
D. An adult aged over 25

(a) Explain why A is more likely than C. **[1]**

Examiners saw many correct responses, which referred clearly to the 18+ age group being larger than the 25+ age group.

Question 4 (b)

(b) Assume the people in the town are typical of the UK.

Put A, B, C and D in order of probability, with the least likely first. **[2]**

Nearly all candidates could place the four categories in the correct order.

Question 4 (c)

(c) The researcher's results are found **not** to be representative of the UK as a whole.

Suggest **one** possible reason for this. **[1]**

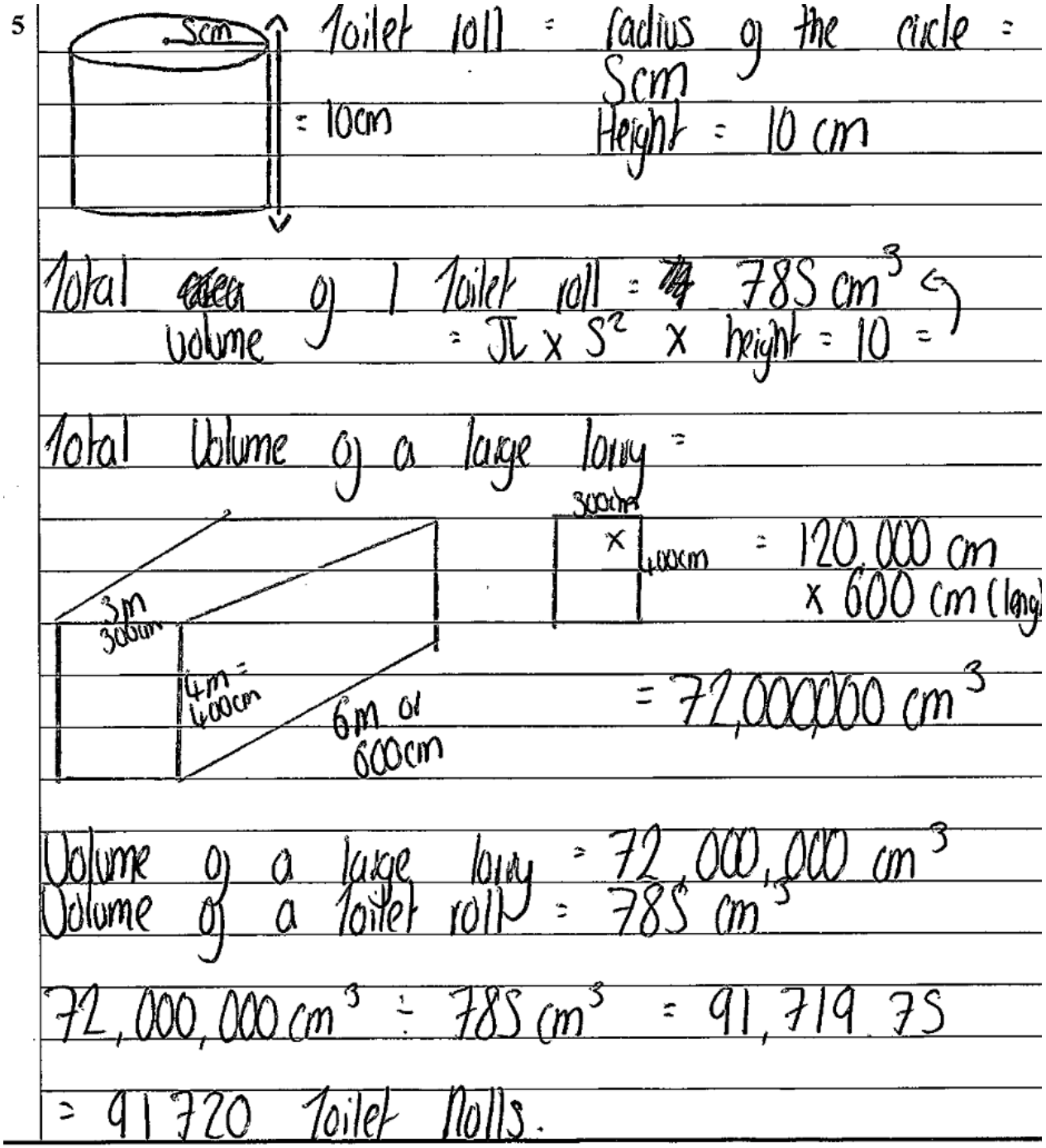
The most successful responses referred to a particular feature such as the small sample, or the demography of the town where the research was carried out, or the chosen time for the survey. Many responses wrongly referred to the particular groupings in Question 4(a), which on its own could not earn credit for why the researcher's results were not representative.

Question 5

5 Estimate the number of toilet rolls in a large lorry full of toilet rolls.
Show all your reasoning. **[7]**

This unstructured question was attempted well by most candidates, and examiners saw many excellent and innovative solutions to this unfamiliar problem. The two most popular methods involved volume calculations or a dimensioning approach. Some candidates gave unrealistic sizes for the large lorry and/or toilet rolls. In the dimensioning approach, the number of toilet rolls fitting into each of the length, width, height of the lorry needed to be considered. The best responses clearly stated the size of a lorry and a toilet roll at the outset, with units, which were then converted at an appropriate point.

Exemplar 1



In Exemplar 1 sketches have also been used to good effect, to support the calculation of volume for a cylinder and a cuboid. The response has been structured with toilet roll considered first, followed by the lorry, and at this point the units are dealt with. The final calculation, involving division of the two volumes, is also presented very clearly.

Assessment for learning

In an unstructured question, candidates should take care to organise the main elements of their response. Headings and sketches might be appropriate, alongside calculations, and will give the response a good structure. Conclusions should be stated clearly where there has been an element of reasoning.

Question 6 (a), (b), (c), (d)

6 People in some jobs are tested for illegal drugs.
A test for a particular illegal drug is not completely accurate.
97% of those who **have** taken the drug will test positive.
99% of those who **have not** taken the drug will test negative.

(a) A population has 20% of people taking the drug.
A random sample of 10 000 people from the population is tested for the drug.

Complete the two way table to show the expected frequencies. **[3]**

(b) What percentage of people test positive? **[2]**

(c) What percentage of those who test positive have actually taken the drug? **[2]**

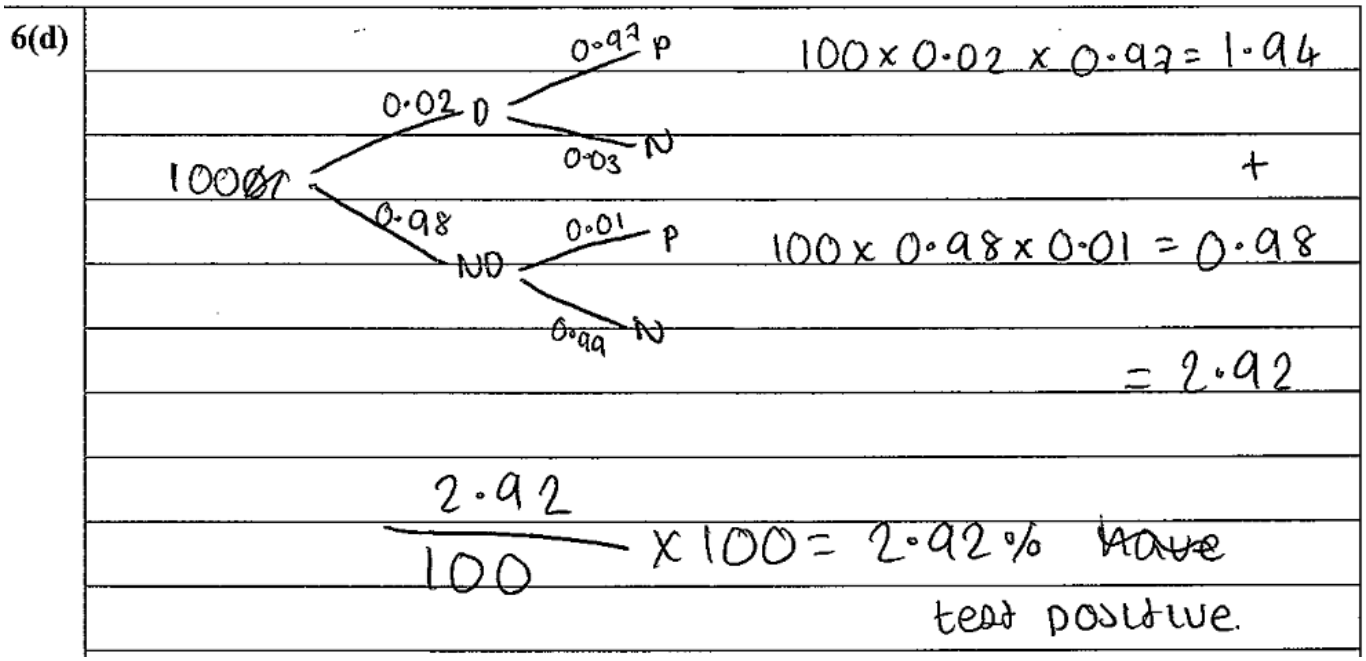
The same test for the drug is used on a different population.
Assume 2% of this population has taken the drug.

(d) Show that nearly 3% would test positive. **[4]**

This commentary applies to Question 6 parts (a) to (d). Most candidates scored well in this question. The two way table, based on 10 000 people in the trial, was nearly always completed correctly. Most candidates then went on to identify the appropriate categories from their table, to form the percentages required to earn full marks in Question 6(b) and Question 6(c). A wide range of approaches was seen in Question 6(d). Modelling with 10 000 people was a popular choice, to build a two way table again, or to simply carry out the minimal number of calculations to justify the given result.

Some candidates presented their calculations clearly using a probability tree, or with a cross-over method as in Exemplar 2 here, which effectively breaks-down a 100 person sample into the various categories.

Exemplar 2



Question 7 (a) (i)

7 This question refers to the article "**A: Attainment 8 and Progress 8**".
This was given out as pre-release material and is available as an Insert.

(a) Alex gets the GCSE results shown in **Fig. 7.1**.
Alex does **not** take any other qualifications.

Maths	7
English Language	5
English Literature	9
Biology	7
Chemistry	8
Physics	6
Art	4
French	7
Religious Studies	8
History	9

Fig. 7.1

(i) Calculate Alex's Attainment 8 score. Show your working clearly. **[5]**

There were many excellent responses to this question. The most successful responses took a structured approach, setting out clearly the scores in maths, English, EBacc and Open to obtain the correct total score. Other attempts were more unstructured, with some including all subject scores despite the description of Attainment 8 given in the insert.

Question 7 (a) (ii)

(ii) A new system for calculating attainment is proposed.
It is similar to Attainment 8 but uses the **total** of English Language and English Literature for the English score.
The Maths and EBacc elements are the same as for Attainment 8.
The open element still contains the three highest point scores in any other subjects, but it cannot contain English Language or Literature as these have already been used.

Calculate Alex's score using the new system. **[2]**

Those who took a strategic approach here were most successful, replacing the doubled English Literature score with the sum of Literature and Language. Many incorrect responses were also able to earn partial credit for this element.

Question 7 (a) (iii)

(iii) Tick the correct statement about the proposed new system for calculating attainment and justify your answer. **[2]**

Many candidates scored just 1 mark here, for choosing the correct statement intuitively, but were unable to justify their choice robustly.

Question 7 (b) (i)

(b) **Fig. 7.2** and **Fig. 7.3** show the Progress 8 scores of a random sample of schools.
For both graphs, a negative improvement means that the score went down from 2018 to 2019.

(i) **Fig. 7.2** shows the overall Progress 8 score in 2018 and the improvement from 2018 to 2019 for each of the schools.

Circle a point in **Fig. 7.2** which represents a school which had below average Progress 8 in 2018 **and** did worse in 2019. **[1]**

Candidate responses were usually correct, choosing a point in the correct quadrant of the graph.

Question 7 (b) (ii)

(ii) **Fig. 7.3** shows the equivalent data for just the Maths element from Progress 8.

Circle the point in **Fig. 7.3** which represents the school with the greatest improvement in the Maths element of Progress 8 from 2018 to 2019. **[1]**

The selection of one of two points could earn the mark here, due to the ambiguity with the labelling of graph axes.

Question 7 (c) (i)

(c) **(i)** Draw a line of best fit on **Fig. 7.3**. **[1]**

Most candidates drew an appropriate line of best fit. The most common wrong response came from a line that was too steep and did not fit the trend of the points.

Question 7 (c) (ii)

(ii) What feature of **Fig. 7.3** shows that there is regression to the mean? **[1]**

Many candidates offered a range of incorrect reasons for this that were not given marks, for example, clustering around the intersection of the axes was not a correct response. There were an encouraging number of stronger responses, that gave a clear description of regression towards the mean in the context of improvement against attainment.

Question 8 (a) (i), (ii) and (b)

8 A large number of people are taking part in a programme to improve their memories.

Li says:

"There is just as much chance of a randomly chosen person improving as there is of them doing worse."

To test Li's theory, a random sample of 256 people taking part in the programme is taken. People who did neither better nor worse are **not** included in the sample.

(a) Assume that Li is correct.
Imagine lots of random samples of 256 people are taken and the number of people with improved memories is counted in each sample.

(i) What would be the mean number of people with improved memories in the samples? **[1]**

(ii) What would be the standard deviation of people with improved memories in the samples? **[2]**

(b) A random sample of 256 people is taken and 120 of them have improved memories.

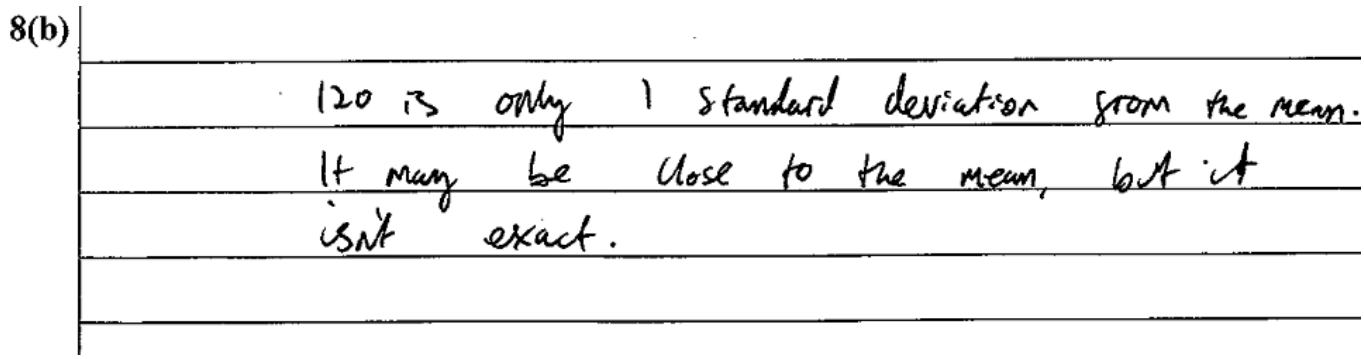
Explain whether this provides evidence that Li was wrong about people having just as much chance of improving as doing worse. **[3]**

This commentary applies to all parts of Question 8. An encouraging number of candidates showed a good understanding of the "statistical experiments" part of the specification, applying an appropriate model in response to this question. Nearly all candidates wrote down the correct response to Question 8(a)(i) intuitively. Most attempted a calculation for standard deviation in Question 8(a)(ii), but only a few of these quoted the correct formula $\frac{\sqrt{n}}{2}$.

Nearly all candidates who had a value for standard deviation in Question 8(a)(ii), were able to articulate the number of standard deviations from the mean, see Exemplar 3.

The response in Exemplar 3 here, showed the number of standard deviations from the mean to earn the first 2 method marks. However, only a small number of candidates were able to draw an appropriate conclusion in context, about whether this was an unusual result or not, based on the initial assumption. The extract here does not score the final mark.

Exemplar 3



Misconception

For an experiment which can be modelled by the toss of a fair coin, for n repetitions of the experiment the standard deviation is $\frac{\sqrt{n}}{2}$ which is not the same as $\sqrt{\frac{n}{2}}$.

Copyright information

Supporting you

Post-results services

If any of your students' results are not as expected, you may wish to consider one of our post-results services. For full information about the options available visit the OCR website.

Keep up-to-date

We send a weekly roundup to tell you about important updates. You can also sign up for your subject specific updates.
If you haven't already, sign up here.

OCR Professional Development

Attend one of our popular CPD courses to hear directly from a senior assessor or drop in to a Q&A session. Most of our courses are delivered live via an online platform, so you can attend from any location.

Please find details for all our courses on the relevant subject page on our website or visit OCR professional development.

Signed up for ExamBuilder?

ExamBuilder is the question builder platform for a range of our GCSE, A Level, Cambridge Nationals and Cambridge Technicals qualifications. Find out more.

ExamBuilder is **free for all OCR centres** with an Interchange account and gives you unlimited users per centre. We need an Interchange username to validate the identity of your centre's first user account for ExamBuilder.

If you do not have an Interchange account please contact your centre administrator (usually the Exams Officer) to request a username, or nominate an existing Interchange user in your department.

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on
01223 553998

Alternatively, you can email us on
support@ocr.org.uk

For more information visit
ocr.org.uk/qualifications/resource-finder
ocr.org.uk
/ocrexams
/ocrexams
/company/ocr
/ocrexams

We really value your feedback

Click to send us an autogenerated email about this resource. Add comments if you want to. Let us know how we can improve this resource or what else you need. Your email address will not be used or shared for any marketing purposes.

I like this **I dislike this**

Please note – web links are correct at date of publication but other websites may change over time. If you have any problems with a link you may want to navigate to that organisation's website for a direct search.

CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT