



AELP Think Piece

“Understanding the Challenges in Functional Skills Maths Qualifications (FSQs)”

Introduction

Despite a substantial increase in the funding rate for delivering FSQs to new apprentice starters from January 2024 (rising from £471 to £724) marking a significant improvement in addressing long-standing funding inadequacies in this domain, benefiting both apprentices and training providers, FSQs face wider challenges beyond funding. This is reflected in the persistently low pass rates observed in FSQ maths, particularly at Level 2¹. Moreover, the 2019 FSQ reforms, which introduced non-practical and context-free maths into assessments have drawn criticism for reducing the qualifications functionality, making it resemble GCSEs, rather than serving as a viable alternative.

[Research](#) published by [AELP \(2024\)](#), in collaboration with the Institute of Employment Research (IER) at Warwick University and the Association of Colleges (AoC), funded by the Edge Foundation and Gatsby Foundation, emphasised the challenges posed as a contributing factor to withdrawal from apprenticeship programmes. Despite the aim of FSQs to empower those learners without GCSEs, they currently hinder vocational programme attainment, necessitating a strategic reassessment to effectively support learner progression.

In order to explore these challenges further AELP², in partnership with Edge Foundation and Gatsby Foundation, conducted an additional research study in 2024 to ‘Understand challenges in Functional Skills Maths Qualifications’, gathering insights from a small sample of apprentices (18) and Independent Training Providers (ITPs) tutors (10) from across a variety of sectors, including Health, Engineering, Business, Education, and Construction. The findings highlighted several issues with the FSQ maths exam content, particularly the presence of overly complex exam questions and abstract questions which lacked relevance to the apprentices’ actual job role.

There is an urgent need to consider how we can improve FSQ maths curriculum and exam content in order to address the complexity and contextual nuances of underpinning skills and problem-solving questions, ultimately to ensure that such matters do not hinder the learners’ ability to achieve and progress.

This think piece, using the findings of our 2024 research study, aims to highlight the key challenges and provide opportunities to open the discussion wider with the sector and the new Government. We are also raising these issues and discussion points (see below) with the Federation of Awarding Bodies (FAB), Ofqual and Awarding Organisations delivering functional skills at a roundtable event in October 2024.

Project Lead:

Cheryl Swales, AELP Head of Strategic Projects

¹ Based on the overall pass rates published by three Awarding Organisations noted as: 44% NCFE, 37% Pearson and 45% City and Guilds (2022/23 data)

² *Principal Researcher - Dr Chihiro Kobayashi (April – June 2024)*



Points for discussion:

1. *How can we simplify FSQ exam questions to focus the assessment on mathematical rather than reading ability?*
2. *How can we increase the contextual or vocational relevance of FSQ maths exam questions without increasing the verbosity of questions?*
3. *Can AI be used more widely/effectively to create functional mathematics questions of similar difficulty but in different vocational contexts.*
4. *How can online testing platforms be improved to focus on learners' mathematical proficiency?*
5. *How can we ensure a balanced and standardised approach across AOs that prioritises clarity and manageability whilst maintaining real-life relevance and maths practicality?*
6. *How can we ensure that employers support their apprentices to develop and practice mathematical concepts and techniques in the workplace and ensure that apprentices are given sufficient time with providers to consolidate their mathematical understanding.*
7. *How can improved understanding and collaboration between employers and training providers be fostered by the sector to showcase the value of FSQ maths in apprenticeships?*

Existing studies:

Existing studies have already emphasised the value of contextualised learning, citing its ability to link math problems to real-world applications, engage learners, enhance understanding, and improve information retention. These studies ([ETF, 2014](#); [Casey et al., 2006](#)). [DfE \(2018a\)](#) describe that ‘the subject content is not designed to be occupationally-specific, but rather to set out the broader skills required at each skills level and teaching approaches should be adapted to suit the specific occupational context if required’.

During our research, we found that tutors delivering FSQs encounter significant difficulties in contextualising lessons to match the diverse backgrounds and sectors. Although many tutors attempt to integrate maths into apprentices' occupations, when dealing with mixed groups consisting of individuals from diverse vocational fields, it becomes notably difficult to customise the curriculum to address the unique needs of each learner. As one tutor interviewed for this research explained:

“But what we found is my colleague was really trying to embed the contextualisation into her hair and beauty, and she got a lot of pushback from it because they [apprentices] were saying that it doesn't work. The maths that we're doing is not what we do in the workplace. We don't do it like that”

Given the challenges around FSQs, the research emphasised the importance of appropriate contextualisation. It recommended:

“Infusing real-world scenarios into exams motivates learners and enhances skills acquisition. Government and regulators should also proactively consider FSQ assessment methods in line with evolving AI capability”

This approach complemented other recommendations to promote diverse assessment methods for FSQs, incorporation of FSQs into off-the-job training within apprenticeships, and tailored English and maths programmes to specific occupational scenarios.

Given apparent difficulties around appropriate contextualisation, the research suggested contextualising FSQ examination questions might not need to be an overwhelming task:

“The advent of artificial intelligence (AI) tools will make it even easier. For instance, the use of generative AI was recently showcased at the Conference on Test Security, where questions created by AI were reviewed and adjusted by human experts ([FE News, 2023](#)). This process allows the development of individualised exams that are both robust and consistently indicative of the same skill level [...] In principle there is no reason why AI could not produce individualised applied questions in specific occupational scenarios, highlighting a direct connection between the subject and the work the learner is training for”

Moreover, the process of occupation contextualisation requires a deep understanding of the sector and occupation to relate to and adopt maths. Tutors may encounter difficulties in fully grasping the nuances of every vocational field present within their classes, thereby making it challenging to tailor the content in a manner that resonates with and captivates all learners.

Further in assessment, the integration of real-life applications of maths into their problem-solving questions often leads to longer, more convoluted question passages compared to abstracted maths.



This can overwhelm learners, and lead to increased anxiety. This is especially problematic in a timed test environment where learners also feel the pressure of time constraints. For ESOL learners and learners with additional needs, this problem of inaccessibility can be compounded. Further issues included a limited perceived authenticity of questions to job roles, and employers' failure to prioritise study over immediate job. FSQ summative examination mediums compounded issues. Learners expressed specific challenges related to online exams, such as difficulty in transferring answers and work from paper to digital formats, and a lack of alternative pathways or options within the testing system.

An evaluation by [Ofqual \(2024\)](#) of recent reforms to FSQs echoed stakeholders' concerns regarding increased inaccessibility and diminished comprehensibility due to changes in subject content, the introduction of non-calculator assessments, and disruptions from COVID-19. Specifically, issues in problem-solving assessments were highlighted, leading to heavier reading loads and context-based questions. Ofqual identified providers were concerned about the 'unfamiliarity of the contexts used in some instances, as well as the length or complexity of wording of the questions'.

Methodology:

To begin to explore this avenue of inquiry, this study undertook an empirical approach. The research utilised a combination of interviews and focus groups. It gathered firsthand insights from learners and tutors regarding the challenges faced during FSQ maths tests. It focused on the complexity and contextual nuances of underpinning skills and problem-solving questions. It also sought to investigate how different question presentations, such as abstract maths, sector-contextualised maths, visual aids, and simpler maths, influence learners' perceptions of question manageability. During learner interviews, participants were presented with a brief FS maths worksheet comprising six underpinning and problem-solving FSQ Level 2 maths questions.

These questions, developed by AELP using ChatGPT, were customised to suit learners' sectors across five different domains in order to compare their understanding (see annex 1). Focus groups were organised within each sector to facilitate occupation-contextualised discussions, with an emphasis on conducting maths exercises relevant to apprentices' respective fields. Participants were instructed to review paired questions covering the same mathematical concepts and to indicate their preference on the style and format. The learners were not required to answer the questions themselves but were asked to give their impressions about how easy or not they found the question format. This means we cannot determine which question was easier for learners to answer correctly, a notable limitation of this study. Nevertheless, this research offers stimulating indications on the nature of effective contextualisation and designing accessible assessments.

Learners were presented with an original question (A) and a form of contextualised version (B) created by AELP based on an occupation sector. Researchers invited students to compare questions with several types of contextualisation. For the first question (Q1), a ratio problem, analysis shows a preference for the straightforward unit division (A), with 13 responses, over the contextualised version (B), garnering only 5. Conversely, in the second question (Q2) involving percentage increase, the contextualised version (B) slightly outperforms the abstract one (A), suggesting the nuanced impact of context on occupational contextualisation in underpinning skills questions, as adding context can extend the length of the question.



Summary

FSQ maths tutors have to navigate an array of challenges when delivering FSQ maths, such as occupational contextualisation, time constraints, and balancing examination preparation with skill retention. Customising lessons for diverse learners proves intricate, while limited time frames hinder comprehensive skill mastery. Moreover, the focus on exam strategies risks overshadowing genuine learning. With the development of new technologies and wider use throughout the education system this could be an opportunity to enable a review of how Awarding Organisations structure FSQ exams, particularly maths.

Our research activities highlighted the following **five key challenges** faced by FSQ maths tutors and learners, where we feel that improvements could be made. These challenges are explored below and relate to the discussion points above:

1) Lengthy and complex maths questions:

Tutors and learners reported that the lengthy and complex questions used in FSQ maths exams tend to overwhelm and as a result, learners must exert considerable cognitive effort beyond simple maths calculations. This is especially problematic in a time test environment where learners also feel the pressure of these time constraints, impacting their ability to focus and perform effectively and understand what they are being asked to do. This can be more challenging for learners where English is not their first language, and/or they present with Special Education Needs and Disabilities (SEND) or Additional Learning Needs (ALNs) whereby learners often find themselves at a disadvantage as they grapple, not only with the complexity of the mathematical concepts, but also with the intricacies of a second language and/or additional need.

2) Disconnect between FSQ curriculum and occupational job roles:

Findings from interviews suggested a significant disconnect between the FSQ curriculum and the practical needs and expectations of learners in vocational and apprenticeship settings. Learners often cannot see the connection between the skills being taught/tested and their everyday life and professional tasks. This challenges, their ability to perceive the value in what they are learning, adversely affects their engagement and motivation and also increases stress and anxiety. However, it should be noted that the study also found that adding context can extend the length of the question, and can still be difficult for learners with weak maths foundations. While learners seem to prefer the assessment to relate to their occupational area (relevance to) the increased verbosity of the questions made it more daunting and challenging to maintain existing negative attitudes towards maths as a subject.

3) Constraints with online exam formats:

Learners expressed specific challenges relating to online exams, such as difficulty in transferring answers and work from paper to digital formats, particularly for setting out 'workings out' and calculations, highlighting a preference for paper-based exams. Online testing requires extra time and effort and tutors are equally concerned that the requirement to type answers that are traditionally solved on paper and then uploading them to the online testing platform consumes valuable time,



potentially leading to incomplete responses and lost marks. This not only affects the students' ability to demonstrate their mathematical proficiency but also impacts on their overall test performance.

4) Standardisation of FSQ maths exam questions across Awarding Organisations (AOs):

This part of the research included analysis of past FSQ maths exam papers from three different AOs in terms of the length of questions and it was found that typically, there is no standardised approach. Longer questions typically involve problem-solving and carry higher point values, ranging from 4 to 6 points (from the calculator section) and in some instances, question length may exceed 100 words, often containing a multitude of information making them challenging to comprehend in a single reading. Learners prefer straightforward and concise questions and the inclusion of visual aids and occupational contextualisation to reduce cognitive load.

5) Time constraints and employer support for FSQ delivery/exam preparation:

Tutors reported that time constraints for delivery pose a considerable challenge. The restriction of FSQ training not being counted towards 'Off-The-Job-Training' time results in tight schedules around other activities, not only affecting the depth of understanding for learners but also posing a threat to their progression. There is also often inadequate employer support for FSQs; whilst they understand the need for learners to participate they don't always understand the importance of it and periods of sickness and departmental limitations were particularly highlighted as issues, as learners can often fall behind and find it difficult to get back on track. Tutors also encounter the dual challenge of imparting both the subject matter and the strategies necessary to effectively navigate the maths component around the apprentices' other commitments such as other aspects of their apprenticeship, their actual job role, and personal responsibilities such as childcare.

Addressing these issues, and the discussion points noted above, is crucial for fostering meaningful learning experiences and preparing learners for the complexities of the real world and work, whilst ensuring that learners are able to learn, achieve and progress, regardless of age and/or starting points.



Supporting Statements

AELP

The work of both this study and AELP's recent mini commission into Functional Skills Qualifications (FSQs) has highlighted some key frustrations for employers, providers and learners, but we acknowledge that it remains a complicated situation. We know that good literacy and numeracy are essential to building a sustainable and progressive career, however the applied policy can sometimes hinder this, along with the content of FSQs, and the suitability and complexity of assessments.

The five key challenges identified in this study highlight the need for a review of how FSQ maths, in particular, are assessed and administered, taking consideration of the advancement of more innovative technologies and the use of Artificial Intelligence (AI) being developed and utilised more by providers in their teaching. Subsequent discussions with Awarding Organisations allude to this being 'a long way off' in being used for assessment purposes, however we believe that with further research and more testing of this approach with learners, we may, over time, be able to bring technology to the forefront to improve the assessment experience for all.

As mentioned in the introduction section of this think piece, there is an urgent need to consider how we can improve FSQ maths curriculum and exam content in order to address the complexity and contextual nuances of underpinning skills and problem-solving questions, ultimately to ensure that such matters do not hinder the learners' ability to achieve and progress.

The bigger question for AELP remains 'are FSQ qualifications necessary as an exit requirement for apprenticeships?' We are continuing our discussions around bringing apprenticeships in line with other programmes of study where FSQs are not a mandatory exit requirement (i.e. T-Levels, A-Levels) but are clear that there should also be an option available to those learners who want to upskill, with or without the added pressure of assessment (and in a lot of cases multiple resits) to enable them to progress in their chosen career.

Edge Foundation



There are considerable problems in the assessment and delivery of English and Maths Functional Skills Qualifications. This has understandably led to frustrations from learners, providers, and employers. And it is clear that cultivating good English and maths competencies doesn't have to be fractious in this way. At Edge, we've held up past [examples of the sort of English and maths provision](#) that [used to prevail in Further Education](#) to learn from.

The capacity to utilise the powerful tools gained through the study of English and maths are critical to learners, for their careers and in life. They foster learners' ability to collaborate in and outside of work, wield technical aptitude, communicate professional judgments, and establish a solid foundation for addressing future challenges.

This study and subsequent roundtable discussion illuminated the tensions in balancing the accessibility of assessment, the length of assessment questions, and their authenticity to the professional context of apprentices. It perhaps points towards the need for a rethink. There might still be opportunities for

using innovative technologies, including AI, across delivery and assessment. There needs to be consensus around the purpose of Functional Skills Qualifications – who they are for and what we want learners to achieve. With that, we can ensure learners have confidence in their capacities, and we may be able to sustain the objective of ensuring every apprentice leaves their apprenticeship with Level 2 English and maths accreditation.

Gatsby Foundation



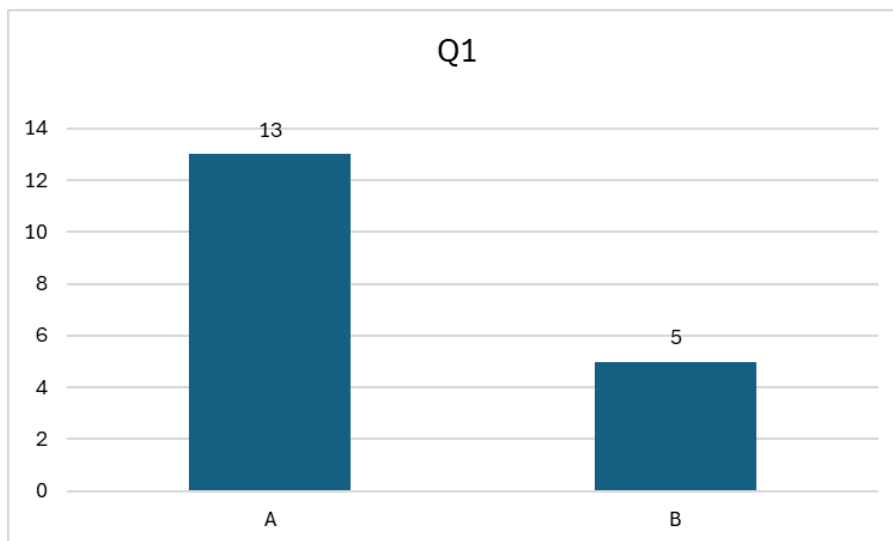
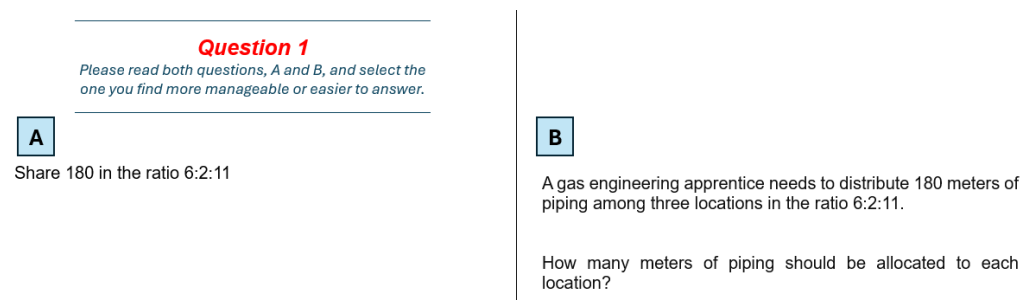
These two pieces of research on functional skills show how challenging it is to get the assessment right. We know, and this work confirms, that assessment will drive pedagogy and the resulting experiences of learners. We need to find ways of re-engaging learners, both young and old, with mathematics and English. The second piece of research sought to explore whether the contextualisation of mathematics assessment might be a tool for this re-engagement, but it appears to have fallen foul of learners' poor literacy skills.

Perhaps the real lesson here is that solving problems of literacy and numeracy post-16 is very difficult. The current curriculum and assessment review must look to reduce the number of students who reach the age of 16 without basic literacy and numeracy. For older learners, we should explore how to integrate numeracy and literacy into their training, rather than using separate qualifications.

Annex 1

Questions 1 and 2 delve into how occupation contextualisation influences learners' ability to solve underpinning skills questions. Each question presents an original (A) and contextualised version (B) created by AELP based on an occupation sector. For the first question (Q1), a ratio problem, analysis shows a preference for the straightforward unit division (A), with 13 responses, over the contextualised version (B), garnering only 5. Conversely, in the second question (Q2) involving percentage increase, the contextualised version (B) slightly outperforms the abstract one (A), suggesting the nuanced impact of context on occupational contextualisation in underpinning skills questions, as adding context can extend the length of the question.

Figure 1: Mini FS Maths Worksheet Question 1



Source: Created by AELP

Figure 2: Mini FS Maths Worksheet Question 2

Question 2
Please read both questions, A and B, and select the one you find more manageable or easier to answer.

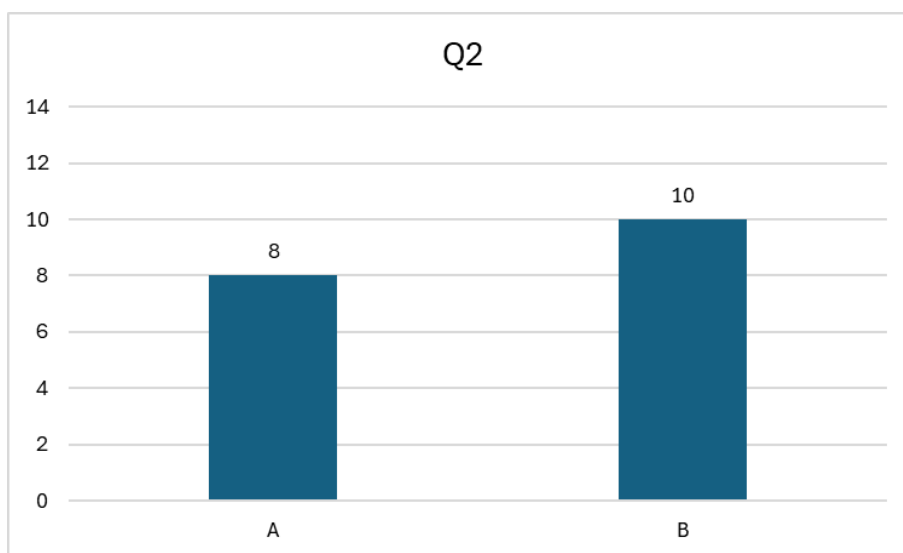
A

Work out the percentage increase from 250 to 330

B

An apprentice measures the pressure in a gas storage tank. It has increased from 250 psi to 330 psi.

What is the percentage increase in pressure?



(Source: Created by AELP)

Questions 3 and 4 investigated if visual aids reduce cognitive load and enhance question comprehension. For Question 3, 11 apprentices opted for the visual representation, while 7 chose the sentence-based format. Participants favoured visuals like diagrams and scatter graphs for their simplicity and ease of understanding. Similarly, in Question 4, 14 apprentices preferred the visual format over the text-based option due to its clarity. However, some apprentices cautioned that inappropriate visuals could hinder comprehension.

Figure 3: Mini FS Maths Worksheet Question 3

Question 3

Please read both questions, A and B, and select the one you find more manageable or easier to answer.

A

10A

A sports car is made into a scale model. The real length of the car is 3.60 metres. The scale used is 1 : 30.


What is the length of the scale model?

 cm

B

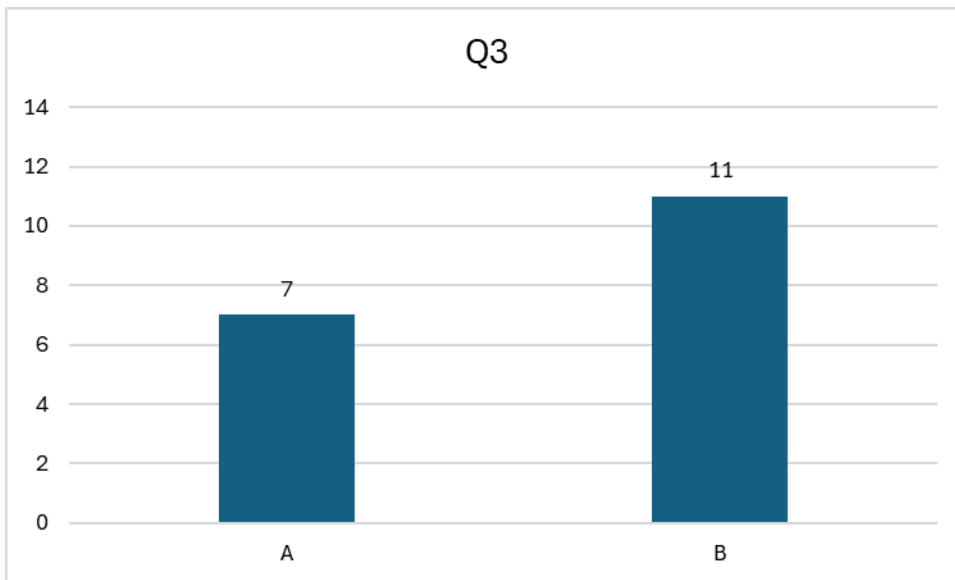
10B

Real length of car = 3.60 metres
 Scale 1 : 30



What is the length of the scale model?

 cm



(Source: Created by AELP)

Figure 4: Mini FS Maths Worksheet Question 4

Question 4

Please read both questions, A and B, and select the one you find more manageable or easier to answer.

A

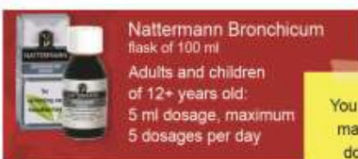
17A

You are using a medicine against coughing. The cough drops are sold in flasks of 100 ml. Adults and children of 12+ years old are allowed to take 5 ml as a dosage, with a maximum of 5 dosages per day. You use the maximum dosage.

How many days will one flask of cough drops suffice?
 days

B

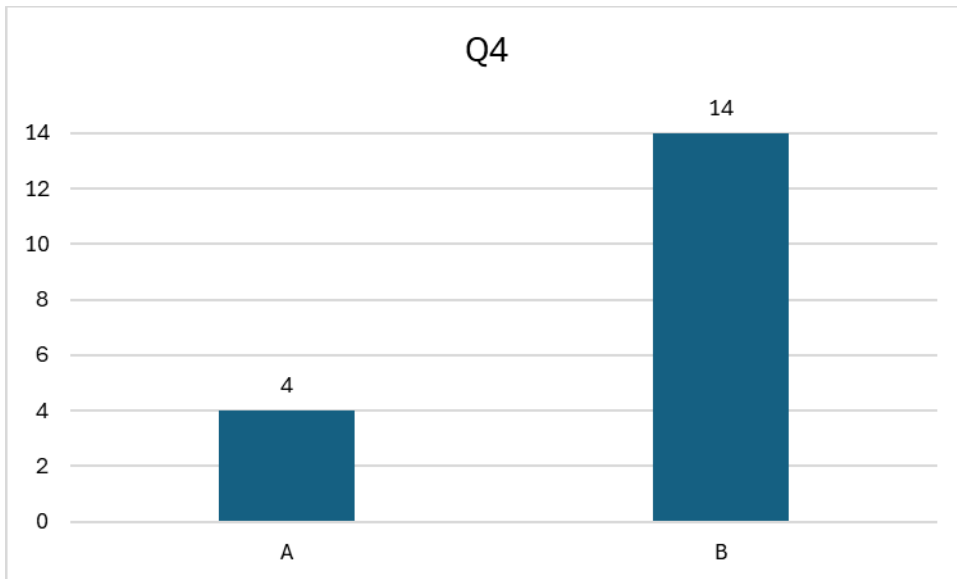
17B



Nattermann Bronchicum
flask of 100 ml
Adults and children of 12+ years old:
5 ml dosage, maximum 5 dosages per day

You use the maximum dosage.

How many days will one flask of cough drops suffice?
 days



(Source: Created by AELP)

Question 5 presents a comparison between a past paper problem (A) and one occupation contextualised within an apprentice's occupation (B), aiming to assess the effectiveness of contextualisation on problem-solving questions. In response, 6 individuals preferred A, while 12 favoured B. Despite B's popularity, many found both questions lengthy, requiring multiple readings for comprehension. Some preferred B for its simplified bullet points and contextual relevance to their occupation, facilitating understanding. However, numerous apprentices deemed the question irrelevant unless directly related to their job roles again raising questions around the possibility of authenticity of contextualisation in FSQ examination questions.

Figure 5: Mini FS Maths Worksheet Question 5

Question 5

Please read both questions, A and B, and select the one you find more manageable or easier to answer.

A

Carla is the director of a building company. She employs builders at a site in Hull and at a site in London.

The average day rate of her builders in London is £153. In Hull the day rates she pays her builders are shown in this table

Builder	A	B	C	D	E	F	G
Day rate (£)	290	75	115	84	120	89	298

The builders in Hull say their average day rates is less than £153

Carla says the average day rate is the same in Hull and in London.

Show how both these statements can be true. You **must** show your working.

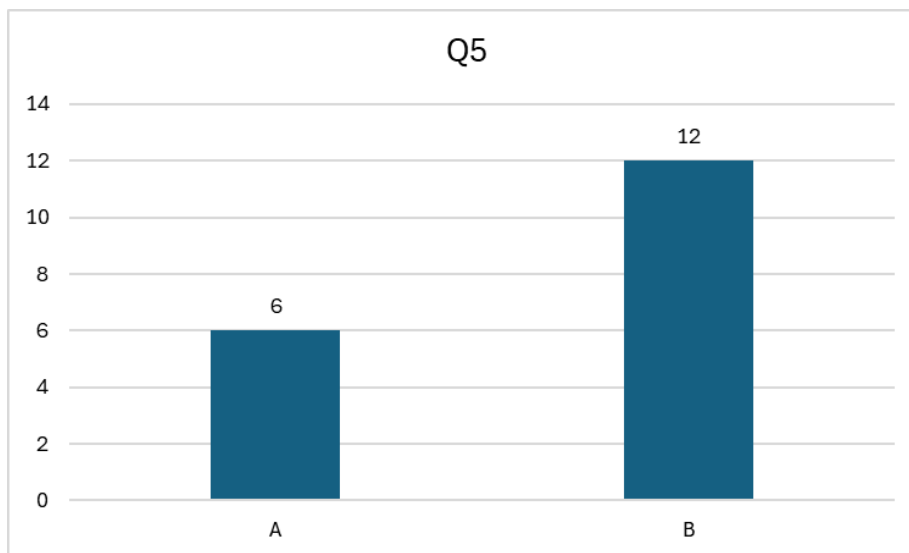
B

- Carla manages gas appliance servicing in Hull and London.
- The average day rate for servicing gas appliances in London is £153.
- In Hull, the day rates for servicing different gas appliances are listed below:

Appliance type	A	B	C	D	E	F	G
Day rate (£)	290	75	115	84	120	89	298

- Technicians in Hull claim their average day rate for servicing is less than £153.
- Carla argues that the average day rate for servicing is the same in Hull and London.

Show how both these statements can be true. You **must** show your working.



(Source: Created by AELP)

Question 6 presents four distinct formats: A, a problem-solving task from past papers; B, a occupation contextualised, concise occupation-related query; C, a straightforward question focusing on underpinning skills; and D, an occupation-contextualised, visually-supported question. Option C emerged as the most favoured, a simple underpinning skills question (12 responses), while B and D tied for second (each with 3 responses), and A received no selection. Learners overwhelmingly favoured option C for its simplicity, rejecting verbose or overly detailed formats. Option D, combining occupation context and visual aids, ranked second, highlighting a preference for clarity, though some found visuals distracting. Learners expressed frustration with options A and B due to excessive information. They prioritise clear, concise questions over occupation contextualisation.

Figure 6: Mini FS Maths Worksheet Question 6

Question 6
Please read all questions, A, B, C, and D and select the one you find more manageable or easier to answer.

A
Ryan is doing a project about sugar at school. He wants to compare the amount of sugar in grapes with the amount of sugar in cookie dough.

Ryan finds this information

- grapes weighing 92g contain 15g of sugar
- cookie dough weighing 610g contains 110g of sugar

Ryan thinks that there is a higher percentage of sugar in the cookie dough than in the grapes.

Is Ryan correct?
Show why you think this.

C
What is the percentage of 15 out of 92?
What is the percentage of 110 out of 610?


B
Sara, a gas engineering apprentice, is tasked with analysing the gas consumption efficiency of two different appliances as part of her training.

She gathers the following data:


- A gas heater uses 92 units of gas to produce 15 units of heat.
- A gas stove uses 610 units of gas to produce 110 units of heat.

Sara believes the gas stove is more efficient than the gas heater.
Show why you think this?

D

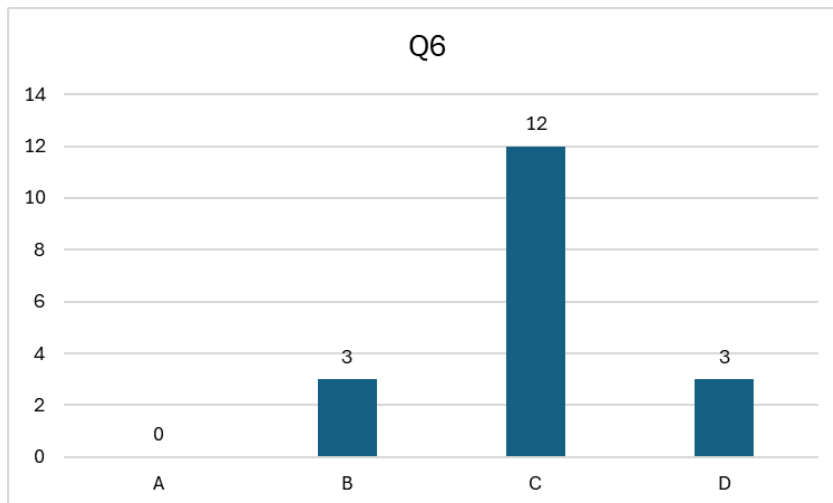


92 units of gas to produce 15 units of heat



610 units of gas to produce 110 units of heat

Is the gas consumption efficiency rate higher in gas stove than gas heater? Explain your reasoning.



(Source: Created by AELP)

While FSQ maths promotes real-world applications, overly complex maths problems risk diminishing practicality. Balancing practicality with brevity is crucial, along with simplifying information to reduce cognitive load. Designing AI-generated FSQ exam questions tailored to specific job roles faces challenges, constraining applicable contexts. Even when occupation contextualisation aided comprehension, it didn't alter perceptions for students with weak maths foundations, who found such questions daunting and maintained existing negative attitudes towards maths. There is a need for a balanced approach in assessments that prioritises clarity and manageability while maintaining real-life relevance and maths practicality.