Highfield Level 3 End-Point Assessment for ST0193 Improvement Technician

End-Point Assessment Kit

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EPA Kit

Contents

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Versions:

ST0193 / v1.1

IMT v4.0

How to use this EPA Kit

Welcome to the Highfield End-Point Assessment Kit for the Improvement Technician apprenticeship standard.

Highfield is an end-point assessment organisation that has been approved to offer and carry out end-point assessments for the Level 3 Improvement Technician apprenticeship standard.

The EPA Kit is designed to outline all you need to know about the end-point assessments for this standard and will also provide an overview of the on-programme delivery requirements. In addition, advice and guidance for trainers on how to prepare apprentices for the end-point assessment is included. The approaches suggested are not the only way in which an apprentice may be prepared for their assessments, but trainers may find them helpful.

In this kit, you will find:

- an overview of the standard and any on-programme requirements
- a section focused on amplification
- guidance on how to prepare the apprentice for gateway
- detailed information on which part of the standard is assessed by which assessment method
- suggestions on how to prepare the apprentice for each part of the end-point assessment
- a section focused on the end-point assessment method where the assessment criteria are presented in a format suitable for carrying out 'mock' assessments

Introduction

Standard overview

Improvement technicians are responsible for delivery and coaching of improvement activity within an area of responsibility, often associated with Lean and Six Sigma methodologies. They can be found across all industry sectors and functions including automotive, banking, engineering, food products, IT, property, retail, telecoms, etc.

Typically, technicians work as a member of an operational team to resolve problems. They prevent re-occurrence, engaging others in issues affecting them and support the improvement of performance. Typical activities include:

- engaging team members in the identification of improvement opportunities and relevant countermeasures and controls
- initiating and facilitating improvement activities through to confirmed resolution
- providing local expertise in business improvement methods and basic tools to team

There are a variety of job titles associated with the occupation, these include, but are not limited to: Business Improvement Co-ordinator, Continuous Improvement Executive, Process Technician, Operational Excellence/Lean Engineer, Lean Six Sigma Yellow belt and Quality Control Analyst.

On-programme requirements

Although learning, development and on-programme assessment is flexible, and the process is not prescribed, the following is the recommended baseline expectation for an apprentice to achieve full competence in line with the Improvement Technician apprenticeship standard.

The on-programme assessment approach will be agreed between the training provider and employer. The assessment will give an ongoing indication of an apprentice's performance against the final outcomes defined in the standard. The training provider will need to prepare the apprentice for the end-point assessment, including preparation for the professional discussion and collation of the log of evidence (such as a provision of recordings of professional discussions or workplace evidence).

The training programme leading to end-point assessment should cover the breadth and depth of the standard using suggested on-programme assessment methods that integrate the knowledge, skills and behaviour components, and which ensure that the apprentice is

sufficiently prepared to undertake the end-point assessment. Training, development and ongoing review activities should include:

- the achievement of level 2 English and maths. If the apprentice began their apprenticeship training before their 19th birthday, they will still be subject to the mandatory requirement to study towards and achieve English and maths. The requirements for English and maths are optional for apprentices aged 19+ at the start of their apprenticeship training.
- completion of a log to be used to underpin the professional discussion
- completion of a project portfolio to evidence completion of an improvement project(s)

Log

The apprentice must complete a log that will be used to underpin the EPA professional discussion. The log will typically include 1 piece of evidence for each KSB that is assessed in the professional discussion.

The log will typically reference between **13 and 15** pieces of evidence and must be holistically mapped against the KSBs. For example, the apprentice may write up a meeting held with stakeholders to demonstrate team working and communication and/or examples of application of learning to the wider job role.

The log **must** be accompanied by a log evidence matrix. This can be downloaded from our website. The log matrix **must** be fully completed, including a declaration by the employer and the apprentice to confirm that the log is valid and attributable to the apprentice.

The log of evidence **must** be submitted to Highfield at gateway. It is **not** directly assessed but underpins the professional discussion.

Project portfolio

The apprentice **must** complete a project portfolio to evidence completion of an improvement project(s). The improvement project(s) will be the subject of a project report to be produced during the end-point assessment period and the subject of the presentation and questioning component.

The improvement project **must**:

- clearly demonstrate delivery of a business improvement benefit as confirmed in writing by the apprentice's employer
- be completed in the apprentice's workplace
- address substantive business problem(s)
- follow each step of 1 of the recognised improvement methodologies

Use of artificial intelligence (AI) in the EPA

Assessments must be carried out in accordance with the published assessment plan and all work submitted must be the apprentice's own. AI tools must not be used to generate evidence in its entirety or to replace the apprentice's own judgement, performance or competence. Any use of AI must be transparent, limited and properly referenced.

Where AI has been used by the apprentice as part of normal work activity (for example, drafting a document, worksheet or PowerPoint) this may form part of the portfolio provided that:

The apprentice has materially authored, verified and taken responsibility for the content:

- AI use is clearly declared and referenced within the work (include tool name, purpose and how outputs were verified)
- Source prompts, system settings and the portions influenced by AI are retained and available for review
- AI outputs must not substitute for authentic demonstration of competence against the standard

If an AI tool is used at any stage of an assessment method (for example, to prepare a presentation outline or to organise notes), its use must be fully referenced in the submission or assessor records, and must not compromise authenticity, validity or security. Assessors must be satisfied that decisions remain rooted in the apprentice's knowledge, skills and behaviours, and in direct evidence gathered through observation, questioning and professional discussion.

AI tools must not be used to produce assessment evidence end-to-end, to fabricate logs/records or to simulate performance.

Additional, relevant on-programme qualification

There are no mandatory qualifications for this standard, however, employers may wish to include relevant qualifications to help structure the on-programme delivery.

Readiness for end-point assessment

In order for an apprentice to be ready for the end-point assessments:

- the employer must be satisfied that the apprentice is consistently working at or above the level set out in the standard. To ensure this, the apprentice must attend a formal meeting with their employer to complete the gateway readiness report.
- the apprentice must have completed the log of all training, learning and workshops they have attended. This **must** be submitted to Highfield at gateway.

- the apprentice must have completed a project portfolio to evidence completion of an improvement project(s). There is **no** requirement to submit this at gateway.
- the apprentice must have achieved Level 2 English and mathematics. The requirements for English and maths are mandatory for all apprentices aged between 16-18 at the start of their apprenticeship training. The requirements for English and maths are optional for apprentices aged 19+ at the start of their apprenticeship training.
- the apprentice and the employer should then engage with Highfield to agree a plan and schedule for each assessment activity to ensure all components can be completed within a **mandated** end-assessment window. Further information about the gateway process is covered later in this guide.

If you have any queries regarding the gateway requirements, please contact your EPA customer engagement manager at Highfield Assessment.

Order of end-point assessments

The assessment methods can take place in any order. Both the presentation and questioning around the project report and the professional discussion underpinned by log can take place on the same day. They will take place during month 2 of the end-point assessment window with a minimum of two weeks' notice period given to the employer.

The multiple-choice examination can take place at any point during the end-point assessment window.

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The Highfield approach

This section describes the approach Highfield has adopted in the development of this end-point assessment in terms of its interpretation of the requirements of the end-point assessment plan and other relevant documents.

Specific considerations

In accordance with the Improvement Technician assessment plan, Highfield have noted that where assessment criteria are not present, these have had to be created based on the standards provided. The assessment criteria have been written based on the standard and the grading criteria from the assessment plan.

For the presentation and questioning and professional discussion, Highfield have taken the decision to allow apprentices the maximum allocated time as stated in the assessment plan.

For the multiple-choice exam, the assessment plan states that 40 questions should be drawn at random for every examination. Highfield have created a bank of questions for the Improvement Technician EPA and questions are drawn from this bank in order to create examination papers that ensure full and comparable coverage of the required knowledge criteria in every examination.

Where the assessment plan has duplicated assessment criteria for the professional discussion in both the merit and distinction columns, we have treated them as merit only. Where assessment criteria have been duplicated in both the pass and distinction columns, we have treated this as distinction only.

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Gateway

How to prepare for gateway

After apprentices have completed their on-programme learning, they should be ready to pass through 'gateway' to their end-point assessment.

Gateway is a meeting that should be arranged between the apprentice, their employer and training provider to determine that the apprentice is ready to undertake their end-point assessment. The apprentice should prepare for this meeting by bringing along work-based evidence, including:

- customer feedback
- recordings
- manager statements
- witness statements

As well as evidence from others, such as:

- mid and end-of-year performance reviews
- feedback to show how they have met the apprenticeship standards while on-programme

In advance of gateway, apprentices will need to have completed the following. The requirements for English and maths listed below are mandatory for all apprentices aged between 16-18 at the start of their apprenticeship training. The requirements for English and maths listed below are optional for apprentices aged 19+ at the start of their apprenticeship training.

- Achieved level 2 English
- Achieved level 2 maths
- Completed a suitable log of evidence to be used as the basis for the professional discussion (see the log evidence matrix)
- Completed a project portfolio that evidences the completion of an improvement project(s)

Therefore, apprentices should be advised by employers and providers to gather this evidence and undertake these qualifications during their on-programme training. It is recommended that employers and providers complete regular checks and reviews of this evidence to ensure the apprentice is progressing and achieving the standards before the formal gateway meeting is arranged.

The gateway meeting

The gateway meeting should be attended by the apprentice and a representative from the employer and training provider.

The **Gateway Readiness Report** should be used to log the outcomes of the meeting and agreed by all 3 parties. This report is available to download from the Highfield Assessment website.

The report should then be submitted to Highfield. If you require any support completing the Gateway Readiness Report, please contact your EPA customer engagement manager at Highfield Assessment.

Reasonable adjustments
Highfield Assessment has measures in place for apprentices who require additional support. Please refer to the Highfield Assessment Reasonable Adjustments policy for further information/guidance.

ID requirements
Highfield Assessment will complete an identification check before starting any assessment and will accept the following as proof of an apprentice's identity:

- a valid passport (any nationality)
- a signed UK photocard driving licence
- a valid warrant card issued by HM forces or the Police
- another photographic ID card, such as an employee ID card or travel card

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The Improvement Technician apprenticeship standard

The following pages contain the Level 3 Improvement Technician apprenticeship standard and the assessment criteria in a format that is suitable for delivery.

Compliance
Multiple-choice examination
Knowledge
K1 Legislative and **customer compliance** requirements including environment and health and safety
Assessment criteria
E1 Identify an **employer's main duty under the Health and Safety at Work Act** (K1) **E2** Explain the purpose of **customer compliance** requirements (K1)
Amplification and guidance

Customer compliance
• Customer compliance requirements are typically derived from:
  ○ regulations by ensuring adherence to laws and industry-specific rules such as General Data Protection Regulations (GDPR) for data or ISO certifications
  ○ contracts by meeting the agreed terms and conditions with customers including service-level agreements (SLAs)
  ○ customer expectations by aligning with customer-specific standards or codes of conduct
• Benefits of meeting customer compliance requirements include:
  ○ enhanced customer trust and loyalty
  ○ market competitiveness
  ○ reduced legal and financial risks
  ○ operational efficiency
• Challenges in achieving compliance:
  ○ the complexity and diversity of requirements
  ○ the cost of compliance
  ○ the time and resource intensity
• Risks of non-compliance:
  ○ legal consequences

- loss of business
- reputational damage

- Strategies for managing compliance:
  - proactive risk management
  - effective communication
  - automation and technology
  - training and awareness
- Critical considerations:
  - balancing flexibility and standardisation:
    - businesses must adapt to individual customer needs while maintaining cost-effective, standardised processes
  - sustainability and ethics:
    - customers increasingly expect compliance with not just laws but also ethical and sustainable standards such as carbon footprint reduction
  - continuous improvement:
    - compliance is not a static but a dynamic process requiring ongoing monitoring, adaptation and improvement

Employer's main duties under the Health and Safety at Work Act

- Provide a safe working environment by:
  - ensuring that the workplace is free from hazards and that any risks to health and/or safety are properly controlled
  - maintaining safe access to and from the workplace
- Ensure the health, safety and welfare of employees and non-employees by:
  - providing and maintaining safe systems of work such as procedures, tools and equipment
  - minimising risks associated with machinery, hazardous substances or processes
  - safeguarding contractors, visitors, customers and the general public who may be affected by work activities
  - supplying appropriate personal protective equipment (PPE) to employees free of charge where risks cannot be adequately controlled by other means
- Record and report injuries and conduct risk assessments:
  - comply with the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)
  - maintain accurate records of accidents and near-misses
  - identify potential risks in the workplace through regular and thorough risk assessments

- take steps to reduce or eliminate identified risks as far as is reasonably practicable

- Provide information, training and supervision:
  - inform employees about hazards and the measures in place to control them
  - provide adequate health and safety training and ensure employees understand their responsibilities
  - supervise work activities to ensure safety measures are being followed
  - involve employees and their representatives in discussions about health and safety matters
  - ensure workers have a voice in decision-making processes related to health and safety
  - for businesses with more than 5 employees, prepare a written health and safety policy

Change management
Multiple-choice examination
Knowledge
K5 Roles of the manager and leader within change. Influencing, reinforcement and coaching principles
Assessment criteria
E3 Identify the **key skills a leader needs** to manage change effectively (K5) **E4** Describe **organisational and individual barriers to change and methods to overcome these** (K5) **E5** Identify **the role that coaching can play in supporting change** in the organisation (K5) **E6** Recognise **how to reinforce change in the organisation** (K5)
Amplification and guidance

Key skills a leader needs
• Communication skills
• Emotional intelligence
• Problem-solving and decision-making
• Adaptability and flexibility
• Vision and strategic thinking
• Motivation and influencing skills
• Resilience and persistence
• Collaboration and team building
 	
Organisational and individual barriers to change and methods to overcome these
• Organisational barriers:
  ○ lack of leadership support
  ○ inadequate resources
  ○ poor communication
  ○ cultural resistance
  ○ lack of training or skill gaps
• Individual barriers:

    - fear of the unknown
    - lack of involvement or ownership
    - comfort with the status quo
    - low trust in the leadership team
    - poor understanding of the change
- Methods to overcome barriers:
    - communication
    - training and support
    - leadership and sponsorship
    - employee involvement
    - reinforcement and recognition

The role that coaching can play in supporting change

- Building understanding and clarity
- Reducing resistance to change
- Empowering employees
- Skill development and capability building
- Supporting leaders through change
- Maintaining focus and accountability
- Driving engagement and motivation
- Supporting cultural change

How to reinforce change in the organisation

- Continuous communication
- Celebrate success and recognise achievements
- Embed change into policies, procedures and processes
- Provide ongoing training and support and provide regular feedback
- Monitor and measure progress and address resistance or relapse
- Make change part of the organisational culture

Principles and methods

Multiple-choice examination

Knowledge

K6 Six Sigma principles per ISO13053 (International Organisation for Standardisation), interim containment actions, **Lean** principles

Assessment criteria

E7 Define the focus of **Six Sigma** methodology (K6)
E8 Explain how **DMAIC** is used for solving problems in Six Sigma (K6)
E9 Explain the **purpose of interim containment actions in the 8D Framework** (K6)
E10 Identify the main principles of **Lean** (K6)

Amplification and guidance

Six Sigma

- The main focus of the methodology is to:
  - improve processes by identifying and eliminating defects or errors
  - reduce variation to ensure consistent, predictable outcomes
  - enhance quality of products or services to meet customer requirements
  - increase efficiency by streamlining processes and removing waste
- Key principles of Six Sigma include:
  - focusing on the customer to understand their requirements and ensure processes meet these
  - identifying and reducing variation to improve reliability
  - using data and facts to help identify root causes of problems
  - eliminating waste and effects
  - involving everyone at all levels
  - applying a structured methodology such as DMAIC to drive improvements

Lean

- Main principles:
  - identify value:
    - define what constitutes value from the customer's perspective

- map the value stream:
  - analyse all the steps involved in delivering a product or service from start to finish
  - categorise activities as:
    - value-added – activities directly contributing to the product or service value
    - non-value-added (waste) – activities that do not add value and should be minimised or eliminated
- create flow:
  - ensure that processes move smoothly and continuously without interruptions, delays or bottlenecks
- establish pull:
  - produce only what is needed when it is needed based on customer demand rather than overproducing
- pursue perfection:
  - continuously seek ways to improve processes and eliminate waste

- Main types of waste (Muda):
  - Lean focuses on eliminating the 7 types of waste (TIMWOOD):
    - transportation – unnecessary movement of materials or products
    - inventory – excess stock that ties up capital and space
    - motion – unnecessary movement of people
    - waiting – idle time due to delays or bottlenecks
    - overproduction – producing more than is needed
    - overprocessing – performing more work than necessary
    - defects – errors requiring rework or causing dissatisfaction

DMAIC

- DMAIC is a structured methodology to solve complex problems and achieve process improvements
- The 5 phases are:
  - Define – clearly define the problem, goals and scope of the improvement project
  - Measure – collect data to establish a baseline and quantify the current state of the process
  - Analyse – identify the root causes of the problem using data analysis and Lean Six Sigma tools
  - Improve – develop and implement solutions to address root causes and improve process performance
  - Control – ensure that improvements are sustained over time
- DMAIC ensures effective problem-solving by:

- using a structured approach where each phase builds upon the previous one, ensuring problems are addressed methodically
- ensuring decisions are based on measurable facts and evidence rather than assumptions
- focusing on the root causes of problems, eliminating problems at their source and preventing recurrence
- producing sustainable results by implementing controls so that improvements become part of standard practice

Purpose of interim containment actions in the 8D framework

- The 8D framework consists of:
  - D0 – Plan for solving the problem and determine opportunities
  - D1 – Establish the team
  - D2 – Define the problem
  - D3 – Implement interim containment actions (ICA)
  - D4 – Identify root causes
  - D5 – Develop permanent corrective actions (PCA)
  - D6 – Implement PCA
  - D7 – Prevent recurrence
  - D8 – Recognise and celebrate team success
- ICAs are applied in D3 with the purpose of:
  - containing the problem quickly by stopping the problem from spreading or worsening to minimise impact
  - protecting the customer to prevent defective products or services from reaching the customer
  - limiting financial and operational impact while addressing the issue
  - buying time for root cause analysis to take place without rushing
  - building confidence and trust when customers and stakeholders see immediate action being taken
- Key characteristics of ICAs:
  - short-term in nature, they are temporary measures to limit impact
  - they address the symptoms of the problem, not the root cause
  - they are designed to be practical, easy to execute and immediately effective

Project selection and scope
Multiple-choice examination
Knowledge
K7 Selection matrix, scoping tree
Assessment criteria
E11 Describe the purpose of a **scoping tree** in selecting a project to undertake (K7) **E12** Explain the main benefit of a **selection matrix** (K7)
Amplification and guidance
Selection matrix • A structured tool used to compare and prioritise options based on multiple criteria • Helps teams make objective, data-driven decisions when faced with several alternatives • It provides a systematic and objective method to evaluate and prioritise options based on clearly defined criteria • By doing so, it: o eliminates subjectivity and bias ensuring that decisions are based on logical, pre-defined criteria rather than opinions or guesswork o facilitates comparisons, allowing multiple options to be compared and ensuring the best solution is chosen based on merit o focuses efforts and resources on the best option(s) o enhances team collaboration and agreement o simplifies complex decisions • A selection matrix works by: o defining the options o establishing criteria and factors to evaluate the options o weighing the criteria based on their importance o scoring the options o calculating scores o choosing the best option(s) **Scoping tree** • A visual tool used to breakdown and organise the elements of a project during its selection phase

- Helps to clearly identify the scope, boundaries and opportunities within a project
- Ensures a clear understanding of what is in scope and what is out of scope
- The main purpose of a scoping tree is to:
    - clarify the project's boundaries
    - identify opportunities and focus areas
    - support project selection decisions
    - facilitate team understanding and agreement
    - prioritise efforts and resources
- How a scoping tree works:
    - start with the overall problem/goal
    - break down the problem/goal into major categories
    - subdivide categories into smaller, manageable components
    - define which parts of the tree are in scope and out of scope
- Benefits include:
    - improved focus on the most relevant issues
    - increased transparency for stakeholders
    - limits the risk of adding unrelated or unnecessary tasks
    - helps to decide which projects or opportunities offer the most significant benefits
    - improves resource management

Problem definition

Multiple-choice examination

Knowledge

K8 Exploratory data analysis, data collection planning, problem and goal statements

Assessment criteria

E13 Explain **data collection planning methods** (K8)
E14 Identify expected outcomes from **exploratory data analysis** (K8)
E15 Define the purpose of a **problem statement** (K8)
E16 Explain what a **goal statement** should contain (K8)

Amplification and guidance

Exploratory data analysis

- A method used to analyse and summarise datasets to uncover patterns, trends, relationships and anomalies
- Typically performed before formal modelling or hypothesis testing to better understand the data and prepare for further analysis
- Involves both visualisations such as graphs or charts and statistical summaries to extract insights from the data
- Expected outcomes from exploratory data analysis include:
    - an understanding of what a dataset contains and any structural issues
    - awareness of data quality issues and the steps needed to clean or prepare the data
    - insights into how data is distributed and whether it meets assumptions for further analysis such as normality
    - early identification of meaningful trends that can guide decision-making or hypothesis testing
    - insights into which variables are related and could influence each other, helping to guide further analysis
    - identification of unusual data points that may require further investigation or exclusion during analysis
    - understanding data segmentation to refine analysis or target specific areas for improvement
    - cleaned and structured data that is ready for modelling or hypothesis testing

Data collection planning methods

- A structured approach to identifying hat data needs to be collected, how it will be collected, who will collect it and when
- Ensures that the right data is gathered in an efficient, accurate and reliable manner to support problem-solving, decision-making and analysis
- Data collection planning is important because it:

    - ensures relevant and accurate data is gathered
    - prevents wasting time and resources on unnecessary or poor-quality data
    - provides a clear plan for data ownership, frequency and methodology
    - reduces the risk of errors, bias or incomplete datasets
- Key data collection planning methods include:
    - surveys and questionnaires
    - observation and process walks (Gemba walks)
    - interviews
    - check sheets
    - focus groups

Problem statement

- A clear, concise description of an issue that needs to be addressed
- It identifies the problem, its impact and the gap between the current state and the desired outcome
- It is often used at the beginning of a project to align the team and stakeholders on the purpose and docus of improvement efforts
- Its purpose is to:
    - clearly define the problem
    - create focus and alignment towards a common goal
    - establish the scope of the problem
    - highlight the impacts of the problem
    - provide a baseline for improvement
    - guide root cause analysis and solutions
- Benefits of a well-written problem statement include:
    - providing clarity and a shared understanding of the issue
    - encouraging teams to focus on fact-based problem-solving
    - serving as a foundation for measuring the success of improvement efforts
    - building urgency and stakeholder support for addressing the problem

Goal statement

- A clear, concise declaration of what a project or initiative aims to achieve

- It defines the desired outcome in measurable terms and provides direction to ensure everyone is working toward a common objective
- A well-crafted goal statement is essential in improvement projects as it sets a clear target and aligns stakeholders and team members
- A strong goal statement typically includes:
    - the desired outcome (what needs to be achieved?)
    - a measurable target (how much improvement is needed?)
    - a timeline (when will it be achieved by?)
    - the scope (where does the goal apply?)
    - alignment to business objectives (why is the goal important?)
- A goal statement should align with specific, measurable, achievable, realistic, timebound (SMART) criteria to ensure clarity and effectiveness

Process mapping and analysis

Multiple-choice examination

Knowledge

K9 Supplier Input Process Output Customer (SIPOC), **process mapping**, **value and waste analysis**, performance metrics - **discrete data**

Assessment criteria

E17 Identify the benefits of creating a **SIPOC diagram** (K9)
E18 Identify the benefits of **process mapping** (K9)
E19 Explain the purpose of a **value and waste analysis** (K9)
E20 Describe the use of "**discrete data**" in performance metrics (K9)

Amplification and guidance

Process mapping

- A visual representation of the steps involved in a process
- It illustrates:
    - what happens in the process
    - who performs each step
    - inputs and outputs at various stages
    - how the process flows from start to finish
- Process maps come in various forms including flowcharts, swim lane diagrams and value stream maps
- Benefits of process mapping include:
    - providing a clear understanding of the process
    - identifying process inefficiencies and waste
    - improving communication and collaboration
    - clarifying roles and responsibilities
    - supports problem-solving and root cause analysis
    - enables standardisation of processes
    - facilitates continuous improvement
    - supports project scoping
    - enhances customer satisfaction

Value and waste analysis

- A Lean tool used to identify activities in a process that either add or do not add value
- It is used to streamline processes, eliminate waste and improve efficiency
- Its purpose is to:
    - differentiate between value-added and non-value-added activities:
        - value-added activities directly meet customer requirements
        - non-value-added activities are wasteful and do not contribute to customer satisfaction
    - identify and eliminate waste (Muda)
    - improve process efficiency
    - enhance customer value
    - optimise resource utilisation
    - provide a baseline for improvement

Discrete data

- A type of data that consists of distinct, countable values
- It represents items or events that can be counted in whole numbers and does not include fractions or decimals, for example:
    - number of customer complaints
    - number of defective products
    - number of sales transactions
    - pass/fail outcomes of a quality check
- In performance metrics, discrete data is used to:
    - measure process outcomes that help to assess whether a process meets performance standards:
        - number of defective items in a production batch
        - number of customer orders processed daily
    - tracking quality and defects providing insight into process consistency
    - supporting statistical analysis
    - monitoring service and customer metrics
    - goal setting and benchmarking
    - process improvement initiatives

SIPOC diagram

- A visual tool used in process improvement projects to provide a high-level view of a process
- Suppliers – who provides the input to the process?
- Inputs – what resources or materials are required to perform the process?
- Process – what are the high-level steps of the process?
- Outputs – what are the results or deliverables of the process?
- Customers – who receives the outputs of the process?
- Benefits of creating a SIPOC diagram include:
    - aligning team understanding and scope
    - identifying key process inputs and outputs
    - helping to define customer requirements
    - clarifying roles and responsibilities
    - supporting root cause analysis
    - simplifying communication with stakeholders
    - identifying improvement opportunities
    - acting as a starting point for process mapping
- By creating a SIPOC diagram, teams can quickly and effectively understand the process, align on priorities and identify areas for improvement

Data acquisition for analysis

Multiple-choice examination

Knowledge

K10 Data stratification, sampling theory, data types, variation types and sources, data collection tools, operational definition and principles of measurement error

Assessment criteria

E21 Explain the purpose of **'data stratification'** (K10)
E22 Identify the **key factors that affect the size and number of samples** to take when acquiring data (K10)
E23 Define the **difference between continuous and discrete data** (K10)
E24 Determine the relevant **data collection methods** appropriate to the requirements (K10)
E25 Define the term '**operational definitions'** (K10)
E26 Explain the purpose of **output and input data** in establishing measures (K10)

Amplification and guidance

Data stratification

- The process of dividing or grouping data into meaningful categories (or strata) based on certain characteristics
- This allows teams to analyse subsets of data separately to uncover patterns, trends or root causes that may not be visible when examining aggregated data
- It is often used in quality improvement and problem-solving methodologies helping to ensure data analysis is focused and actionable
- Its purpose is to:
    - isolate specific causes of variation in data
    - enhance data interpretation
    - focus improvement efforts
    - identify trends and patterns
    - improve the effectiveness of statistical analysis
- Data stratification is applied by:
    - determining stratification categories and identifying relevant factors that might influence the data, such as:
        - time
        - location

        - equipment
        - people
        - product type
    - collecting and grouping data into strata based on the identified categories
    - analysing the stratified data to uncover patterns, trends or root causes
- Its benefits include:
    - enhance problem-solving
    - improved decision-making
    - targeted improvement
    - better communication

Key factors that affect the size and number of samples

- Objective of the study:
    - determines the scope and depth of the data required
- Population size:
    - larger populations may allow for proportionally smaller sample sizes
- Desired confidence level:
    - higher confidence increases sample size
- Margin of error (precision):
    - smaller margins of error increase sample size
- Population variability:
    - high variability requires larger samples
- Type of data:
    - discrete data often requires larger samples
- Sampling method:
    - stratified methods may reduce overall sample size
- Cost and resources:
    - budget and time constraints limit sample size and frequency
- Regulatory standards:
    - prescribed minimums influence sample size

- Process stability:
    - unstable processes require more samples to capture variability
- Risk level:
    - high-risk decisions require larger and more reliable sample sizes

Difference between continuous and discrete data

- Continuous data represents measurements that can take any value within a range, including fractions and decimals
- It is measured, not counted
- Characteristics include:
    - infinite possibilities as values can take any number
    - represents dimensions such as time, length, weight or temperature
    - it is divisible so can be broken down into smaller units for more precision
- Its uses include:
    - monitoring process performance such as production time
    - analysing trends and distributions
    - evaluating compliance with specifications
- Discrete data consists of distinct, countable values that cannot be broken down into smaller parts
- Each value represents a specific category or count
- Characteristics include:
    - it is countable as values are whole numbers
    - it is finite as it is limited to specific values or categories
    - it is often categorical and can represent groups or classifications
- Its uses include:
    - tracking occurrences such as defects or complaints
    - measuring frequencies such as shifts with errors
    - evaluating pass/fail outcomes

Data collection methods

- The choice of data collection methods depends on the specific requirements of the project or study

- Factors such as the type of data (quantitative or qualitative), the purpose of the data collection, available resources, and the level of precision required will guide the selection of the appropriate methods
- Key considerations when selecting a data collection method include:
    - the purpose of data collection:
        - what question needs to be answered or problem solved?
    - the type of data required:
        - quantitative data – numerical information used for statistical analysis such as production rates
        - qualitative data – descriptive information used to understand perceptions or behaviours such as employee feedback
    - time and resource availability:
        - can the data be collected in real-time or is retrospective data acceptable?
        - are there any budgetary or staffing constraints?
    - accuracy and reliability:
        - what level of precision is required for decision-making?
        - does the method minimise bias or errors?
    - compliance standards:
        - does the method meet regulatory or industry standards?
- Common data collection methods:
    - direct observation
    - surveys or questionnaires
    - interviews or focus groups
    - sampling
    - historical data

Operational definitions

- Precise, unambiguous explanations of concepts, terms, or measures used in a process or study
- They ensure that everyone involved has a shared understanding of what is being measured or evaluated and how it will be measured
- Key characteristics:
    - specificity – clearly defines the term or concept in measurable or observable terms
    - objectivity – minimises subjective interpretation by providing criteria for consistency
    - relevance – aligns the definition with the objectives of the project or process

Output and input data

- Critical for defining measures that evaluate performance, identify opportunities for improvement, and ensuring processes meet their objectives
- These data types are interconnected and help link cause (input) with effect (output)
- Input Data:
    - represents the resources, materials, or information that go into a process
    - these are factors that can directly influence the outcome of the process
- Key purposes:
    - identify process drivers:
        - input data highlights the factors or variables that affect process performance
    - control variables:
        - input data serves as control points to ensure consistency and reduce variability
        - enable root cause analysis
        - improve predictability
- Output data:
    - represents the results or outcomes of a process
    - this data is used to evaluate the effectiveness of the process and whether it meets its goals
- Key purposes:
    - measure performance
    - assess process effectiveness
    - identify improvement opportunities
    - monitor trends
- Relationship between input and output data:
    - input data drives the process, while output data reflects the process results
    - establishing a clear link between inputs and outputs helps identify cause-and-effect relationships, enabling targeted improvements

Basic statistics and measures
Multiple-choice examination
Knowledge
K11 Control charts - discrete data
Assessment criteria
E27 Explain the use of a **control chart** (K11)
Amplification and guidance

Control chart
• A statistical tool used to monitor, control, and improve process performance over time
• It helps identify whether a process is operating within acceptable limits or if it is being influenced by special causes of variation
• Purpose of a control chart:
  ○ monitor process stability:
  ▪ tracks process performance over time to determine if the process is stable and predictable
  ○ identify variation:
  ▪ differentiates between common cause variation (natural variability inherent to the process) and special cause variation (unexpected deviations caused by external factors)
  ○ facilitate decision-making:
  ▪ helps determine whether corrective actions are necessary to bring a process back under control or improve it further
  ○ drive continuous improvement:
  ▪ provides insights into trends and patterns, enabling targeted improvements
• Components of a control chart:
  ○ data points:
  ▪ represent individual measurements or averages plotted over time
  ○ central line (CL):
  ▪ the mean or average of the data, showing the expected process performance
  ○ upper control limit (UCL):
  ▪ the maximum acceptable value for the process (mean plus 3 standard deviations)
  ○ lower control limit (LCL):
  ▪ the minimum acceptable value for the process (mean minus 3 standard deviations)

    - control limits versus specification limits:
        - control limits reflect process variation while specification limits reflect customer requirements
- Types of control charts:
    - variable data control charts:
        - used for continuous data such as time, weight or length
    - attribute data control charts:
        - used for discrete data such as counts of defects or nonconformities
- How to use a control chart:
    - define the process
    - collect data
    - calculate control limits
    - plot the data
    - analyse the chart
    - take action
- Interpreting a control chart
    - in-control process:
        - all data points fall within the control limits
        - no distinct patterns or trends are visible
    - out-of-control process:
        - points fall outside the control limits
        - patterns, trends, or shifts in the data suggest special causes of variation
- Benefits of using control charts:
    - proactive monitoring
    - objective decision-making
    - improved process understanding
    - supports continuous improvement

Process capability and performance
Multiple-choice examination
Knowledge
K12 Capability analysis - continuous data
Assessment criteria
E28 Describe the purpose of a **process-capability analysis** (K12) **E29** Explain **why continuous data is used in capability analysis** (K12)
Amplification and guidance

Process-capability analysis
• A statistical method used to determine how well a process can consistently produce outputs that meet specified requirements or tolerances
• It assesses the ability of a process to perform within the defined limits of customer or business expectations
• Its purpose is to:
  ○ evaluate process performance by determining whether a process is capable of consistently meeting specifications or standards
  ○ quantify variation by measuring the extent of natural process variability compared to the tolerance limits
  ○ identify improvement opportunities by highlighting areas where the process may need adjustment or redesign to meet requirements
  ○ providing a basis for decision-making by helping stakeholders to make informed decisions about process control, changes or investments
  ○ support quality assurance by ensuring the process can reliably deliver products or services that meet customer needs
• Key metrics in process-capability analysis:
  ○ capability potential (Cp):
  ▪ measures the process's ability to produce outputs within specification limits, assuming it is centred
  ○ capability performance (Cpk):
  ▪ adjusts for how well the process is centred between the specification limits
  ○ Pp and Ppk:
  ▪ similar Cp and Cpk but consider overall process performance, including long-term variability
• Applications of process-capability analysis include:
  ○ assessing new processes
  ○ ongoing process monitoring
  ○ supplier qualification

- Benefits of process-capability analysis:
  - improved product quality
  - cost reduction
  - enhanced customer satisfaction
  - supporting Six Sigma goals

Why continuous data is used in capability analysis

- Continuous data is the preferred data type in process-capability analysis because it provides detailed, granular insights into process performance
- This enables accurate and reliable statistical calculations, which are essential for determining whether a process can meet specification requirements consistently
- Key reasons for using continuous data in capability analysis:
  - greater precision:
    - continuous data captures detailed measurements on a numerical scale
  - greater statistical relevance:
    - capability analysis relies on statistical methods that require variability to be measured accurately
  - supports normal distribution assumptions:
    - many capability analyses assume a normal distribution of data
  - detailed process insights:
    - continuous data allows for identifying subtle process trends, shifts or variations that may be missed with discrete data
  - improved decision-making:
    - granular data provides the information needed to make precise adjustments to a process
  - calculation of capability indices:
    - metrics like Cp and Cpk require continuous data to measure the process's spread and centering relative to specification limits

Root cause analysis
Multiple-choice examination
Knowledge
K13 Histograms
Assessment criteria
E30 Explain the purpose of a Histogram (K13)
Amplification and guidance

Histograms

- A graphical representation of data that shows the distribution of a dataset
- Uses bars to group data into intervals (or "bins") and visually displays the frequency of data points within each bin
- This helps in understanding the underlying patterns, trends, and variability in a dataset
- Purposes include:
    - analysing quality control by assessing process capability by examining how data points cluster around target values
    - visualising data distribution
    - identifying patterns or trends
    - assessing process variability and facilitating process improvement
    - highlighting anomalies
    - helping to compare data distribution against set specification limits to determine if a process meets requirements
    - facilitating decision-making
- Key features of a Histogram:
    - bins (intervals):
        - data is grouped into ranges such as 0-10 or 10-20
        - the size of the bins can affect the histogram's appearance and the insights drawn
    - bar height (frequency):
        - represents the number of data points that fall within each bin
    - shape:
        - common shapes include normal (bell curve), skewed, bimodal and uniform distributions

Experimentation
Multiple-choice examination
Knowledge
K14 Active analysis versus one factor at a time, Plan Do Check Act
Assessment criteria
E31 Explain the term '**one factor at a time**' (K14) **E32** Provide a **comparison of active analysis and One Factor at a Time** when using experiments. Identify the **benefit of active analysis** (K14) **E33** Identify **uses for the Plan Do Check Act approach** (K14)
Amplification and guidance
Active analysis • Refers to a proactive, structured approach to investigating and understanding problems, processes, or systems • Unlike passive observation, active analysis involves deliberate experimentation, interaction, and data-driven inquiry to uncover root causes, patterns, or opportunities for improvement **One factor at a time** • Refers to an experimental method used in problem-solving or process improvement • In this approach, only 1 factor (variable) is changed at a time while all other factors are held constant • This allows for the direct observation of the impact of that single factor on the outcome **Comparison of active analysis and One Factor at a Time** • Approach: o active analysis tests multiple factors simultaneously o OFAT tests 1 factor at a time while keeping others constant • Factor interaction: o active analysis identifies interactions between factors o OFAT does not account for interactions between factors • Efficiency: o active analysis requires fewer experiments to analyse multiple factors

    - OFAT can be time-consuming and resource-intensive
- Data analysis:
    - active analysis uses advanced statistical tools to analyse results such as regression
    - OFAT uses simpler analysis that focuses on individual factor effects
- Optimisation capability:
    - active analysis is capable of identifying optimal conditions through factorial designs
    - OFAT is limited to assessing individual factors only
- Complexity:
    - active analysis is more complex and requires planning and statistical expertise
    - OFAT is easier to perform and understand for basic cases
- Accuracy:
    - active analysis is more accurate for complex systems as it considers all variables
    - OFAT may miss important insights due to limited scope

Benefit of active analysis

- Benefits include:
    - identifying factor interactions, revealing how multiple variables interact to influence outcomes
    - improving efficiency by testing multiple factors simultaneously
    - providing comprehensive insights by providing a holistic view of the system
    - optimising solution identification
    - enhancing statistical rigour
    - being applicable to complex systems

Uses for the Plan Do Check Act approach

- Widely used iterative cycle for continuous improvement, problem-solving, and quality management
- Provides a structured framework for testing changes, implementing solutions, and refining processes
- Uses for Plan Do Check Act (PDCA):
    - process improvement
    - problem-solving
    - change management

- quality control
- strategic planning
- employee training and development
- addressing customer complaints to improve customer satisfaction
- innovation and experimentation
- risk management
- environmental sustainability

Identification and prioritisation
Multiple-choice examination
Knowledge
K15 Brainstorming, selection criteria
Assessment criteria
E34 Explain the **key benefits of effective brainstorming** (K15) **E35** Define the term '**Affinity grouping**' (K15) **E36** Identify **factors to consider when selecting improvement projects** (K15)
Amplification and guidance

Key benefits of effective brainstorming
• Encourages creative thinking:
  ○ it removes traditional constraints, encouraging participants to think outside the box
• Generates a variety of ideas:
  ○ it brings diverse perspectives together, leading to a broader range of ideas and approaches
• Promotes team collaboration
• Builds engagement and ownership
• Identifies hidden opportunities
• Provides a safe space for ideas
• Facilitates quick problem-solving
• Supports continuous improvement
• Enhances decision-making
 	
Affinity grouping
• A method used to organise and categorise ideas, data, or information into logical groups based on their natural relationships or common themes
• Key features include:
  ○ clustering ideas or data points by shared characteristics or connections
  ○ visual representation
  ○ collaborative process involving team members working together to sort and group ideas

- simplifies complexity by distilling large volumes of unstructured information into manageable categories

Factors to consider when selecting improvement projects

- Strategic alignment:
  - ensure the project aligns with the organisation's strategic objectives, vision, and mission
- Business impact:
  - assess the potential value or benefits of the project, such as cost savings, revenue increase, or customer satisfaction
- Feasibility:
  - evaluate the practicality of the project in terms of available resources, technology, and time
- Stakeholder support:
  - consider the level of buy-in and support from key stakeholders, including management and team members
- Resource availability:
  - assess whether the required resources, such as personnel, budget, and materials, are accessible
- Urgency:
  - determine whether the project addresses an immediate problem or opportunity that requires prompt action
- Scope and complexity:
  - define the project's scope and ensure it is manageable within the given constraints
- Potential risks:
  - identify risks associated with the project and evaluate their likelihood and potential impact
- Measurable outcomes:
  - ensure the project has clear, measurable objectives to track progress and success
- Customer impact:
  - consider how the project will affect customer satisfaction or experience
- Alignment with continuous improvement goals:
  - ensure the project contributes to a culture of continuous improvement
- Competitive advantage:
  - consider whether the project will improve the organisation's market position or competitive edge
- Sustainability:
  - evaluate whether the project's benefits are sustainable over the long term
- Organisational capacity:

- assess whether the organisation has the skills and expertise required to execute the project successfully
- Legal and compliance requirements:
  - consider whether the project helps meet legal or regulatory obligations

Sustainability and control
Multiple-choice examination
Knowledge
K16 Process
Assessment criteria
E37 Explain why processes need a **control mechanism** (K16) **E38** Summarise **key qualities of a successful and sustainable process** (K16)
Amplification and guidance

Control mechanism
• Provides a systematic way to monitor, evaluate, and adjust processes to meet desired outcomes and prevent errors or inefficiencies
• Reasons why processes need a control mechanism include:
  ○ maintaining consistency
  ○ ensuring quality
  ○ monitoring performance
  ○ identifying and correcting deviations
  ○ preventing waste and inefficiency
  ○ supporting continuous improvement
  ○ managing risks
  ○ compliance and accountability
• Examples of control mechanisms include:
  ○ checklists
  ○ control charts
  ○ feedback loops
  ○ audits

Key qualities of a successful and sustainable process

- Consistency:
  - builds trust in the output and reduces errors
- Efficiency:
  - reduces costs and increases productivity
- A focus on quality:
  - ensures customer satisfaction and meets regulatory requirements
- Adaptability:
  - maintains relevance and effectiveness in dynamic environments
- Clear objectives:
  - helps to provide direction and purpose to all involved
- Stakeholder engagement:
  - encourages buy-in, reduces resistance and improves implementation success
- Measurable outcomes:
  - enables monitoring, evaluation and continuous improvement
- Sustainability:
  - ensures longevity and aligns with corporate responsibility
- Resilience:
  - reduces downtime and maintains operational continuity
- Standardisation:
  - ensures everyone follows the same steps, reducing variability
- Scalability:
  - supports long-term growth and market competitiveness

Project report, presentation and questioning		
Knowledge	**Skills**	**Behaviours**
K2 Improvement team roles and responsibilities in a change environment **K4** Project charter, Gantt chart, reporting documentation, Red Amber Green (RAG) status, communication (verbal and non-verbal channels) and implementation plans	**S1** Work in accordance with organisational controls and statutory regulations **S3** Plan, manage and implement improvement activities. Identify and support management of risks. Develop the business case for improvement activity and implementation **S4** Engage through communications. Reinforce – positively and negatively. Effectively coach peers **S5** Use a structured method and appropriate improvement tools engaging with subject matter experts to deliver business benefits **S6** Identify and scope improvement projects and establish clear measurable objectives **S7** Develop a problem/opportunity statement supported by validated data **S8** Apply techniques to identify customers, their requirements and translate these to metrics **S9** Apply process mapping tools to visualise processes, analyse process performance establishing key insights for performance improvement	**B1** Clear commitment for identifying opportunities and delivering improvements, pays attention to detail **B4** Acts upon feedback, reflects on performance and has a desire for learning

	S10 Apply techniques such as identification and removal of 8 wastes, 5S (Sort, Shine, Set, Standardise, Sustain), standard work, kaizen, visual displays and controls, error proofing, preventative maintenance **S11** Develop data collection plan and validated measurement processes to understand performance **S12** Establish patterns and trends in data over time using tally, pie, run/trend and pareto charts **S13** Identify common and special cause variation **S14** Analyse product/process performance using good quality data **S15** Use cause and effect diagrams, technique of 5 whys and graphical analysis to understand and verify root causes **S16** Identify and prioritise improvement solutions **S18** Create control and reaction plans with detection measures, identify opportunities to embed changes to leverage benefit to the business	

Pass criteria	Merit criteria	*Distinction criteria*
PR1 Show **business benefit** to the apprentice's employer (S18) **PR2** Follow the steps of a recognised problem-solving methodology (e.g. **PPS**, **DMAIC**, **8D**) with a clear flow from one step to another and supported by the application/interpretation of appropriate Lean, Six Sigma, project and change management tools (S1, S3, S4, S5, S6, S7, S8, S9, S10, S16, S18) **PR3** Demonstrate **data-backed decision making** to support definition, measurement, analysis and improvement (S11, S12, S13, S14, S15) **PR4** Explanation of why the project was chosen (S3) **PR5** How they used each tool (S5) **PR6** How they worked with others in a team during the project (K2, K4)	**PR7** Clearly explains how the outputs of each tool are used to inform the next step (S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S18) **PR8** Takes the opportunity to share and/or replicate the improvements made to one other area/system where there are differences in the solutions/controls required to deliver successful outcomes (B1)	***PR9*** *Takes the opportunity to share and/or replicate the improvements made to one other area/system where there are differences in* ***baseline metrics*** *(B1)* ***PR10*** *Seeks opportunities to apply Lean, Six Sigma, Project and Change Management tools in daily work (B4)*

Amplification and guidance

Business benefit

- Can be shown through analysis of the current state or problem, the target or desired state, and evidence that shows how the implementation of solutions has resolved problems or improved process or quality

PPS

- The eight-step approach to practical problem solving
- At each stage appropriate project management tools are used according to the complexity of the problem, the root cause, and the countermeasures required

DMAIC

- DMAIC is a structured methodology to solve complex problems and achieve process improvements
- The 5 phases are:
    - Define – clearly define the problem, goals and scope of the improvement project
    - Measure – collect data to establish a baseline and quantify the current state of the process
    - Analyse – identify the root causes of the problem using data analysis and Lean Six Sigma tools
    - Improve – develop and implement solutions to address root causes and improve process performance
    - Control – ensure that improvements are sustained over time
- DMAIC ensures effective problem-solving by:
    - using a structured approach where each phase builds upon the previous one, ensuring problems are addressed methodically
    - ensuring decisions are based on measurable facts and evidence rather than assumptions
    - focusing on the root causes of problems, eliminating problems at their source and preventing recurrence
    - producing sustainable results by implementing controls so that improvements become part of standard practice

8D

- A method to approach and to resolve problems
- It aims to improve products and processes by identifying, correcting, and eliminating recurring issues through root cause analysis and corrective actions
- The 8D framework consists of:
    - D0 – Plan for solving the problem and determine opportunities
    - D1 – Establish the team
    - D2 – Define the problem
    - D3 – Implement interim containment actions (ICA)
    - D4 – Identify root causes
    - D5 – Develop permanent corrective actions (PCA)
    - D6 – Implement PCA
    - D7 – Prevent recurrence
    - D8 – Recognise and celebrate team success

Data backed decision making

- Must show how decisions have been informed using evidence, such as:
    - Value Stream Maps
    - Process/Walks or Voice of the Customer Analysis
    - data collection and analysis supported with visual presentations
    - use of Cause-and-Effect Analysis and/or 5 Whys

Baseline metrics

- The starting measures of any improvement project
- Baseline metrics in Six Sigma are also known as the before measure
- These metrics can be quantitative or qualitative
- These baselines are often used as benchmarks for improvement projects

Professional discussion underpinned by log		
Knowledge	**Skills**	**Behaviours**
K2 Improvement team roles and responsibilities in a change environment **K3** Different sources for knowledge development	**S2** Share improvement progress through appropriate reporting **S3** Plan, manage and implement improvement activities. Identify and support management of risks. Develop the business case for improvement activity and implementation **S4** Engage through communications. Reinforce – positively and negatively. Effectively coach peers **S17** Recognise the value of sharing best practice	**B1** Clear commitment for identifying opportunities and delivering improvements, pays attention to detail **B2** Helps when asked, works effectively in a diverse team, considers impact of own actions on others, motivates peers **B3** Acts in a moral, legal and socially appropriate manner, aligns behaviours to the organisations values, trusted to working on own when appropriate **B4** Acts upon feedback, reflects on performance and has a desire for learning **B5** Ensures safety of self and others, challenges safety

Professional discussion underpinned by log		
Pass criteria	**Merit criteria**	***Distinction criteria***
PD1 Demonstrates clear commitment for identifying opportunities and delivering improvements, pays attention to detail (B1) **PD2** Evidences how they helped when working in a diverse team, considered impact of own actions on others and motivated peers (B2)	**PD12** Identifies other opportunities for improvement in their area (B1) **PD13** Uses own knowledge and skills to support colleagues in their application of improvement tools (B4) **PD14** Takes the opportunity to co-deliver training to upskill colleagues (B1)	***PD15*** ***Critically evaluates*** *their improvement journey and identifies recommendations for improvement/change (e.g. "If I were to do this again I would…") (B4)* ***PD16*** *Identifies other opportunities for improvement (B1)*

PD3	Acts in a moral, legal and socially appropriate manner that aligns to the organisations values and is trusted to work alone where appropriate (B3)		
PD4	Explains how they acted on feedback, reflected on own performance and showed a desire for learning (B4)		
PD5	Ensures the safety of self and others and challenges safety concerns (B5)		
PD6	Clearly explain their role in the team (K2)		
PD7	Clearly explain the different sources used to develop knowledge (K3)		
PD8	Clearly explain how they shared progress throughout the project (S2)		
PD9	Clearly explain their approach to Project Management including identification and approach to risks (S3)		
PD10	Clearly explain how they engaged others through Change Management (S4)		
PD11	Clearly explain how best practice can be shared with others (S17)		

Amplification and guidance:

Critically evaluates

- How the project delivery could have been improved by use of different tools, techniques, and approaches
- How could you have acted differently to ensure any changes to the approach were adopted
- How those changes could have positively impacted the project outcomes and what you must do in the future to ensure that recommendations for improvement/change are actioned

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Assessment summary

The end-point assessment for the Improvement Technician apprenticeship standard is made up of 3 components:

1. A 40-minute multiple-choice examination
2. A project report, 40-minute presentation and a 35-minute questioning session based on an improvement project
3. A 50-minute professional discussion underpinned by log

The presentation and questioning around the project report and the professional discussion underpinned by log can take place on the same day. They **must** take place during month **2** of the end-point assessment window with a minimum of 2 weeks' notice period given to the employer.

The multiple-choice examination can take place at any point during the end-point assessment window.

As an employer/training provider, you should agree a plan and schedule with the apprentice to ensure all assessment components can be completed effectively.

Multiple-choice examination

The multiple-choice examination will contain 40 knowledge-based questions and have a time limit of 40 minutes. The multiple-choice examination is an open book exam. Reference books can be used but access to the internet is prohibited.

The exam is graded pass/merit/distinction:

- to achieve a **pass**, apprentices must achieve **25-29 out of 40**
- to achieve a **merit**, apprentices must achieve **30-35 out of 40**
- to achieve a **distinction**, apprentices must achieve **36 or more out of 40**
- unsuccessful apprentices will have scored **24 or below out of 40**

Project report, presentation and questioning

The project report, presentation and questioning is weighted at 60% of the end-point assessment.

- To achieve a **pass**, apprentices must achieve **all** the pass criteria
- To achieve a **merit**, apprentices must achieve **all** the pass criteria and **all** the merit criteria
- To achieve a **distinction**, apprentices must achieve **all** the pass criteria, **all** the merit criteria and **all** the distinction criteria

The project report, presentation and questioning can be conducted face to face or remotely, as long as fair assessment conditions are maintained.

Professional discussion underpinned by log

The professional discussion underpinned by log is weighted at 30% of the end-point assessment.

- To achieve a **pass**, apprentices must achieve **all** the pass criteria
- To achieve a **merit**, apprentices must achieve **all** the pass criteria and **all** the merit criteria
- To achieve a **distinction**, apprentices must achieve **all** the pass criteria, **all** the merit criteria and **all** the distinction criteria

The professional discussion can be conducted face to face or remotely, as long as fair assessment conditions can be maintained.

Grading

Each assessment method will be individually graded in line with the conditions outlined above as fail, pass, merit or distinction.

Points will be awarded for each grade achieved in each individual assessment component using the table below.

Assessment component	Points awarded		
	Pass	Merit	Distinction
Multiple-choice examination	10	20	30
Project report, presentation and questioning	60	120	180
Professional discussion underpinned by log	30	60	90

Points for each assessment component will be added together to determine the overall grade using the table below:

Total points achieved	Overall Grade
Below 100	Fail
100 or above	Pass
200 or above	Merit
260+	Distinction

Apprentices **must** achieve a minimum of a pass in each assessment component to pass the EPA overall.

Retake and resit information

Apprentices that fail the EPA will have the opportunity to resit/retake. A resit does not require further learning, whereas a retake does.

Apprentices who fail any **1** EPA method will be offered the opportunity to take a resit for that 1 method. The resit/retake must be taken within **1 month** of notification of the result of the original EPA, otherwise the entire EPA must be retaken.

The resit will be graded pass/merit/distinction and combined with the grades for the other 2 assessment methods to determine the EPA grade. If an apprentice fails the resit, they will be required to retake the EPA in full after a period of further learning.

Resits are not available to apprentices wishing to move from pass to merit/distinction or merit to distinction.

Apprentices who fail **more than 1** of the EPA methods or who have retaken the EPA in full due to conditions described above will be required to retake the entire EPA after a period of further learning and the **maximum grade awarded will be 'pass'** unless Highfield establishes that the reason for the original fail was for reasons beyond the apprentice's control.

In all cases the apprentice's employer will need to agree that a resit or retake is an appropriate course of action.

When your learner is ready to complete their resit or retake, please contact the Highfield scheduling team to discuss this further. Feedback will be provided on the areas of failure and a retake checklist will need to be submitted when the professional review has taken place.

When your learner is undertaking their resit or retake, the assessment method(s) will need to be re-attempted in full, regardless of individual assessment criteria that were passed on any prior attempt. The EPA report will contain feedback on which areas there are for development along with resit or retake guidance.

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Assessing the multiple-choice examination

The multiple-choice examination will contain **40 knowledge-based questions** and have a time limit of **40 minutes**. The pass mark for this exam is **25 out of 40**.

Multiple Choice Examination		
Pass	**Merit**	**Distinction**
25-29 marks	30-35 marks	36-40 marks

The apprentice may refer to training material/reference books but may not access computer search engines or similar.

A maximum of 12 apprentices per administrator/invigilator are allowed.

Please refer to the Highfield Examination and Invigilation policy for further information regarding the ID verification process and details regarding the set-up of End-Point Assessments.

Before the assessment

- While on-programme, the employer/training provider should brief the apprentice on the areas to be assessed by the multiple-choice examination.
- In readiness for the end-point assessment, the apprentice should complete a sample examination.
- A sample assessment can be found as a separate download on the Highfield Assessment website.

Multiple-choice examination criteria

Compliance
E1 Identify an employer's main duty under the Health and Safety at Work Act
E2 Explain the purpose of customer compliance requirements

Change management
E3 Identify the key skills a leader needs to manage change effectively
E4 Describe organisational and individual barriers to change and methods to overcome these
E5 Identify the role that coaching can play in supporting change in the organisation
E6 Recognise how to reinforce change in the organisation

Principles and methods
E7 Define the focus of six-sigma technology
E8 Explain how DMAIC is used for solving problems in Six Sigma
E9 Explain the purpose of interim containment actions in the 8D Framework
E10 Identify the main principles of Lean

Project selection and scope
E11 Describe the main purpose of a scoping tree in selecting a project to undertake
E12 Explain the main benefit of a selection matrix

Problem definition
E13 Explain data collection planning methods
E14 Identify expected outcomes from exploratory data analysis
E15 Define the purpose of a problem statement
E16 Explain what a goal statement should contain

Process mapping and analysis
E17 Identify the benefits of creating a SIPOC diagram
E18 Identify the benefits of process mapping
E19 Explain the purpose of a value and waste analysis
E20 Describe the use of "discrete data" in performance metrics

Data acquisition for analysis
E21 Explain the purpose of “data stratification”
E22 Identify the key factors that affect the size and number of samples to take when acquiring data
E23 Define the difference between continuous and discrete data
E24 Determine relevant data collection methods appropriate to the requirements
E25 Define the term “operational definitions”
E26 Explain the purpose of output and input data in establishing measures

Basic statistics and measures
E27 Explain the use of a control chart

Process capability and performance
E28 Describe the purpose of a process-capability analysis
E29 Explain why continuous data is used in capability analysis

Root cause analysis
E30 Explain the purpose of a Histogram

Experimentation
E31 Explain the term “one factor at a time”
E32 Provide a comparison of active analysis and One Factor at a Time when using experiments
E33 Identify uses for the Plan Do Check Act approach

Identification and prioritisation
E34 Explain the key benefits of effective brainstorming
E35 Define the term “Affinity Grouping”
E36 Identify factors to consider when selecting improvement projects

Sustainability and control
E37 Explain why processes need a control mechanism
E38 Summarise key qualities of a successful and sustainable process

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Assessing the project report, presentation and questioning

During the 12-15 months leading up to the EPA, the apprentice should have been working on improvement projects and as such, should have produced a project portfolio that details the projects they have been part of.

The project portfolio will then be used by the apprentice to assist them in writing and producing a project report about the improvement project(s) they have been involved with.

The project report is to be submitted to Highfield by the apprentice within 1 month following gateway.

The improvement project **must**:

- **clearly** demonstrate delivery of a business improvement benefit
- the report will be authorised with a signed statement from the line manager to confirm the project's authenticity and business benefit
- have been completed in the apprentice's workplace
- must address a fundamental business problem
- follow each step of 1 of the recognised improvement methodologies

Project brief

The apprentice should be involved in an improvement project that allows them to meet the assessment criteria assigned to this assessment component. The project should involve collaborating with others to identify and analyse failure modes, such as, the way the failure occurs and its impact. From this, the apprentice should generate appropriate corrective actions for reducing the occurrence of failure modes or improving their detection and continue to work with others to determine the effectiveness of the corrective actions taken.

The project should be suitably planned, in accordance with the sector statutory regulations and organisational policies and controls regarding decision making, finance and legal compliance. A project plan should be developed, as should a project charter, based on initial analysis and lessons learned to meet the project deliverables. They should select and make use of recognised tools and models to obtain and use data and information, and make use of appropriate techniques (failure mode, effects analysis, affinity grouping and selection and prioritisation matrix) to identify and prioritise factors, ideas and solutions. The project should demonstrate application of appropriate lean techniques (for example, 5S, standard work, Kaizen, error proofing tools and value stream mapping) to analyse processes and their value to the customer and identify and categorise waste in the process.

The apprentice should prepare for, plan and run a controlled analysis to check the repeatability/reproducibility, and analyse the results of the study and determine the root cause of any problems. There should be clear demonstration of data-backed decision making to support experimentation and optimisation.

This assessment component is made up of **three** parts:

1. **Project report**

The project report must be produced during the end-point assessment period and submitted to Highfield within 1 month of the gateway meeting, detailing a substantive improvement project they were part of during the on-programme time, which will be confirmed in writing by their employer. The end-point assessor will read the project report prior to the presentation and questioning.

The report should:

- be a concise, visual summary
- follow the principles of "A3 Thinking"
- convey key points in a way that enables messages to be grasped "within 3 seconds"
- be typically 1 to three sides of A3
- include any support documents in an annex which must be submitted with the report and which must be distinct from documents included in the project portfolio

The report must follow each step of 1 of the recognised problem-solving methodologies, for example, 'Define, Measure, Analyse, Improve, Control' (DMAIC), '8 Disciples' (8D), 'Practical Problem Solving'.

The project report **must** be authorised by the means of a signed authenticity document from the apprentice's line manager to confirm authenticity and business benefit.

The written submission sheet that is available to download on the Highfield website must be completed and signed by the apprentice and the employer. This submission sheet must accompany the project report when it is submitted.

The assessment component cannot proceed without the written submission sheet being signed.

2. **Presentation**

The apprentice will have to produce a presentation based on the project report and deliver this to the end-point assessor who will then be able to question the apprentice based upon the information contained in the presentation.

There is no word or content restriction in the presentation but it must follow each step of 1 of the recognised problem-solving methodologies.

The presentation **must** also be authorised by the apprentice's line manager to confirm authenticity and business benefit. This will be captured verbally.

The apprentice should clearly explain:

- the reasons for project selection
- how each improvement tool was used
- the business benefit of the project including a key performance indicator measure (for example, hours saved, or money saved)
- how the apprentice worked with a team of people during this project

The presentation must last for no more than **40 minutes**.

A representative of the apprentice's employer must be present during the presentation but only for the purpose of confirming the validity of the information provided.
The assessment component cannot proceed if a representative of the employer is not present.

The employer representative can also provide guidance to the assessor regarding company policy and practice where requested. Internal or external quality assurance staff may also be present.

Presentation format
It is up to the apprentice how this information is presented and can be presented in any format. Acceptable forms of presenting include:

- PowerPoint
- A large copy of the project 'A3' report
- Images
- Charts

3. Questioning

The apprentice must bring their project portfolio of evidence and all necessary materials to the presentation and questioning.

For each of the required knowledge, skills or behaviours that are not naturally evidenced through the report and presentation, the end-point assessor will need to ask follow-up questions to elicit evidence that the criteria have been attained.

The questioning will last for no more than **35 minutes**.

Example questions include:

- tell me about how you work in line with legislation and organisation policies?
- describe how you produced a project plan to schedule activities?
- tell me about a time when you used a problem-solving methodology and an appropriate improvement tool to deliver benefit to the business?

Before the assessment:

- the apprentice must complete a project report based on the improvement project they have been a part of during their time on programme.
- the project report must be submitted to Highfield Assessment within 1 month following the gateway meeting. The presentation will take place within month 2 and the apprentice will be given a minimum of 2 weeks' notice of when the presentation will be.
- the apprentice must create a presentation around the content contained in the project report.
- employers/training providers should discuss any relevant improvement projects that have been implemented within the business over the on-programme duration that the apprentice has been present.

Employers/training providers should:

- ensure the apprentice knows the date, time and location of the end point assessment
- encourage the apprentice to reflect on their experience and learning on-programme to understand what is required to meet the standard
- inform Highfield of the apprentice's selected method of presentation
- prepare/check any/all equipment necessary to enable to apprentice to present

Project report, presentation and questioning mock assessment

It is the employer/training provider's responsibility to prepare apprentices for their end-point assessment, and Highfield recommends that the apprentice completes a mock presentation and experiences the mock questioning in preparation for the real thing. The most appropriate form of mock assessment will depend on the resources available and the industry the apprentice has been working on improvement projects in.

The apprentice should be encouraged to practice their improvement project presentation with the employer/training provider before the end-point assessment.

In designing a mock assessment, the employer/training provider should consider the following elements in its planning:

- the subject of the mock presentation should be a real improvement project that the apprentice has been a part of
- the report must show a clear business benefit to the employer
- the presentation can be in any format but must be a concise visual summary
- the key points of the presentation must be grasped within 3 seconds
- apprentices must clearly explain the reasons why they chose the selected project, how each improvement tool was used, the business benefit of the project including a key performance indicator measure (hours saved, money saved, efficiency increase) and how the apprentice worked with a team of people during the project
- the project must follow 1 of the recognised problem-solving methodologies
- a 75-minute time slot should be made available for the complete presentation and questioning (maximum of 40 minutes for the presentation and maximum of 35 minutes for questioning), if it is intended to be a complete mock observation covering all relevant standards. However, this time may be split up to allow for progressive learning.
- consider a video recording of the mock assessment, and allow it to be observed by other apprentices, especially if it is not practicable for the employer/training provider to carry out a separate mock assessment with each apprentice
- ensure that the apprentice's performance is assessed by a competent trainer/assessor, and that feedback is shared with the apprentice to complete the learning experience; the mock assessment sheets found on the Highfield Assessment website can be used for this purpose

Project report, presentation and questioning criteria

The presentation and questioning will last for a total of 75 minutes during which, the following standards should be evidenced. Apprentices should prepare for this by ensuring their project report is submitted and that they can speak comfortably for up to 40 minutes about this in the presentation.

Project report, presentation and questioning
To gain a pass, the following must be evidenced
PR1 Show business benefit to the apprentice's employer (S18)
PR2 Follow the steps of a recognised problem-solving methodology (e.g. PPS, DMAIC, 8D) with a clear flow from one step to another and supported by the application/interpretation of appropriate Lean, Six Sigma, project and change management tools (S1, S3, S4, S5, S6, S7, S8, S9, S10, S16, S18)
PR3 Demonstrate data-backed decision making to support definition, measurement, analysis and improvement (S11, S12, S13, S14, S15)
PR4 Explanation of why the project was chosen (S3)
PR5 How they used each tool (S5)
PR6 How they worked with others in a team during the project (K2, K4)
To gain a merit, the following must be evidenced
PR7 Clearly explains how the outputs of each tool are used to inform the next step (S6, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16, S18)
PR8 Takes the opportunity to share and/or replicate the improvements made to one other area/system where there are differences in the solutions/controls required to deliver successful outcomes (B1)
To gain a distinction, the following must be evidenced
PR9 *Takes the opportunity to share and/or replicate the improvements made to one other area/system where there are differences in baseline metrics (B1)*
PR10 *Seeks opportunities to apply Lean, Six Sigma, project and change management tools in daily work (B4)*

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Assessing the professional discussion underpinned by log

The apprentice must complete a log that details all of the training, learning and workshops they have attended. This log will be completed during the on-programme part of the apprenticeship. This log must have a minimum of 1 piece of evidence to cover each 1 of the knowledge, skills and behaviours required for the professional discussion.

The log **must** be submitted to Highfield at EPA gateway. The log is reviewed by the end-point assessor before the professional discussion takes place.

The apprentice must bring a copy of their log to the professional discussion to show the assessor extracts if necessary.

The assessment component **cannot** proceed if the apprentice does not bring their log to the discussion.

The evidence produced is mapped holistically so that 1 piece of evidence may cover more than 1 standard set for the professional discussion. Evidence could include the tools and techniques used in improvement projects, and the outcomes achieved in using those tools. Techniques may include mind mapping, value stream mapping and data collection.

The log will typically reference between 13 and 15 pieces of evidence, with at least 1 piece covering each of the standards. Supporting evidence can be provided by testimony from colleagues, managers or other individuals who have worked as part of a project managed by the apprentice. The log will then be used as the focal point of the professional discussion and as such will not be assessed as a separate assessment method.

The independent assessor will typically ask 13 to 15 open questions relating to the log and can, if deemed necessary, ask further follow-up questions for clarification to elicit evidence that all the required standards have been attained.

The apprentice will be asked, with reference to their CPD log to explain how the criteria set out below were practically achieved.

Example open questions that might be used could include:

- describe your role in the improvement team?
- give me an example of where best practice was shared with others
- what was the objective of working independently?
- how did you identify your own strengths and areas for improvement?

The professional discussion must **not** last longer than 50 minutes.

A representative of the apprentice's employer must be present during the presentation but only for the purpose of confirming the validity of the information provided. Internal or external quality assurance staff may also be present.

The assessment component **cannot** proceed if a representative of the employer is **not** present. The grades available are fail, pass, merit and distinction.

Before the assessment

The log must be submitted to Highfield at the gateway meeting and will be reviewed but not assessed by the end-point assessor before the professional discussion. In providing this evidence for the professional discussion, the apprentice can demonstrate a commitment to identifying opportunities and delivering improvements on more than 1 occasion, using appropriate techniques to identify and define improvement opportunities.

Employers/training providers should ensure:

- the availability of quiet and private rooms suitable for all of the end-point assessments to take place with chairs and a standard or larger sized desk available for each apprentice
- that appropriate reasonable adjustments are made with Highfield if an apprentice is declared to the employer as having special needs
- that the apprentice is encouraged to reflect upon their experiences from their on-programme time and how this is relevant to the criteria
- the apprentice is aware of the date/time and location of the assessment
- the apprentice knows which assessment criteria they will be assessed on

It is suggested that a mock assessment is carried out by the apprentice in advance of the end-point assessment with the training provider/employer giving feedback on any areas for improvement.

Further measurement and analysis may have been undertaken to quantity and prioritise projects or activities.
As a result, the apprentice can provide a clear rationale for how projects have been selected and prioritised.

The apprentice should then discuss:

- the effectiveness of the tools used to support project management
- management of risks – A Risk Register, RAID Log or similar tool appropriate to the project is provided with an explanation of how it has been used and its effectiveness in mitigating risks and issues
- own approach to working with others and/or managing the project team
- based on the experience, how the approach to motivating others compared with recognised theories such as Herzberg Two-Factor, McClelland's Need or McGregor's Participation or Vrooms Expectancy Theory
- evidence of occasions when they supported others to deliver outcomes, and the impact of this on motivation of individuals and teams

- how those affected by a project's outcomes were engaged through change management. The approach to change management may be compared to recognised theories such as Lewin, Kotter, Akdar amongst others.
- how a project communication plan was followed to update others on project progress, and how implementation success was shared

The discussion can be summarised with a reflection of own learning journey by the apprentice.

This can include:

- considered thoughts on own behaviour throughout the project/s, how well it aligns to the organisation's values, and how behaviours and actions protected the safety and well-being of others
- a balanced evaluation of own performance, and examples of where he/she acted on feedback from others during the course of the programme/project

Professional discussion underpinned by log mock assessment

It is the employer/training providers responsibility to prepare apprentices for their end-point assessment, and Highfield recommends that the apprentice completes a mock professional discussion in preparation for the real thing. The most appropriate form of mock assessment will depend on the resources available and the industry the apprentice has been working on improvement projects.

In designing a mock assessment, the employer/training provider should include the following elements in its planning:

- a 50-minute time slot must be made available for the professional discussion
- make sure the mock professional discussion takes place in a suitable location
- consider audio or video recording of the mock professional discussion and allow it to be available to other apprentices, especially if it is not practicable for the employer/training provider to carry out a separate mock assessment with each apprentice
- ensure that the apprentice's performance is assessed by a competent trainer/assessor and that feedback is shared with the apprentice to complete the learning experience. The mock assessment sheets found on the Highfield Assessment website can be used for this purpose.

The employer/training provider will typically ask 13 to 15 open questions and can ask follow-up questions if necessary for clarification to elicit evidence that the KSB's have been attained.

The apprentice must be asked open questions with reference to their log to explain how the criteria have been achieved. For example:

- Team Formation and Leadership
    - What is your role in the improvement team?
- Project Management
    - What is your approach to risk management?
- How do you approach risk?
    - What methods do you use to identify risks?
- Benchmarking
    - How would you share best practice with others?
    - What methods do you use to share best practice?
    - How do you identify best practice?

The apprentice will discuss and present the evidence of their training, learning and workshops undertaken.

The log should:

- clearly demonstrate the completion of any training, learning, and workshops attended
- ensure that there is a minimum of 1 piece of evidence for each required criteria

Professional discussion underpinned by log criteria

During the professional discussion, which will last for 50 minutes, the following standards should be evidenced. Apprentices should prepare for the professional discussion by considering how the criteria can be met and by reviewing the evidence contained within their log.

Professional discussion underpinned by log
To gain a pass, the following must be evidenced
PD1 Demonstrates clear commitment for identifying opportunities and delivering improvements, pays attention to detail (B1)
PD2 Evidences how they helped when working in a diverse team, considered impact of own actions on others and motivated peers (B2)
PD3 Acts in a moral, legal and socially appropriate manner that aligns to the organisations values and is trusted to work alone where appropriate (B3)
PD4 Explains how they acted on feedback, reflected on own performance and showed a desire for learning (B4)
PD5 Ensures the safety of self and others and challenges safety concerns (B5)
PD6 Clearly explain their role in the team (K2)
PD7 Clearly explain the different sources used to develop knowledge (K3)
PD8 Clearly explain how they shared progress throughout the project (S2)
PD9 Clearly explain their approach to project management including identification and approach to risks (S3)
PD10 Clearly engaged others through change management (S4)
PD11 Clearly explain how best practice can be shared with others (S17)
To gain a merit, the following must be evidenced
PD12 Identifies other opportunities for improvement in their area (B1)
PD13 Uses own knowledge and skills to support colleagues in their application of improvement tools (B4)
PD14 Takes the opportunity to co-deliver training to upskill colleagues (B1)
To gain a distinction, the following must be evidenced
PD15 *Critically evaluates their improvement journey and identifies recommendations for improvement/change (B4)*
PD16 *Identifies other opportunities for improvement (B1)*

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