Unit 334: Sanitation system planning and design

Sample scheme of learning

Please revise the following text to suit your requirements.

This sample scheme of learning covers both classroom and workshop based learning for Unit 334. It is based on 90 hours over 15 sessions, plus additional hours for independent learning. Some suggestions of independent learning are made in the session plans. **This requires tutors to produce their own support material to enable the learners to achieve**

This is only an example of a possible scheme of learning. You can use it as it is, adjust it or extract content to suit your delivery needs, or the needs of individual learners. We have endeavoured to make the schemes of learning as flexible as possible: where sessions may be taught out of order, this has been signposted. You may find it useful to use our lesson plan template to translate and adapt the sessions.

The schemes of learning are intended to be learner-focused, and they embrace current pedagogical methodology such as flipped and blended learning. They include the following types of learning tasks:

- **Pre-learning** – tasks for the learner to complete in advance of the session to allow for flipped learning
- **Active learning** – active, experiential and discovery learning approaches
- **Challenge focus** – stretching tasks to challenge more able learners
- **Independent learning** – tasks that learners can complete individually or collaboratively without tutor supervision. These tasks may be given as homework.

Reference is made within the scheme of learning to learning materials and other resources required for each session. **Materials will have to be produced by the tutor prior to delivering each session.** Ideas for support material can be found on the internet by using sites such as:
www.tripticoplus.com
www.asdan.org.uk
www.quizlet.com
www.wordsheetsworks.com
www.classtools.net

and adapting their base material to suit.

Resources consist of physical equipment required, as well as any technologies needed. Where possible we have included blended learning activities that make good use of technology so as to help centres fulfil the minimum amount of digital teaching recommended by the government.

The scheme of learning also signposts opportunities within the unit content to introduce the following wider skills and government initiatives:

- English, mathematics and ICT
- employability skills and behaviours
- British values (including the Prevent strategy).

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Centres should also incorporate the following themes, where appropriate. Although they are not specifically referred to in the scheme of learning, City & Guilds regards these as essential in the teaching of the qualification:

- spiritual, moral, social and cultural issues
- health and safety considerations, in particular the need to impress upon learners the fact that they must preserve the health and safety of others as well as themselves
- environmental education and related European issues.

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Unit 334: Sanitation system planning and design

Sample scheme of learning

Course/Qualification: _____ **Tutor's name**: _____

Number of sessions: 15 **Delivery hours**: 90 **Venue**:_____ **Group**: _____

Learning outcomes:	**To enable learners to understand**:
• Understand types of sanitation systems and their layout requirements • Understand design techniques for sanitation and rainwater systems • Understand fault diagnosis and rectification procedures for sanitary pipework systems and components • Understand commissioning requirements of sanitary pipework systems and components • Commission sanitary pipework systems and components	• What air admittance valves are used for • What are the common faults with macerators • How waste pipe faults are diagnosed • Which documents and regulations relate to sanitation systems

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Session 1: Above ground drainage and sanitation systems

Suggested Teaching Time: 6 hours

Learning Outcomes: 1. Understand types of sanitation systems and their layout requirements

Learners will describe the installation requirements for sanitation pipework with consideration of:

- type of system, eg stub stacks, primary vented stacks, secondary ventilated, fully ventilated
- air admittance valves
- multi-occupancy dwellings
- minimum and maximum distances.

Topics: 1.1 – Above ground drainage and sanitation systems

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to **look at** sanitary system installations at home or work, and identify how they work. Note the waste pipe arrangements and how they connect to the main soil stack. Observe where the soil stack terminates on the building and estimate distances from adjacent openings. If the stack terminates inside, inspect the components fitted to the terminal. Survey other soils stacks and see if any similar components are installed externally at the termination. Learners to **write a short summary** of their findings and take photographs of soil stacks/waste pipes. **Discuss** and state their type, purpose and functionality in class. **Active learning:** • Tutor to ask learners about the sanitation systems they've found at home, at work or at work. Tutor will generate a **group discussion**, incorporating all of the learners' observations, and then develop the **outcomes, thoughts and ideas discussed** into a basic understanding of how a sanitation system works and why they differ in pipework	**Materials** For the tutor to devise in advance: • **Presentation 1** • **Worksheet 1** **Resources** • Computers • Phones and/or tablets • BS EN pt 1-5 12056 • BS 6465 • Domestic Building Compliance Guide 2010: www.planningportal.gov.uk/uploads/br/domestic_building_compliance_guide_2010.pdf	• Tutor-led group discussion to check if learners have correctly identified systems of pipework and their individual function and purpose. Assess how learners can identify requirements for sanitation within a building. • Tutor can ask learners key questions about **the different types of systems in Europe** and ask them to write down their thoughts. Ask them to share their thoughts and findings with the larger group. • **Assess** group discussion outcome about systems used in the UK by asking questions. • **Review** learners' response in notes and their discussions regarding the features of a primary ventilated stack. • Tutor to **check clarity and depth of**

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Key learning activity/approach	Suggested materials and resources	Skills check
arrangements. • Tutor to produces and present **Presentation 1** on the four types of soil stacks installed in the UK based on BS EN 12056. • **Tutor-led discussion** on the four main types of systems – I, II, III and IV – utilised in sanitary applications in Europe. Highlight system III, which is based on UK practice. • Tutor to **initiate a group discussion** about the four soil stack systems used in the UK: primary ventilated stack system, secondary ventilated stack system, ventilated branch discharge system and stub stack. • Learners to study the main features of a primary ventilated stack. Learners to **make notes and exchange** completed notes with the person next to them; compare findings, including outcomes from the pre-learning activity, and discuss their outcomes, such as appliance pipework dimension and maximum pipe runs from a soil stack, critical differences in drain invert dimension for connections for low rise and high rise dwellings. • Learners to get into small groups, and tutor to allocate one technical question to each group. The aim is for learners to **generate as many ideas** as possible in response to the specific question, and provide feedback to the class as a whole. • **Learners to work in pairs** to identify the key features of a ventilated branch discharge pipework system, and the difference in how appliances are individually vented and location of the pipework. • Learners to present to class in pairs how systems work by using their own work to prove learning. • Tutor to facilitate a **discussion** with learners about secondary ventilated stack systems and the use and purpose		**learners' responses** to technical questions; give feedback and discuss in class. • **Analyse** outcome of **learners discussing in pairs** ventilated branch discharge systems, and assess understanding of key points and difference from primary ventilated stacks. • Tutor to **check** clarity of learners' responses to discussion about secondary ventilated stack systems and the use and purpose of smaller 25–32mm ventilating pipes. • Check **learners' awareness** of the importance of the correct location of soil pipe terminals to prevent the ingress of foul smells into dwellings. • **Quality-check** the answers from learners in the discussion regarding critical dimensions in relation to pipe runs and distances on stub stack installations. • Assess **learners' understanding** of the function and location of AAVs within the building and external options. • **Examine responses to Worksheet 1** on sanitation systems, where there are important installation issues and logical thinking required. • Tutor to **check accuracy** of learners' technical responses. Check answers, give feedback and discuss in class. • **Discuss and assess** individual ideas and

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Key learning activity/approach	Suggested materials and resources	Skills check
of smaller 25–32mm ventilating pipes in larger multi-storey applications. Investigate the flexibility in distances of appliances from the soil pipe. • **Tutor to describe** the location of soil pipes in relation to the opening in the building to prevent the ingress of foul air into dwellings. Learners to locate critical dimension from regulations: **AD Part F** (www.planningportal.gov.uk/uploads/br/domestic_building_compliance_guide_2010.pdf). • Learners to **split into groups** and **examine** the range of application of a stub stack system and its critical dimension in relation to pipe runs and distances from inverts of the drain. Note maximum loading. • **Learners in groups** to examine the mechanical function and application of AAVs, and the importance of correct specification, highlighting the advantages and limitations, plus instruction of external installation opportunities, while discussing and providing feedback to each other in class. • Tutor to produce and learners to complete **Worksheet 1**, answering questions covering a range of sanitation systems and regulations. Once complete, tutor to facilitate a **discussion** regarding different learners' responses to each question. • Learners to get into small groups, and tutor to allocate one further technical question to each group. The aim is for learners to **generate as many ideas** as possible in response to the specific question, and provide feedback to the class as a whole. **Challenge focus:** • More able learners to **investigate** systems used in France or Germany, and compare advantages and		thoughts from learners involved in the Challenge focus task.

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Key learning activity/approach	Suggested materials and resources	Skills check
disadvantages in their possible application to multi-storey dwellings in the UK then write a **short essay**. **Independent learning:** • Learners to gather information on WC macerators and **compare** the different performance criteria for each product. Learners can also carry out **online research** into sink waste disposal units form manufacturers' websites and write a **summary** of their findings.		

Opportunities to develop maths, English, ICT and wider skills:

English: • **Speaking and listening** skills can be demonstrated in developing the **discussions** about above ground drainage and sanitation systems, **giving a point of view**, as well as **allowing** and **responding** to **others' opinions**. • Learners demonstrate **reading** skills in peer task, as they **identify** the **correct information** to answer the comprehension questions about sanitation systems and their functions which are found at home or in the workplace. • More able learners can demonstrate **writing** skills when producing an **essay** about European systems and the potential application to multi-storey dwellings in the UK. Check that learners have used **formal language** appropriately. Ensure that correct **spelling**, **punctuation** and **grammar** have been used. **ICT:** • Learners have the opportunity to use **advanced search techniques** to **locate, select and evaluate** relevant online sources	**British values:** • Learners to develop their **self-knowledge**, **self-esteem** and **self-confidence** when assessing their skills and further training options. Learners to display their responsibility to be qualified, competent and registered with competent person schemes such as CIPHE membership. • Talk about how learners may come into contact with wider **public institutions**, such as the CIPHE, the need for learners to **respect** them, and why they are **important** in the plumbing industry. **Employability:** • Learners can experience **working in a team** when answering the technical questions and during other group work. Check that learners are **working well together** (letting one another have input, being positive, motivated, etc) and all are **contributing** appropriately. • Learners can demonstrate their ability to **generate** and **select**

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that provide suitable information about sink waste disposal units.	**ideas**, and **develop** them more fully as part of the technical questions tasks.

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Session 2: Sanitary facilities and equipment

Suggested Teaching Time: 6 hours

Learning Outcomes: 1. Understand types of sanitation systems and their layout requirements

Learners will explain the working principles and system layout features of specialist sanitary components including:

- WC macerators
- waste water lifters
- sink waste disposals
- wet rooms.

Topics: 1.2 – Sanitary facilities and equipment

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to observe appliances and installations at home or at work, and observe their operation and functions. Detect electrical isolation points and assess access to moving parts. **Make notes, take photograph of appliances and installations (where appropriate)** and bring to class. **Active learning:** • Tutor to ask learners about the process of operation of appliances and the key features of installations at home or at work. • Tutor to produce and present **Presentation 2** on specialist sanitary components, including macerators, waste lifters, sink disposal and wet rooms. • **Tutor-led discussion** on WC macerators; ask learners to identify the typical location based on information from the textbook or from survey at home. Discuss information on restrictions and conditions of such installations, referring to Building Regulations AD G:	**Materials** For the tutor to devise in advance: • **Presentation 2** **Resources** • Computers • Phones and/or tablets • Flipchart	• Tutor can ask learners questions about their home and work survey on appliances and installations; ask them to explain their thoughts in class. • Confirm that learners know the advantages and limitations of WC macerators. Reference criteria from Building Regulations AD G. • Check learners' awareness of pipework rise and fall requirements to and from a macerator. • Identify learners' understanding of pipework type, jointing, support and bends when connecting to soils stacks and below ground. • Analyse quality of learners' responses to access, extensions and electrical connections, and fuse ratings.

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Key learning activity/approach	Suggested materials and resources	Skills check
www.planningportal.gov.uk/uploads/br/domestic_building_compliance_guide_2010.pdf. • Tutor to facilitate a **discussion** with learners about pipework requirements for rise and fall to and from a macerator. • **Group discussion** about discharge pipework requirements with regard to type, jointing, support and bends, as well as connection to soils stacks and underground locations. Feed back with comments to class. • Learners to **split into groups** and **explain** the installation requirements of a WC macerator regarding access, extensions and electrical connections, and fuse ratings; can access manufacturer's websites. • Learners to attempt formative quiz set by the tutor**.** • **Tutor-led discussion** about the purpose and location of sink waste disposal units. • **Learners to work** in pairs and **discuss** bonding requirements and safe isolation provisions. • **Tutor-led group discussion** about compact pump systems for small domestic wastewater applications: key dimensions and operational methods. • **Tutor-led discussion** to **explain** the key features and applications of walk-in wet rooms. Highlight sealing the floor, tanking and the waterproof membrane offering flexibility of location carried out by specialist contractors. • **Learners to work** in pairs and explore the types of grating and special trapping arrangement for wet rooms, as well as the option of the location of outlets specialist components. • Learners to carry out **reflective writing** within **small groups**. They can refer to the pre-learning exercise, and compare		• Check and discuss responses to the formative quiz set by the tutor. • Confirm learners' understanding of purpose and location of sink waste disposal units. • Check understanding of bonding and safe isolation to units using manufacturer's instructions. • Check learners' recognition of compact pump systems for small domestic wastewater applications. Discuss typical applications. • Tutor to check accurate feedback from learners and whether they give clear and relevant examples of key features and applications of walk-in wet rooms, including tanking, waterproof membranes and specialist contractors. • Check learners' understanding of types of grating and special trapping arrangement, as well as location of outlets and specialist components. • Tutor to assess **reflective writing** about **pre-learning exercise**. • Check and discuss responses to the summative quiz set by the tutor. • Check response and solution to the Challenge focus task, and discuss with whole class.

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Key learning activity/approach	Suggested materials and resources	Skills check
notes/images of appliances and installations identified during the pre-learning survey. • Learners to attempt **summative quiz** set by the tutor. **Challenge focus:** • More able learners to get into pairs to explain how a macerator works to the class in a **short presentation**, identifying its key features and components as set by the tutor. **Independent learning:** • Learners to conduct **online research** to find sanitation options for dwellings in isolated or off mains locations. Investigate special requirements for installers. Write a **short summary** of the findings.		

Opportunities to develop maths, English, ICT and wider skills:

English: • **Speaking and listening** skills can be demonstrated in developing the **discussions** about sanitary facilities and equipment, **giving a point of view** as well as **allowing** and **responding** to **others' opinions**. • Learners can demonstrate **writing** skills when producing **reflective writing** about their home survey in the pre-learning exercise. Ensure that correct **spelling**, **punctuation** and **grammar** have been applied. **ICT:** • Learners could use appropriate **presentation software**, as well as hand-held and other electronic devices to photograph and video	

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real-life scenarios for presentation to class. More able learners could use this software for their short presentation on the function of a macerator.	

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Session 3: Foul tanks

Suggested Teaching Time: 6 hours

Learning Outcomes: 1. Understand types of sanitation systems and their layout requirements

Learners will explain the working principles and layout features of foul tanks used in in sanitation systems including their periodic maintenance and cleaning requirements. Foul tank types include:

- cesspits
- septic tanks.

Topics: 1.3 – Foul tanks

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to **research** potential locations in their own area or by discovering online possibilities where foul tanks could be used. This activity can be carried out in any area which is off mains. With permission from the responsible persons, and where appropriate, **take photos and videos** of such installations and bring to the session. **Active learning:** • Tutor to produce and show **Presentation 3**, about when and where cesspools and cesspits are used, outlining the requirements and installation, and lead a **group session** discussing principles of operation, as well as the advantages and disadvantages of each individual type of application. • Tutor to produce and give learners **Handout 1** on the installation requirements of cesspits and septic tanks, which can be referred to during the presentation and activity sessions. Learners to get into groups to discuss cesspits and septic tanks. Make notes and then **discuss in pairs** the main differences between them, by highlighting the key features. Information can be shared later in tutorials or even as a	**Materials** For the tutor to devise in advance: • **Presentation 3** • **Handout 1** • **Worksheet 2** **Resources** • Interactive whiteboard • Computers and hand-held devices • Photos and videos from home • CIPHE plumbing engineering service design guide • Manufacturer's instructions	• Tutor-led discussion on pre-learning exercise; tutor to check and help with organising information into photo reel sequence or video clip editing. Discuss in groups and present in class. • Group discussion for tutor to confirm key principles of operation of cesspools and cesspits, noting advantages and disadvantages. • Check learners' responses from group discussion on key features of foul tanks and accurate references to **Handout 1**. • Think-pair-share activity for tutor to confirm the correct identification of **Vp** factor when assessing soil porosity and suitability for installation. • Check learners' recognition of purpose and frequency of maintenance tasks. • Tutor to **assess** understanding of reed

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Key learning activity/approach	Suggested materials and resources	Skills check
presentation. • Learners to get into pairs for the **think-pair-share** activity and explore soil porosity. Feed back to the class important determining features for specification including **Vp** factor. • Learners to **work in groups** to identify the importance, purpose and methods of maintaining cesspools and septic tanks, specifying the period of routine checks and timescale for emptying. Make notes and feed back to the class with outcome. • Tutor-led **discussion** about the purpose of reed beds, and how they relate to the requirements of Local Authorities and satisfy Building Regulation. • **Group discussion** about sewage treatment plants and pump stations. Learners to research how they work, why they are specified and their operating criteria. Then **get into pairs** and feed back to the class with ideas and design thoughts for remote locations. • Tutor to prepare and **learners, in pairs,** to attempt **Worksheet 2**, using a diagram of both a cesspit and aseptic tank**,** listing key questions about the installation requirements of both; feed back answers in class. • Learners to answer questions set by the tutor in pairs and feed back their experiences from the pre-learning survey. **Challenge focus:** • More able learners to offer solutions to questions set by the tutor regarding range of options for a new installation. **Independent learning:** • Learners to **read** manufacturer's instructions and refer to CIPHE plumbing engineering service design guide manual, and make notes on the purpose and location of fire stops and intumescent collars; then include findings in **plumbing**		beds and their relevance to Building Regulations, and acceptance and sometimes preference by Local Authorities. • Tutor-led discussion where tutor can ask learners questions about pump stations and sewage treatment plants to check their ideas and confirm understanding. • Tutor to assess clarity of responses from learners in pairs to **Worksheet 2**, checking key points in their presentation. • Tutor to **check range and depth of individual** responses to questions asked to the learners. • Tutor to assess more able learners by discussing answers and solutions to questions regarding range of options for a new installation; stretch the learning experience in the questions set.

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Key learning activity/approach	Suggested materials and resources	Skills check
dictionary. This can include definitions and explanations of different terminologies found in a plumbing context		

Opportunities to develop maths, English, ICT and wider skills:

English: • **Speaking and listening** skills can be demonstrated in developing the **discussions** about foul tanks, **giving a point of view** as well as **allowing** and **responding** to **others' opinions**. • Learners to use **reading** skills in the independent learning task about the purpose and location of fire stops and intumescent collars; then include findings in a **plumbing dictionary**. **ICT:** • Learners have the opportunity to engage in **blended learning** when researching and examining manufacturer's literature regarding the specification and application of foul tanks, which makes use of the centre's VLE/Moodle. This is an example of **cloud-based and/or collaborative** technology.	**British values:** • Talk about how learners may come into contact with wider **public institutions**, such as CIPHE, the need for learners to **respect** them and why they are **important** in the plumbing industry. **Employability:** • Learners can experience **working in a team** as part of the group work tasks. Check that learners are **working well together** (letting one another have input, being positive, motivated, etc) and all are **contributing** appropriately.

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Session 4: Selecting sanitation systems

Suggested Teaching Time: 6 hours

Learning Outcomes: 2. Understand design techniques for sanitation and rainwater systems

Learners will describe the factors which affect the selection of sanitation systems and appliances with consideration of:

- occupancy and appliance requirements
- building layout and features
- underground drainage/sewer system
- access/maintenance requirements
- sources of information – for example, manufacturer's instructions, Building Regulations, British Standards, customer information
- requirements for fire stops
- space requirements, eg for disabled access.

Topics: 2.1 – Selecting sanitation systems and appliances

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to continue creating their own **plumbing dictionary** with definitions of sanitary systems and appliances. Make notes and drawings, and take photos or videos with the aim to collaborate with others to produce a reference guide. Post the completed outcomes on the centre's VLE/Moodle and present to other learners during tutorials. **Active learning:** • **Tutor-led discussion** about occupancy and appliance requirements. Talk about findings during the pre-learning activity; learners to discuss findings of survey. • Tutor to prepare and present **Presentation 4** based on all of the factors that affect the selection of sanitation systems, including: occupancy, building layout, drainage system, maintenance, manufacturer's instructions, regulations, fire stops and disabled access.	**Materials** For the tutor to devise in advance: • **Presentation 4** • **Worksheet 3** **Resources** • Building Regulations Approved Document F, G and H • Building Regulations Approved Document M • BS EN 12056 • BS 6465	• Tutor to check learners' dictionaries for accuracy by reviewing Moodle activity and commenting where appropriate. • Tutor to check that learners identify types of sanitary systems and appliances accurately during the pre-learning survey. • Tutor to ensure that learners in groups give explanations of underground drainage system requirements. • Tutor to check that learners, in pairs, offer clear examples of application and rationale of spacing requirement for sanitary installations. Assess responses to **Worksheet 3**. • Check learners' responses from group

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Key learning activity/approach	Suggested materials and resources	Skills check
• Learners in **groups** to **explain** the main requirements for underground drainage systems. • **Learners to get into pairs** and describe space requirement for sanitary appliances in relation to BS 6465, explaining overlap requirements and stating typical application in modern building and modifications. Learners to complete the space requirements around sanitary appliances question sheet in **Worksheet 3**. This can involve diagrams and pictures, allowing learners to identify space requirements for various sanitary appliances. • **Tutor-led discussion** on the importance of resourcing the correct information when working on sanitary appliances, including customer information, British Standards, manufacturers' instructions and Building Regulations; can use websites: http://osma.wavin.com/, www.floplast.co.uk/ and www.planningportal.gov.uk/uploads/br/BR_PDF_ADH_2002. • Learners to get into small groups to **discuss** and draw a **mind map** of their thoughts about different Building Regulations Part H and F, identifying key design requirements for underground drainage and ventilation of sanitary appliances, and relevance to preventing waterborne and airborne disease. Learners to feed back their **mind maps** to the class. • Group **discussion for learners** to describe key design features of BS EN 12056, BS 6465 and the purpose of BS 8000 in the selection and specification of sanitary systems. Provide feedback to the class with outcomes. • Tutor to lead **discussion** on the relevance of Building Regulation AD Part M in the installation of sanitary environment and appliances for people with physical impairments. Learners to refer to manufacturer's instructions	• www.planningportal.gov.uk/uploads/br/BR_PDF_ADF_2010.pdf • www.planningportal.gov.uk/uploads/br/100312_app_doc_G_2010	discussion regarding key features and benefits derived from customer information, British Standards, manufacturers' instructions and Building Regulations. • Tutor to engage with mind map session and review quality of learners' responses offered in relation to Building Regulation standards, and water- and airborne disease prevention. Check accuracy of the feedback. • Tutor to check that learners' feedback accurately reflects the requirements of British Standards when selecting sanitary systems and appliances. • Tutor to check accurate feedback from learners and that they give clear and relevant examples in appliances and installation suitable for those with physical impairments. Ensure clear referencing to the Building Regulations and manufacturer's instructions. • Assess that pairs of learners offer clear purpose, descriptions and specification of fire stops such as intumescent collars in dwellings. • Tutor to check learners' awareness of the importance of access points in sanitary installations. • Tutor to check learners' responses to questions set. • Tutor to ensure that more able learners

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Key learning activity/approach	Suggested materials and resources	Skills check
and identify specialist products which are supplied as packages to comply with the Building Regulations. Learners can read Part M on the following website: www.gov.uk/government/publications. • **Learners to work in pairs** and use information from slides to identify the purpose, location and types of fire stops used in sanitary installation. State specific dimensions, how material becomes pyrolised and how an intumescent collar works**.** **Feed back in class group discussion.** Make notes to add to personal plumbing dictionary. • **Tutor-led discussion** on access points and maintenance requirements within a sanitary system. Learners to give examples and provide feedback in class discussion. • Learners to complete **quiz** set by the tutor by answering the questions in pairs, and tutor to go through the answers at the end of the session. **Challenge focus:** • More able learners to attempt questions set by the tutor on sanitary problem with effluent saturations and a soakaway, offering solutions by feeding back to the group at end of the session. **Independent learning:** • Learners to conduct **research** into the compatibility of a range of different materials which can be installed on a sanitary system. How can you identify manufacturers that have provided methods of mechanical interfaces to overcome dimensions and material property differences? **Make notes** and discuss with the tutor.		provide creative and workable solutions to the questions set by the tutor in the Challenge focus task.

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Opportunities to develop maths, English, ICT and wider skills:

English: • **Speaking and listening** skills can be demonstrated in developing the **discussions** about selecting sanitation systems, **giving a point of view** as well as **allowing** and **responding** to **others' opinions**. • Learners demonstrate **reading** skills in the independent learning task, as they **identify** the **correct information** to answer the question about manufacturer's mechanical interfaces. **ICT:** • Learners have the opportunity to engage in **blended learning** when carrying out research for their plumbing dictionary, which makes use of the centre's VLE/Moodle. This is an example of **cloud-based and/or collaborative** technology.	**British values:** • Talk about how learners may come into contact with wider **public institutions**, such as British and industry standards, the need for learners to **respect** them, and why they are **important** in the plumbing industry.

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Session 5: Designing sanitary pipework systems

Suggested Teaching Time: 6 hours

Learning Outcomes: 2. Understand design techniques for sanitation and rainwater systems

Learners will calculate sanitary provision requirements for dwellings and design sanitary pipework systems, including primary ventilated (inc. branches) and stub stacks, with consideration of:

- gradient
- diameter
- length
- material
- system type.

Learners will need to present design calculations to meet industry formatting conventions:

- using basic not to scale line drawings
- providing quotations or tenders for work in a small-scale dwellings.

Topics: 2.2 – Designing sanitary pipework systems

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to prepare for the session by examining the chapter in textbook on self-cleansing velocities and the importance of using the specified gradient range. Add outcomes to their own plumbing dictionary for tutor to review. **Active learning:** • **Tutor-led session** to help learners to identify the importance of precise calculations in sanitary systems in order to make accurate specifications to ensure performance in accordance with BS EN 12056. • **Tutor** to prepare and present **Presentation 5**, outlining the calculations and design requirements for sanitary pipework, including: gradient, diameters, lengths, material and system	**Materials** For the tutor to devise in advance: • **Presentation 5** • **Worksheet 4** • **Worksheet 5** **Resources** • Interactive whiteboard • Computers • BS EN 12056	• Tutor to confirm quality of information and understanding from learners regarding self-cleansing velocities in relation to the fall of a pipe. • Tutor to assess learners' awareness of accurate calculation in relation to system performance criteria. • Check accuracy of learning and understanding about range of materials and interface options when learning in pairs. • Tutor to monitor learners' awareness of dimensions during tutor-led group

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Key learning activity/approach	Suggested materials and resources	Skills check
types. • Learners to **get into pairs** and discuss the range of materials used in a sanitary system, comparing notes from the independent learning task on interface options from the previous session. Discuss in class with tutor to verify feasibility and compatibility with standards. • **Learners** to examine **in groups** the specified dimensions for waste pipework different applications in sanitary systems in the UK. • **Tutor-led discussion** on the design of sanitary pipework in dwellings and how to assess discharge units (DU). Use a commercial example which utilises a transferrable process highlighting flow rates and frequency factors for different types of systems. • Learners to complete **formative** questions in pairs, and tutor to go through the answers at the end of the session. • **Learners** to get **into pairs** to complete **Worksheet 5**. This can include using a multiple appliance installation, and working out the discharge units and system design, using AD H and BS 12056. • **Tutor-led discussion** on waste pipe dimension, and maximum permissible pipe length and gradient range and specified traps. Highlight gradient chart in Building Regulation Part H. Explain how the length of a pipe will need to decrease as the gradient increases. • **Learners in groups** to explore appliance specification in multi-storey dwellings and the suitability of a range of soil stacks to avoid pressure fluctuations. Learners to pay special attention to this process and make notes in preparation for synoptic assignment. • **Learners in pairs** to identify branch connections on soil pipe to avoid crossflow, noting specified restrictions. Examine		discussions by observing, and asking and answering questions. • Tutor to check that learners understand the principles of discharge units and realise how they can transfer this methodology to a wide range of applications. • Tutor to confirm accuracy of learners' responses to formative questions. • Check quality of learners' response to **Worksheet 5**. • Tutor to verify correct information imparted from learners in groups about gradients in relation to pipe length in order to avoid and detect this common installation problem. • Tutor to verify understanding of how to help prevent pressure fluctuations within a range of sanitary applications. • Check accuracy of learning in pairs regarding the importance of access and rodding points to comply with Building Regulation and British Standards. • Tutor to confirm accuracy of learners' responses to summative questions. • Tutor to assess learners' awareness and comprehension through their responses to **Worksheet 4** in tutor-led group discussion. • Tutor to assess learners' understanding and application of knowledge in the Challenge focus exercise.

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Key learning activity/approach	Suggested materials and resources	Skills check
access for clearing blockages, such as rodding points located on a sanitary pipework system. Discuss outcomes in class. • **Tutor to summarise** key points of the session and emphasise the importance of translating calculations and drawings into a format suitable for quotations and tenders. • Learners to complete summative **questions**, set by the tutor, in pairs; tutor to go through the answers at the end of the session. • Learners to complete **Worksheet 4**, a series of multiple choice questions on designing sanitary pipework systems, and feed back responses in tutor-led group discussion. **Challenge focus:** • More able learners to explain to the rest of the class the purpose of using discharge when calculating system requirements. **Independent learning:** • Learners to **research online**, and using manufacturer's literature, gutter profiles for rainwater systems commonly used in domestic dwellings. Upload outcomes of research to the centre's VLE/Moodle, and present to other learners during tutorials.		

Opportunities to develop maths, English, ICT and wider skills:

English: • **Speaking and listening** skills can be demonstrated in developing the **discussions** about designing sanitary pipework systems, **giving a point of view** as well as **allowing** and **responding** to **others' opinions**.	**Employability:** • Learners show an understanding of the **wider** aspects of the **industry** when they are introduced to the **range of job roles** by being able to calculate sanitary requirements in relation to pipe size and offer solution in a format suitable for tenders and quotes.

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• Learners demonstrate **reading** skills in the independent learning task – **identifying** and **summarising** the **main points** about gutter profiles for rainwater systems. **ICT:** • Learners have the opportunity to engage in **blended learning** when carrying out research for the independent learning task, which makes use of the centre's VLE/Moodle. This is an example of **cloud-based and/or collaborative** technology.	

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Session 6: Rainwater systems components

Suggested Teaching Time: 6 hours

Learning Outcomes: 2. Understand design techniques for sanitation and rainwater systems

Learners will calculate the size of rainwater system components used with single occupancy and multiple terraced properties including:

- outlets
- gutters
- rain water pipes.

Topics: 2.3 – Rainwater systems components

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to observe the methods used to remove water from buildings and note the materials and dimensions of the pipework used in domestic and large or commercial environments. Make notes and share in class. **Active learning:** • Tutor to introduce the range of documents relevant to rainwater pipework selection and specification. Tutor to prepare and present **Presentation 6**, outlining the calculations and design criteria for rainwater systems. • **Group discussion** on gutter standards and individual profile for different installations; combine information gained form independent learning research in previous session. • Tutor to lead a **discussion** on calculations referring to roof size and learners to engage with the basic maths exercise. Discuss two-minute storm event and where to derive the information from. • Learners to complete the following questions as a as a **think-pair-share** activity: '*Calculate the plan area of a roof which*	**Materials** For the tutor to devise in advance: • **Presentation 6** • **Worksheet 6** • **Worksheet 7** **Resources** • Building Regulations Doc H3:2002 rainwater drainage • Design and installation of rainwater systems • BS EN 12056-3:2000	• Tutor to check learners' knowledge gained from research about types of pipework in the pre-learning exercise. • Tutor to check for comprehension of the importance of referring to Regulations, standards and manufacturers' instructions by asking questions. • Tutor to verify feedback from learners regarding standards relating to the installation of rainwater gutters. • Tutor to check learners' approach to calculation relating to roof size and apply basic formula. • Tutor to check calculations in pairs and discuss roof pitch factors multiplications. • Tutor to check learners' understanding during group discussions by asking and answering questions on alternative

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Key learning activity/approach	Suggested materials and resources	Skills check
is: 6m long, 4m wide and 3m high, with a pitch of 45 degrees. Make notes on outcomes to feed back to the group, giving explanation of roof pitch factor multiplications. • Tutor to lead a group **discussion** on alternative methods of calculating roof size. Learners to engage with calculation exercise and make notes for the next stage. • Tutor to ask learners to examine the different formula to **work out** gutter size in relation to the elevation of a roof and the methodology shown in the Building Regulation, and apply the factors to the plan area of portion of roof. Learners to feed back to the class with calculation outcomes and thoughts. • Learners to complete formative questions set by the tutor and feed back to class; then rotate questions. • Learners to work in pairs and complete **Worksheet 6**. This involves using a diagram of a property with dimensions and roof pitch; calculate roof area and pitch factor using AD H. • Group **discussion** on gutter flow 90% capacity assertion and fixed levels, as well as options and performance capabilities relating to outlet positions. Learners to discuss opinions in class. • **Tutor-led discussion** on running outlet positions, and the fall and changes of direction, stating the factors that affect flow capacity. Learners to discuss in group. • Tutor to prepare **Worksheet 7**, which includes ten written questions of fact and identification, and learners to share responses with the rest of the class. • Learners to complete summative questions set by the tutor and feed back to the class; then rotate questions. **Challenge focus:** • More able learners to attempt **stretcher questions** set by the tutor about a client request for a new guttering system		methods of calculating roof size. • Ensure that learners have full understanding of how to apply calculation methodologies by applying factors shown in the Building Regulations. • Tutor to check learners' responses to formative questions and encourage discussion of the answers offered. • Assess correct methods and application of formula to **provide accurate answers to Worksheet 6**. • Check learners' approach of 90% capacity calculation of gutter flow in relation to outlet positions assessed with feedback from the learners. • Check understanding in discussion regarding running outlet position, and changes in direction, and its impact on flow capacity by questioning individual learners. • Tutor to check learners' answers for **Worksheet 7** by marking them and assessing shared responses. • Tutor to check learners' responses to further key point questions and encourage discussion of the answers offered. • Check outcomes from more able learners in Challenge focus task; discuss the practicality of solutions offered.

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Key learning activity/approach	Suggested materials and resources	Skills check
and, using the appropriate methodologies, provide a solution. **Independent learning:** • Learners to get into pairs to **devise a method** to create a fault finding process when responding to a client's problem. They should itemise the sequence and critical information required to help solve the problem appliance and component choice and write a **short report**.		

Opportunities to develop maths, English, ICT and wider skills:

English: • **Speaking and listening** skills can be demonstrated in developing the **discussions** about rainwater system components, **giving a point of view** as well as **allowing** and **responding** to **others' opinions**. • Learners can demonstrate **writing** skills when producing a **report** about fault finding processes. Check that learners have used **formal language** appropriately. Ensure that correct **spelling**, **punctuation** and **grammar** have been used. **Math:** • Learners can practise using **formulas** in a plumbing context, as part of completing simple calculations when applying size, measurement and position, as well as multiplication sequences in relation to formulas when calculating roof and gutter size. • Learners will have to **record**, **organise** and **present the data** about a suitable fault finding process when providing a method to approach a client's problem in the **Independent learning task**.	**Employability:** • Learners can demonstrate their ability to **generate** and **select new ideas**, and **develop** them more fully, as part of the Independent learning task. • Learners to suggest various **potential solutions** in the Independent learning task, when devising a method for a fault finding process for clients, and **judge** if the proposed solutions will work or not. Encourage them to work out how to **prevent** the problem occurring in future.

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Session 7: Diagnostic checks (workshop) **Suggested Teaching Time**: 6 hours

Learning Outcomes: 3. Understand fault diagnosis and rectification procedures for sanitary pipework systems and components

Learners will explain diagnostic checks for common faults to sanitary components including:

- WC macerators
- sink waste disposal units
- air admittance valves
- pipework/traps.

Topics: 3.2 – Diagnostic checks

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to **read** manufacturer's instruction for appliances and components, then plan sequence and approach to activities in workshop and research diagnostic methodologies form textbooks. Consider what is required to work safely and in an organised way in accordance with BS 8000. **Active learning:** • Tutor to prepare and present **Presentation 7**, outlining the diagnostic checks and common faults found in sanitary systems, including: macerators, waste disposal units, AAV, pipework and traps. • Learners to get into pairs and **compare** their individual plans/approaches to workshop diagnostic activities. • Tutor to **check individual plans**, and assist learners to prepare for individual tasks and risk assess the area in accordance with manufactures' instructions and British Standards. • Learners to **safely isolate** WC macerator and sink waste	**Materials** For the tutor to devise in advance: • **Presentation 7** **Resources** • BS 7671 • CIPHE design guide • Manufacturer's instructions • Part P of the Building Regulations • AP Doc M **For workshop appliances** • WC macerators	• Tutor to check learners' understanding by discussing pre-learning activity in class whilst learners compare their plans/approaches to workshop activities. • Tutor to monitor learners' progress during scenario/role play and ask questions or offer feedback where appropriate. • Tutor to ensure effective communication during workshop role-play activity. Tutor to ensure that learners have carried out all of the following. 1. **Safe isolation** checks for electrical power and water at appliance. 2. **Label circuit** and inform client/colleagues. 3. **Read** technical information for pressure and flow rates in manufacturers' instructions.

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Key learning activity/approach	Suggested materials and resources	Skills check
disposal systems and components to prevent them being brought into operation before the diagnostic processes and repairs have been fully completed. • Learners to lock off at fused spur and at consumer unit; inform client and colleagues and label accordingly. Inform others of what you are doing and where you will be, and avoid lone working. • Tutor to hand out **manufacturers' instructions** and industry standards which show the diagnostic methods and processes required to check sanitary pipework systems and components. • **Explain the process** of ordering replacements for damaged or defective components from manufacturer's short parts list and specific number needed for the original parts used. • Tutor to **discuss** how to carry out the diagnostic tests in accordance with **scenario/role play** exercise. **Workshop:** • Introduce and identify (ID card) yourself to the client (tutor); notify them about work to be carried out and advise them about safety and interruption of supplies. Give expected duration of work and expected outcome. • **Read** and analyse performance flow chart in manufacturer's instructions. • Tutor to help learners to visually **inspect** the area and ensure that **safe isolation** of electrical supplies to the whole unit is possible. • Diagnose faults. • Test WC macerators for correct operation and complete discharge, dismantle and cleaning of components, filters and valves • Listen to motor and pump noise, and check pipework	• Sink waste disposal units • Air admittance valves • Pipework and traps **For test instruments** • Calibrated multimeter (GS38 compliant) • Tools • Materials • PPE • Practical portfolio • Pens and paper • Dust sheet **For test instruments and special equipment/materials** • Lock-off devices for MCBs and fused outlet • Warning notices	4. Test operation of **WC macerators and sink waste disposal units** while explaining agreed sequence of testing appliance and measure pressure in accordance with the manufacturers' performance criteria. 5. **Analyse fault** procedure for WC pump impeller jammed or stuck, motor burn-out on sink waste disposal unit, AAV ingress of foul smell and loss of trap seal. 6. **Examine** the process of testing appliance components. 7. **Produce action plan for rectification of faults**. • Tutor to review learners' dictionaries and personal course portfolios, correcting where appropriate. • Tutor to check that the correct process is explained for the use of a calibrated multimeter.

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Key learning activity/approach	Suggested materials and resources	Skills check
installation for correct rise and fall. • Check sink waste disposal units for smooth operation; complete removal of food via a trap location of isolation point. • Observe operation of air admittance valve mechanism, including the opening and closing of the valve, location above flood level, access and odours. • **Inspect pipework installation with traps** by checking pipework size, length and fall, reports of smells near trapped appliances, evidence of self- or induced siphonage and connection to main soil stack. • **Specify remedy** to diagnosed problems set by tutor, and prepare an **action plan** to carry out remedial works. **Challenge focus:** • More able learners to explain the use of calibrated multimeter on selected faults. **Explain** dead testing then diagnosing the reason for component failure on a pump in a WC macerator unit. **Independent learning:** • Learners to **record** actions and outcomes, and include any of their own ideas and discoveries. They should add key features of work to be carried out to the proposed action plan, including descriptions and processes. This should be added to learners' **plumbing dictionary and personal course portfolio** for tutor to review.		

Opportunities to develop maths, English, ICT and wider skills:

English: • Learners demonstrate the **writing** skills of **planning** and **drafting**	**British values:** • Learners to develop their **self-knowledge**, **self-esteem** and **self-**

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in workshop sequence and approach planning task. • **Speaking and listening** skills in **effective communication** can be developed during the workshop role-play task with client/tutor. • Learners demonstrate **reading** skills when consulting manufacturers' literature, as they **identify** the **correct information** to answer the comprehension questions about routine checks and diagnostics.	**confidence** when carrying out diagnostic and successful repair processes to the required British Standards through study and personal research. **Employability**: • Learners should gain an understanding of the **wider** construction **industry** by communicating with manufacturers online and downloading fault finding information which can improve knowledge of **technical terms** and increase potential employability. • Learners should demonstrate that they can **actively listen** during the effective communication /role-play session in the workshop, **understand** what has been said and **respond/act** accordingly by carrying out safe practices, and successful diagnosis and repair in relation to industry standards.

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Sessions 8 and 9: Obtain information on system faults and perform repair/rectify procedures (workshop)

Suggested Teaching Time: 10.5 hours

Learning Outcomes: 3. Understand fault diagnosis and rectification procedures for sanitary pipework systems and components

Learners to be able to describe methods of obtaining information on system faults. Learners will also be able to explain the repair and rectification procedures when dealing with common faults to sanitary components. Stages of repair and rectification procedure to include:

- diagnosis
- notifying clients
- safely isolating
- decommissioning
- rectifying
- re-commissioning
- handing over.

Topics: 3.1 – System faults; 3.3 – Repair and rectification procedures

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to write down a **short summary** of the questions they would ask a customer in order to carry out a successful repair of a WC macerator unit, and bring to the class. **Active learning:** • Tutor to **discuss** learners' findings from the pre-learning exercise and share the examples of questions to ask customers. • Tutor to prepare and present **Presentation 8**, outlining the system faults, repairs and rectification required in sanitary pipework and appliances. • Tutor to ask **learners to download** manufacturers' technical information and electronic fault finding tools, and facilitate **a discussion**.	**Materials** For the tutor to devise in advance: • **Presentation 8** • **Worksheet 8** • **Worksheet 9** **Resources** • BS 7671 • CIPHE design guide • Manufacturer's	• Assess awareness of the importance of manufactures instructions' warranty requirements, regulations and Benchmark form completion. • Verify learners' knowledge of manufactures' instructions and their precedence over BS. Describe manufacturers' short parts list. • Monitor and assess learners' responses to specific installation problems and malfunctions, and their descriptions of test methods. • Assess learners' explanation of the logical

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Key learning activity/approach	Suggested materials and resources	Skills check
• Tutor to initiate a group **discussion**, asking learners about the importance of reading and deciphering manufacturer's flow charts, and about the process of carrying out performance checks on appliances components within a sanitary system. • Learners to **describe** the manufacturers' and industry standard commissioning procedures, and give details on repair methods for a WC macerator, sink waste disposal unit, AAVs and pipework on a sanitary installation. • Learners in pairs to **explain** how to carry out repairs for motors on WC macerators and sink waste disposal units using a calibrated multimeter system and flow switches. • Learners to complete **Worksheet 8** on macerator installation and fault finding. This can include pictures and diagrams for identification, along with written answer key point questions. • Learners to give details of procedures used for checking and replacing defective components and how to deal with evacuation of water seals in pipework. • Learners to **actively fault find** and solve the WC macerator discharge process failure using flow charts and testing equipment. • Learners to explain individually the process for checking and remedying the ingress of foul smells into a building through a faulty AAV. • Learners in pairs to explain completion process to client (tutor) and explain preventative steps to take in order to avoid the motor seizing on WC macerator. **Workshop:** • Learners to continue the role play but focus on when **handing over** to the customer. They must remember to: • explain that all **tests** have been carried out satisfactorily	instructions • Part P of the Building Regulations • AP Doc M • BS EN 12056 **For workshop appliances** • WC macerators • Sink waste disposal units • Air admittance valves • Pipework and traps **For test instruments** • Calibrated multimeter (GS38 compliant) • Tools • Materials • PPE • Practical portfolio • Pens and paper • Dust sheet	sequence of testing in accordance with the manufacturer's performance criteria. • Examine learners' responses within the discussion about effective action carried out to diagnose and remedy faults. • Tutor to check responses to **Worksheet 8**. • Verify quality and effectiveness of suggestions for practical actions. • Ensure the accuracy of learners' research by assessing the technical information, key features and descriptions which are to be included in the learners' plumbing dictionary. • Tutor to check learners' responses to **Worksheet 9**. • Check confidence of learners when responding to action required in role-play scenarios. • Ensure that learners have conducted relevant and accurate research when checking the outcome of the Challenge focus task.

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Key learning activity/approach	Suggested materials and resources	Skills check
• explain the relevance of the ErP (energy related products) • give details on how the **system operates** as planned • describe that fittings are **clean and ready to use** • explain **how** the system works • **demonstrate** appliances in operation • **advise** on isolation, basic maintenance and safe operations • explain what to do in an **emergency** • provide **a not to scale drawing** showing the position of all isolation valves and backflow prevention devices. • write job details, **compliance certification** and commissioning records • describe how to complete the **Benchmark book** • explain how the system **complies** with manufacturer's instructions, relevant standards and regulations • state that this validates the client's manufacturer's **warranty** • ask the client to add **their name** to theirs on the documentation • give reasons why a **guarantee** of workmanship and supplying company details is important. • Tutor to prepare and learners to complete **Worksheet 9** on sanitation multiple choice questions**.** **Challenge focus:** • More able learners to conduct **online research** to explore how to notify the BCO regarding commissioning of a macerator and installing an AAV in a newbuild sanitation system.	**For test instruments and special equipment/materials** • Lock-off devices for MCBs and fused outlet • Warning notices	

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Key learning activity/approach	Suggested materials and resources	Skills check
Independent learning: • Learners to think about the activities in the workshop session regarding fault finding, and **make a list** of PPE and equipment that they would carry to enable a solution to a range of problems, such as loss of trap seal, pipework blockage, and motor failure on a WC macerator and sink waste disposal unit.		

Opportunities to develop maths, English, ICT and wider skills:

English: • **Speaking and listening** skills in **effective communication** can be developed during the workshop role-play task with client/tutor. • Learners can demonstrate **writing** skills when producing a **short summary** asking questions for clients in the pre-learning task. Check that learners have used **formal language** appropriately. Ensure that correct **spelling**, **punctuation** and **grammar** have been used. • Learners demonstrate **reading** skills in manufacturers' literature tasks, as they **identify** the **correct information** to answer the comprehension questions about clearly explaining routine checks and diagnostics on WC macerators, sink waste disposal units, loss of trap seal and AAVs. **Math:** • Learners will need to **extract** the **relevant data** from the information provided by the manufacturers' **charts and graphs**, when researching the methods of logical fault diagnosis.	**British values:** • Learners to develop their **self-knowledge**, **self-esteem** and **self-confidence** when obtaining information on system faults and perform repair/rectifying procedures, to the required British Standards, through study and personal research. **Employability**: • Learners should gain an understanding of the **wider** construction **industry** by communicating with manufacturers online and downloading fault finding information which can improve knowledge of **technical terms** and increase potential employability. • Learners should demonstrate that they can **actively listen** during the effective communication /role-play session in the workshop, **understand** what has been said and **respond/act** accordingly by carrying out safe practices and successful diagnosis and repair in relation to industry standards.

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Sessions 10 and 11: Commissioning procedures and notifying authorities (workshop) **Suggested Teaching Time**: 9 hours

Learning Outcomes: 4. Understand commissioning requirements of sanitary pipework systems and components

Learners will be able to describe how to carry out each stage of the commission procedure for sanitary components to meet industry standards, including: interpreting information, visual inspections, safe isolation (electrical/mechanical), air testing sanitary pipework, performance testing, setting up appliances and handing over for. Sanitary components to include:

- WC macerators
- sink waste disposal units
- air admittance valves
- pipework.

Learners will be able to describe procedures for notifying works carried out to the relevant authorities to comply with the Building Regulations.

Topics: 4.1 – Commissioning procedures; 4.2 – Notifying authorities

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to prepare forms which include methods of commissioning and notifying authorities about work to be carried out. Bring to class and discuss in group session. **Active learning:** • **Tutor-led discussion** about describing how to carry out operations in accordance with tutor brief/scenario discussion/role play in sanitary system appliances and components and carry out repair work. **Workshop:** • Tutor to prepare and present **Presentation 9** based on outlining the full and complete commissioning procedures for sanitary pipework and components, including: macerators, disposal units, AAVs and pipework. • Explain the process of how to introduce and identify (ID card)	**Materials** For the tutor to devise in advance: • **Presentation 9** • **Worksheet 10** • **Worksheet 11** **Resources** • BS 7671 • CIPHE design guide • Manufacturer's instructions	• Examine and evaluate the quality of the forms created by learners for commissioning. • Carry out initial survey in accordance with the portfolio directions and manufacturer's instructions in learner discussions. Apply specific installation requirements and test methods in relation to the technical problems reported by end user. • Tutor to verify safe isolation process explained and calibration of test instruments. • Check explanation of commissioning records. • Assess quality of responses to **Worksheet 10** and check learners'

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Key learning activity/approach	Suggested materials and resources	Skills check

yourself to the client (tutor); notify them about commissioning documentation to be carried out (role play).
• Learners to describe processes involved in completing commissioning records and explain how to:
  • complete commissioning records to include the date and time, and their name as the commissioning engineer
  • write down the location of the installation
  • identify the types and manufacturer of equipment and components installed
  • state how to safely isolate a WC macerator and sink waste disposal unit
  • explain the soundness test procedure to be carried out when testing sanitary pipework and its duration
  • give details of the performance testing of a system and explain minimum depths of trap seal after three test. State the instruments used and how the seal is measured
  • describe how to check pipework installation to ensure preventing loss of trap seal in a ventilated discharge branch system and secondary ventilated stack system
  • describe how to carry out tests for induced siphonage and self-induced siphonage
  • describe hydraulic jump
  • detail the process for ensuring the correct fall or size of pipework, excessive pipe length sagging due to poor clipping, checking for blockage, extra ventilation requirements
  • complete **Worksheet 10** on soundness testing. This can involve using a diagram to question the soundness test procedure and the performance test procedure
  • give details of inspection of location and performance of self-sealing valves on different sanitary systems.
• Tutor to explain setting up appliances:
	• Part P of the Building Regulations
	• AP Doc M
	• BS EN 12056
	
	Resources for workshop appliances
	• WC macerators
	• Sink waste disposal units
	• Air admittance valves
	• Pipework and traps
	
	For test instruments
	• Calibrated multimeter (GS38 compliant)
	• Manometer and hose, test tee with hand pump test plugs, leak detection fluid
	• Dipstick/matt black wooden stick, etc
	• Tools
	• Materials
	• PPE
	• Practical portfolio
		feedback in group discussion.
		• Examine the accuracy of descriptions when handing over to the customer.
		• Assess the following in the workshop role play scenario.
		  • Ask the learners about their explanation to the customer on how the system operates, and see how they demonstrate it.
		  • Check learners' advice given to a customer, and what they must do in an emergency.
		  • Check learners' commissioning records and their completed Benchmark book to see whether it complies with the manufacturer's instructions, relevant standards and regulations and it is warranty validated. Ensure that the name of the installer and client have been added to the documentation.
		  • Verify learners' explanation of the notifications procedure.
		  • Confirm that learners always communicate clearly with the client.
		  • Assess reasons why completed work must comply with regulation requirements and why a Building Regulations compliance certificate has been issued.
		• Tutor to check that learners have effective communication with the client during the

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Key learning activity/approach	Suggested materials and resources	Skills check

• WC macerator – safe isolation, eg:
  • check spigot connection
  • gradient or fall
  • vertical pipe
  • seals
  • non-return valve
  • float switch
  • electrical connections
• sink waste disposal unit
• air admittance valves.
• Explain why it must be ensured that commissioning records include: the date, time and the name(s) of the commissioning engineer(s) and other details and be kept in a file in a secure location.
• Tutor must ensure that all learners are able to explain the following to the client when handing over:
  • all tests have been carried out satisfactorily
  • give details on how the system operates as planned
  • describe that fittings are clean and ready to use
  • explain how the system works
  • demonstrate appliances in operation
  • advise of isolation, basic maintenance and safe operations
  • explain what to do in an emergency
  • provide as fitted drawing showing the position of all isolation valves and backflow prevention devices
  • write job details compliance certification and commissioning records
  • complete Benchmark book
  • inform them that the system complies with manufacturer's instructions, relevant standards and regulations
	• Pens and paper
	• Dust sheet
	
	For test instruments and special equipment/materials
	• Lock-off devices for MCBs and fused outlet
	• Warning notice
		role play explanation of commissioning records and handover details.
		• Check responses to **Worksheet 11** and provide feedback in class.
		• Discuss outcomes of the Challenge focus task in class.

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Key learning activity/approach	Suggested materials and resources	Skills check
• state that this validates their manufacturer's warranty • ask client to add their name to theirs on the documentation • give guarantee of workmanship and company details. • Learners to complete a **role play** where they imagine giving details of notifications to a client. They would need to explain to the client that: • notification of the installation will be given to authorities • their name will be included as installing plumber • location will be inserted • the type of work carried out will be included • the local building control office (BCO) will have been informed five days before the completion of the work • the completed work complies with regulation requirements • a building regulations compliance certificate has been issued. • Tutor to prepare and learners to complete **Worksheet 11,** which includes questions based on the commissioning and testing procedures with pictures for identification; feed back answers to the class in a group discussion. • Learners to **engage** with summative question given by the tutor; give answers in pairs to the class. **Challenge focus:** • More able learners to attempt further stretcher questions set by the tutor on assessing the problem of ingress of smells. Feed back answers to the class by leading a discussion on their outcomes. **Independent learning:** • Learners to conduct **online research** into safe and effective		

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Key learning activity/approach	Suggested materials and resources	Skills check
methods, and accurate means of recording all testing procedures on a sanitary installation. Consider whether it is safe to work alone on certain tasks, and risk assess practical process and how to verify test equipment.		

Opportunities to develop maths, English, ICT and wider skills:

English: • **Speaking and listening** skills in **presenting** can be developed during the role-play task. Learners to use the **correct format** with an **introduction**, **supporting evidence** and **statements**, and **conclusions**. They should adapt the content to **suit the audience** and **purpose**. **ICT:** • Learners have the opportunity to use **advanced search techniques** to **locate, select and evaluate** relevant online sources that provide suitable information about safe and effective methods when recording all testing procedures on a sanitary installations.	**British values:** • Learners to develop their **self-knowledge**, **self-esteem** and **self-confidence** when obtaining information on commissioning and notification procedures, to the required British Standards through study and personal research. **Employability***:* • Learners should demonstrate they can **actively listen** during the effective communication/role-play session in the workshop and understand what has been said, and **respond/act** accordingly in relation to industry standards. • Learners can demonstrate how they change their communication style when handing over in the customer exercise. Check use of appropriate language and carry out simple clear demonstrations.

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Session 12: Visual inspections (workshop)

Suggested Teaching Time: 4.5 hours

Learning Outcomes: 5. Be able to commission sanitary pipework systems and components

Learners will carry out visual inspections on sanitary systems to confirm they are ready for operation.

Topics: 5.1 – Carrying out visual inspections

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to read manufacturer's instructions for appliances and components to be commissioned. They should then plan sequence and approach to activities in the workshop. **Active learning:** • Learners to get into pairs and **compare** their plans/approaches to workshop activities. **Discuss** what is required to work safely and in an organised way in accordance with Building Regulations and British Standards. • Tutor to **demonstrate** to learners how to carry out methods of visually inspecting sanitation systems, appliances and components. • Learners to use manufacturers' instructions, industry standards and Building Regulations to establish the diagnostic requirements of sanitation systems. • **Prepare** for individual task and risk assess the area. • Tutor to lead a **discussion** on how to carry out visual inspections and inspect appliances in sanitary systems. **Workshop:** • Introduce and identify (ID card) yourself to the client (tutor); notify them about work to be carried out and advise them about safety and interruption of supplies. Give expected	**Resources** • BS EN 12056 • Building Regulations AD Part H • Manufacturer's instructions **Resources for workshop appliances** • WC macerators • Sink waste disposal units • Air admittance valves • Pipework and traps **For test instruments** • Calibrated multimeter (GS38 compliant) • Manometer and hose,	• Tutor to check learners' understanding by discussing pre-learning activity in class whilst learners compare their plans/approaches to visual inspection procedures for workshop activities. • Tutor to check learners' understanding during initial demonstration and discussion by asking questions and ensuring that they know what's required of them in the workshop task. • Tutor to ensure effective communication during workshop role-play activity. • Tutor to ensure that learners have fulfilled the appropriate criteria during the workshop activity through observation and offering feedback/suggestions for improvement and answering questions. • Check that the manufacture's information has been interpreted correctly and the relevant regulation adhered to. • Verify that appropriate risk assessments are carried out with regard to different aspects of inspection, especially when

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Key learning activity/approach	Suggested materials and resources	Skills check
duration of the work and expected outcomes. • Walk around the installation and check that the appliances and components are **correctly located** and meet industry standards. • Inspect connections and dimensions around appliances for compliance with the regulations and standards, as well as future access for maintenance and repair. • **Safe isolation** of all services such as electricity and water must be verified and isolation points accessible. • Check that all **open ends** are capped off and that all valves are isolated, and ensure that **compression** joints are fully tightened, push fit fully engaged and that solvent weld connections are complete. • Inspect sufficiency of **pipe clips**, supports and brackets; also check that they are installed correctly and that all pipework is secure. • Check that appliance **isolation valves** are turned off. They can be turned on and tested when the system is filled with water. • Confirm availability of **access and inspection points** for soundness testing. **Challenge focus:** • More able learners to research how to carry out and organise soundness testing and appliance preparation set if leading in a team. Explain collaborative working methods, communication and safety procedures. **Discuss and provide feedback** during learner group session in tutorial or upload findings onto the centre's VLE/Moodle. **Independent learning:** • Learners to write out agreed procedures for inspection and	test tee with hand pump test plugs, leak detection fluid • Dipstick/matt black wooden stick, etc • Tools • Materials • PPE • Practical portfolio • Pens and paper • Dust sheet **For test instruments and special equipment/materials** • Lock-off devices for MCBs and fused outlet • Warning notices	dealing with electrical appliances or exposure to category 5 effluent. • Tutor to review learners' dictionaries and personal course portfolios, correcting where appropriate, offering suggestions for improvement and answering any questions. • Ensure safe isolation where appropriate during inspection. • Check that all potential sources of leaks on joints and connections are inspected and confirmed watertight. • Discuss outcome of challenge focus with the rest of the class.

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Key learning activity/approach	Suggested materials and resources	Skills check
add to their plumbing dictionaries. Upload onto the centre's VLE/Moodle to compare and share definitions with other learners.		

Opportunities to develop maths, English, ICT and wider skills:

English: • Learners demonstrate the **writing** skills of **planning** and **drafting** in workshop sequence and approach planning task. • **Speaking and listening** skills in **presenting** can be developed during the role-play task. Learners to use the **correct format** with an **introduction**, **supporting evidence** and **statements**, and **conclusions**. They should adapt the content to **suit the audience** and **purpose**. **ICT:** • Learners have the opportunity to engage in **blended learning** in the plumbing dictionary task, which makes use of the centre's VLE/Moodle. This is an example of **collaborative** technology.	**British values:** • Learners to develop their **self-knowledge**, **self-esteem** and **self-confidence** when carrying out visual inspection and testing preparation processes to the required British Standards, regulations and manufacturers' requirements through study and personal research. **Employability:** • Learners should demonstrate they can **actively listen** during the effective communication/role play session in the workshop and understand what has been said and **respond/act** accordingly in relation to industry standards.

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Session 13: Performing air tests (workshop)

Suggested Teaching Time: 6 hours

Learning Outcomes: 5. Be able to commission sanitary pipework systems and components

Learners to perform air tests on sanitary pipework systems to meet industry requirements.

Topics: 5.2 – Performing air tests

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to plan sequence and approach to activities in advance of the workshop session. **Active learning:** • Learners to get into pairs and identify the equipment required; **compare** their plans/approaches to workshop activities. **Discuss** what is required to work safely and in an organised way in accordance with British Standards and **recognised testing procedures**. • **Prepare** for co-ordinated soundness task and **risk assess** the area, eg leakage into building, contact with category 5 effluent. **Workshop:** • Introduce and identify (ID card) yourself to the client (tutor); notify them about work to be carried out and advise them about safety risks. • Learners to **prepare test** and give client an **expected duration** of work and expected outcome. • **Walk around** the installation to check if all traps have water and joints are tightened. • In the case of multi-storey property installations, testing of appliances on a floor-to-floor basis is required.	**Resources** • BS EN 12056 • Building Regulations AD Part H • Manufacturers' instructions **Resources for workshop appliances** • WC macerators • Sink waste disposal units • Air admittance valves • Pipework and traps **For test instruments** • Calibrated multimeter (GS38 compliant) • Manometer and hose,	• Tutor to check learners' understanding by discussing pre-learning activity in class whilst learners compare their plans/approaches to workshop activities. • Tutor to check learners' understanding during discussion by asking questions and ensuring that they know what's required of them in workshop task, including the risks involved in the process. • Tutor to ensure clear and effective learner communication during workshop activity. • Tutor to confirm that learners have fulfilled the appropriate criteria during the workshop activity through observation and offering feedback/suggestions for improvement and answering questions. • Inspect plan for testing procedure. • Check that learners verify integrity of test equipment for use before test. • Ensure that the test is carried out methodically and any leak remedied before the task is completed. • Discuss the outcome from the Challenge

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Key learning activity/approach	Suggested materials and resources	Skills check
• The installation needs to be checked in accordance with BS 12056-2:2000 to ensure that there are no leaks, which could cause the ingress of foul odours into a property. • Test points to be plugged and watertight. • Confirm whether there are **sufficient operatives** available to conduct the test efficiently. • Use a **manometer** as the test instrument. • A hose is then connected via a tee piece to one end of the manometer, and the other hose to a hand pump. • Make sure that the water in the manometer is level at zero. • Re-check to ensure that there is water in the traps. • Gently squeeze the hand pump until the water level in the gauge reaches **38mm** and wait for **three minutes**. • If there is no drop seen on the gauge during that time, the system is sound. • If there is a drop, there is a leak somewhere and this can be detected by applying leak detection fluid to all of the joints while the system is under pressure. Bubbling will reveal any leaks. • Once the test has **proved that the system is sound**, it should be witnessed and a signature obtained on the **test certificate**. **Challenge focus:** • More able learners to discuss and provide feedback during a tutorial session about the process of carrying out separate soundness testing procedures on a seven-storey dwelling. Devise a reliable method and upload to the centre's VLE/Moodle. **Independent learning:** • Learners to conduct research methods of performance	test tee with hand pump test plugs, leak detection fluid • Dipstick/matt black wooden stick, etc • Tools • Materials • PPE • Practical portfolio • Pens and paper • Dust sheet **For test instruments and special equipment/materials** • Lock-off devices for MCBs and fused outlet • Warning notices	focus task and then verify answers and ideas with group before uploading to Moodle. • Tutor to review learners' dictionaries and personal course portfolios, correcting where appropriate, offering suggestions for improvement and answering any questions.

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Key learning activity/approach	Suggested materials and resources	Skills check
testing and write down the processes involved if any part of the installation failed in a **short report**.		

Opportunities to develop maths, English, ICT and wider skills:

English:

- Learners demonstrate the **writing** skills of **planning** and **drafting** in workshop sequence and approach planning task.
- **Speaking and listening** skills in **presenting** can be developed during the role-play task. Learners to use the **correct format** with an **introduction**, **supporting evidence** and **statements**, and **conclusions**. They should adapt the content to **suit the audience** and **purpose**.
- Learners can demonstrate **writing** skills when producing a **short report** about research methods of performance testing. Check that learners have used **formal language** appropriately. Ensure that correct **spelling**, **punctuation** and **grammar** have been used.

ICT:

- More able learners have the opportunity to engage in **blended learning** in the Challenge focus task, which makes use of the centre's VLE/Moodle. This is an example of **collaborative** technology.

Employability:

- Learners can show perseverance and **resilience** by sticking to the testing process even if there are leaks and other obstacles to a satisfactory result. They should be encouraged to remain **flexible, positive** and **motivated** during a process which can be time-consuming and may contain unusual outcomes, especially if a BCO is present.
- Learners should demonstrate they can **actively listen** during the workshop session, and understand what has been said and **respond/act** accordingly in relation to industry standards.

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Session 14: Carry out performance tests (workshop session) **Suggested Teaching Time**: 12 hours

Learning Outcomes: 5. Be able to commission sanitary pipework systems and components

Learners will carry out performance tests on sanitary pipework systems to check for effective trap seal retention. Performance test to include:

- branch discharge pipework
- test for self-siphonage
- test for induced siphonage
- test for compression.

Topics: 5.3 – Carrying out performance tests

Key learning activity/approach	Suggested materials and resources	Skills check
Pre-learning: Learners to **plan** a sequence and approach in preparation for activities in workshop. Read section in textbook and refer to manufacturer's instruction for appliances and components. **Active learning:** • Learners to get into pairs and **compare** their plans/approaches to workshop activities. • **Discuss** in groups what is required to work safely and in an organised way in accordance with BS 8000 to carry out performance tests on sanitary installation systems or components to ensure correct performance in accordance with Building Regulations and British Standards. • **Prepare** for individual task of risk assessing the area. • **Tutor to lead a** group **discussion** about carrying out a performance test in accordance with tutor brief/scenario discussion/role play in sanitary system components and carrying out remedial work.	**Resources** • BS EN 12056 • Building Regulations AD Part H • Manufacturers' instructions **Resources for workshop appliances** • WC macerators • Sink waste disposal units • Air admittance valves • Pipework and traps	• Tutor to check learners' understanding by discussing pre-learning activity in class whilst learners compare their plans/approaches to workshop activities. • Tutor to check learners' understanding during discussion by asking questions and ensuring that they know what's required of them in the workshop task. • Tutor to ensure meaningful and effective communication during workshop activity. • Tutors to ensure that learners have fulfilled the appropriate criteria during the workshop activity through observation and offering feedback/suggestions for improvement and answering questions. • Check performance testing procedures and confirmation of correct system performance.

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Key learning activity/approach	Suggested materials and resources	Skills check

Workshop:
• Introduce and identify (ID card) yourself to client (tutor); notify them about work to be carried out, and advise them about safety and interruption of supplies. Give expected duration of work and expected outcome.
• Learners to visually inspect area installation and discuss any issues about the system with the customer.
• Learners to then begin the performance test and perform the following:
  • check the depth of seal, using a black dipstick, and make a note
  • fill all the appliances to overflow level and discharge simultaneously
  • flush the WCs at the same time
  • after all of the appliances have been discharged, check the traps again with a dipstick to ensure that the seal is not less than **25mm**
  • if the trap seal is **below 25mm**, the cause must be identified and rectified
  • once the problem has been rectified, the system should be re-tested and proved to be working correctly. (If on-site, this test can be monitored by the Building Control Officer).
• Learners must then **explain** the outcome of testing to the 'customer' and hand over any documents or paperwork. They must finish by cleaning the area.
Challenge focus:
• More able learners to conduct **online research** and write an **essay** on the following: '*If a trap continues to fail the performance test even though it is correctly installed, what solutions could be offered to remedy the system?*'
	For test instruments
	• Calibrated multimeter (GS38 compliant)
	• Manometer and hose, test tee with hand pump test plugs, leak detection fluid
	• Dipstick/matt black wooden stick, etc
	• Tools
	• Materials
	• PPE
	• Practical portfolio
	• Pens and paper
	• Dust sheet
	
	For test instruments and special equipment/materials
	• Lock-off devices for MCBs and fused outlet
	• Warning notices
		• Assess that measurement of traps is accurate and all of the appliances are discharged simultaneously.
		• Tutor to engage in research in the Challenge focus task to discover innovative solutions offered by learners and then feed back in class.
		• Tutor to review learners' dictionaries and personal course portfolios, correcting where appropriate, offering suggestions for improvement and answering any questions.

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Key learning activity/approach	Suggested materials and resources	Skills check
Independent learning: • Learners to record actions and outcomes, and add to their **plumbing dictionary and personal course portfolio** for tutor to review. Research alternative tools that can be used in a performance test, and upload to the centre's VLE/Moodle to share ideas.		

Opportunities to develop maths, English, ICT and wider skills:

English: • Learners demonstrate the **writing** skills of **planning** and **drafting** in workshop sequence and approach planning task. • **Speaking and listening** skills in **presenting** can be developed during the role-play task. Learners to use the **correct format** with an **introduction**, **supporting evidence** and **statements**, and **conclusions**. They should adapt the content to **suit the audience** and **purpose**. • More able learners can demonstrate **writing** skills when producing an **essay** about solutions to remedy a failed trap in a performance test. Check that learners have used **formal language** appropriately. Ensure that correct **spelling**, **punctuation** and **grammar** have been used. **ICT:** • Learners have the opportunity to engage in **blended learning** in the independent learning task, which makes use of the centre's VLE/Moodle. This is an example of **collaborative** technology.	**Employability:** • Learners should demonstrate they can **actively listen** during the workshop session, and understand what has been said and **respond/act** accordingly in relation to industry standards.

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Session 15: Commission a WC with macerator pump (workshop) **Suggested Teaching Time**: 6 hours

Learning Outcomes: 5. Be able to commission sanitary pipework systems and components
Learners will commission WCs with macerator pump installation to meet industry requirements.

Topics: 5.4 – Commissioning a WC with macerator pump

Key learning activity/approach	Suggested materials and resources	Skills check

Pre-learning: Learners to download manufacturer's literature for two separate brands of macerator and compare commission process. They must **make notes** and discuss in class.
Active learning:
• **Tutor to lead discussion** about carrying out operations in the workshop in accordance with tutor brief/scenario discussion/role play in commissioning of WC macerator.
Workshop:
• Introduce and identify (ID card) yourself to the client (tutor); notify them about commissioning documentation required to be carried (role play).
• Learners to refer to jobs carried out and:
  • complete **commissioning records** to include the date and time, and their name as the commissioning engineer
  • write down the **location** of the installation
  • identify the types and **manufacturer of equipment** and **components** installed
  • ensure safe isolation from fused spur and lock off at MCB and label.
• Leaners must then check the spigot connection, gradient or fall, vertical pipe, seals, non-return valve, float switch,
	Resources
	• BS EN 12056
	• Building Regulations AD Part H
	• Manufacturer's instructions
	
	Resources for workshop appliances
	• WC macerators
	• Sink waste disposal units
	• Air admittance valves
	• Pipework and traps
	
	For test instruments
	• Calibrated multimeter (GS38 compliant)
	• Manometer and hose,
		• Tutor to ensure that learners use effective communication with the client, including an explanation of commissioning records and handover details.
		• Learners must refer to jobs carried out and:
		  • confirm that all checks are made during commissioning and the outcome is recorded accurately
		  • fully completed commissioning records with date and time, and name as the commissioning engineer
		  • hand over to the customer during walk around installation.
		• Assess the following in the workshop role-play scenario.
		  • Ask the learners about their explanation to the customer about how the system operates, and see how they demonstrate it.
		  • Verify learners' advice given of appliance isolation, basic maintenance and safe operations, and what to do in

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Key learning activity/approach	Suggested materials and resources	Skills check
electrical connections, and then operate appliance and also check for leaks. • Once commissioning is complete, learners should then **explain** to the 'customer': how the appliance operates, what to expect from the appliance performance, how to avoid operational problems, what to do in an emergency and the information in the user guide of manufacturer's literature. • Learners to write down job details in compliance certification and commissioning records, and complete their Benchmark book. • Learners to inform tutor that the system complies with manufacturer's instructions, relevant standards and regulations. State that this validates their manufacturer's warranty. • Learners to ask the 'client' to add their name to theirs on the documentation. Give guarantee of workmanship and company details, and ensure that commissioning records are kept in a file in a secure location. **Challenge focus:** • More able learners to **write a best practice guide** based on the notes and experiences made throughout their workshop sessions. **Independent learning:** • Learners to record actions and outcomes and add to their **plumbing dictionary and personal course portfolio** for tutor to review.	test tee with hand pump test plugs, leak detection fluid • Dipstick/matt black wooden stick, etc • Tools • Materials • PPE • Practical portfolio • Pens and paper • Dust sheet **For test instruments and special equipment/materials** • Lock-off devices for MCBs and fused outlet • Warning notices	an emergency. • Check learners' commissioning records and their completed Benchmark book to see that it complies with the manufacturer's instructions, relevant standards and regulations, and is warranty validated. Ensure that the name of the installer and client have been added to the documentation. • Confirm that the learners always communicate clearly with the client. • Assess confirmation that the newly installed system complies with the manufacturer's instructions, relevant standards and regulations, and is warranty validated. • Tutor to assess learners' group discussions, and record actions, outcomes and information, adding key features to the work carried out.

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Opportunities to develop maths, English, ICT and wider skills:

English: • Learners demonstrate **reading** skills in the pre-learning task – **identifying** and **summarising** the **main points** about brands of macerator and their commissioning processes. • **Speaking and listening** skills in **presenting** can be developed during the role-play task. Learners to use the **correct format** with an **introduction**, **supporting evidence** and **statements**, and **conclusions**. They should adapt the content to **suit the audience** and **purpose**. • More able learners can demonstrate **writing** skills when producing a **best practice guide** about their workshop experience. Check that learners have used **formal language** appropriately. Ensure that correct **spelling**, **punctuation** and **grammar** have been used.	**Employability:** • Learners should demonstrate they can **actively listen** during the workshop session, and understand what has been said and **respond/act** accordingly in relation to industry standards.

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