Unit 307: Central heating systems

Sample scheme of work

This sample scheme of work covers both classroom and workshop based learning for the delivery of the unit content for Phase 1 of Unit 307. The scheme of work is based on 3 hours per session for 3 sessions. It is an example only of a possible scheme of work and is based on theory and practical within an FE centre.

You can use the sample scheme of work as it is, adjust it or extract content to create a scheme of work to suit your learning facility and individual learner needs. It can also be adjusted by adding theory and practical workshops to support learners who have/need additional learning time.

The assessments for this qualification are divided into four phases: Phases 1–3 cover core content and Phase 4 covers the pathway content (for environmental technologies, natural gas, oil *or* solid fuel). The four phases roughly equate to the four years of the Apprenticeship, with Phase 1 assessments delivered at the end of Year 1. All relevant content for this phase must be delivered before candidates attempt the assessments.

Content for this unit is divided between the three core phases and separate schemes of work are available for each phase. The schemes of work for this unit could be combined to suit your delivery needs.

Reference is made within the scheme of work to **worksheets**, **handouts**, **questions and PowerPoint presentations** (in **black bold**) that are available on SmartScreen.co.uk for tutors to use with learners. Any other resources listed are not provided on SmartScreen but provide guidance for the tutor as to others they may produce. Delivery timings are given, however, these can be amended to suit the group. The contents of presentations, discussions, explanations, etc are left to the professionalism of the course tutor.

Centres should also incorporate the following themes, where appropriate, as strands running through each of the sections within the qualification. Although they are not specifically referred to in the section content section, City & Guilds regards these as essential in the teaching of the qualification:

- 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
- Functional Skills (mathematics, English and ICT)
- extension tasks and differentiation, inclusion, entitlement and equality issues
- spiritual, moral, social and cultural issues
- environmental education and related European issues
- British values
- use of information learning technology (ILT).

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Sample scheme of work

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

Number of sessions: 3 **Delivery hours**: 9 **Venue**: _____ **Group**: _____

Aims	**To enable learners to**:
• To cover the installation, maintenance, decommissioning and soundness testing of a range of wet central heating system/component types in domestic dwellings/light commercial properties	1. Install central heating systems 1.1 Identify types and layout features of heating systems

Session	Objectives/learning outcomes **The learner will:**	Activities and resources	Assessment
1 3 hours	**(Learning outcome 1)** Install central heating systems 1.1 Identify **types** and **layout** features of **heating systems** **Types** • pumped heating gravity hot water **Layout** • one pipe • two pipe **Heating systems** • wet central heating	**Activities:** • Learners to get into small groups to discuss their thoughts and what they know about central heating systems. Learners to complete **Worksheet 1: Heating system prior knowledge check** and feed back to the class. Tutor to list and, where appropriate, draw the responses from the learners. • Learners to individually consider the key features of central heating systems and their layouts, in relation to everyday work in domestic dwellings and new installations which they may encounter on site, including: ○ requirements for thermal comfort ○ selections for individual areas ○ purpose of central heating ○ background to central heating ○ progression from gravity to fully pumped ○ open vented low pressure ○ sealed high pressure ○ combination boilers. • Tutor to deliver **PowerPoint presentation 1: Identify types and layout features of heating systems (part 1)** and give out **Handout 1: Central heating options.** • Learners to get into pairs to assess the key differences of operation between: ○ gravity and semi-gravity ○ gravity hot water and pumped central heating	• **Worksheet 1** • **Worksheet 2** • **Worksheet 3** • Observation

Session	Objectives/learning outcomes **The learner will:**	Activities and resources	Assessment
		○ fully pumped systems. • Tutor to ask learners specific questions based on their understanding of the key features of the process of gravity circulation, semi-gravity and fully pumped heating systems. • Class discussion on the individual layout of one- and two-pipe systems and learners to gather feedback from on-site or everyday work experiences. Learners to complete **Worksheet 2: Typical system**. • Learners to get into small groups to research and discuss the different layout of pipework systems such as: ○ one-pipe systems ○ two-pipe systems. • Class discussion on the common applications of these systems, why they were installed and the reason for upgrading or modifying. • Learners to research why these systems are no longer used and what are the requirements for heating new buildings. The Domestic Building Services Compliance guide (2013 edition, incorporating 2018 amendments) should be a source of research. • Learners to be given **Handout 2: Glossary of terms**. This document is to be used and completed throughout this phase of learning. • Learners to complete **Worksheet 3: System types**. Tutor to facilitate a Q&A session to check learners' understanding and to answer any queries.	

Session	Objectives/learning outcomes **The learner will:**	Activities and resources	Assessment
		Resources: • **Sample lesson plan** • **PowerPoint presentation 1: Identify types and layout features of heating systems (part 1)** • **Handout 1: Central heating options** • **Handout 2: Glossary of terms** • **Worksheet 1: Heating system prior knowledge check** • **Worksheet 2: Typical system** • **Worksheet 3: System types** • Whiteboard and/or flip chart • Computers, tablets and/or handsets • www.planningportal.co.uk	
2 3 hours	**(Learning outcome 1)** Install central heating systems 1.1 Identify **types** and **layout** features of **heating systems** **Types** • fully pumped, 2 x two-port valves (S plan) • fully pumped, 3 x two-port valves (S plan+) • fully pumped, three-port valve	**Activities:** • Learners to complete **Worksheet 4: System controls** and feed back to the class. • Tutor to deliver **PowerPoint presentation 2: Identify types and layout features of heating systems (part 2)**. • Tutor to facilitate a class discussion on the layout features of a two-pipe semi-gravity system that includes a cylinder thermostat and zone control on the hot water (Honeywell type C plan). Learners to get into pairs to discuss the key features and then share their findings with the class. • Learners to get into pairs to identify the advantages and disadvantages of a C plan system, record thoughts on a flip	• **Worksheet 4** • Paired and class discussions • Online research findings • Q&A session

Session	Objectives/learning outcomes **The learner will:**	Activities and resources	Assessment
	(mid-position/diverting) (Y/W plans) **Layout** • two pipe **Heating systems** • wet central heating	chart, and then present back to the class. • Tutor to facilitate a class discussion on the key purpose, features and layout of a two-pipe semi-gravity with heat sink. Discuss the advantages and disadvantages, and then share thoughts with the class. • Learners to conduct online research to find examples of fully pumped central heating system installations and typical applications, and then provide feedback in selected groups. • Learners to get into small groups to discuss how a Y plan system works and then share ideas on its function using a flip chart in class. • Tutor to demonstrate wiring boards, showing how the controls switch when operated. Learners to investigate the type and form of controls (zone valves, programmers and thermostats). • Learners to individually examine the difference in function between a diverter valve (Honeywell W plan/Y plan systems) and compare similarities in appearance. Share ideas and thoughts in small groups. Tutor to assess learners' thoughts. • Tutor to facilitate a class discussion on the key purpose and features of Honeywell S plan and S plan+ systems using individual zone valves. Feedback drawing typical designs on the whiteboard. Tutor to check responses in discussion. • Tutor to facilitate a class discussion on the inclusion of thermostatic radiator valves and how they are incorporated into a heating system. • Learners to write and draw the key points/keywords in **Handout 2: Glossary of terms.**	

Session	Objectives/learning outcomes **The learner will:**	Activities and resources	Assessment
		• Tutor to provide **Handout 3: Central heating systems – fully pumped**, and facilitate a Q&A session to check learners' understanding and to answer any queries. **Resources:** • **PowerPoint presentation 2: Identify types and layout features of heating systems (part 2)** • **Handout 2: Glossary of terms** • **Handout 3: Central heating systems – fully pumped** • **Worksheet 4: System controls** • **SmartScreen animation**: www.smartscreen.co.uk/mod/scorm/view.php?id=100622 • **SmartScreen animation**: www.smartscreen.co.uk/mod/scorm/view.php?id=100621 • Whiteboard and/or flip chart • Controls wiring boards and individual zone valve components	
3 3 hours	**(Learning outcome 1)** Install central heating systems 1.1 Identify **types** and **layout** features of **heating systems** **Types** • combination boiler • system boiler	**Activities:** • Tutor to deliver **PowerPoint presentation 3: Identify types and layout features of heating systems (part 3)**. • Tutor to **discuss** key points during presentation and ask questions. • Tutor to facilitate a class discussion on the key purpose and features of system boilers and sealed systems. • Tutor to assess, in discussion, the level of learners' comprehension about how system boilers and sealed system	• **Worksheet 5** • **Multiple choice questions**

Session	Objectives/learning outcomes **The learner will:**	Activities and resources	Assessment
	Layout • manifold (micro- and minibore) • underfloor heating **Heating systems** • warm air • storage heaters • district heating	vary from open vented types. • Learners to explore: www.worcester-bosch.co.uk/installer/boilers/what-is-a-system-boiler, summarise the information gathered and feed back to the class. • Learners to get into pairs to identify how a combination boiler operates and compare it with other heating systems. • Learners to explore the manufacturer's link (below) online, discussing and summarising the information in small groups. www.worcester-bosch.co.uk/products/boilers?boilerType=combi. • Learners to complete **Worksheet 5: Combination boilers**. • **Discuss** learners' understanding of combination boilers and W plans by asking question on the key differences to learners in pairs • Learners to get into small groups to discuss the differences between mini-bore and microbore systems, including manifold applications such as underfloor heating. Share thoughts with the class by writing and drawing ideas on the whiteboard. • Learners to write and draw examples of underfloor heating. Highlight the key points and advantages in dwellings. Get into pairs to illustrate this on a flip chart, explaining the advantages to a partner. • Tutor to analyse the level of understanding and quality of details about underfloor heating. • Learners to get into pairs to identify a scenario where a warm air system would be a suitable alternative to a wet central heating in a domestic environment. Follow the manufacturer's	

Session	Objectives/learning outcomes **The learner will:**	Activities and resources	Assessment
		web link: www.johnsonandstarley.co.uk/warm-air/overview.asp and discuss thoughts. Tutor to analyse the outcome of learners' discussion. • Tutor to facilitate a class discussion on the typical application of district heating, giving examples of suitable locations. Tutor can **ask** learners key questions about the suitability of locations for district heating. • Learners to carry out research on district heating: www.theade.co.uk/case-studies. • Learners to conduct individual research into the common use of storage heating and compare it to wet and warm air systems. Write down thoughts and discuss in class. Tutor to examine and assess individual responses. • Learners to work in pairs to complete **Multiple choice questions**, and then discuss answers in class. **Resources:** • **PowerPoint presentation 3: Identify types and layout features of heating systems (part 3)** • **Worksheet 5: Combination boilers** • **Multiple choice questions** • Worcester Bosch Group – search website for 'Archive', 'Boilers' and then 'What is a system boiler?' • Johnson & Starley – search website for the 'Products' tab and then 'Warm air heating' • The ADE– search website: www.theade.co.uk/	