



Unit Title	Science and materials for water industry construction projects (J/506/1627)	
Level	4	
Credit Value	12	
Learning Outcomes – the learner will be able to:	Assessment Criteria – the learner can:	
1. Understand the properties and use of construction materials	<ol style="list-style-type: none"> describe the properties of construction materials. evaluate the properties and uses of construction materials. justify the specification of construction materials regarding their performance in use. 	
2. Understand the structural behaviour of construction materials	<ol style="list-style-type: none"> discuss the effects of loading on structural materials. compare the behaviour of timber, steel and reinforced concrete structural members under load. 	
3. Apply scientific principles to the design and use of buildings	<ol style="list-style-type: none"> relate scientific principles to human comfort levels. discuss the methods used to integrate building services into the overall building design. determine the thermal performance of buildings regarding heat gains and heat losses. 	
4. Solve scientific problems in construction and the built environment	<ol style="list-style-type: none"> perform scientific experiments associated with construction science and materials. derive conclusions from the results of the scientific experiments. 	

Additional information about the unit	
Unit purpose and aims	<p>This unit provides learners with an understanding of the properties, structural behaviour and use of construction materials, and develops the skills needed to use scientific principles to solve construction problems.</p> <p>On completion of the unit the learner will:</p> <ul style="list-style-type: none"> understand the properties and use of construction materials understand the structural behaviour of construction materials be able to apply scientific principles to the design and use of buildings be able to solve scientific problems in construction and the built environment.
Unit expiry date	31/03/2019
Assessment requirements or guidance specified by a sector or regulatory body (if appropriate)	<p>In the assessment of this unit, the learner must ensure that the evidence that they produce covers the following:</p> <ol style="list-style-type: none"> The learner's description of the properties of construction



materials must cover:

- (a) metals and alloys (e.g. steel, zinc, aluminium)
- (b) timber and timber products
- (c) masonry and roofing products (e.g. bricks and tiles)
- (d) cements and concretes
- (e) plastics and other artificial materials
- (f) coatings and finishes (e.g. paints, clear finishes, wood treatments).

2. The **properties and uses** of construction materials must include:

- (a) strength and elasticity
- (b) porosity and water absorption
- (c) thermal and moisture movement
- (d) thermal and electrical conductivity/resistivity
- (e) durability and workability
- (f) density
- (g) specific heat capacity
- (h) viscosity.

3. The learner's justification of the **specification** of construction materials must be made with reference to:

- (a) construction
- (b) refurbishment
- (c) maintenance
- (d) replacement
- (e) energy efficiency
- (f) environmental issues
- (g) use of renewable resources.

4. The **effects of loading** on structural materials must cover:

- (a) forms of loading
- (b) inherent properties of structural materials (including timber, steel and reinforced concrete).

5. The learner's comparison of the behaviour under load of timber, steel and reinforced concrete **structural members** must include:

- (a) beams
- (b) columns
- (c) frames
- (d) pads and bases
- (e) studs
- (f) steel brackets.

6. **Human comfort levels** must cover:

- (a) thermal comfort (air temperature; mean radiant temperature; air velocity; relative humidity)
- (b) lighting comfort (natural light; artificial light; minimum illumination levels; glare)



	<p>(c) acoustic comfort (sound transmission; sound absorption; sound insulation; reverberation).</p> <p>7. The learner's discussion of the methods used to integrate buildings services into the overall building design must cover:</p> <ul style="list-style-type: none">(a) cold water supply and distribution(b) gas supply and distribution(c) electricity supply and distribution(d) safe and effective disposal of water products(e) refrigeration and air conditioning(f) fluid flow (hydrostatics; fluid dynamics). <p>8. In determining the thermal performance of buildings, the learner must consider:</p> <ul style="list-style-type: none">(a) thermal properties of materials(b) heat losses (fabric; ventilation; hot water)(c) heat gains (solar; casual)(d) required level of heat input(e) ventilation levels. <p>The assessment of this unit will be via a combination of centre-devised assignments and tests, and will be conducted in supervised conditions. The assessment strategy for the unit has been agreed with industry stakeholders.</p>
Location of the unit within the subject/sector classification system	4.1 Engineering
Name of the organisation submitting the unit	CABWI Awarding Body
Availability for use	Shared
Unit guided learning hours	48