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Domestic Hot Water

1. Localised will deliver hot water at the appliance (eg, electric shower).
Centralised is a store of hot water (DHW storage cylinder) which is delivered to all hot water outlets via distribution pipework.
2. Electric shower, under sink electric water heater
3. 60-65 Degrees C to pasteurise Legionella bacteria
4. To prevent the hot water in the cylinder from reaching 100 Degrees C
5. 80-85 Degrees C
6. An internal coil heat exchanger
7. Full way gate valve
8. Stratification
9. A system which contains a vent pipe which is open to atmosphere
10. $\pi r^2 h$
11. To prevent parasitic circulation in the vent pipe leading to energy losses
12. 2 metres
13. Part L

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Water Treatment

Water Filter - filters mains water to reduce Chlorine and Calcium which affect its taste and odour.

Water Meter - measures volumes of mains water in litres and m^3 to allow billing of the end user by the water undertaker.

Water Softener - removes Calcium Carbonate from the mains water supply using Zeolite Resin to make turn the water soft.

Magnetic Scale Reducer - uses magnets in the flow of the water to create a magnetic field which rounds the Calcium Carbonate molecules so they cannot join together.

Electrolytic Scale Reducer - two dissimilar metals placed in the flow of water create a galvanic reaction which creates a magnetic field which rounds the Calcium Carbonate molecules so they cannot join together

Electronic Scale Reducer - the small electric current passing through the wire wrapped around the incoming main creates a magnetic field which rounds the Calcium Carbonate molecules so they cannot join together.

Combi Mate Chemical Conditioner - the water passes over the Polyphosphate balls located in the unit. This coats the Calcium Carbonate which prevents it from joining together to solidify in the system.

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Bathrooms & Showers

Answer c) W= 900mm x D= 700mm

Answer c) W= 1000mm x D= 700mm

Answer a) W= 800mm x D= 600mm

Answer d) W= 800mm x D= 600mm

Answer c) W= 1100mm x D= 700mm

Exposed Valve (EV) mixer thermostatic

Built in Valve (BIV) Mixer thermostatic

Digital Mixer thermostatic

Shower booster pump twin impeller

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Off Mains Gas Heating

LPG, Oil, Electric, Biomass, Heat Pump and Solid Fuel are all energy options for a heating system in an off gas grid property.

Oil, LPG and Bulk LPG are stored in the tanks.

The heat emitter is a night storage heater and it uses electricity.

Economy 7 is a reduced rate electricity tariff that takes advantage of low load times on the National Grid

Stretch and Challenge!!

The cost of the heating and hot water for a typical property using **15,000 kWh** of energy per year.

Fuel/Energy	Pence per kWh	Cost
Electricity	14.05	£2107.50
Economy 7 Electricity	7.22	£1083
Oil	5.36	£804
LPG	8.32	£1248
Natural Gas (mains)	4.29	£643.50

Extension Task!

For the same property with a **15,000kWh** load showing how many kg of CO² is produced as a result of using each fuel or energy source.

Fuel/Energy	kg/kWh of CO ²	Total kg CO ² per annum
Electricity	0.49	7350
Oil	0.245	3675
LPG	0.214	3210
Natural Gas (mains)	0.185	2775

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PPE Quiz

1. Dust mask Safe to use. Used when dust particles are likely to be in the atmosphere
2. Hi visibility vest, not safe to use has hole in it which could snag on something. Used on construction sites to prevent vehicles and other site machinery from colliding with the wearer.
3. Safety glasses. Not safe to use as they are scratched causing poor visibility. Used to protect eyes from flying objects when cutting, drilling etc.
4. Hard hat. Not safe to use due to sticky tape and permanent marker writing. This can cause the plastic to degrade and fail to prevent injury. Used on all construction sites.

5. Ear defenders. Not safe to use as the foam insert is damaged and cause excessive dBA to damage the ear. Used when operating noisy machinery or tools or working in an environment when someone else is operating them.
6. Steel toe cap boots. Not safe to use. Toe cap is exposed and protective midsole also exposed. Used on all construction sites to prevent crushing injuries to feet.
7. Gloves. Not safe to use as skin is exposed. Used when hands can come into contact with dangerous substances or sharp edges.
8. Overalls. Not safe to use. They are torn which will allow dirt and debris inside and also a snagging hazard. Worn to protect wearer from dirt and substances coming into contact with skin and clothing.

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Boiler Parts

PCB & housing
Condensation trap
Fan assembly
Burner

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Taps

Picture A: AUK3 & 5
Picture B: Non concussive

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Ventilation Decisions

1. Yes
2. Rear of brick
3. 25.6cm
4. 2

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Ventilation Decisions 2

1. B
2. $201.60\text{cm}^2 (12 \times 240 \times 7 = 20160 / 100 = 201.6\text{cm}^2)$
3. $151.20\text{cm}^2 (9 \times 240 \times 7 / 100 = 151.2\text{cm}^2)$
4. 10 mm diameter ball but allow entry of a 5 mm