PLUMBING

Plumbing – The system of pipes, drains, fittings, valves, and fixtures installed for the distribution of potable water for drinking, heating and washing, and waterborne waste removal. "Plumbing" also refers to the skilled trade which installs and maintains it (Plumbers).
Plumbers – Skilled tradespeople who specialise in the installation and maintenance of water systems. Plumbers are required to obtain a license from a trade or vocational school and have a background in various aspects of industrial, commercial, domestic, and communal pipe work, water heating, water treatment such as water cleaning and purification, rain water & drainage, sewer networking, water flow dynamics, the storage of water, temperature adjustment, and the dangers of water hazards.
Plumbers get their name from the Latin Plumbum, for "lead," since the ancient Romans used pipes made from lead. The term therefore refers to the metallic element out of which their main building material is made. The use of lead for potable water declined after World War II because of increased awareness of the dangers of lead poisoning.
At this time, copper piping was introduced as a better and safer alternative to lead pipes, but the first copper pipes were made by the Egyptians, who's plumbing process was as formidable as their building expertise. Places like China also used hollow bamboo reeds as pipes to carry fresh water and natural gas to and from the ancient salt mines.
Interestingly, Einstein, the father of modern mathematics, admired the plumber:

"*If I would be a young man again and had to decide how to make my living, I would not try to become a scientist or scholar or teacher. I would rather choose to be a plumber in the hope to find that modest degree of independence still available under present circumstances.*"

– Albert Einstein, The Reporter, 18 November 1954

Not too long after this remark was published, Einstein was granted an honorary membership into the Plumbers and Steamfitters Union, A.F.L. in Washington. This made the genius, in effect, a plumber. The new title pleased Einstein, although he supposedly wasn't looking for or expecting praise. When it comes to solving the great mathematical puzzles of the universe, Einstein would have been the first to be considered. Who would have known that he would have been the person to call to straighten out the water pipes, too?
The history of plumbing goes back to Crete four thousand years ago. The Minoan Palace on Crete is the oldest known structure to have sewerage and water pipes.
The Romans were the first to build elaborate systems that could transport water in and out of cities. By building aqueducts, or water bridges that conveyed water.
The first flushable toilet was not designed until the Elizabethan era and was described in 1596 by Sir John Harington, an English courtier and the godson of Queen Elizabeth I. Harington's device called for a 2-foot-deep oval bowl waterproofed with pitch, resin and wax and fed by water from an upstairs cistern. In 1857 the first commercially available toilet paper was invented by Joseph Getty in America and in 1870, Thomas Twyford a Pottery manufacturer in England created the single piece, ceramic flush toilet.
In the year 1883, an American man by the name of John Michael Kohler invented the world's first bathtub. He took a cast-iron horse trough and added four decorative feet to the bottom of it and covered it in an enamel finish.
In 1940 the War Production Board had severely restricted the use of iron steel and copper during World War II, forcing the use of new materials such as cast iron and plastics in manufacturing. Improved plumbing materials were thus introduced.
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energy agency

Reducing CO2 and greenhouse gas emissions in Scotland

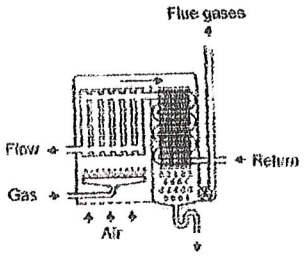
CONDENSING BOILERS – OPERATION, BENEFITS AND MYTHS

How Condensing Boilers Work

Condensing boilers are highly efficient boilers that have much lower fuel and running costs than conventional boilers.

Condensing boilers offer tangible benefits by:

- Reducing carbon dioxide emissions and helping to combat global warming.
- Improving household efficiency thus reducing fuel bills.



They work on the principle of recovering as much as possible of the waste heat which is normally rejected to the atmosphere from the flue of a conventional (non condensing) boiler.

This is accomplished by using an extra-large heat exchanger or sometimes two heat exchangers within the boiler which maximises heat transfer from the burner as well as recovering useful heat which would normally be lost with the flue gases.

When in condensing mode (as condensing boilers do not condense all the time) the flue gases give up their 'latent heat' which is recovered by the heat exchanger within the boiler and used to preheat the return water, as illustrated in the diagram.

As a result the temperature of the gases leaving the flue of a condensing boiler is typically 50-60°C compared with 120-180°C in a current non-condensing boiler. At the same time an amount of water or 'condensate' is produced.

A condensing boiler will always have a better operating efficiency than a conventional non-condensing one, due to its larger and more efficient heat exchanger.

Addressing the Myths

The benefits of condensing boilers are therefore quite clear, and in order to encourage greater take up of these benefits we now need to address the myths surrounding them.

Typical Annual Fuel Costs	Flat	£197	£175
	Bungalow	£249	£220
	Semi-detached	£289	£254
	Detached	£394	£347

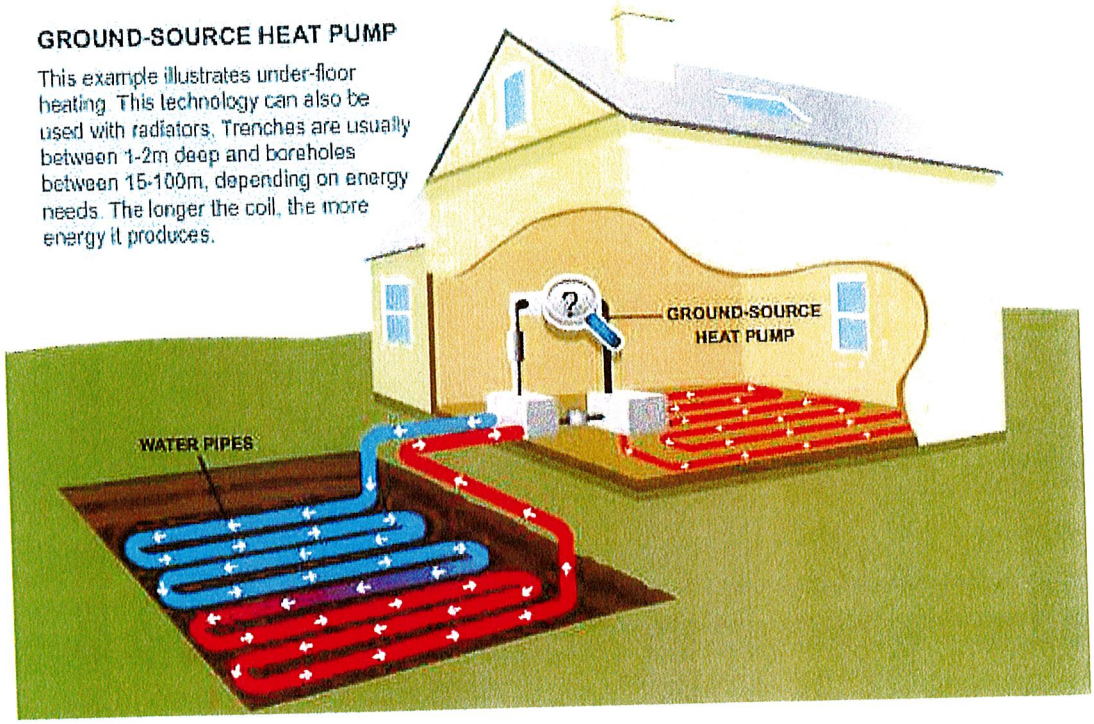
Myth: They are only efficient when fully condensing.

Not true. Due to its larger heat exchanger, a condensing boiler does not have to condense in order to be more efficient. Typically a new gas condensing boiler will have a seasonal efficiency of between 84% and 92% compared with a new non-condensing boiler at 78% or an older boiler at 55-65%.

See table for typical annual fuel costs for condensing and non-condensing boilers.

Ground Source Heat Pumps

Ground Source Heat Pumps (GSHP)



Ground source heat pumps extract heat from below ground using pipes that are filled with a mixture of water and antifreeze. The 'ground loop' is buried in your garden where the temperature remains constant, even throughout the winter. The length of the loop depends on the available space and the amount of heat required. Ground source heat pumps with longer loops produce the most heat. if you are restricted by lack of room a vertical borehole can be drilled as an alternative.

How does a ground source heat pump work?

Ground source heat pumps work by extracting heat at low temperatures from below the ground and transfering it into a refrigerant fluid that is within a loop of pipe (ground loop). The fluid travels through a compressor that raises the temperature higher still and in turn the heat can be used for domestic heating and hot water requirements. The cooled fluid continues its cycle back round the loop collecting heat from the ground and bringing into your home. Ground source heat pumps work in a continuous cycle until heating is no longer needed.

Space Air® DAIKIN

Space Airconditioning plc

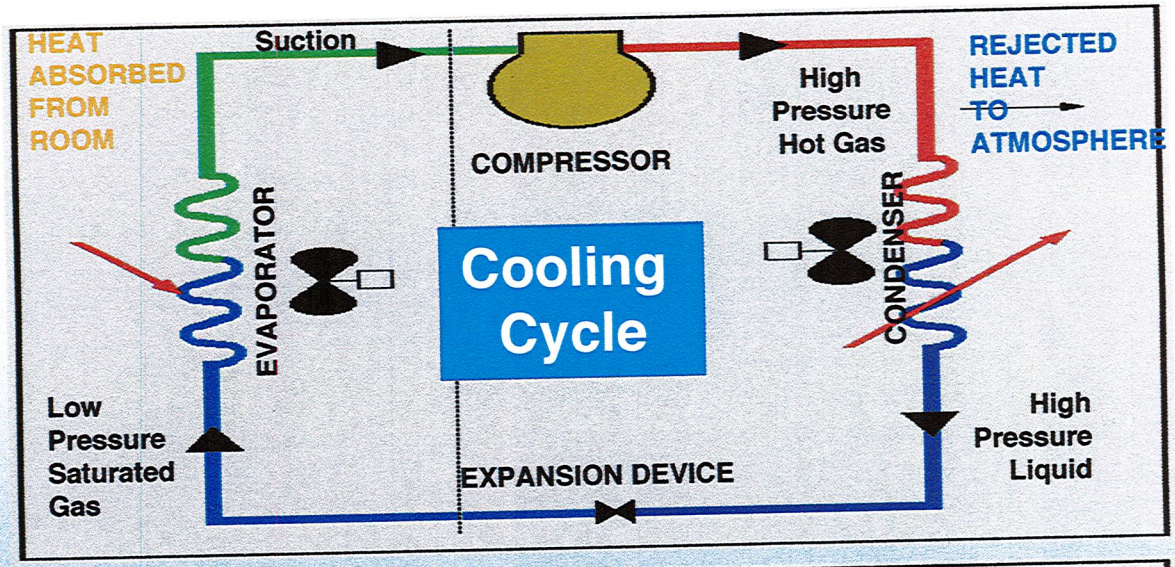
Guildford - Bristol - Birmingham - Leeds - Manchester

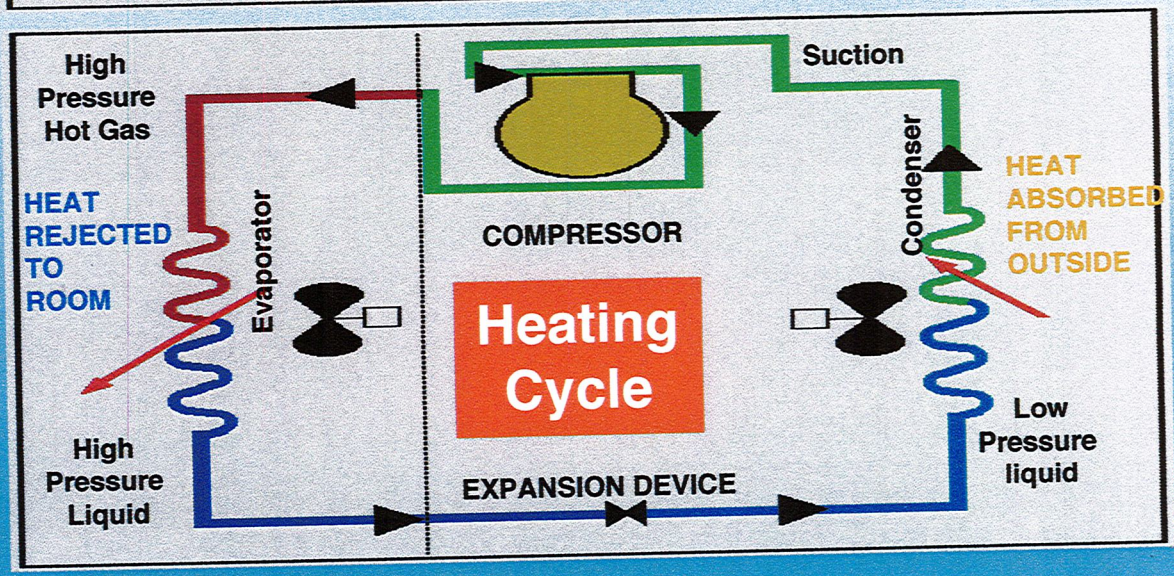
RIBA · CPD PROVIDERS NETWORK

Direct Expansion Cycle (DX)

4 Components:-

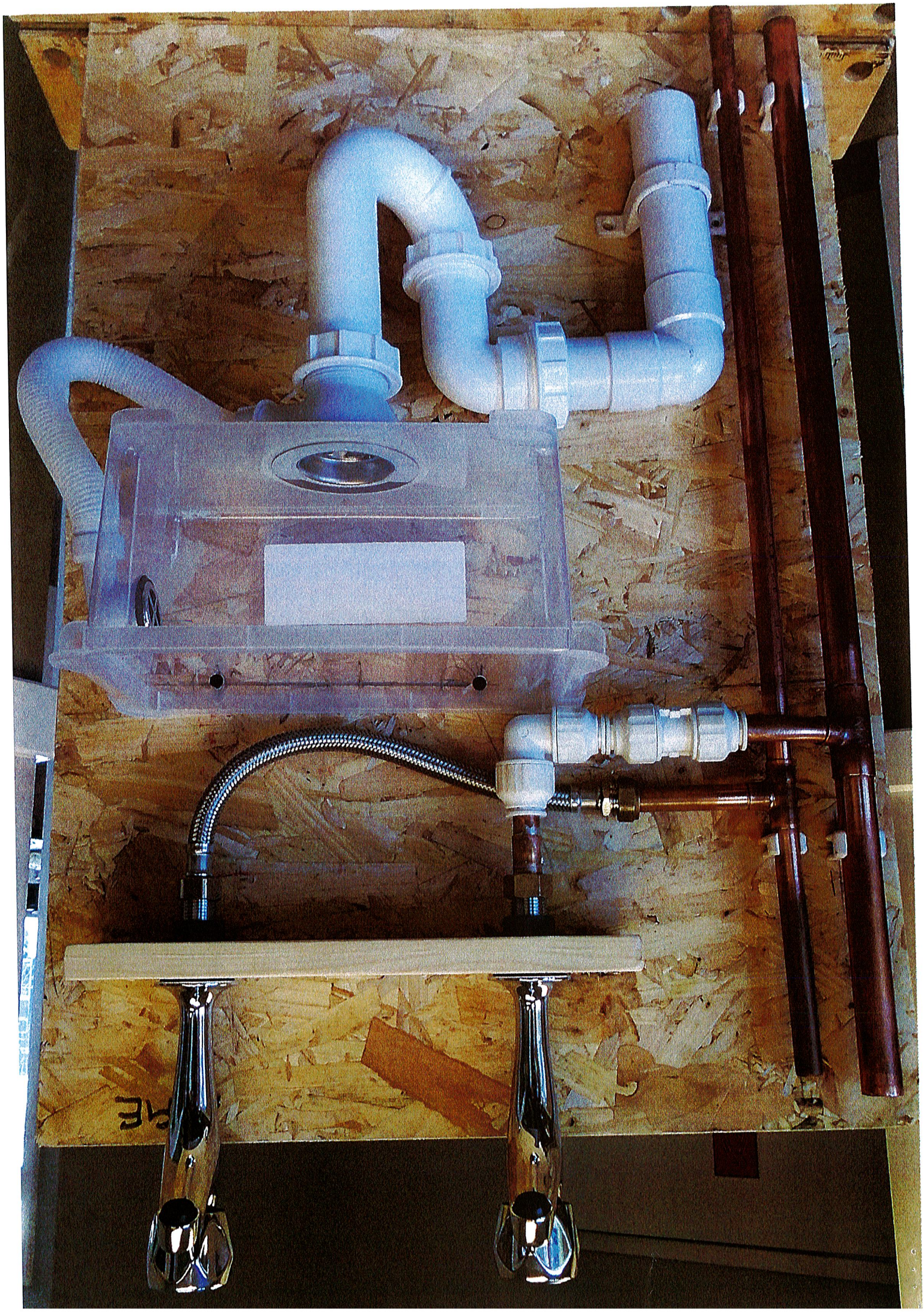
The Compressor.
The Condenser.
The Expansion Valve.
The Evaporator.





Reverse Cycle "Heat Pump" Heating

Boiling Temp = - 53°C

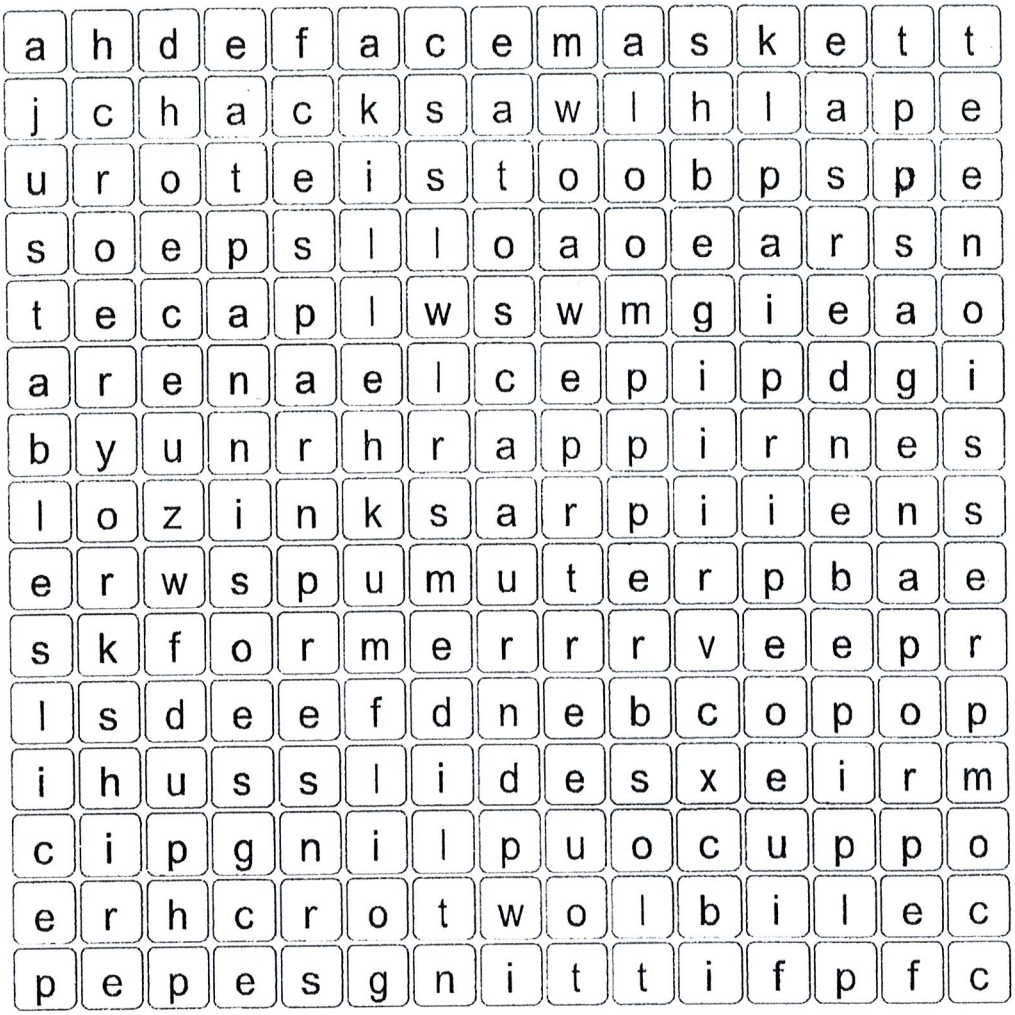


Conduction convection or radiation

1. Sunbathing
2. Teaspoon in hot drink gets hot
3. Water in a kettle
4. Standing by heater
5. House warmed by one heater
6. Car heater
7. Weather patterns around the world
8. Hand on hot kettle
9. Air conditioning
10. Coil heating water in cylinder
11. Outer casing of boiler getting hot
12. Warming hands by blowing on them
13. Warming hands near radiator
14. Warming hands on radiator
15. Room heated by light bulbs
16. Warmed by getting in bath
17. Pipe warmed by water inside
18. Hand near flame of blow torch

How did you do? ..... / 18

Plumbing



a	h	d	e	f	a	c	e	m	a	s	k	e	t	t
j	c	h	a	c	k	s	a	w	l	h	l	a	p	e
u	r	o	t	e	i	s	t	o	o	b	p	s	p	e
s	o	e	p	s	l	l	o	a	o	e	a	r	s	n
t	e	c	a	p	l	w	s	w	m	g	i	e	a	o
a	r	e	n	a	e	l	c	e	p	i	p	d	g	i
b	y	u	n	r	h	r	a	p	p	i	r	n	e	s
l	o	z	i	n	k	s	a	r	p	i	i	e	n	s
e	r	w	s	p	u	m	u	t	e	r	p	b	a	e
s	k	f	o	r	m	e	r	r	r	v	e	e	p	r
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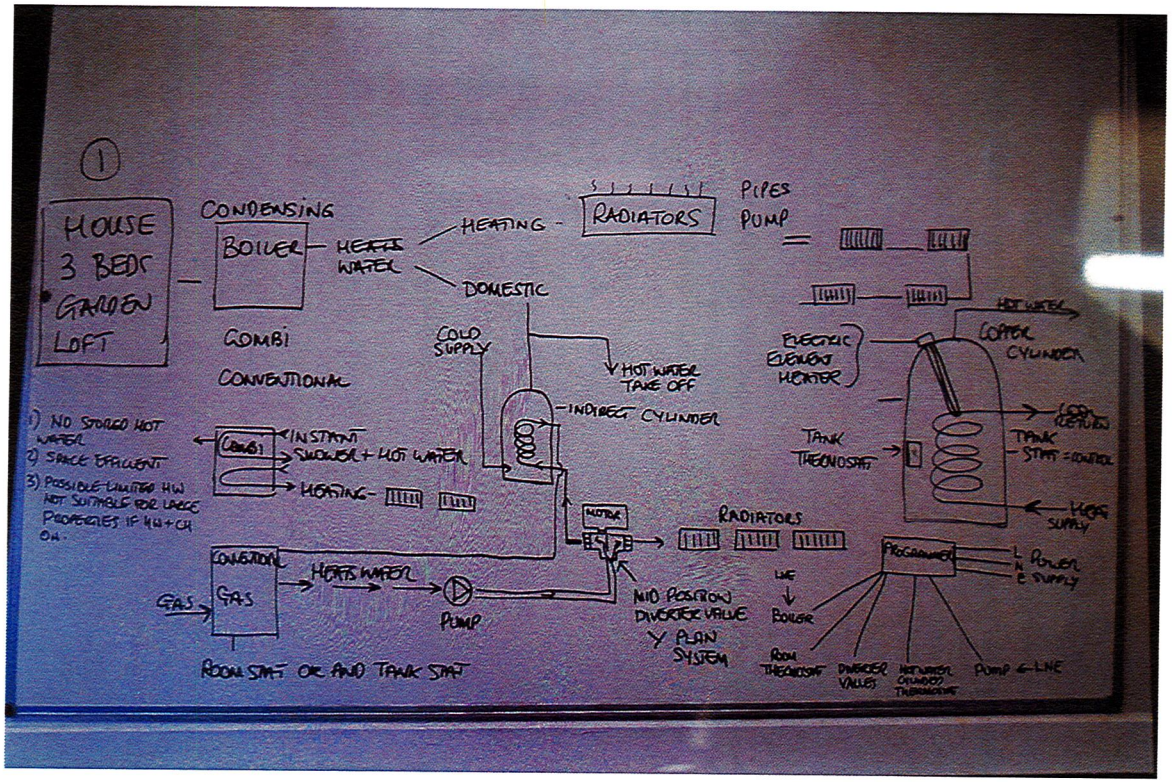
i	h	u	s	s	l	i	d	e	s	x	e	i	r	m
c	i	p	g	n	i	l	p	u	o	c	u	p	p	o
e	r	h	c	r	o	t	w	o	l	b	i	l	e	c
p	e	p	e	s	g	n	i	t	t	i	f	p	f	c

Words to find:

ajustable slice, blow torch, boots, cap, compression, copper, coupling, elbow, end feed, face mask, fittings, flux, flux brush, former, hack saw, lead, mapp gas, overalls, pipe, pipe benders, pipe cleaner, pipe slice, ppe, propane gas, slides, solder, solder ring, tape measure, tee, wire wool, yorkshire, zink.


1
HOUSE
3 BEDS
GARDEN
LOFT
CONDENSING
BOILER
HEATS WATER
HEATING
DOMESTIC
RADIATORS
PIPES
PUMP
COMBI
CONVENTIONAL
COLD SUPPLY
HOT WATER TAKE OFF
INDIRECT CYLINDER
INSTANT
SHOWER + HOT WATER
HEATING
1) NO STORED HOT WATER
2) SPACE EFFICIENT
3) POSSIBLE LIMITED HW NOT SUITABLE FOR LARGE PROPERTIES IF HW + CH ON.
MOTOR
RADIATORS
CONDENSING
GAS
HEATS WATER
PUMP
MID POSITION DIVERTER VALVE
Y PLAN SYSTEM
ROOM STAT OR AND TANK STAT
HOT WATER
ELECTRIC IMMERSION HEATER
COPPER CYLINDER
TANK THERMOSTAT
TANK STAT = CONTROL
PROGRAMMER
POWER SUPPLY
LINE
BOILER
ROOM THERMOSTAT
DIVERTER VALVES
PUMP
LINE