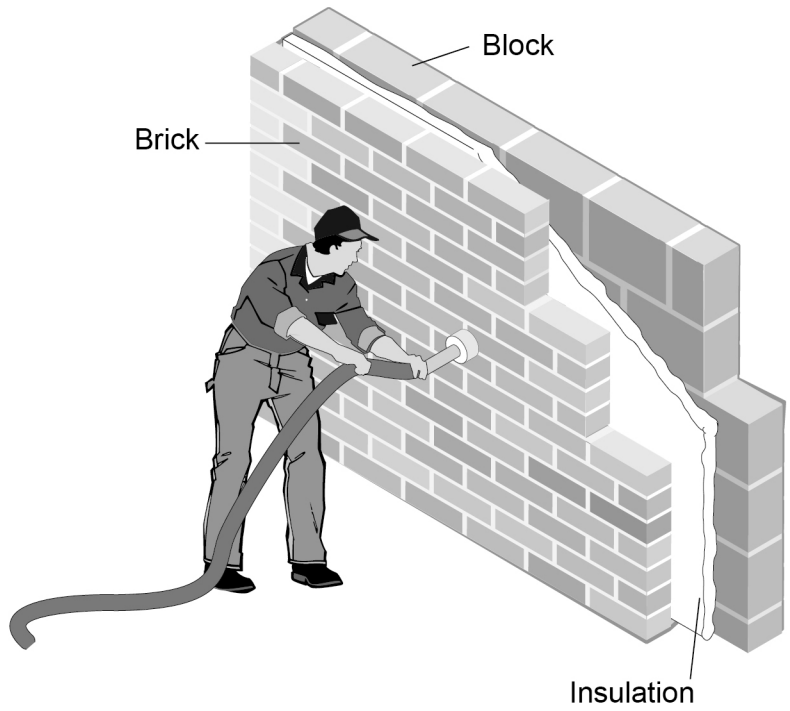


0 5

Figure 7 shows cavity wall insulation being installed in the wall of a house.

Figure 7



0 5 . 1

Explain how the wall reduces unwanted energy transfers.

[3 marks]

Question 5 continues on the next page

Turn over ►



0 5 . 2 The cavity insulation was tested.

- The heating inside the house was switched off.
- The temperature inside the house was measured every 20 minutes for 2 hours.

Table 4 shows the results.

Table 4

Time in minutes	Temperature in °C
0	25.0
20	20.8
40	17.4
60	14.5
80	12.1
100	10.0
120	8.4

Determine the temperature inside the house after 30 minutes.

[2 marks]

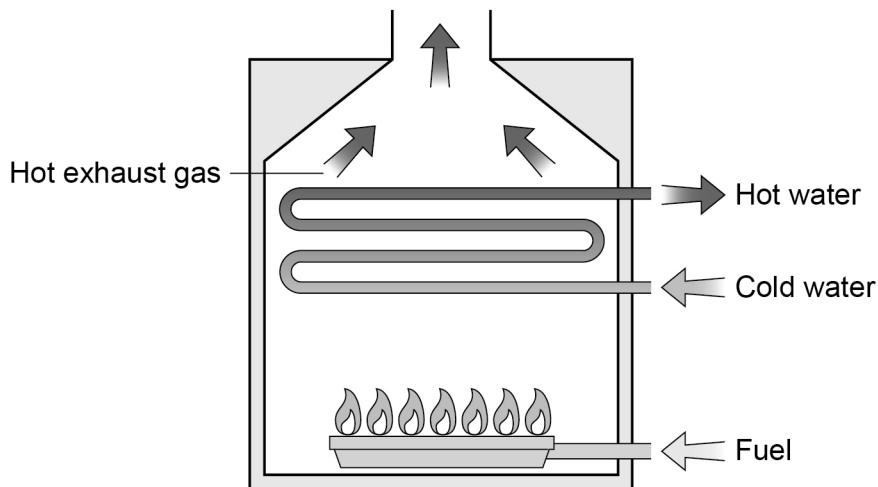
Temperature = _____ °C



0 5 . 3

Figure 8 shows the gas boiler used to heat the house.

Figure 8



Describe how different energy stores are changed by the boiler.

[3 marks]

0 5 . 4

To heat the house, the boiler transfers 15 MJ of energy in 10 minutes.

Calculate the power of the boiler.

Write any equation that you use.

[4 marks]

Power = _____ W

Turn over for the next question

12

Turn over ►



Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	the wall has two / three layers	allow the wall is thick	1	AO1 6.1.2.1
	cavity wall insulation / brick / block has a low thermal conductivity		1	
	so less energy is transferred by conduction	allow rate of energy transfer is lower ignore any reference to convection and / or radiation	1	
05.2	$T = 17.4 + \left(\frac{(20.8 - 17.4)}{2} \right)$	an answer in the range 18.5–19.1 scores 2 marks	1	AO3 6.1.2.1
	or $T = 20.8 + \left(\frac{(20.8 - 17.4)}{2} \right)$			
	T = 19.1 (°C)		1	
05.3	chemical energy store of the fuel decreases		1	AO1 6.1.2.1
	thermal energy store of the water increases	allow kinetic energy store of the water particles increases	1	
	thermal energy store of the air / atmosphere increases	allow kinetic energy store of the air particles increases	1	
05.4	E = 15 000 000 (J)	an answer of 25 000 scores 4 marks	1	AO2 6.1.1.4
	t = 600 (s)		1	
	$p = \frac{15\,000\,000}{600}$	allow a correct substitution of incorrectly / not converted values of E and / or t	1	
	P = 25 000 (W)	allow a correct calculation using incorrectly / not converted values of E and / or t	1	
Total			12	