P7.2 Summary questions

1 A4, B1, C3, D5, E2

2 a If energy is dissipated it is transferred to a less useful store, such as the thermal store of the surrounding.
   b

3 D, A, B, C

4 a Equation for efficiency:
   Efficiency = useful output energy transfer (J) ÷ input energy transfer (J)
   Useful output energy transfer = 25 J
   Input energy transfer = 30 J
   Efficiency = 25 J ÷ 30 J
   = 0.83 (2 sig fig), or 83 %
   b Efficiency = useful output energy transfer (J) ÷ input energy transfer (J)
   so
   Useful output energy transfer (J) = input energy transfer (J) × efficiency
   = 1000 J × 0.80
   = 800 J
   So ‘wasted energy’ = input energy transfer – useful output energy transfer
   = 1000 J – 800 J
   = 200 J

5 a

<table>
<thead>
<tr>
<th></th>
<th>Building A (high thermal conductivity)</th>
<th>Building B (low thermal conductivity)</th>
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<tbody>
<tr>
<td>a long time to heat up</td>
<td>√</td>
<td></td>
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<tr>
<td>a small rate of transfer of energy through walls</td>
<td></td>
<td>√</td>
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<tr>
<td>once heated, a short time to cool down</td>
<td>√</td>
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b by using insulation that reduces the rate of transfer of energy when the temperature is too hot or too cold

6 a power = 120 W = 0.12 kW
   assume all the appliances are on standby overnight = 8 hours
   number of units per year = 0.12 kW × 8 hours/day × 365 days/year = 350.4 kW h/year
   cost = 10 p/kW h
   cost = 350.4 kW h/year × 10 p/kW h = 3500 p (2 sig fig) = £35
   b cost = 26 000 000 × £35 = £910 000 000
   c You could run 182 schools on the money saved from turning off appliances.