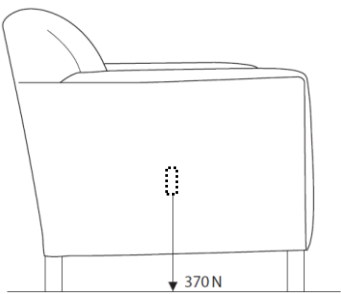


Question number	Answer	Notes	Marks
5 a	attempt to use 25%;  scaling up to 1 week; evaluation;  e.g. $1.2 \times 10^7 \times 0.25 (= 3.0 \times 10^6)$ (energy =) $3.0 \times 10^6 \times 7$ (energy =) $2.1 \times 10^7$ (J)	allow 25% or 0.25 seen anywhere allow x7 seen anywhere   final answer of $3.0 \times 10^6$ or $8.4 \times 10^7$ gains 2 marks	3
b	any one from:  MP1. idea of double/triple glazing; MP2. draw curtains; MP3. close windows; MP4. use of reflective film applied to windows;		1
c	any four from:  MP1. air is a good insulator / poor conductor; MP2. conduction is reduced; MP3. fibreglass is a good insulator / poor conductor; MP4. (trapped) air cannot move around;  MP5. convection (current) cannot form / is reduced;	ignore references to heat being trapped   ignore unqualified 'air is trapped' as it is given in question	4
d	correct general shape i.e. one input and two outputs; reasonable correct proportions (by eye); correctly labelled;	allow 'input, waste, useful' or 'chemical, thermal, thermal'	3

Total for question 5 = 11 marks

Question number	Answer	Notes	Marks
6 a	<p>X drawn at the base of the weight arrow within area shown by the dashed box;</p> 		1
b (i)	pressure = force ÷ area;	allow rearrangements and standard symbols e.g. $p=F/A$	1
(ii)	<p>weight on each foot OR total area found;</p> <p>substitution;</p> <p>evaluation;</p> <p>matching unit;</p> <p>e.g.  force on each foot = 92.5 (N) OR total area = 20.8 (cm<sup>2</sup>)  (pressure =) 92.5 / 5.2 OR 370 / 20.8  (pressure =) 18  N/cm<sup>2</sup></p>	<p>allow 92.5 or 20.8 seen anywhere in working</p> <p>allow any valid unit of pressure if no valid working seen</p> <p>17.788..., 17.8 allow 10<sup>4</sup> Pa or 10<sup>4</sup> N/m<sup>2</sup></p> <p>ignored factor of 4 gives 71 N/cm<sup>2</sup> gains 3 marks</p> <p>used 5.2<sup>2</sup> for area gives 3.4 N/cm<sup>2</sup> gains 3 marks</p> <p>used 5.2<sup>2</sup> for area and ignored factor of 4 gives 13.7 N/cm<sup>2</sup> gains 2 marks</p>	4
c	<p>MP1. (cups) increase (surface) area;</p> <p>MP2. force (on floor) remains the same;</p> <p>MP3. (since <math>p=F/A</math>) pressure (on floor) is decreased;</p>	ignore 'force is more spread out' / eq	3

Total for question 6 = 9 marks

Question number	Answer	Notes	Marks
10 a	any two from: MP1. comets orbit the Sun but moons orbit planets; MP2. moons have (approximately) circular orbits but comets have elliptical orbits; MP3. a comet has variable speed but a moon's speed is (approximately) constant;	allow 'comet orbits are more elliptical'	2
b (i)	gravitational potential energy = mass x g x height;	allow rearrangements and standard symbols e.g. GPE = mgh reject 'gravity' for g	1
(ii)	substitution; rearrangement; evaluation to more than 1 significant figure;  e.g. $2.2 = 0.75 \times 1.6 \times \text{height}$ (height =) $2.2 / (0.75 \times 1.6)$ (height =) 1.83333...	award 2 marks max. if mass not converted to kg giving 0.00183	3
(iii)	2.2 (J);		1
(iv)	any three from: MP1. gravitational field strength is greater on the Earth;  MP2. (therefore) hammer has a greater weight on Earth;  MP3. (therefore) astronaut has to apply a greater force (to lift the hammer); MP4. hammer gains more GPE on Earth;	allow use of $g = 10$ in calculation condone 'gravity is more on Earth' OR allow 'downward force greater' condone 'hammer is heavier'  GPE on Earth is 15J gains MP1 and MP4	3
c	substitution; rearrangement; evaluation of time period; evaluation of number of orbits;  e.g. $7.66 = \frac{2\pi \times 6780}{T}$ (T =) $\frac{2\pi \times 6780}{7.66}$ (T =) 5560 (s) (number of orbits = $(24 \times 60 \times 60) / 5560$ =) 15.5	allow method of finding total distance travelled and dividing by distance of one orbit ( $2\pi r$ )   5561 allow 15, 16	4

Total for question 10 = 14 marks