

1.

the home of the future – built from waste – dirt cheap to run

The Earthship



The Earthship is the home of the future and it can help save the future of our planet. How? Earthships are built using recycled materials, especially old car tyres. Every year, there are 48 million used tyres in Britain that have to be thrown away. They are either buried in tips or burnt, creating greenhouse gases. The growing mountain of car tyres is a huge environmental concern, but now, in the building of Earthship homes, one problem can be used to solve another. The mountain of old tyres can provide homes for people who need them.

Old bottles, reclaimed wood and other waste materials are also used in the construction of these homes. And that's not all – another important advantage of Earthships is that they cost almost nothing to run.

The Earthship is a house that:




- takes heat from the sun so your heating bills are very small
- maintains a comfortable living temperature: neither too hot, nor too cold
- makes electricity from sun and wind
- collects its own water from rain so you never have to pay water bills
- disposes of all waste.

A happy customer of a two-bedroom Earthship wrote:

"The lowest temperature in my house was 21°C and the highest 24°C. The total energy bill for the year was only £25."

A builder said:

"These walls will still be here in 800 years' time – that's how long rubber tyres last. My daughter's children will be able to come and see what I've done long after I'm gone."

<p>Cosy bedroom</p> 	<p>Mike Reynolds, the man who first thought up this new eco-house, called it 'The Earthship' because it is designed to be a home that will 'sail' into the future.</p> <p><i>For more information and how to contact us, go to www.lowcarbon.co.uk</i></p>	<p>Sunny living room</p> 	<p>Tyres make the perfect building material. They are packed with earth, stacked like bricks and plastered.</p> 
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A plan of a simple Earthship

Solar panels are set above the building to make electricity from sunlight. Solar power provides enough energy to run lights and electrical equipment and to heat up water. Batteries can store sunlight energy for several days.

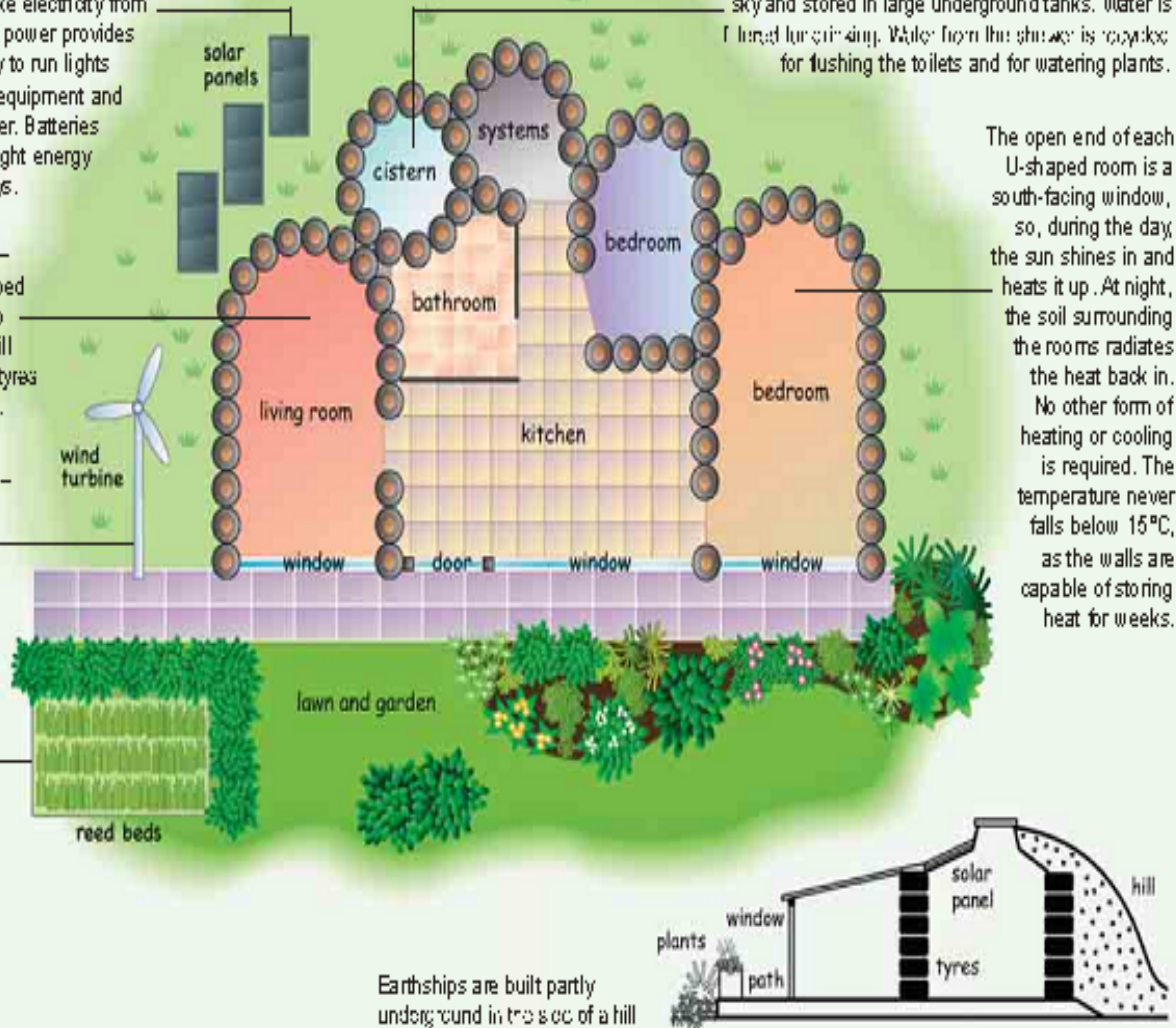
Living spaces – usually U-shaped rooms dug into the side of a hill and lined with tyres on three sides.

Wind turbines – electricity is also made from wind energy.

Reed beds – human waste recycled here.

Underground water tanks – rain is caught from the sky and stored in large underground tanks. Water is filtered for drinking. Water from the shower is recycled for flushing the toilets and for watering plants.

The open end of each U-shaped room is a south-facing window, so, during the day, the sun shines in and heats it up. At night, the soil surrounding the rooms radiates the heat back in. No other form of heating or cooling is required. The temperature never falls below 15°C, as the walls are capable of storing heat for weeks.



2.

How many tyres have to be thrown away every year?

1 mark

2. Which of these materials are used to build Earthships?

Tick **three**.

bricks concrete old wood

tyres cement old bottles

1 mark

3. Complete in the table to show how the Earthship provides the following.

One has been done for you.

We need:	How the Earthship provides it:
light and electricity	
heat during day	
protection from cold at night	<i>The walls release heat into the rooms.</i>
water	
disposal of waste	

2 marks

4. ...***maintains*** a comfortable living temperature...

Give the meaning of the word *maintains* in this sentence.

2 marks

5. 'Earthship' is made up of two words: *earth* and *ship*.

Why are these two words used for this new type of house?

earth _____

2 marks

ship _____

1 mark

6. How does the text prove that Earthships cost very little to run?

2 marks

7. This leaflet gives information about the Earthship.

How does it also advertise the Earthship? Find **two** points.

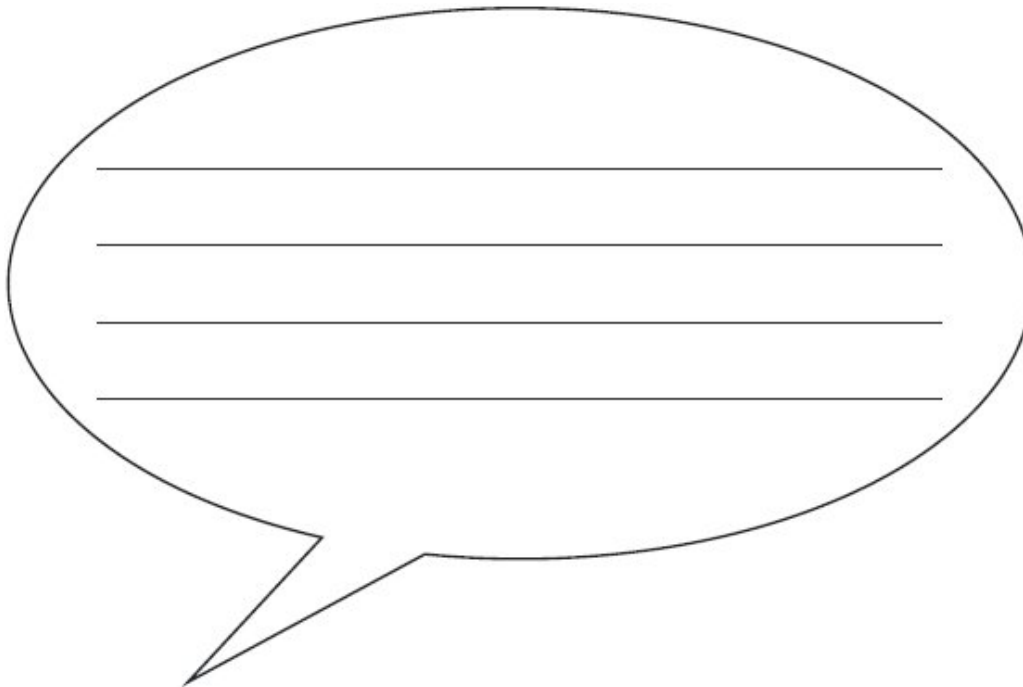
1. _____

2. _____

2 marks

8. On the front of the leaflet two quotations are included from people who like the Earthship.

Now use the information on the plan to write your own comment about the Earthship for use in the leaflet.



Your comment about the Earthship

2 marks

9. Explain fully how Earthship houses can solve different types of problems.

3 marks

Mark schemes

2.

1. Award **1 mark** for:

- 48 million / 48,000,000 / forty-eight million.

1 mark

2. Award **1 mark** if three correct answers are ticked:

bricks	<input type="checkbox"/>	concrete	<input type="checkbox"/>	old wood	<input checked="" type="checkbox"/>
tyres	<input checked="" type="checkbox"/>	cement	<input type="checkbox"/>	old bottles	<input checked="" type="checkbox"/>

1 mark

3. Award **2 marks** for all four cells correctly completed.

Award **1 mark** for two or three cells correctly completed.

We need:	How the Earthship provides it:
light and electricity	<ul style="list-style-type: none"> • solar panels / from sun (light) – or • wind turbines / wind energy – or • both from sun and wind
heat during day	<ul style="list-style-type: none"> • sunlight heats up the rooms • from the sun • windows let in sunlight <p>Do not accept: solar panels / south-facing windows</p>
protection from cold at night	<i>The walls release heat into the rooms.</i>
water	<ul style="list-style-type: none"> • rain water (is collected / stored) <p>Do not accept: underground water tanks</p>
disposal of waste	<ul style="list-style-type: none"> • recycled for toilets / watering plants • reed beds <p>Do not accept: <i>recycled</i></p>

up to 2 marks

4. Award **1 mark** for references to staying the same, eg.

- carry on
- keeps the same
- continue at the same level

2 marks

5. (a) Award **2 marks** for reference to the environmental aspect of the Earthship, eg:

- *it's a house design that saves the Earth / environment / planet*
- *it's eco-friendly.*

Award **1 mark** for reference to any one of the following points:

- built into the earth, eg: *it's an underground house*
- uses earth in its construction, eg: *it is built into the ground / soil / earth*
- uses natural resources, eg: *it's made out of natural things.*

up to 2 marks

(b) Award **1 mark** for reference to either of the following points:

- **figurative** interpretation, eg:
 - *it's self-contained / self-sufficient*
 - *it's like a space ship because it's meant to 'travel' into the future*
 - *it's very complex to run like a space ship*
- the **architect's quotation** , eg:
 - *it's a home that will sail into the future*
 - *it will sail long into the future as the walls stay for 800 years.*

1 mark

6. Award **2 marks** for reference either to the endorsement provided by inhabitants of the Earthship or for answers referring to the energy bill, eg:

- *because he used happy customers to show how much it would cost*
- *it has a little interview with customers asking them how much it was*
- *by putting the section of a user's opinion*
- *by getting a quote from a person who lives in an Earthship*
- *the total bill for the year was £25*
- *someone who was the owner of a two-bed Earthship said that the energy bill was £25*
- *by saying how much it was for the energy bill.*

Award **1 mark** for reference to cost-reducing features, eg:

- *it has solar panels / electricity from wind*
- *it uses natural resources*
- *it uses its own energy*
- *by explaining what resources it uses to keep its bills low.*

Do not accept reference to the cheapness of the original building materials, eg:

- *it is made from recycled materials.*

up to 2 marks

7. Award **1 mark** for each valid point taken from one or more of the categories below, up to a maximum of **2 marks**, eg:

- **language**, eg:
 - *it uses persuasive language*
 - *it has the sort of language features that you see in advertising, eg: 'the home of the future', 'dirt cheap to run', sunny living room / cosy bedroom*
 - *makes you want to have one*
- **content**, eg:
 - *it only mentions the good aspects of Earthships, nothing bad*
 - *it has facts and figures to sound convincing*
 - *it has good comments from users*
 - *has a website*
 - *says how cheap it is*
 - *says how comfortable it is*
 - *says how ecological it is*
- **presentation**, eg:
 - *it has a slogan [the home of the future] / catchy heading*
 - *use of appealing / attractive photographs*
 - *it has a big photograph across half the front page*
 - *eye-catching title.*

Also award **1 mark** for answers that identify advertising features by copying them. For **1 mark**, pupils must give **two** examples from the lists below. No marks are given for a single example, even in combination with answers from the lists above.

- Identifying **relevant quotations**:
 - *the home of the future*
 - *it says 'Dirt cheap to run'*
 - *cosy bedroom*
 - *sunny living room.*
- Identifying **positive features of the Earthship**:
 - *it helps the world*
 - *it's cheap to build / run*
 - *the materials last really long.*

Do not accept:

- *it has a picture / photograph*
- *it has captions.*

up to 2 marks

8. Award **2 marks** for selecting and re-interpreting a relevant piece of information from the labels on the plan and implicitly or explicitly making a comment about it, eg:

- *it's so cool knowing that I'm using only sun and wind to get all my electricity*
- *I really like the idea of not polluting the earth and using all my waste water for growing things in the garden*
- *the reed beds can get very smelly when the weather's hot, so I'm not that keen on it anymore*
- *all the bedrooms are so cosy, you'd never know the walls were made of old tyres.*

Award **1 mark** for a general comment on the eco-features of the Earthship, taken from the front or back of the leaflet, eg:

- *it is really good because think how much energy you waste in your house*
- *it's all made from recycled materials*
- *I would recommend this house to anyone. It is very cheap to live in*
- *it's saving the environment and costs almost nothing to run*
- *it's incredible. It doesn't pollute the Earth and prevents global warming.*

Do not accept answers that are based on the quotations in the leaflet, eg:

- *my bills are so cheap, only £30 per year.*

up to 2 marks

9. Acceptable points:

- use of old tyres / recycling / longevity of tyres
- provision of homes
- beneficial environmental impact
- saving on energy bills / cheapness of utilities / energy production and/or consumption.

Award **3 marks** for mentioning three of the problems that Earthships solve or for discussing two in greater detail, eg:

- *Earthships are a good way of using up old tyres, which are an environmental problem, as they are so difficult to get rid of by burning or burying. Earthships also help to solve another problem and that is the problem of not enough houses for people to live in*
- *it will solve problems of pollution and greenhouse gases. By recycling tyres, they are not burnt and then no greenhouse gases escaping and you don't have to put them in a big hole in the ground either, so there'll be less rubbish because it is being used.*

Award **2 marks** for two of the problems that Earthships solve or for outlining one in greater detail, eg:

- *waste products are being used by the Earthship and the cost of the energy bills is cheap*
- *it will save people money, will help global warming, save energy.*

Award **1 mark** for covering one problem on a very general or over-specific level, eg:

- *the mountain of old tyres can provide homes for people who need them*
- *it will just keep re-using water and it saves a lot of water by filtering it so you don't have to keep going out and buying new bottles of water.*

up to 3 marks