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**KS3 Cross-curricular Teaching Resources**

**About Rescue Wooden Boats**

Boat builders and craftsmen David Hewitt and George Hewitt, together with wooden working boat enthusiasts launched a charitable trust called Rescue Wooden Boats in 2011.

Its aims are to:

* Restore examples of wooden working boats back to use on the water,
* Tell their stories through film and photographs,
* Conserve the crafts and skills involved in building and using them, as

well as to

* Encourage young people to become actively involved in understanding

their maritime heritage.

Rescue Wooden Boats has been given ***Dunkirk veteran*** [***Lucy Lavers***](http://www.rescuewoodenboats.com/Lucy_lavers) a Liverpool single screw lifeboat, built in 1940, by the *[Dunkirk Little Ships Restoration Trust](http://www.dlsrt.org.uk/" \t "_blank" \o "Dunkirk Little Ships Restoration Trust)*. Their first project is to restore her with the help of a Heritage Lottery Grant and to return her by sea to Dunkirk for the 75th anniversary in 2015. After this she will give trips afloat in Wells-next-the-Sea.

They have set up a ***Visitor and Education Centre in Stiffkey***, North Norfolk, which is housed in part of the old artillery training military camp, and tells the story of *Lucy Lavers* and working fishing boats and boatbuilding through displays, films and artefacts. Visitors can also see the working boat yard next door where the restoration works is taking place.

Rescue Wooden Boats is filming the restoration work as well stories from fishermen and life boatmen and of the boats themselves. There are over ***100 short films*** on their website.

Rescue Wooden Boats also has a number of ***fishing boats, whelkers and crab boats*** which are waiting to be restored and returned to being used afloat.

**Rescue Wooden Boats**

**KS3 Cross-curricular Teaching Resources**

**Lesson summary**

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| **Activity** | **Curriculum links** | **Activity** |
| 1. The Lucy Lavers | All | Students watch video ‘Lucy Lavers – introduction’ and complete worksheet to provide overview of the project. |
| 1. Build a lifeboat | Design and technology, Science (Working scientifically, Physics Motion and forces), Maths (Geometry and measures), | Students use provided materials to design, make and test a lifeboat. Compare their design with other students and make predictions about how the boats will travel through the water. Evaluate designs. Watch the RWB videos to see real boatbuilders at work. |
| 1. Lifeboat rescue | English (Writing) | Students use the RWB video ‘Rescue of Waterwitch’ as stimulus for writing:   * A newspaper report about the rescue * A letter from Peter to his family telling them what had happened * A report of the incident for lifeboat records * Their own (imaginary) rescue story |
| 1. Little Ships | History, Computing, Geography, English (Reading, Writing, Spoken English) | Introduce students to Dunkirk and the role of the Little Ships using PowerPoint and British Pathé film. Students use maps to draw the route taken by the little ships. Students evaluate evidence to decide whether the evacuation of Dunkirk was a triumph or a disaster. Students write an account of Operation Dynamo from the perspective of a Little Ship, a crew member or a rescued soldier. Students role play Operation Dynamo, or undertake hotseating activity. |
| 1. Modern lifeboats | History, English (Writing), Art and design | Students watch RWB video ‘Modern Aldeburgh lifeboat’ and use this to write a comparison, or draw pictures to illustrate how lifeboats are different now to when Lucy Lavers was at Aldeburgh. |
| 1. Finding the Lucy Lavers | Geography, Computing, English (writing) | Students watch the video ‘Lucy Lavers - finding her’ and add labels to a map of Great Britain to where she has been. Use a compass and grid references to identify the specific location of each place and describe their geographical position compared to each other. Use Ordnance Survey maps to compare topographical data for the different locations. Use the Internet to source aerial photographs of each location and use these to describe the human and physical geography of each.  Students write a newspaper or magazine article describing Lucy Lavers journey around Britain and how she was found. |
| 1. Ramps investigation | Science (Working scientifically, Physics Motion and forces), Maths (Geometry and measures), Design and technology | Students watch video ‘Abdy Beauclerk and Lucy Lavers’ to hear description (at 4 mins) of how ramps, weights, chains, pulleys and turntables were used to launch the lifeboat and bring it back to the lifeboat house. Ramps investigation – students make predictions then investigate the effect of friction on the speed at which objects move down a ramp. Students change the mass of the object to find out what effect this has. Students change the gradient of the ramp and measure the size of the angle to see what effect this has on the speed at which objects move down the ramp. Students use chains and pulleys to see how this impacts the mass of object that can be moved up the ramp. |

**Using these resources**

These lesson plans can be used individually within your own longer scheme

of work, or as part of cross-curricular themed days/weeks. The resources can be used as provided, or they can be adapted to meet the needs of your own class/es.

**Visiting the Education Centre and getting involved**

These resources can be used by teachers to help them to prepare students for a visit to the Rescue Wooden Boats Education Centre. They can also be used to help students to understand the restoration project before the Dunkirk 75th anniversary commemoration in 2015, as well as after Lucy Lavers has returned from her 75th anniversary trip to Dunkirk in May 2015.

**RWB videos**

The Rescue Wooden Boats website (rescuewoodenboats.com) features a vast library of short films (in vimeo format) that can be shared with classes. Some of the lesson plans refer to specific films (identified as ‘RWB video’). These can all be accessed from the Films page of the Rescue Wooden Boats website, under the sub-heading ‘Lucy Lavers’.

**Abbreviations:**

BA = Below average (activity for pupils needing extra support)

A = Average (core activity)

AA = Above average (activity for most able pupils)

RS = Resource Sheet

**Rescue Wooden Boats Key stage 3 lesson resource**

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| 1. **The Lucy Lavers** | | |
| **National Curriculum criteria/cross-curricular links**  All | | |
| **Lesson objectives**  To find out about the Lucy Lavers and plans for her restoration. | | |
| **Lesson plan**  Show students theRWB video ‘Lucy Lavers – introduction’.  Students complete worksheet to provide overview of the project (RS1).  Go through answers with students (RS1a) and discuss the restoration project – do students think it is worthwhile? Are they surprised by how long it will take? Should we try to keep old skills like boatbuilding going? | | |
| **Lesson outcome**  Students understand what the Lucy Lavers is, some information about her history and structure and an overview of the plans for her future.  **Success criteria** | | |
| **AA**  Most questions answered correctly. Useful and well-considered contribution made during class discussion. | **A**  Most questions answered correctly. Contribution made during class discussion. | **BA**  Some questions answered correctly. Limited contribution made during class discussion. |
| **Resources**  RS1 The Lucy Lavers worksheet  RS1a The Lucy Lavers - answers | | |
| **Health and safety**  N/A | | |

**Rescue Wooden Boats Key stage 3 lesson resource**

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| 1. **Build a lifeboat** | | |
| **National Curriculum criteria/cross-curricular links**  Design and technology,  Science (Working scientifically), Physics (Motion and forces)  Maths (Geometry and measures), | | |
| **Lesson objectives**  To design and make a lifeboat and to recognise features that will make the lifeboat faster, slower, more stable etc. | | |
| **Lesson plan**  Show a picture of a lifeboat (RS2 KS3 PowerPoint) and ask students what features make it float on water, stable in rough seas, easy to spot, fast etc.  Students use provided materials to design, make and test a lifeboat (see RS2a Teachers’ notes, RS2b and RS2c).  Compare their design with other students and make predictions about how the different boats will travel through the water.  Test and compare the boats travelling on water (use a hairdryer to make them go).  Students evaluate their design.  Watch the RWB video ‘Ben and George at work on Lucy December ‘13’ to see real boatbuilders at work. Then watch ‘George and Lucy January ‘14’ to see further progress. | | |
| **Lesson outcome**  Students design and make a lifeboat, explain why design features have been chosen and evaluate their design.  **Success criteria** | | |
| **AA**  Design boat, explaining why all features have been chosen. Test boat and evaluate its performance by considering features that aided the design and those that could be improved. | **A**  Design boat, stating which features have been chosen and explaining why some of them will help the boat. Test boat and evaluate its performance by considering some of the features that aided the design and those that could be improved. | **BA**  Design boat using sheet RS2c to help. State some of the features that have been chosen and attempt to explain why some of them will help the boat. Test boat and begin to evaluate its performance by considering some of the features that aided the design and those that could be improved. |
| **Resources**  RS2 PowerPoint  RS2a Teachers’ notes  RS2b and RS2c Build a lifeboat design and evaluation sheets  Materials to build boats (see RS2a Teachers’ notes) | | |
| **Health and safety**  Will depend on materials being used – risk assessment may be required if students will be using machinery to cut materials etc. | | |

**Rescue Wooden Boats Key stage 3 lesson resource**

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| **3. Lifeboat rescue** | | |
| **National Curriculum criteria/cross-curricular links**  English (Writing) | | |
| **Lesson objectives**  To write an account of a lifeboat rescue using a chosen format. To illustrate the account to show key events. | | |
| **Lesson plan**  Students use the RWB video ‘Rescue of Waterwitch’ as a stimulus for writing an account in one of the following formats:   * A newspaper report about the rescue * A letter from Peter to his family telling them what had happened * A report of the incident for lifeboat records * Their own (imaginary) rescue story   Students illustrate their work to show key events from their story. | | |
| **Lesson outcome**  Illustrated account of a lifeboat rescue in a chosen format.  **Success criteria** | | |
| **AA**  Detailed and clear account of a lifeboat rescue using a chosen format. Demonstrates correct use of voice and empathy with characters. Very few spelling and grammatical errors. Carefully chosen illustrations. | **A**  Account of a lifeboat rescue using a chosen format. Demonstrates correct use of voice and empathy with characters. Good spelling and grammar. Illustrations of key events. | **BA**  Use the help sheet (R34) to write an account of a lifeboat rescue. Some illustrations. |
| **Resources**  RS3 Lifeboat rescue help sheet | | |
| **Health and safety**  N/A | | |

**Rescue Wooden Boats Key stage 3 lesson resource**

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| 1. **Little Ships** | | |
| **National Curriculum criteria/cross-curricular links**  History  Computing  Geography  English (Reading, Writing, Spoken English) | | |
| **Lesson objectives**  To identify places on a map. To write an account of the Little Ships rescue from a defined perspective, with illustrations. To role play a character from Operation Dynamo. | | |
| **Lesson plan**  Use PowerPoint presentation to introduce children to Dunkirk and the role of the little ships (RS4 KS3 PowerPoints). Show British Pathé film of Dunkirk, provide other sources for children to read (See RS4a Teachers notes for suggested resources).  Students use the Internet to find out why the Little Ships were needed and what their role was. Students use maps to draw the route taken by the Little Ships.  Students evaluate evidence to decide whether the evacuation of Dunkirk was a triumph or a disaster (use slide 7 to encourage students to write both sides of argument).  Students write an account of Operation Dynamo from the perspective of a Little Ship, a crew member or a rescued soldier (RS4 KS3 PowerPoint, slide 8, RS4b and RS4c).  Students role play Operation Dynamo, or undertake hotseating activity where different students play different characters (e.g. soldier being rescued, politician, crew member), see RS4a. | | |
| **Lesson outcome**  Students identify Dunkirk and the route of the Little Ships on a map. Students write an account of the Little Ships rescue from a chosen perspective, with illustrations. Students role play a character from the rescue.  **Success criteria** | | |
| **AA**  Comprehensive evaluation of Dunkirk considering both sides of triumph vs disaster argument. Detailed memoir from chosen perspective that shows empathy. Active part of role play. | **A**  Evaluation of Dunkirk considering both sides of triumph vs disaster argument. Memoir from chosen perspective that shows empathy. Takes part in role play. | **BA**  An evaluation of Dunkirk that attempts to consider both sides of triumph vs disaster argument. Brief memoir from chosen perspective, using RS4c. Limited participation in role play. |
| **Resources**  RS4 PowerPoint and RS4a Teachers’ notes  Maps of English channel showing Ramsgate and Dunkirk  RS4b Little ships memoir  RS4c Little ships memoir (with writing frame)  Colouring materials, Internet access | | |
| **Health and safety**  Refer to school Internet access policy as applicable | | |

**Rescue Wooden Boats Key stage 3 lesson resource**

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| **5. Modern lifeboats** | | |
| **National Curriculum criteria/cross-curricular links**  History  English (Writing)  Art and design | | |
| **Lesson objectives** | | |
| **Lesson plan**  Students watch the RWB video ‘Modern Aldeburgh lifeboat’ and use this to write a comparison, or draw pictures to illustrate how lifeboats are different now to when the Lucy Lavers was at Aldeburgh.  Students can use the Internet (e.g. RNLI website) to find out additional information about modern lifeboats. | | |
| **Lesson outcome**  Students produce a comparison of lifeboats now and in the 1940s**.**  **Success criteria** | | |
| **AA**  Detailed comparison of modern lifeboat with the Lucy Lavers, including additional information researched from Internet. Useful illustrations to highlight key differences/similarities. | **A**  Comparison of modern lifeboat with the Lucy Lavers, including some additional information researched from Internet. Illustrations highlight key differences/similarities. | **BA**  Comparison of modern lifeboat with the Lucy Lavers, with no relevant additional information researched from Internet. Illustrations don’t highlight key differences/similarities. |
| **Resources**  Internet access | | |
| **Health and safety**  Refer to school Internet access policy as applicable | | |

**Rescue Wooden Boats Key stage 3 lesson resource**

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| 1. **Finding the Lucy Lavers** | | | |
| **National Curriculum criteria/cross-curricular links**  Geography  Computing  English (writing) | | | |
| **Lesson objectives**  To identify places on a map, their specific geographical location and their relationship to each other using compass directions. To describe different types of environment and to recognise examples of physical and human geography. To use the Internet to find resources. To describe different habitats. | | | |
| **Lesson plan**  Students watch the RWB video ‘Lucy Lavers - finding her’ and add labels to a map of Great Britain to show Isle of Wight, Aldeburgh, Wells-next-the-Sea, Sheringham, Rhyll, Southampton, the Solent and Stiffkey (student’s own knowledge and the Internet can be used to locate places) (RS6 labels sheet).  Use a compass and grid references (Ordnance survey maps) to identify the specific location of each place and describe their geographical position compared to each other.  Use Ordnance Survey maps to compare topographical data for the different locations. Use the Internet to source aerial photographs of each location and use these to describe the human and physical geography of each (RS6a).  Students write a newspaper or magazine article describing Lucy Lavers journey around Britain and how she was found (RS6b and RS6c). | | | |
| **Lesson outcome**  Students identify specific locations on map and describe the human and physical geography found at different locations. Students produce an article describing the journey to find the Lucy Lavers.  **Success criteria** | | | |
| **AA**  Identify places and directions on a map. Choose appropriate images from the Internet and use them to compare physical and human geography. Detailed article describing the journey to find the Lucy Lavers. | **A**  Identify places and directions on a map. Choose mostly appropriate images from the Internet and use them to compare physical and human geography. Article describing the journey to find the Lucy Lavers. | **BA**  Identify places on a map. Choose some appropriate images from the Internet and use them to compare different locations. Use help sheet (RS6c) to write article describing the journey to find the Lucy Lavers. |
| **Resources**  RS6 Map labels and blu-tak  Maps of Great Britain, Ordnance Survey maps of each location, compass  RS6a Different places worksheet  RS6b Magazine article sheet, RS6c Magazine article sheet (with writing frame)  Colouring materials, Internet access | | |
| **Health and safety**  Refer to school Internet access policy as applicable | | |

**Rescue Wooden Boats Key stage 3 lesson resource**

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| **7. Ramps investigation** | | |
| **National Curriculum criteria/cross-curricular links**  Science (Working scientifically), Physics (Motion and forces)  Maths (Geometry and measures)  Design and technology | | |
| **Lesson objectives**  To understand the opposing forces acting on a moving object. To investigate how changing one thing at a time changes results of an investigation. | | |
| **Lesson plan**  Students watch RWB video ‘Abdy Beauclerk and Lucy Lavers’ to hear description (at 4 mins) of how ramps, weights, chains, pulleys and turntables were used to launch the lifeboat and bring it back to the lifeboat house. Discuss the video with the class and introduce the practical investigation that they are going to complete.  Students complete ramps investigation – students make predictions then change the height of the ramp, the surface of the ramp and the mass of the car to investigate the effect of changing each aspect on the distance the car travels. Students calculate the speed of the moving vehicle (RS7 and RS7a).  *See RS7b Teachers’ notes, for more information about this activity*  Discuss results of investigation and ask students to think about how the type of ramp used by a lifeboat will impact whether it reaches the sea. Students write about this in their own words (or use writing frame RS7a). | | |
| **Lesson outcome**  To understand and explain the opposing forces acting on a moving object. To demonstrate how to conduct a fair test and to record repeat measurements.  **Success criteria** | | |
| **AA**  Complete investigation showing understanding of impact of opposing forces on vehicle. Understand why only one variable is changed at a time. Identify all anomalies. Calculate speed of car. Apply knowledge to lifeboat ramp. | **A**  Complete investigation showing mostly correct understanding of impact of opposing forces on vehicle. Understand why only one variable is changed at a time. Identify anomalies (allow some incorrect. Apply knowledge to lifeboat ramp. | **BA**  Use the help sheet (RS7a) to complete the investigation. Show some understanding of impact of opposing forces on vehicle. Begin to recognise why only one variable is changed at a time. Correctly identify some anomalies. Begin to apply knowledge to lifeboat ramp. |
| **Resources**  RS7 and RS7a Ramps investigation worksheets  RS7b Teachers’ notes  Ramps, cars, books, metre rules, plasticine, ramp surfaces (see teachers’ notes) pennies or marbles, stopwatches | | |
| **Health and safety**  Arrange the ramps so that the cars do not collide with other groups or create a trip hazard. | | |

RS1: The Lucy Lavers (page 1 of 2) NAME……………………………………………………………

**The Lucy Lavers**

Answer these questions as you watch the video.

1. What kind of lifeboat is the Lucy Lavers?
2. How long is she?
3. What feature makes her unique?
4. Why was she stripped out?
5. What is she made of?
6. What are the bronze ports for?
7. What are the handrails for?
8. Which part of the Lucy Lavers is in good condition?
9. There are bits missing from the rudder – how will it be replaced?

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1. What is the propeller tunnel for?

RS1: The Lucy Lavers (page 2 of 2) NAME……………………………………………………………

1. Why are there holes on the boat?
2. Why is a turntable needed?
3. Where is most work needed and what needs to be done?
4. What shape is the engine canopy?

1. How many hours will it take to restore the Lucy Lavers?

RS1a: The Lucy Lavers (page 1 of 2)

**The Lucy Lavers – answers to worksheet**

1. What kind of lifeboat is the Lucy Lavers?

*Single screw Liverpool lifeboat*

1. How long is she?

*35’6”*

1. What feature makes her unique?

*Distinctive roller*

1. Why was she stripped out?

*To complete another boat*

1. What is she made of?

*Mahogany and calico*

1. What are the bronze ports for?

*To drain the deck*

1. What are the handrails for?

*Survivors to hold on to*

1. Which part of the Lucy Lavers is in good condition?

*The hull*

1. There are bits missing from the rudder – how will it be replaced?

*Cast or fabricate one or try to source one from another boat*

RS1a: The Lucy Lavers (page 2 of 2)

1. What is the propeller tunnel for?

*To protect the propeller on the beach*

1. Why are there holes on the boat?

*To pull it out of the water and onto the carriage*

1. Why is a turntable needed?

*To turn the boat stern first onto the carriage*

1. Where is most work needed and what needs to be done?

*Inside – bulkheads and deckbeams need to be replaced, remove and check centreboard case*

1. What shape is the engine canopy?

*Double diagonal turtleback*

1. How many hours will it take to restore the Lucy Lavers?

*1000 – 1500hours*

RS2a: Build a lifeboat

**Teachers’ notes**

The main purpose of this activity is to encourage the students to design, test and evaluate their lifeboat. The choice of materials to make the lifeboat will be dependent on the time and equipment available at your school. Suggestions are provided below:

* Simple boats can be moulded from plasticine, with students exploring the impact of different shapes and sizes on floating, streamlining and cargo carrying abilities;
* Shoeboxes can be made to float when waterproofed with aluminium foil. Students can then adapt the shape of the shoebox to improve the boats ability to float, move quickly, etc.;
* Students can be provided with materials to create their own design using junk modelling from waster packaging;
* When time and equipment allow, Perspex and plywood boats allow students more scope to create their own design.

RS2b: Build a lifeboat (page 1 of 2) NAME……………………………………………………………

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| **Build a lifeboat - design** Use this sheet to help you to plan and design your lifeboat | |
| What does a lifeboat do? | What design features will help it to do its job well? |
| Sketch and label a diagram of the lifeboat you plan to build. Include a list of materials you’ll need to make it. | Use this space to explain why the different features in your design will help the lifeboat to do its job. |

RS2b: Build a lifeboat (page 2 of 2) NAME……………………………………………………………

**Build a lifeboat – evaluation**

1. Does your finished boat look like the one you designed? If it doesn’t, what were the reasons for changing it?

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1. Explain how each of the design features you chose helped the boat to do its job.

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1. Describe the feature that you are most pleased with. Why does it work so well?

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1. If you could design and build a lifeboat again, what improvements would you make and why?

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RS2b: Mini lifeboats (page 1 of 2) NAME……………………………………………………………

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| **Build a lifeboat - design** Use this sheet to help you to plan and design your lifeboat | |
| What does a lifeboat need to be able to do? | What will help it to do its job well? |
| Draw a picture of the lifeboat you are going to build. Add some labels. Include a list of the things you’ll need to make it. | Use this space to explain why your lifeboat will be able to do its job. |

RS2b: Build a lifeboat (page 2 of 2) NAME……………………………………………………………

**Design a lifeboat – evaluation**

1. Does your lifeboat look like your design? Why?

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1. What worked well?

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1. What do you need to improve?

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1. Why does it need to be improved?

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RS3 Lifeboat rescue NAME…………………………………………………………

**Lifeboat rescue – letter home**

Imagine you are Peter and you have just been rescued by a lifeboat. Use this sheet to write a letter home to your parents to tell them what has happened.

Dear \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ,

(Tell them why you are writing to them)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Tell them what happened)

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(Tell them that you’re ok and where you are now)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Love from,

Now illustrate your letter to show what happened.

RS4a Little Ships

**Little Ships – teachers’ notes**

The following resources may be useful to help students to understand the Little Ships evacuation of soldiers from the beaches of Dunkirk:

**Dunkirk photos:**

http://1940.iwm.org.uk

(click on Dunkirk. Look on menu at right hand side – no.5 also has additional photos)

http://gallery.nen.gov.uk/gallery13587-.html

http://en.wikipedia.org/wiki/Little\_ships\_of\_Dunkirk

http://en.wikipedia.org/wiki/Evacuation\_of\_Dunkirk

**Film:**

http://www.britishpathe.com

Time to remember – Run Rabbit Run (1940) reel 4

video newsreel

<http://www.historylearningsite.co.uk/dunkirk.htm>

http://www.adls.org.uk

http://en.wikipedia.org/wiki/Little\_ships\_of\_Dunkirk

http://www.guardian.co.uk/world/2010/may/27/operationdynamo-dunkirk-little-ships

Eric Woodroffe’s recount: http://www.warexperience.org/history/keyaspects/dunkirk/default.asp

Ted Stonard’s memoir: http://www.britishpathe.com

‘A Little Ship goes back’

**How to access the British Pathé site from your school premises:**

You should be able to download footage for education purposes. You will be able to see a smaller clip version at home but there will be a ‘Buy this Clip icon’ instead of just a download button. If you are unable to access a full screen version at school, contact British Pathé, following the instructions on their site.

**Role play and hotseating activities**

A simple role play activity can be used to encourage the students to imagine what it would have been like to be part of Operation Dynamo. Small groups could be divided into crew members travelling to the beaches and soldiers waiting to be rescued on the beaches.

Alternatively, a hotseating activity could be organised, with students taking on the roles of key players in Operation Dynamo – crew members, rescued soldier, politician. The students explain their involvement and whether they think the rescue is a triumph or a disaster.

RS4b: Little ships

**Little Ships memoir**

You are going to write about the Little Ships rescue. You can choose to be one of the following authors:

* a Little Ship,
* a crew member,
* a rescued soldier

Think about what you would be feeling – scared, excited, nervous? What happened before you became involved in Operation Dynamo? What will life be like after the rescue? What do you think about the war?

Draw a picture showing your character during the rescue.

You are going to write about the Little Ships rescue. You can choose to be one of the following authors:

* a Little Ship,
* a crew member,
* a rescued soldier

Think about what you would be feeling – scared, excited, nervous? What happened before you became involved in Operation Dynamo? What will life be like after the rescue? What do you think about the war?

Draw a picture showing your character during the rescue.

RS4c: Little ships NAME……………………………………………………………

**Little Ships memoir**

You are going to write about the Little Ships rescue. You can choose to be one of these characters:

* a Little Ship,
* a crew member,
* a rescued soldier.

You will write about your feelings and what your role is in the Little Ships rescue.

My name is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and I am a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ . I have travelled from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ . I am feeling \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

Before the Little Ships rescue I was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

Now I am \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

I think the war is necessary / unnecessary. This is because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

Now draw a picture showing your character during the rescue.

RS6 Where is Lucy Lavers?

**Map and direction labels**

|  |  |
| --- | --- |
| Aldeburgh | Stiffkey |
| Southampton | Solent |
| Isle of Wight | Rhyll |
| Wells-next-the-Sea | Sheringham |
| Where I live |  |

RS6a: Where is Lucy Lavers? (Page 1 of 2) NAME……………………………………………………………

**Different places**

Attach photos from the Internet of some of the different locations you have been researching and add information about their geographical location.

|  |  |
| --- | --- |
| Location 1: | Location 2: |
| Location 3: | Location 4: |

RS6a: Where is Lucy Lavers? (Page 2 of 2) NAME……………………………………………………………

**Different places**

Choose two locations and write down features that are made by nature (physical geography) and made by humans (manmade geography). Include any evidence from the Ordnance Survey maps.

|  |  |
| --- | --- |
| Location 1: | |
| Examples of physical geography | Examples of human geography |
| Location 2: | |
| Examples of physical geography | Examples of human geography |

RS6b: Where is Lucy Lavers? NAME……………………………………………………………

**Magazine or newspaper article**

Before you start writing your article, list the places that the Lucy Lavers has been to, in the right order – start with where she was built – the Isle of Wight.

|  |  |
| --- | --- |
| **Lucy Lavers journey:**  Isle of Wight  Stiffkey | **Use this space to record what she was doing at each location:** |

Now write an article that explains her journey and provides readers with an insight into the places that she has visited along the way and what she was doing at each destination.

Conclude your article by explaining what is happening to her now and where she will travel to next.

RS6c: Where is Lucy Lavers? (Page 1 of 2) NAME……………………………………………………………

**Magazine or newspaper article**

You are going to write about Lucy Lavers journey around Great Britain. Start by listing all the places that she has been to, beginning with where she was built – the Isle of Wight.

|  |  |
| --- | --- |
| **Lucy Lavers journey:**  Isle of Wight  Stiffkey | **What she was doing at each location?:** |

Now write an article for a newspaper or a magazine that explains her journey. Tell the readers about some of the places that she has visited along the way and what she was doing at each destination.

Finish by explaining what is happening to her now and where she will travel to next.

You can use the writing frame to help, if you would like to.

RS6c: Where is Lucy Lavers? (Page 2 of 2) NAME……………………………………………………………

**Magazine or newspaper article**

**Writing frame**

**Start by writing about where she was built.**

The Lucy Lavers was built on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Next, write about where she was first based.**

She went to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to be a lifeboat. But before she was used to rescue people, she was sent to Dunkirk as one of the Little Ships. Aldeburgh is \_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Now write about one or two of the other places she has been to.**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Finish by explaining what is happening to her now.**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

RS7 Ramps investigation (Page 1 of 7) NAME……………………………………………………

**Ramps investigation**

In this investigation, you will measure how far a car travels after it’s gone down a ramp. You will change the ramp and the car to see how this effects how far the car travels. You will change these things, one at a time:

1. The height of the ramp
2. The surface of the ramp
3. The weight of the car

First, make a prediction about how changing each thing will affect the distance the car travels.

**Predictions**

1. The height of the ramp

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The surface of the ramp

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The weight of the car

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Why is it important that we only change one thing at a time?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

RS7 Ramps investigation (Page 2 of 7) NAME……………………………………………………………

A. Changing the **height** of the ramp

1. Measure the height of the ramp and record in the results table.
2. Send the car down the ramp and measure how far it travels.
3. Repeat two more times and record your results.
4. Change the height of the ramp and repeat steps 2 and 3.
5. Repeat for three more heights.

|  |  |  |  |
| --- | --- | --- | --- |
| Height of ramp (m) | Distance travelled by car (m) | | |
| 1 | 2 | 3 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Look at your results. Circle any that do not fit the pattern of the numbers in each row (anomalous results).

A1. Which ramp height caused the car to travel the longest distance?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

A2. Why do you think this ramp height made the car travel the longest distance?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Was your prediction correct? \_\_\_\_\_\_\_\_\_\_\_\_

RS7 Ramps investigation (Page 3 of 7) NAME……………………………………………………………

B. Changing the **surface** of the ramp

1. Set the ramp at one height - do not change it!
2. Record the surface of the ramp in the results table.
3. Send the car down the ramp and measure how far it travels.
4. Repeat two more times and record your results.
5. Change the surface of the ramp and repeat steps 3 and 4.
6. Repeat for three more surfaces.

|  |  |  |  |
| --- | --- | --- | --- |
| Surface of ramp | Distance travelled by car (m) | | |
| 1 | 2 | 3 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Look at your results. Circle any that do not fit the pattern of the numbers in each row (anomalous results).

B1. Which ramp surface caused the car to travel the shortest distance?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B2. Why do you think this ramp surface made the car travel the shortest distance?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Was your prediction correct? \_\_\_\_\_\_\_\_\_\_\_\_

RS7 Ramps investigation (Page 4 of 7) NAME……………………………………………………………

C. Changing the **mass** of the car

1. Set the ramp at one height - do not change it!
2. Record the mass of the car.
3. Send the car down the ramp and measure how far it travels.
4. Repeat two more times and record your results.
5. Add a weight to the car and repeat steps 2, 3 and 4.
6. Repeat for three more weights.

|  |  |  |  |
| --- | --- | --- | --- |
| Mass of car (g) | Distance travelled by car (m) | | |
| 1 | 2 | 3 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Look at your results. Circle any that do not fit the pattern of the numbers in each row (anomalous results).

C1. Which mass of car travelled the longest distance?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C2. Why do you think this mass made the car travel the longest distance?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Was your prediction correct? \_\_\_\_\_\_\_\_\_\_\_\_

RS7 Ramps investigation (Page 5 of 7) NAME……………………………………………………………

**Ramps investigation – Conclusions**

Use this table to summarise your results

|  |  |  |
| --- | --- | --- |
| **Investigation** | **Write down the result that made the car travel** | |
| **the longest distance** | **the shortest distance** |
| 1. Height of ramp |  |  |
| 1. Surface of ramp |  |  |
| 1. Mass of car |  |  |

1. Look at your ‘longest distance’ results and try to explain why this height, surface and mass made the car travel the furthest.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Look at your ‘shortest distance’ results and try to explain why this height, surface and mass made the car travel the least distance.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Why was it important to repeat each measurement?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

RS7 Ramps investigation (Page 6 of 7) NAME……………………………………………………

**Ramps investigation – Calculating speed**

Now you know the conditions needed to make the car travel the longest and shortest distances, you can compare the speed the car is travelling when it reaches the bottom of each ramp.

1. Set up the ramp that makes the car travel the longest distance.
2. Mark two points on the metre rule and make a note of the distance between the two points (distance = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ).
3. Let go of the car at the top of the ramp.
4. When the car passes the first point on the metre rule, start the stopwatch.
5. Stop the stopwatch when it passes the second marker.
6. Record the time in the table and repeat twice more.
7. Set up the ramp that makes the car travel the shortest distance and repeat steps 3 - 6.
8. Use this equation to calculate the speed of the car and write it in the table:

speed = distance / time

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Time taken (s) | | | Average speed (m/s) |
| 1 | 2 | 3 |
| Longest ramp |  |  |  |  |
| Speed (m/s) |  |  |  |
| Shortest ramp |  |  |  |  |
| Speed (m/s) |  |  |  |

Which ramp caused the car to travel fastest? Why?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

RS7 Ramps investigation (Page 7 of 7) NAME……………………………………………………

**Ramps and lifeboats**

Lifeboats are launched into the sea down ramps. You have investigated how different things effect the distance a vehicle going down a ramp will travel. Imagine there is going to be a new lifeboat station. What advice would you give to the designers who are going to build the ramp, to make sure that lifeboats can reach the sea?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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RS7a Ramps investigation (Page 1 of 7) NAME……………………………………………………

**Ramps investigation**

In this investigation, you will measure how far a car travels after it’s gone down a ramp. You will change the ramp and the car to see how this effects how far the car travels. You will change these things, one at a time:

1. The height of the ramp
2. The surface of the ramp
3. The weight of the car

First, make a prediction about how changing each thing will affect the distance the car travels.

**Predictions**

1. I predict that the higher the ramp the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. I predict that the rougher the surface of the ramp the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. I predict that the heavier the car the

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Why is it important that we only change one thing at a time?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

RS7a Ramps investigation (Page 2 of 7) NAME…………………………………………………………

A. Changing the **height** of the ramp

1. Measure the height of the ramp and write it in the results table.
2. Send the car down the ramp and measure how far it travels.
3. Repeat two more times and write down your results.
4. Change the height of the ramp and repeat steps 2 and 3.
5. Repeat for three more heights.

|  |  |  |  |
| --- | --- | --- | --- |
| Height of ramp (m) | Distance travelled by car (m) | | |
| 1 | 2 | 3 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Look at your results. Draw a circle around any that do not fit the pattern of the numbers in each row.

The car travelled the furthest when the ramp was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

I think this was because (*think about forces*) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Was your prediction correct? \_\_\_\_\_\_\_\_\_\_\_\_

RS7a Ramps investigation (Page 3 of 7) NAME…………………………………………………………

B. Changing the **surface** of the ramp

1. Set the ramp at one height - do not change it!
2. Write the surface of the ramp in the results table.
3. Send the car down the ramp and measure how far it travels.
4. Repeat two more times and write down your results.
5. Change the surface of the ramp and repeat steps 3 and 4.
6. Repeat for three more surfaces.

|  |  |  |  |
| --- | --- | --- | --- |
| Surface of ramp | Distance travelled by car (m) | | |
| 1 | 2 | 3 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

The car travelled the furthest when the ramp was made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

I think this was because (*think about forces*) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Was your prediction correct? \_\_\_\_\_\_\_\_\_\_\_\_

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C. Changing the **mass** of the car

1. Set the ramp at one height - do not change it!
2. Record the mass of the car.
3. Send the car down the ramp and measure how far it travels.
4. Repeat two more times and record your results.
5. Add a weight to the car and repeat steps 2, 3 and 4.
6. Repeat for three more weights.

|  |  |  |  |
| --- | --- | --- | --- |
| Mass of car (g) | Distance travelled by car (m) | | |
| 1 | 2 | 3 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Look at your results. Draw a circle around any that do not fit the pattern of the numbers in each row.

The car that travelled the furthest weighed \_\_\_\_\_\_\_\_\_\_.

I think this was because (*think about forces*) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Was your prediction correct? \_\_\_\_\_\_\_\_\_\_\_\_

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**Ramps investigation – Conclusions**

Use this table to show your results

|  |  |  |
| --- | --- | --- |
| **Investigation** | **Write down the result that made the car travel** | |
| **the longest distance** | **the shortest distance** |
| 1. Height of ramp |  |  |
| 1. Surface of ramp |  |  |
| 1. Mass of car |  |  |

The car travelled the longest distance when the height of the ramp was \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the surface of the ramp was made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the mass of the car was \_\_\_\_\_\_\_\_\_\_\_\_\_\_. This meant there was more / less force making the car go and more / less force making it stop.

The car travelled the shortest distance when the height of the ramp was \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the surface of the ramp was made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the mass of the car was \_\_\_\_\_\_\_\_\_\_\_\_\_\_. This meant there was more / less force making the car go and more / less force making it stop.

The force that made the car stop is called \_\_\_\_\_\_\_\_\_\_\_\_.

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**Ramps investigation – Calculating speed**

Now you know which ramps made the car travel the longest and shortest distances, you can compare the speed the car is travelling when it reaches the bottom of each ramp.

1. Set up the ramp that makes the car travel the longest distance.
2. Mark two points on the metre rule and make a note of the distance between the two points (distance = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ).
3. Let go of the car at the top of the ramp.
4. When the car passes the first point on the metre rule, start the stopwatch.
5. Stop the stopwatch when it passes the second marker.
6. Record the time in the table and repeat twice more.
7. Set up the ramp that makes the car travel the shortest distance and repeat steps 3 - 6.
8. Use this equation to calculate the speed of the car and write it in the table:

speed = distance / time

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Time taken (s) | | | Average speed (m/s) |
| 1 | 2 | 3 |
| Longest ramp |  |  |  |  |
| Speed (m/s) |  |  |  |
| Shortest ramp |  |  |  |  |
| Speed (m/s) |  |  |  |

Which ramp caused the car to travel fastest? Why?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Ramps and lifeboats**

Lifeboats travel down ramps to get into the sea. You have found out how different things effect the distance a vehicle travels. Imagine there is going to be a new lifeboat station. What advice would you give to the designers who are going to build the ramp, to make sure that lifeboats can reach the sea?

Dear Designer of lifeboat ramp,

When you are designing the ramp you will need to think about these things:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This is because they will all change the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If these things aren’t measured correctly the lifeboat might not reach the sea. I hope this is helpful.

Yours sincerely,

RS7b Ramps investigation

**Ramps investigation – teachers’ notes**

The ramps investigation has been designed to work either as a collaborative activity, with different groups collecting different sets of data which is then shared, or as an extended activity over a sequence of lessons. To understand the investigation, students will need to already have an understanding of forces and the speed equation.

As well as demonstrating the effect of forces on a moving vehicle, the practical provides an opportunity for students to understand key investigative skills of:

* Making predictions
* Fair test (changing one variable at a time)
* Taking repeat measurements (and identifying anomalous results)

**Practical notes**

Changing the height of the ramp – this can be achieved by adding or removing books at one end of the ramp.

Changing the surface of the ramp – use a variety of materials such as paper towels, A4 paper, tissue paper, textured wallpaper, carpet tiles, lego boards.

Changing the mass of the car – balls of plasticine can be added to the car. If the cars are large, marbles or pennies can be added to the plasticine to increase the mass.