



Ministry of Defence

Ministry of Defence
Main Building
Whitehall
London SW1A 2HB
United Kingdom

Our Reference: FOI2017/06937

[REDACTED]

10 August 2017

Dear [REDACTED]

Thank you for your e-mail to the Ministry of Defence (MOD) dated 13 July 2017 in which you requested the following information:

Could the Ministry of Defence supply copies of any Army, Navy and RAF Science, Technology, Engineering and Mathematics (STEM) resources used in schools currently or since 2016 in any part of the United Kingdom. Including any materials used or produced in partnership with other organisations, for example the BAE Systems and RAF Schools Roadshow.

I am treating your correspondence as a request for information under the Freedom of Information Act (FOI) 2000. A review of our data holdings has been completed, and I can confirm the MOD does hold some information within the scope of your request; this is provided in the Annex at the end of this letter.

The Armed Forces never visit schools for recruitment purposes and would only ever visit a school after being invited by a teacher to support school activities. Similar contributions to schools are made by the Police, Fire, Ambulance and other emergency Services. The Armed Forces receive numerous requests from schools each year and the three Services take these opportunities to both explain their role, and to assist schools in teaching valuable skills such as leadership, teamwork and citizenship.

If you have any queries regarding the content of this letter, please contact this office in the first instance.

If you wish to complain about the handling of your request, or the content of this response, you can request an independent internal review by contacting the Information Rights Compliance team, Ground Floor, MOD Main Building, Whitehall, SW1A 2HB (e-mail CIO-FOI-IR@mod.uk). Please note that any request for an internal review should be made within 40 working days of the date of this response.

If you remain dissatisfied following an internal review, you may raise your complaint directly to the Information Commissioner under the provisions of Section 50 of the Freedom of Information Act. Please note that the Information Commissioner will not normally investigate your case until the MOD internal review process has been completed. The Information Commissioner can be contacted at: Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire, SK9 5AF. Further details of the role and powers of the Information Commissioner can be found on the Commissioner's website at <https://ico.org.uk/>.

1) **Royal Navy**

The Royal Navy does not provide any Science, Technology, Engineering and Mathematics (STEM) resources to schools. They assist with the delivery of STEM activities using their own resources but do not leave anything behind for later use by the school. They do have a teachers pack but this informs them of the services they can offer and does not provide them with any direct curriculum resources.

2) **British Army**

The Army information is provided in the attached documents to this request.

3) **Royal Air Force**

The Royal Air Force (RAF) does not currently provide curriculum resources to schools; RAF outreach teams did previously provide workbooks to secondary school pupils for a 'Maths Challenge'; however these were discontinued in 2013

In addition, the RAF helped develop an online learning resource (along with the Royal Navy, BAE Systems and approved by the Royal Academy of Engineering) which assists with the delivery of Science, Technology, Engineering and Mathematics (STEM) activities to schools. This information is available on the BAE Systems Education Programme Website and is available to view at the following link. <https://www.baesystemseducationprogramme.com>

FORENSICS CHALLENGE

ARMY DELIVERY GUIDE



INTRODUCTION

This Army Forensics Challenge helps pupils apply their science skills and understanding to examine forensic evidence, identify a suspect and solve a crime.

Pupils carry out their investigations in character as members of the Royal Military Police (RMP).

Working in small groups, they will:

1. Inspect a crime scene.
2. Undertake a series of activities to examine evidence collected from the scene, including:
 - hair and thread samples
 - a boot print
 - fingerprints
 - ink and liquid samples
 - three witness testimonies
3. Match the evidence to the most likely suspect to identify who committed the crime.

AGE GROUP

The challenge is most suitable for pupils aged 11–14 (Key Stage 3). Two versions of the Information Sheets support younger/less able and older/more able pupils – the teacher will let you know in advance which version will be most appropriate for the group.

TIMING

The session lasts 90 minutes, with the option for a 60-minute delivery: the teacher will let you know which session there is time for. You will also need about 15 minutes before and after the session to set up and clear down.

For the shorter 60 minute session:

Maintain a relatively brisk pace at all times (while still making sure the pupils understand the activity).

Omit the ink and thread stations.

Omit slides as indicated.

Limit the evidence discussion at the end.

Limit any additional information about your role at the Army.

PREPARATION

Liaise with your school contact beforehand. Ensure you know:

- The date and timings for the lesson.
- Which version of the **Station Information Sheets** you will be using – higher or lower.
- Where to park and what to do on arrival.
- Where you will meet the teacher to guide you to the room.
- The number of pupils in your class and how many groups they will be divided into.
- How pupils will be rotated around the activity stations (agree this with the teacher).
- What connector to bring to link to the school's data projector if you're bringing your own laptop with the presentation on it. Or bring the presentation on a USB to use with their computer.
- Whether the school will provide a second laptop to play the witness testimony sound files on the USB stick.

Before you go, make sure you have the evidence samples and all resources ready for pupils to use, as outlined below.

RESOURCES AND LAYOUT

The school should prepare the room as follows, for you to add the evidence and Station Information Sheets.

All the evidence you need is provided in the Evidence Pack. It should contain:

- Hair and thread sample slides.
- Army issue boot, cast of boot print and soil and seed samples.
- Fingerprint samples.
- Ready-made filter paper with ink samples (of suspects) and completed chromatogram (of crime scene).
- Universal Indicator paper strips and colour scale.
- Liquid samples in containers.
- **Information Sheets (1-7)** – one at each station. Ensure your teacher contact reviews the higher and lower Information Sheets and agrees with you which you should provide.

In addition, you will need to provide:

- Presentation on a laptop (ask the school which connector you will need) or USB stick.
- Witness testimony sound files (on USB stick).
- **Laminated Crime Scene Photo** (double sided) in envelopes – one per pupil, placed on their desks before the session starts.
- **Crime Scene Sheets** – one per pupil, placed on their desks before the session starts.
- **Evidence Sheets** – one per pupil, handed out when they're put into groups.
- **Suspects' Sheets** – one per group, handed out when they're put into groups.

STATIONS

1. Liquid

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• A bin for disposal of Universal Indicator paper	<ul style="list-style-type: none">• 1 x Information Sheet• 6 x liquid samples in pots• Universal Indicator paper, with colour chart

2. Thread (omit for 60-minute session)

WHAT THE SCHOOL SHOULD PROVIDE	WHAT YOU NEED TO ADD
<ul style="list-style-type: none">• 3 x magnifying glasses or loupes	<ul style="list-style-type: none">• 1 x Information Sheet• 3 x thread sample slides

3. Boot print

WHAT THE SCHOOL SHOULD PROVIDE	WHAT YOU NEED TO ADD
<ul style="list-style-type: none">• 1 x metre rule or tape measure	<ul style="list-style-type: none">• 1 x Information Sheet• 1 x plaster cast of boot print• 1 x standard Army-issue boot• 6 x soil and seed samples

4. Fingerprints

WHAT THE SCHOOL SHOULD PROVIDE	WHAT YOU NEED TO ADD
<ul style="list-style-type: none">• 3 x magnifying glasses or loupes	<ul style="list-style-type: none">• 1 x Information Sheet• 3 x fingerprint sample slides

5. Ink (omit for 60-minute session)

WHAT THE SCHOOL SHOULD PROVIDE	WHAT YOU NEED TO ADD
<ul style="list-style-type: none">• 8 x beakers• 8 x glass rods• Sellotape• Source of water• A bin for disposal of suspect ink sample sheets	<ul style="list-style-type: none">• 1 x Information Sheet• 1 x crime scene chromatogram• 8 x suspect ink sample sheets (one for each group)

6. Hair

WHAT THE SCHOOL SHOULD PROVIDE	WHAT YOU NEED TO ADD
<ul style="list-style-type: none">• 3 x magnifying glasses or loupes	<ul style="list-style-type: none">• 1 x Information Sheet• 3 x hair sample slides

7. Witness testimonies

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• Laptop with built-in or separate speakers and USB port (unless you are bringing your own)	<ul style="list-style-type: none">• 1 x Information Sheet• USB stick with 3 sound files

WHO IS THE MOST LIKELY SUSPECT, AND WHY?

The likely suspect is person F. This person is linked to the crime by more pieces of evidence (nine in total) than other suspects. Suspect K is linked by seven pieces of evidence, but not the fingerprint that vitally links F to the scene.

Sex	Suspect F is male, which matches the witness testimony. Based on this testimony, pupils can eliminate any suspect who is female.
Hair colour	Suspect F has brown hair. This matches one of the samples found in the room – but so does anyone with brown or blond hair. However the witness also said the suspect had brown hair. Pupils can eliminate anyone with black or blonde hair. The red hair found in the room doesn't match any suspect and must have come from someone else using the room.
Thread colour and Last seen wearing	The three thread samples are common colours and link every suspect to the room. On its own, this evidence does nothing to narrow down the list of suspects.
Blood type	Suspect F matches one of the two types found, O-. Pupils can eliminate any suspect with a blood type that is not O- or AB+.
Boot size	Suspect F matches the size 9 boot print. Pupils can eliminate suspects with feet larger or smaller than this.
Soil and seeds	Suspects F and K have the same soil and seeds as found in the room. This adds to the evidence against suspect F as K can be eliminated as he has size 10 boots and no fingerprints found in the room. This is good evidence to link them to the crime.
Soldier?	The boot print at the crime scene is from a civilian boot. Based on a comparison with the standard Army-issue boot pupils can eliminate any suspect who is a soldier. Suspect F is not a soldier so this is good evidence to link them to the crime.
Fingerprint	Suspects J, F and O are all linked to the room by their fingerprints. This adds to the evidence against suspect F as J can be eliminated as she is female, but suspect O may still be possible. This is good evidence to link them to the crime.
Ink sample	Suspects A, H and N all had pens. But the ink found in the room is different, so this evidence does not help find a suspect.
Liquid sample	Suspect F has a matching liquid on their clothes. This is good evidence to link them to the crime.

COMPLETED SUSPECTS SHEET

The table below shows how pupils should have marked the evidence to identify suspect F as having the most evidence linking them to the scene.

SUSPECT	SEX	AGE	BLOOD TYPE	HAIR	BOOT SIZE	SOLDIER?	LAST SEEN WEARING	FINGERPRINTS (see page 3 for enlarged versions)	OTHER EVIDENCE FOUND
A	M	19	O+	Brown	9	Y	MTP		Ink Liquid
B	M	20	AB+	Brown	11	Y	MTP		
C	F	26	O-	Black	6	Y	MTP		
D	M	27	O-	Blonde	13	N	Blue		Seeds & soil
E	F	32	O+	Brown	5	Y	Black		
F	M	25	O-	Brown	9	N	Blue	Yes	Liquid Seeds & soil
G	M	22	AB+	Black	9	Y	Black		
H	M	50	O-	Blonde	9	N	Blue		Ink
I	M	47	O-	Blonde	8	N	Black		
J	F	28	O+	Black	12	Y	MTP	Yes	Liquid
K	M	18	O-	Brown	10	Y	Black		Liquid Seeds & soil
L	F	30	O+	Brown	9	N	Black		Seeds & soil
M	F	31	AB+	Brown	7	Y	MTP		
N	M	26	O-	Brown	9	Y	Black		Ink Liquid
O	M	25	O-	Brown	9	N	Blue	Yes	

FORENSICS CHALLENGE

PRESENTATION OUTLINE



Below is outline content for the session, followed by a full script that you may like to use. Please feel free to make the session your own.

INTRODUCTION

3 minutes

RESOURCE <small>SlideActivity</small>	DETAILS	KEY POINTS
2	<i>Show while speaking</i>	Introduce yourself, briefly explain your role in the Army and outline the Royal Military Police (RMP) within the Special Investigation Branch.
3	<i>Show while speaking</i>	Talk through the different career streams on offer in the Army and which ones have the RMP.
4	<i>Show while speaking</i>	Talk through the essential skills needed working in the Army. In this session, the pupils will be tested on those skills.

SET THE SCENE

2 minutes

RESOURCE <small>SlideActivity</small>	DETAILS	KEY POINTS
6	<i>Show while speaking</i>	Set the scene for the exercise: pupils have to imagine they're in Minerva Barracks. They need to investigate a disturbance in the building.

STARTER

5 minutes

RESOURCE <small>Slide/Activity</small>	DETAILS	KEY POINTS
6	<i>Show while speaking</i>	Pupils have two minutes to investigate the crime scene by carefully studying photos – they can't make any notes and have to try to remember as much about the room as possible. They then need to note what's there, and what might be missing. Ask if they have any questions before starting the task.
7&8	<i>Show while speaking</i>	Get pupils to open the envelope on their desks and study the photos, show it on the screen too (flick between slide 7&8). Start timer. Warn pupils when they have one minute, 30 seconds and 10 seconds left.
9	<i>Show only after pupils have made their suggestions</i>	When the time is up, tell them to put the photo back in the envelopes and remove from the screen. Give them a few minutes to write down everything they can on their Crime Scene Sheet. Discuss their findings.
10&11	<i>Show while speaking</i>	Ask if they can remember anything that was missing from the room. Let pupils try and answer, read the list if they miss anything.

ABOUT FORENSICS (omit for a shorter session)

5 minutes

RESOURCE <small>Slide/Activity</small>	DETAILS	KEY POINTS
12	<i>Show while speaking</i>	Next step is to look into the evidence. Briefly discuss what evidence is and why it's important. <i>Evidence is any clue that can help prove that a person is responsible for a crime.</i>
13	<i>Show while speaking. Click to reveal labels after pupils have made suggestions</i>	Ask pupils to suggest what type of evidence might be found in the room. Click to reveal the various types of evidence. You might discuss DNA when you get to 'Hair'. <i>All of this evidence might hold clues that we can use to identify who was in the room.</i>
14	<i>Show while speaking</i>	Explain what 'clean' evidence is. Discuss what might contaminate evidence and why it's so important to have 'clean' evidence.
15	<i>Show only after pupils have made their suggestions</i>	Ask what else could have been used for evidence.

MAIN ACTIVITY

35 minutes: short session

65 minutes: long session

RESOURCE <small>Slds/Activity</small>	DETAILS	KEY POINTS
16	<i>Show while speaking</i>	<p>The pupils now have to inspect the evidence and find the identity of the person who committed the crime.</p> <p>Ask them to get into groups of four. Each pupil needs an Evidence Sheet, each group needs a Suspects Sheet. The suspects have been narrowed down to 15.</p> <p>Hold up and briefly review what's on the Suspects Sheet.</p>
17	<i>Show while speaking</i>	<p>Key evidence is placed at stations around the room. At each station they must carefully read instructions of what to do.</p> <p>They have five minutes at each station. As they go through each piece of evidence, they should circle the letters of suspects who match each piece of evidence on their Suspects Sheet. Once they've been to each station the person involved should become clear.</p>

Give pupils five minutes on each station. Warn pupils when they have one minute left.

- *For the shorter session omit the thread and ink stations. Tell pupils they ignore those sections of the Evidence Sheet.*

Ask the teacher to help rotate pupils between stations so you have a maximum of two minutes delay in between each station. Ensure that pupils are aware that they must clear away rubbish at each station.

RESULTS AND FEEDBACK

10 minutes: short session

15 minutes: long session

RESOURCE <small>Slds/Activity</small>	DETAILS	KEY POINTS
18		In their groups, pupils should decide which suspects they can rule out who they think the offender is. Talk through their decision-making process with them.
19-20	<p><i>Show while speaking.</i></p> <p><i>Click to remove suspects.</i></p> <p><i>Click to reveal offender.</i></p>	Click to work through the evidence, removing suspects according to each piece of evidence, starting with their gender. Explain why suspect F is the most likely offender.

REFLECT ON SCIENCE SKILLS

5 minutes

RESOURCE <small>Slide/Activity</small>	DETAILS	KEY POINTS
21	<i>Click to reveal each skill and its details one by one while speaking</i>	Ask students if they can remember what the essential skills needed to have a role in the Army are.
22	<i>Click to reveal each skill and its details one by one while speaking</i>	Ask them to think about the <u>science</u> skills they used today and invite suggestions. Reveal the five skills on the slide and read out. Ask pupils to suggest what each skill means. Reveal the explanation for each skill and read out.

WRAP-UP

1 minute + questions – (keep to a minimum for a shorter session)

RESOURCE <small>Slide/Activity</small>	DETAILS	PRESENTER SCRIPT
20	<i>Show while speaking</i>	Thank pupils for taking part and participating. Ask for any further comments or questions.

FORENSICS CHALLENGE

FULL DELIVERY SCRIPT



INTRODUCTION

3 minutes

RESOURCE <small>Slate/Activity</small>	DETAILS	PRESENTER SCRIPT
2	Show while speaking	<p>Good morning/afternoon everyone. My name is <i>(name)</i> and I'm a <i>(role)</i> in the <i>(division)</i></p> <p>I'm here today to help you see what a day in the life of a Royal Military Police officer might be like in the Special Investigation Branch. We're going to do this by using evidence to solve a crime.</p> <p>So first off you'll need to know a bit about what the Royal Military Police or 'RMP' is. The RMP is the Army's own police force. Just like your local Police they are responsible for policing this community, and my goodness is it a big one!</p>
3	Show while speaking	<p>The Army community consists of seven different career streams: Combat, Engineering, Logistics & Support, Intelligence, IT & Communications, HR & Finance, Medical, Music & Ceremonial. Of these, HR & Finance have the Royal Military Police as a career within it.</p> <p>The RMP are responsible for policing the Army community worldwide, whether that's at a base in the UK, or when any part of the Army is stationed abroad.</p> <p>Just like the regular police, they have a Special Investigation Branch (or SIB) where they are trained to investigate crimes and gather evidence that helps us identify our suspect.</p> <p>But RMP members are also soldiers, and the Army is a pretty unique community. So we also undertake military tasks connected with our role.</p> <p>So what's life in the Army like? Well, my day to day job looks a bit like this... <i>(describe your role in a few words)</i>.</p>
4	Show while speaking	<p>Just like any other area of the Army, in the RMP you need some essential skills.</p> <p><i>(Outline in brief your main skills: observation, memory, listening, communication and problem-solving skills)</i></p> <p>Today we're going to solve a crime just like members of the RMP. The aim of this exercise is to test your ability in these areas <i>(point to the board)</i>.</p> <p><i>(Take a minute to establish behaviour management, for example, if you want the attention of the class you could raise your hand or clap.)</i></p>

SET THE SCENE

2 minutes

RESOURCE	DETAILS	KEY POINTS
<small>SkinsActivity</small> 6	<i>Show while speaking</i>	<p>Let me set the scene. I said before that if the Army is stationed somewhere, no matter where in the world, then you'll also find members of the RMP.</p> <p>You are in the police station in Minerva Barracks, when you receive a phone call from Private McKillop. She heard sounds coming from the room below her in the accommodation building. As she was coming down the stairs she saw, from the window, an individual leaving the building. It looked like the person was carrying electrical goods - they may be a thief.</p> <p>Concerned Private McKillop has reported the incident to the military police. You've been tasked to attend the scene and find out what happened.</p>

STARTER

6 minutes

RESOURCE <small>Slide/Activity</small>	DETAILS	PRESENTER SCRIPT
6	Show while speaking	<p>You arrive at the building and go inside. It's clear which room was the scene of the disturbance – the rest room where soldiers spend some of their spare time. It's where they watch TV, play computer games, listen to music, relax, and play games. Some items are definitely missing.</p> <p>As you start to investigate the scene you notice the time – you're running late for a regimental Hockey Game. You need to get this done before you can leave.</p> <p>You give yourself two minutes to look carefully and remember everything you see, whether or not you believe it will be helpful to your investigation.</p> <p>I'm going to give you two minutes to investigate the scene. I have provided several images of the crime scene taken from different angles. During your two minute investigation you can't make notes. But when the time is up, you'll have time to write down everything you can remember.</p> <p>This is an individual task, so you're not allowed to help one another. Any questions, before you view the crime scene?</p>
7&8	Show for exactly two minutes.	<p>Open the envelope on your desk. I'm going to start a two-minute timer now. I'll also project the images on the screen.</p> <p><i>(Start timer. Warn pupils when they have one minute, 30 seconds and 10 seconds left. At 30 seconds click through to next slide to show alternative angles of the crime scene.)</i></p>
9	Show only after pupils have made their suggestions	<p>OK, stop and put the crime scene photo back in the envelope. Find your Crime Scene Sheet and write down everything you can remember from the scene.</p> <p><i>(Give pupils a couple of minutes to write down their observations.)</i></p> <p>Right, what did you find?</p> <p><i>(Let the pupils guess what was in the room)</i></p>
10&11	Show while speaking.	<p>Did you miss anything? Here's a complete list of what you might have spotted.</p> <p><i>(Read the list)</i></p> <p>Do you remember me saying that this is where the soldiers play computer games and listen to music? What wasn't in the room?</p> <p><i>(Explain that it was the stereo, CDs, DVD player, video game console)</i></p>

ABOUT FORENSICS (omit for a shorter session)

5 minutes

RESOURCE <i>Slide/Activity</i>	DETAILS	PRESENTER SCRIPT
12	<i>Show only after pupils have made their suggestions</i>	<p>We've looked carefully at the crime scene, and you've been able to put your powers of observation and memory to the test. We need to gather evidence. What is evidence, and why is it important? <i>(Invite pupils to suggest definition and reasons evidence is important.)</i></p> <p>Evidence is any clue that can help prove that a person is responsible for a crime.</p>
13	<p><i>Show while speaking.</i></p> <p><i>Click to reveal labels after pupils have made suggestions</i></p>	<p>So what forms of evidence do you think you might find in the room? <i>(Project the slide. Invite pupils to suggest examples.)</i></p> <p><i>(Click to reveal the labels as you say them: hair, fingerprints, liquid, DNA from saliva – pause clicking here)</i></p> <p>There are lots of forms evidence: hair or threads from fabrics, fingerprints, liquid, and traces of DNA from saliva on the mug, bowl or spoon.</p> <p>What is DNA? <i>(Invite pupils to explain why DNA is important.)</i></p> <p>DNA is our unique genetic code – every person has their own unique DNA. We can obtain strands of DNA molecules from the tiniest drop of blood or saliva, or from a single hair.</p> <p>Why is it so important in crime scene investigations? <i>(Invite pupils to explain why DNA is important.)</i></p> <p>If two DNA samples match, for example a hair from the scene and one from a suspect, then there's only a one in a billion chance the DNA is actually from two people. It's 99.999999% certain they came from the same person.</p> <p><i>(Click to reveal the final labels on the slide)</i></p> <p>There is also paper on the floor, and footprints outside the room – they might also hold clues as to the identity of who was in the room.</p>
14	<i>Show while speaking</i>	<p>The RMP look for, gather and store 'clean' evidence so it's not spoiled or contaminated.</p> <p>Why do you think it's really important to gather 'clean' evidence? <i>(Invite pupils to suggest reasons.)</i></p> <p>It's so that we can be sure that any conclusions we come to, after examining the evidence, give us a true picture of what happened. If evidence is contaminated, we can't be sure whether what we're looking at really came from the crime scene or from somewhere else.</p>

ABOUT FORENSICS CONTINUES ON NEXT PAGE.

CONTINUED...

ABOUT FORENSICS (omit for a shorter session)

5 minutes

RESOURCE <small>Slide/Activity</small>	DETAILS	PRESENTER SCRIPT
15	<i>Show only after pupils have made their suggestions</i>	<p>We've thought about the evidence from the room. But what else might we use as evidence?</p> <p><i>(Invite pupils to suggest examples)</i></p> <p>If we know the identity of the person who reported the disturbance, we can get a statement from them. This is known as testimony, and it's another important form of evidence.</p> <p>Documents are also important, and these can be digital as well as printed. This includes any stored CCTV footage of the building.</p> <p>Phone and email conversations can be important evidence too.</p> <p>But now, it's time for you to inspect the evidence you have gathered.</p>

FORENSIC SCIENCE CAROUSEL

35 minutes: short session

65 minutes: long session

RESOURCE <small>Skill/Activity</small>	DETAILS	PRESENTER SCRIPT
16	<i>Show while speaking</i>	<p>I'd like you to get into groups of four. Each of you will need Evidence Sheet, and each group will have one Suspects Sheet.</p> <p>You need to find the identity of the person who committed the crime.</p> <p>We've narrowed down the people who might have been in the building to 16. You'll find information on each of these people on your Suspects Sheet.</p> <p><i>(Hold up and briefly review the Suspects Sheet)</i></p>
17	<i>Show while speaking</i>	<p>In this room there are stations of different evidence to inspect, as well as some witness testimonies to listen to carefully.</p> <p>At each station you'll find instructions on what to do. Follow these instructions carefully so you don't contaminate your evidence. You need to work quickly – you only have five minutes at each station.</p> <p>Your teacher and I will circulate between stations to help you.</p> <p>As you complete your investigations, on your Suspects Sheet circle the letters of the suspects who match each piece of evidence. Once you've inspected all the evidence, the prime suspect should become clear.</p>

Give pupils five minutes on each station. Warn pupils when they have one minute left.

- *For the 60-minute session omit the thread and ink stations. Tell pupils they ignore those sections of the Evidence Sheet.*

Ask the teacher to help rotate pupils between stations so you have a maximum of two minutes delay in between each station. Ensure that pupils are aware that they must clear away rubbish at each station.

RESULTS AND FEEDBACK

10 minutes: short session

15 minutes: long session

RESOURCE <i>SlideActivity</i>	DETAILS	PRESENTER SCRIPT
18		<p>You now have all the evidence from your investigation. In your groups, decide which suspects you can rule out, and who you think is the offender.</p> <p><i>(Give pupils time to come to their conclusion. For the 60-minute session, tell pupils they can ignore the information about the clothing and ink, as the evidence didn't help narrow down the suspects.)</i></p> <p>Who did you rule out, and why?</p> <p><i>(Invite pupils to suggest suspects to rule out. Briefly discuss their reasons.)</i></p> <p>So who do you think was the offender, and why?</p> <p><i>(Discuss pupils' decisions and reasons.)</i></p>
19&20	<p><i>Show while speaking.</i></p> <p><i>Click to remove suspects.</i></p> <p><i>Click to reveal offender.</i></p>	<p><i>(Click to work through the evidence, removing suspects according to each piece of evidence, starting with their gender. The liquid and seed and soil samples reinforce that suspect P is likely to be the offender.)</i></p> <p><i>(For the 90-minute session: note that 'last seen wearing' proves nothing – everyone is a match. The ink sample is a red herring and does not link to suspects.)</i></p> <p>You've done a brilliant job of investigating the evidence and working out our prime suspect.</p> <p>It's rare that we only need one piece of evidence to connect someone to a crime. Usually, we need to piece together lots of different pieces of evidence, and look at the picture they paint of what happened and who was there. It's like putting together the pieces of a jigsaw, except in forensics, each piece might be made of a different material.</p>

REFLECT ON SCIENCE SKILLS

5 minutes

RESOURCE <small>Slide/Activity</small>	DETAILS	PRESENTER SCRIPT
21	Click to reveal each skill and its details one by one while speaking	<p>At the start, I mentioned some skills you'd need to use working in the Army. Can you remember what they were?</p> <p><i>(Wait for suggestions, then click to reveal each one.)</i></p> <p>They were:</p> <ul style="list-style-type: none"> • Observation • Memory • Listening • Communication • Problem solving <p>Can you give me examples of how you used these skills today?</p>
22	Click to reveal each skill and its details one by one while speaking.	<p>Before we finish, I'd like each of you to think about the <u>science skills</u> you used today.</p> <p><i>(Listen to suggestions, if they are struggling then explain that you are referring to the skills they used to carry out the task in a scientific way.)</i></p> <p>I think there are five science skills you used today.</p> <p><i>(Reveal the five skills on the slide and read out. Ask pupils to suggest what each skill means. Reveal the explanation for each skill and read out.)</i></p> <p>When you can measure, observe and describe your evidence like a scientist, then you can form a scientific conclusion. It's what you might call a 'fair test', and what we might call a successful investigation: one that helps us solve the crime and find the culprit.</p>

WRAP-UP

1 minute + questions – keep to a minimum for a shorter session.

RESOURCE	DETAILS	PRESENTER SCRIPT
<small>SMA/Activity</small> 23	<i>Show while speaking</i>	Thank you for taking part today, and I hope you've found it interesting and enjoyable. Has today's activity changed your understanding of the Army a little? Can you tell me how? <i>(Discuss)</i> Thanks for listening and for taking part. If you have any questions, I will be here at the end if anyone wants to come and speak to me.

FORENSICS CHALLENGE

TEACHER INFORMATION



INTRODUCTION

This Army Forensics Challenge is an exciting way for pupils to apply their science skills and understanding in a real life context.

Pupils carry out their investigation in character as members of the Royal Military Police (RMP). The RMP are the Army's own police force, responsible for policing the Army community worldwide, investigating crimes and gathering evidence.

Working in small groups, pupils will:

1. Inspect a crime scene.
2. Examine evidence collected from the scene, including:
 - hair and clothing-fibre samples
 - a boot print
 - fingerprints
 - ink and liquid samples
 - three witness testimonies.
3. Match the evidence to the most likely suspect to identify who committed the crime.

Pupils need to use a range of science skills, including careful measurement, detailed observation and inferring the right conclusion from the evidence – just like in a classroom science investigation.

AGE GROUP

The challenge is most suitable for pupils aged 12-14 (upper KS3 – lower KS4). Two versions of the Information Sheets support younger/less able and older/more able pupils.

TIMING

90 minutes, or a simpler 60-minute delivery. Your Army contact will also need around 15 minutes before and after the session.

The shorter session omits two pieces of evidence, and includes shorter discussion sessions about life in the RMP and how each piece of evidence contributes to the conclusion.

LEARNING OUTCOMES

Pupils will be able to:

- Apply and use a range of techniques, apparatus and materials.
- Make, record and interpret observations and measurements.
- Explain how a range of scientific principles contribute to forensic science.

CURRICULUM LINKS

The activities support the following topics at upper KS3 / lower KS4 and equivalents across the UK:

- Using science as a way to analyse and explain.
- Working scientifically, including applying science skills and using scientific language.
- Using equipment, making and recording observations and measurements, interpreting and evaluating results.
- DNA and genetics
- Blood
- pH
- Chromatography and separating mixtures
- Plant reproduction (seeds)
- Soil

RESOURCES

You will need a suitable room with a computer and data projector. Your Army contact will bring their presentation, the 'evidence' and copies of pupil materials to hand out. They may also ask you to provide a second laptop on which to play some sound files on a USB memory stick.

Your school will need to provide:

- 8 x magnifying glasses or loupes
- 8 x 250ml beakers
- 8 x glass rods
- Sellotape
- 1 x metre rule or tape measure

Lay these out using the layout guide below.

PREPARATION

1. Liaise with your local Army contact beforehand. Ensure they know:
 - The date and timings for the lesson.
 - Where to park and what to do on arrival.
 - Where you will meet them to guide them to your room.
 - The number of pupils in your class (the session works best when delivered to a single class rather than to an extended group).
2. Ensure you will have the resources listed above ready to use. Check whether you need to provide a second laptop to play sound files.
3. Review the session and agree whether it will take 60 or 90 minutes.
4. Review the higher and lower Information Sheets and agree with your Army contact which version they should provide.

LAYOUT GUIDE

You will need to create activity stations around the room:

1. Liquid

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• A bin for disposal of Universal Indicator paper	<ul style="list-style-type: none">• 1 x Information Sheet• Universal Indicator paper with colour chart• 6 x liquid samples in pots

2. Thread (omit for 60-minute session)

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• 3 x magnifying glasses or loupes	<ul style="list-style-type: none">• 1 x Information Sheet• 3 x thread sample slides

3. Boot print

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• 1 x metre rule or tape measure	<ul style="list-style-type: none">• 1 x Information Sheet• 1 x standard Army-issue boot• 1 x plaster cast of boot print• 6 x soil and seed samples

4. Fingerprints

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• 3 x magnifying glasses or loupes	<ul style="list-style-type: none">• 1 x Information Sheet• 3 x fingerprint sample slides

5. Ink (omit for 60-minute session)

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• 8 x beakers• 8 x glass rods• Sellotape• Source of water• A bin for disposal of Universal Indicator paper	<ul style="list-style-type: none">• 1 x Information Sheet• 1 x crime scene chromatogram• 8 x suspect ink sample sheets (one for each group)

6. Hair

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• 3 x magnifying glasses or loupes	<ul style="list-style-type: none">• 1 x Information Sheet• 3 x hair sample slides

7. Witness testimonies

WHAT THE SCHOOL SHOULD PROVIDE	WHAT THE ARMY WILL ADD
<ul style="list-style-type: none">• Laptop with built-in or separate speakers and USB port (unless Army contact is bringing their own).	<ul style="list-style-type: none">• 1 x Information Sheet• USB stick with 3 sound files

DELIVERY

Your Army contact will lead the lesson. You have responsibility for class behaviour and pupil engagement. You can help your Army contact by:

- Introducing and concluding the lesson.
- Circulating between groups to help pupils.
- Helping pupils move rapidly between activities.

FORENSICS CHALLENGE

INFORMATION SHEETS

BASE BRITISH
ARMY
SUPPORTING
EDUCATION

STATION 1

Liquid stain

Liquid can link a person to a crime scene if there is a match with liquids found on their clothing.

You found a liquid stain at the crime scene.

You also found liquid stains on some suspects.

Test the suspect liquid stains to find their pH:

1. Take one strip of Universal Indicator (UI) paper.
2. Dip the paper in the liquid sample.
3. Wait until the paper changes colour.
4. Compare the colour to the colour guide to determine the pH number.
Make sure you record the suspect letter at the top of the UI paper so you don't forget which is which.
5. Repeat these steps for the liquid stain found at the crime scene.



- Write down your observations.
 - Decide which suspects match this evidence.
- When you have finished, put the samples back where you found them.

FORENSICS CHALLENGE

INFORMATION SHEETS

BASE BRITISH
ARMY
SUPPORTING
EDUCATION

STATION 2

Thread

Threads can link a person to a crime scene if they can be matched to the clothes they were wearing at the time.

You found three thread samples at the crime scene.

1. Examine each thread under the magnifying glass.
2. Identify the colour.
3. Describe any other features that will help you match it to a fabric.



- Write down your observations.
- Decide which suspects match this evidence.

When you have finished, put the three thread samples back where you found them.

Did you know?

Thread samples may also contain a person's unique DNA. This can also be very useful in linking a person to a crime scene.

FORENSICS CHALLENGE

INFORMATION SHEETS

BASE BRITISH
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EDUCATION

STATION 3

Boot print, soil and seed samples

Boot prints can link a person to a crime scene. A boot print can match the pattern of the footwear they were wearing.

You observed boot prints on the floor of the crime scene and made a cast of one of them.

1. Measure the cast of the boot print to identify the boot size.
2. Compare the cast to a standard Army-issue boot to see whether they match.

MEASUREMENT (CM)	SIZE
27.6	5
28.7	6
29.3	7
30.6	8
31.6	9
32.8	10
33.4	11
34.7	12

You also gathered soil and seed samples from the prints at the crime scene, and from the footwear worn by some suspects.

1. Examine each soil and seed sample.
2. Compare the soil and seeds from the crime scene to the samples taken from the suspects' footwear.

- Write down your observations.
- Decide which suspects match this evidence.

When you have finished, put the boot print and soil and seed samples back where you found them.

FORENSICS CHALLENGE

INFORMATION SHEETS

BASE BRITISH
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STATION 4

Fingerprint

Everyone has a unique fingerprint pattern. Fingerprints can be captured because our skin is covered in a fine layer of oils. When we touch an object we leave a pattern of oils in the same shape as our fingerprint.

Fingerprints can link a person to a crime scene if they prove the person touched objects at the scene.

You found three fingerprints at the crime scene:

- One on the bowl
- One on the table where the TV would be
- One on the door handle

You dusted each print with aluminium powder and took a photograph.

1. Compare each fingerprint to the samples on the suspect sheet.
2. Decide how well each fingerprint matches each sample.

- Write down your observations.
- Decide which suspects match this evidence.

When you have finished, put the fingerprint photos back where you found them.



Did you know?

Fingerprints are made from the tiny ridges on your fingers. Fingerprints are totally unique. There is a 1 in 64 billion chance that someone else's fingerprints match yours. But there are only 7 billion people on Earth!



Fingerprints include:

- **Arches** – narrow up and down patterns
- **Whorls** – circular or spiral patterns
- **Loops** – these begin on one side of the finger and slope to one side or the other

FORENSICS CHALLENGE

INFORMATION SHEETS

BASE BRITISH
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STATION 5

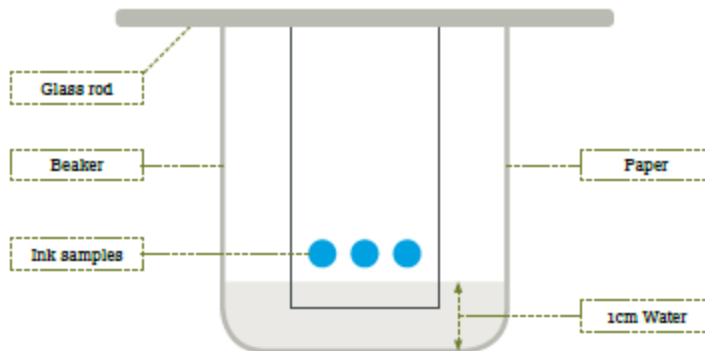
Ink

Hand written notes can link a person to a crime if it can be proven that a suspect wrote the note.

You found a scrap of paper near the bin. You think this may have fallen from the suspect's pocket. The paper has a sample of ink on it.

You obtained a pen from several suspects.

1. Tape one end of the paper to a glass rod, so the ink samples are at the other end.
2. Place the rod over the beaker so the sample end dips in the water.
3. Do not let the ink itself touch the water.
4. Leave the sample in the water until the water has traveled up the paper.



As the ink spreads up the paper, it will create a pattern.

1. Look at the pattern made by the suspects' pens.
2. Compare them to the pattern from the crime scene.
3. Decide whether any of the inks from the suspects' pens match the ink from the crime scene.

- Write down your observations.
- Decide which suspects match this evidence.

When you have finished, throw your paper sample in the bin.

FORENSICS CHALLENGE

INFORMATION SHEETS

BASE BRITISH
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STATION 6

Hair

Hairs can link a person to a crime scene. Each person has their own combination of hair colour and texture.

You found three hair samples at the crime scene.

1. Examine each hair using a magnifying glass.
2. Identify the hair colour.
3. Describe any other features, like its texture (is it straight, curly, frizzy?).



- Write down your observations.
- Decide which suspects match this evidence.

When you have finished, put the three hair samples back where you found them.

Did you know?

Thread samples may also contain a person's unique DNA. This can also be very useful in linking a person to a crime scene.

FORENSICS CHALLENGE

INFORMATION SHEETS

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STATION 7

Witness testimonies

You have interviewed three people about the crime. You recorded each interview. Each person has information that might help you identify the suspect.

1. Click to play each sound file.
2. Listen carefully.
3. Write down the key information each witness provides.



- Write down your observations.
- Decide which suspects match this evidence.

FORENSICS CHALLENGE

EVIDENCE SHEET

NAME

CLASS

DATE

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After each investigation activity:

1. WRITE DOWN YOUR OBSERVATIONS OR MEASUREMENTS

STATION (EG 'HAIR')	EVIDENCE	OBSERVATION OR MEASUREMENT
1	Liquid	
2	Thread	
3	Boot print	
	Seeds & soil	
4	Fingerprints	
5	Ink	
6	Hair	

*You won't be inspecting this evidence if your session is 60 minutes long

STATION 7	WITNESS TESTIMONIES
	Write down the key information in each witness testimony.
1	
2	
3	

2. AS A GROUP, ON YOUR SUSPECTS SHEET DRAW A CIRCLE AROUND THE EVIDENCE THAT MATCHES A SUSPECT.

Once you've finished all the activities take a look at the Suspects Sheet and decide:

- Which suspect has the most matching evidence?
- Who is the most likely suspect?

FORENSICS CHALLENGE

SUSPECTS SHEET

NAMES

CLASS

DATE

BASE BRITISH ARMY SUPPORTING EDUCATION

THE LIST OF SUSPECTS HAS BEEN NARROWED DOWN TO THE PEOPLE BELOW

Each person was interviewed and you now have the following information or evidence. In the last column you can see some extra evidence that was collected, including ink, liquid, seeds and soil.

After each activity, circle any evidence that links the suspect to the crime.

For example, if a hair sample links suspect A, draw a circle around 'Brown' in the 'Hair' row for suspect A.

SUSPECT	SEX	AGE	BLOOD TYPE	HAIR	BOOT SIZE	SOLDIER?	LAST SEEN WEARING	FINGERPRINTS (enlarged versions on separate page)	OTHER EVIDENCE FOUND
A	M	19	O+	Brown	9	Y	Uniform		Ink Liquid
B	M	20	AB+	Brown	11	Y	Uniform		
C	F	26	O-	Black	6	Y	Uniform		
D	M	27	O-	Blonde	13	N	Blue		Seeds & soil
E	F	32	O+	Brown	6	Y	Black		
F	M	25	O-	Brown	9	N	Blue		Liquid Seeds & soil
G	M	22	AB+	Black	9	Y	Black		
H	M	50	O-	Blonde	9	N	Blue		Ink
I	M	47	O-	Blonde	8	N	Black		
J	F	28	O+	Black	12	Y	Uniform		Liquid
K	M	18	O-	Brown	10	Y	Black		Liquid Seeds & soil
L	F	30	O+	Brown	9	N	Black		Seeds & soil
M	F	31	AB+	Brown	7	Y	Uniform		
N	M	26	O-	Brown	9	Y	Black		Ink Liquid
O	M	25	O-	Brown	9	N	Blue		

FORENSICS CHALLENGE

SUSPECTS' FINGERPRINTS

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Suspect A



Suspect B



Suspect C



Suspect D



Suspect E



Suspect F



Suspect G



Suspect H



Suspect I



Suspect J



Suspect K



Suspect L



Suspect M



Suspect N



Suspect O

BIOLOGY CHALLENGE

BRIEFING SHEET

BASE BRITISH ARMY SUPPORTING EDUCATION

THE SITUATION

There has been a severe earthquake in Kashmir. Over 100,000 people are without shelter, food or clean water.

The British Army helps to provide urgent relief in situations like this. Soldiers build bridges and shelters

for families. They also give out emergency blankets, food rations and bottled water.

The soldiers work around the clock.



THE CHALLENGE FOR SOLDIERS

Soldiers use up a great deal of energy as they work. They need regular meals and snacks to keep going.

Many soldiers must work far away from their Army base. These soldiers won't always have time to stop for a meal.

The answer is to give them a high-energy snack they can eat 'on the go'. The Army do not currently have anything suitable, so your designs will really make a difference.

DESIGN BRIEF

Design a **healthy, high-energy snack** that a soldier can carry and eat on the move. Your snack should be made from **natural ingredients** and can be a recipe or a combination of foods.

Your snack should provide plenty of energy from healthy ingredients, but shouldn't contain too much sugar, as this releases energy too quickly and is bad for soldiers' teeth.

Make sure you:

- List your ingredients and why you include each one.
- Say how much carbohydrate, protein, fats and fibre your snack will contain.
- Suggest how many calories of energy your snack will provide.



BIOLOGY CHALLENGE

KEY FACTS SHEET

BASE BRITISH ARMY SUPPORTING EDUCATION

ENERGY NEEDS

Soldiers need 4,000 calories per day when active.

The snacks in an Operational Ration Pack (ORP) provide about 150–200 calories each. Your snack ideas should provide about the same.

Think about...

- Do you know how many calories are in some of your favourite snacks?
- What healthy snack ideas can you think of?

Nutrition

NUTRIENT	USE IN THE BODY	SOURCES
Carbohydrates	Energy	Grains, bread, pasta, sugar, rice, potatoes
Fats	Energy	Oil, butter, nuts, animal fats
Protein	Growth and repair	Meat, nuts, dairy, eggs, beans, pulses
Vitamins	Tiny amounts are needed for good health	Meats, dairy, vegetables, fruits
Minerals	Tiny amounts are needed for good health	Dairy, vegetables, fruits, nuts
Fibre	Helps food move through the gut	Vegetables, beans, pulses, grains, nuts

Think about...

- Which nutrients might make up most of your snack?
- Which nutrients will you include just a little of?
- How many calories are in your snack idea?

A balanced diet

A soldier's daily diet should contain mostly carbohydrates, a small amount of protein and only a little fat. However, individual meals or snacks don't need to match this precisely.

Remember that your snack should not contain too much sugar.



PHYSICS CHALLENGE

BRIEFING SHEET

BASE BRITISH ARMY SUPPORTING EDUCATION

THE SITUATION

Following a severe earthquake in Kashmir over 100,000 people are without shelter, food or clean water.

In situations like this the British Army gets deployed to provide urgent relief. Soldiers build temporary bridges and shelters for families.

They also distribute emergency blankets, food rations and bottled water.

Time is always of the essence and the soldiers work around the clock.



THE CHALLENGE FOR SOLDIERS

Relief work involves a lot of heavy lifting and physical activity. Soldiers expend a great deal of energy as they work, and will generate a lot of heat.

In locations like this, where temperatures are extremely high during the day, soldiers can be at risk of heatstroke. The body is unable to cool itself and a person's temperature becomes dangerously high.

Heatstroke can lead to weakness, dizziness and confusion, a fast pulse, seizures (fits) and loss of consciousness.

DESIGN BRIEF

Design a cooling suit or vest that will remove heat from the soldiers' bodies and allow them to work safely and in comfort. The suit must be lightweight and portable.

Make sure you:

- Explain how your suit will remove heat from their bodies.
- Explain whether your suit or vest will need a source of power.
- Show how your system can work with the soldiers' load carrying system, so soldiers can wear it while carrying a day sack or heavy pack.



PHYSICS CHALLENGE

KEY FACTS SHEET

BASE BRITISH ARMY SUPPORTING EDUCATION

HEAT AND TEMPERATURE




Heat and temperature are not the same thing:

- **Temperature** is how cold or hot something is, and is measured in °C.
- **Heat** is how much thermal energy something contains, and is measured in joules (J).

A spark from a fire may have a very high temperature, but since it's very small, it only contains a very small amount of heat or thermal energy. A warm bath is at a much lower temperature, but contains much more thermal energy.

THERMAL ENERGY TRANSFER: HOW DOES HEAT MOVE?

Thermal energy is transferred through:

CONDUCTION	CONVECTION	RADIATION
<p>Transfer through an object e.g. metal poker</p> 	<p>Molecules move from one place to another e.g. warm air rising</p> 	<p>Carries heat in waves through space e.g. heat from fireplace</p> 
<ul style="list-style-type: none">• Substances are made out of particles.• Heating a substance gives it energy and this makes the particles close to the heat vibrate.• These vibrations are passed onto the adjacent particles (those close by), which themselves vibrate more, passing the heat through the substance from hot to cold areas. <p>Metals and water are good conductors of heat.</p>	<ul style="list-style-type: none">• Particles in liquids and gases can move.• When particles with a lot of thermal energy move, they carry this energy from hot areas to colder ones. <p>Convection can happen through water or a gas like air.</p>	<ul style="list-style-type: none">• Objects emit (give off) infra-red radiation when warm or hot.• This doesn't require particles.• The more thermal energy an object contains, the more radiation it emits. <p>White or light materials don't absorb infra-red radiation. Black or dark objects are good absorbers of infra-red radiation.</p>

PHYSICS CHALLENGE

KEY FACTS SHEET

BASE BRITISH
ARMY
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EDUCATION

HOW DOES THE HUMAN BODY LOSE HEAT?

Evaporation

- When the body gets above normal temperature, capillaries (thin blood vessels near the skin) get larger and allow more blood to flow to the skin.
- This carries heat from within the body to the surface.
- Pores in our skin then secrete sweat.
- When sweat evaporates from our skin, it turns from a liquid to a gas.
- The energy to do this comes from the thermal energy our blood has carried to our skin.

ARMY EXAMPLE

VIRTUS and the DWD system

VIRTUS is the Army's new system for protecting soldiers and helping them carry loads, and is the most advanced system of its type in the world.

VIRTUS includes a hip belt and harness, body armour vest and panels, helmet, hydration system and spine bar. Soldiers can adapt VIRTUS for any situation.

The spine bar allows the soldier to attach a heavy load and vary how they support this load between their hips and shoulders. This lets each soldier choose the right support to reduce fatigue.

If your suit or vest uses a power supply, pump or other active system, you must show how you will attach this to the VIRTUS system. This could include a solar panel or a battery, for example.

You could attach this to the spine bar, or if it is small, by putting it on or into a bag or case.

CHEMISTRY CHALLENGE

BRIEFING SHEET

BASE BRITISH ARMY SUPPORTING EDUCATION

THE SITUATION

Following a severe earthquake in Kashmir over 100,000 people are without shelter, food or clean water.

In situations like this the British Army gets deployed to provide urgent relief. Soldiers build

temporary bridges and shelters for families. They also distribute emergency blankets, food rations and bottled water.

Time is always of the essence and the soldiers work around the clock.

THE CHALLENGE FOR SOLDIERS

The only way to access some remote villages is by helicopter or on foot, along narrow mountain paths. These paths may pass under steep, unstable rock slopes and rock falls can be common. Cracked, uneven ground

makes tripping likely and heads are very vulnerable parts of the body. The soldiers need lightweight head protection from any slips, trips and falling debris.



DESIGN BRIEF

Design a protective, lightweight helmet.

Your design should use a composite material which is light, strong and resistant. Your helmet should also allow a range of accessories to be attached, for example a head torch or camera.

Helmet specification:

- Lightweight (about 1kg).
- Have attachments for a night vision camera and eye piece, camera, torch or visor.
- Include ventilation for use in hot weather.

Make sure you:

- Explain how you combine materials with different properties in a composite material, to provide comfortable, lightweight protection.
- Show how your design is suitable for a hot environment.
- Describe the materials you will use to attach accessories.

CHEMISTRY CHALLENGE

KEY FACTS SHEET

COMPOSITE MATERIALS

What is a composite material?

A composite material is a material made from two or more materials combined together. These materials have very different chemical or physical properties. But when combined, they produce a new material with new and helpful properties.

Most, but not all, composite materials are made up of:

1. **Reinforcement** – long or fibrous material that is cut, shaped or aligned to provide strength and flexibility.
2. **Matrix** – an outer material that bonds the reinforcement to protect it and hold it in place.

Another form of composite is a **laminate** – a material that combines thin layers of different materials, each with different properties.



Examples of composite materials

NAME	MATRIX	REINFORCEMENT
Reinforced Concrete (RC)	Concrete	Steel rods
Glass Reinforced Plastic (GRP)	Polymer resin	Sheets or random strands of flexible glass fibres
Carbon Fibre Reinforced Polymer (CFRP)	Polymer resin	Woven sheets of carbon fibres
Medium Density Fibreboard (MDF)	Wax and resin	Small wood fibres
Gore-Tex (a laminated composite)	Gore-Tex is a laminate of: 1. Outer material. 2. Waterproof and breathable membrane. 3. Lining material.	
Biocomposites	Polymer resin (which may come from natural sources)	Natural fibres like steel, hemp or jute
Kevlar composite	Polymer resin	Woven sheets of Kevlar, an extremely strong synthetic fibre
Spectra composite	Polymer resin	Woven sheets of Spectra, an extremely strong synthetic fibre
Dyneema composite	Polymer resin	Woven sheets of Dyneema, an extremely strong synthetic fibre

Remember:

These are just examples, you can create your own composite material.

CHEMISTRY CHALLENGE

KEY FACTS SHEET

BASE BRITISH ARMY SUPPORTING EDUCATION

ARMY EXAMPLE

The Army's new VIRTUS helmet is lightweight and adaptable, with more protection, and more comfort.

Inside the helmet there's an adjustable harness. This helps the soldier get a comfortable fit, whether they are moving fast or lying down for cover. Outside, there are easy attachment points for eye and face protection, and to attach extra equipment like a torch or night vision camera.

The helmet has been made as light as possible. It includes a special balancing weight. This reduces any pressure on the soldier's neck. This helps to avoid injury or a loss of concentration when on patrol.



PHYSICS CHALLENGE

BRIEFING SHEET

BASE BRITISH ARMY SUPPORTING EDUCATION

THE SITUATION

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for families. They also give out emergency blankets, food rations and bottled water.

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THE CHALLENGE FOR SOLDIERS

Soldiers use up a great deal of energy as they work and may get very hot.

Temperatures can be extremely high during the day – particularly in hot countries. The soldiers can be at risk of heatstroke. This is where the body cannot cool itself down and a person's temperature becomes dangerously high.

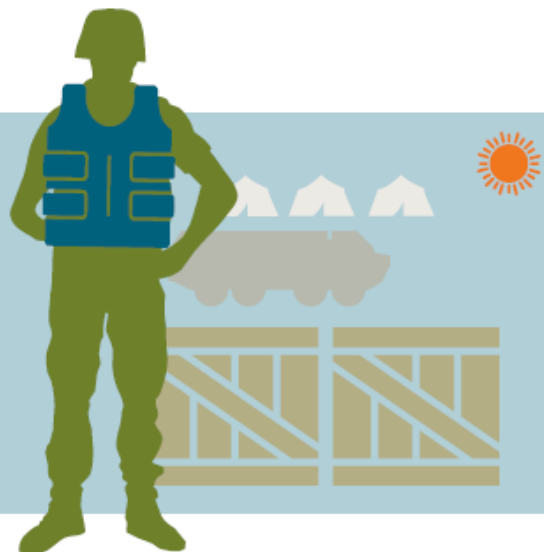
Heatstroke can lead to feeling weak, dizzy and confused. The person may have a fast pulse, fits, and even pass out.

DESIGN BRIEF

Design a cooling suit or vest that will remove heat from the soldiers' bodies. The suit must be lightweight and easy to carry or wear.

Make sure you:

- Explain how your suit will remove heat from their bodies.
- Explain how your suit will be lightweight and easy to wear.



PHYSICS CHALLENGE

BRIEFING SHEET

HEAT AND TEMPERATURE




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Thermal energy is transferred through:

CONDUCTION	CONVECTION	RADIATION
<p>Transfer through an object e.g. metal poker</p>  <ul style="list-style-type: none"> • Everything is made out of particles. • Heating a substance makes the particles vibrate more. • These vibrations spread to particles close by. • These vibrate more, passing from hot to cold areas. <p>Metals and water are good conductors of heat.</p>	<p>Molecules move from one place to another e.g. warm air rising</p>  <ul style="list-style-type: none"> • Particles in liquids and gases can move. • When particles with a lot of thermal energy move, they carry this energy from hot areas to colder ones. <p>Convection can happen through water or a gas like air.</p>	<p>Carries heat in waves through space e.g. heat from fireplace</p>  <ul style="list-style-type: none"> • Objects give off infra-red radiation when warm or hot. • This doesn't need any particles. • Objects with more thermal energy emit more radiation. <p>White materials reflect infra-red radiation, black materials absorb it.</p>

Think about...

- What materials could conduct heat from the soldiers' bodies?
- What substances could convect heat from the soldiers' bodies?
- What colour materials would help the soldiers to stay cool?

CHEMISTRY CHALLENGE

BRIEFING SHEET

BASE BRITISH ARMY SUPPORTING EDUCATION

THE SITUATION

There has been a severe earthquake in Kashmir. Over 100,000 people are without shelter, food or clean water.

The British Army helps to provide urgent relief in situations like this. Soldiers build bridges and

shelters for families. They also give out emergency blankets, food rations and bottled water.

The soldiers work around the clock.

THE CHALLENGE FOR SOLDIERS

The only way to access some remote villages is by helicopter or on foot, along narrow mountain paths. These paths pass under steep, unstable rock slopes and rock falls can be common. Cracked, uneven ground makes

tripping very likely and heads are very vulnerable parts of the body.

The soldiers need lightweight head protection from any slips, trips and falling debris.



DESIGN BRIEF

Design a protective, lightweight helmet.

Your design should use a composite material. This needs to be light, strong and resist knocks or blows. Your helmet should also allow a range of accessories to be attached, for example a head torch or camera.

- Explain which materials are combined in your composite material and the properties they provide.
- Describe how you will attach accessories.

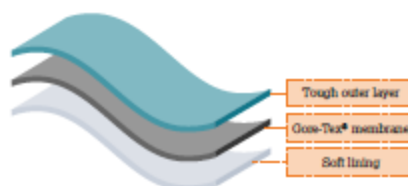


CHEMISTRY CHALLENGE

KEY FACTS SHEET

COMPOSITE MATERIALS

A composite material is made from two or more different materials. Each one is chosen because it has different, useful properties. When you combine them together you are also combining the useful properties, making a brand new, more useful material.



NAME	FIRST MATERIAL	SECOND MATERIAL	THIRD MATERIAL	BENEFITS OF COMPOSITE
Reinforced concrete (RC)	Concrete	Steel rods	N/A	Concrete = strong when squashed Steel = strong when stretched
Breathable fabrics	Nylon/polyester	Polyurethane fibres	PTFE membrane	Nylon = tough, lightweight, waterproof Polyurethane = soft, elastic PTFE membrane = allows water vapour but not water droplets to pass through
MDF (Medium Density Fibreboard)	Wood fibres	Glue	N/A	Consistent properties, therefore does not split easily. Does not expand and contract like normal wood.

Remember:

These are only examples, you can create your own composite material.

Think about...

- Which materials might be suitable for a helmet?
- What properties would a good helmet material have?
- Where might be the best place to attach accessories?

SCIENCE CHALLENGE

SOLUTION SHEET

NAME

CLASS

DATE

BASE BRITISH ARMY SUPPORTING EDUCATION

CHALLENGE

SOLUTION

Draw and label your solution. Use more paper if you need to.



LIST THREE SCIENCE FACTS THAT HAVE HELPED YOU.

1.

2.

3.

SCIENCE CHALLENGE

DISCUSSION QUESTIONS AND NUMERACY IDEAS



BIOLOGY CHALLENGE

Energy needs

Q: How much energy (calories) will your snack provide, and why?

A: *(It should contain 150–200 calories)*

Q: Do you know which foods contain a lot of energy, and which ones contain only a little?

A: *(Foods containing a lot of fats and carbohydrates usually contain the most energy, especially fried or processed foods.)*

Q: Why might active soldiers need more energy than an average adult?

A: *(Working hard uses more energy than moderate activity or rest.)*

Q: What happens to our body if we consume too much energy in our food, or too little?

A: *(We may gain or lose weight and stop being a healthy weight.)*

Q: How much energy does a young person need each day, in calories?

A: *(Boys: from around 2,100 at 11 to 3,100 at 18, Girls: from around 2,000 at 11 to 2,500 at 18.)*

Diet and nutrition

Q: Can you list some of the main nutrients in a healthy diet?

A: *(See Key Facts Sheet)*

Q: What can happen if one of these nutrients is missing from a soldier's diet?

A: *(A lack of some nutrients may lead to a wide range of medical issues and poor health, especially if key vitamins and minerals are absent.)*

Q: What nutrients might be important for an active person, like a soldier?

A: *(They should eat a healthy, balanced diet like any person, but may require additional energy from the calories in their food.)*

Q: What nutrients should your high-energy snack contain, and how much?

A: *(Mostly 'good' carbohydrates, with some protein, a little fat and low sugar.)*

Q: What ingredients might you use to provide these nutrients?

A: *(Students should suggest mostly natural ingredients like whole grains, nuts or fruit that when combined provide good energy, some protein, a little fat, and low sugars. They can also suggest smaller amounts of flavouring ingredients like chocolate.)*

Bacteria in food*(only for higher version of challenge)***Q: How can harmful bacteria in our food affect us?***A: (They can give us food poisoning (vomiting and diarrhoea) which in extreme cases can be fatal.)***Q: Can you name any harmful bacteria?***A: (See upper ability fact sheet.)***Q: Are there any bacteria which might be helpful rather than harmful?***A: (Yeasts help make bread, beer and other fermented foods. A range of lactobacilli make yogurt. Our digestive systems are home to trillions of beneficial bacteria that help us to digest our food.)***Q: What do bacteria need to grow?***A: (Warmth, moisture and an energy source. Many need oxygen, while others do not.)***Preserving food***(only for higher version of challenge)***Q: What methods do we use to preserve food?***A: (We use methods such as canning, cooling, freezing, drying, pickling, and using salt and sugar. Modern methods include freeze drying and using flexible pouches (like in ORPs) that act like cans.)***Q: What might be the best way to preserve an energy bar for the soldiers?***A: (Students should suggest a method suitable for their idea, such as a vacuum pouch or foil wrapper.)***Q: How does preserving food make it safe to eat?***A: (It kills existing bacteria and prevents new bacteria from entering or growing.)***Numeracy Ideas**

1. Have a range of packaged snack and energy bar wrappers available. Pupils can identify calorie data and present as a table or chart.
2. Pupils can use calculators or spreadsheets to calculate the nutritional content of their snack idea, using ingredient nutritional data from the internet.
3. Pupils can calculate how much moderate exercise (for example moderate walking at 250 calories per hour) is needed to 'burn off' the energy from a range of snacks.
4. Pupils can use a spreadsheet to scale up their snack recipe for production, e.g. 100, 1,000 or 10,000 units.

CHEMISTRY CHALLENGE

What is a composite material?

Q: What does the word 'composite' mean?

A: *(Made of more than one material.)*

Q: Can anyone name a composite material?

A: *(See Key Facts Sheet.)*

Q: Why do you think composite materials have new and different properties compared to each material on its own?

A: *(When combined, the two materials behave differently together.)*

Q: What is the purpose of the 'matrix' in a composite material?

A: *(See Key Facts Sheet.)*

Q: What is the purpose of the 'reinforcement' in a composite material?

A: *(See Key Facts Sheet.)*

Q: What is a laminate composite material?

A: *(See Key Facts Sheet.)*

Examples of composite materials

Q: Where are composite materials found in the world around us?

A: *(Cars, boats, clothing, furniture, buildings, technology and more...)*

Q: What laminated composite materials can you think of?

A: *(Waterproofs, plywood, GRP or carbon fibre in performance cars, etc.)*

Q: What are the uses for these composite materials?

A: *(Strength, protection, low cost, lightness, comfort, aerodynamics and more...)*

Q: Most composite materials are made from organic polymers. What is the natural source for these chemicals?

A: *(Crude oil, from which petrol and plastics are also produced.)*

A composite helmet

Q: What important properties does the helmet need to have?

A: *(Lightweight, resists the force from falling objects.)*

Q: How might you make your helmet?

A: *(In a mould, where layers of the reinforcement are bonded and coated in the matrix.)*

Q: What material could you use as the matrix for your composite material?

A: *(A polymer resin.)*

Q: How might you attach accessories like a camera or light?

A: *(Velcro, a fabric or elastic strap, or a plastic or metal attachment.)*

Q: What material or materials could you use as the reinforcement?

A: *(Glass fibre, carbon fibre, Kevlar, Spectra, Dyneema.)*

Numeracy Ideas

1. Pupils can measure the circumferences of their heads and find the mean, mode, median and range. They can specify small, medium and large helmet sizes.
2. Pupils could research the cost of some composite materials (many can be found on eBay, for example) and compare the cost per unit of mass or area.
3. Pupils can estimate or calculate the surface area of a helmet or head. What could pupils use, like paper or fabric, to help them?
4. An average, a head weighs around 4kg. A neck vertebra has an area of around 0.04m^2 . What is the pressure on the vertebra and how does this change when a soldier wears a helmet of different weights?

PHYSICS CHALLENGE

Heat and temperature

Q: Do 'heat' and 'temperature' mean the same thing, or do they have different meanings?

A: *(They mean different things – see Fact Sheet.)*

Q: What does it mean to have 'a lot of heat'?

A: *(A thing contains a lot of thermal energy.)*

Q: Does something at a high temperature always have a lot of heat?

A: *(No. A cool swimming pool contains a lot of thermal energy, though it may only be 27°C, but a burning ember at several hundred degrees contains only a tiny amount of thermal energy in total.)*

Thermal energy transfer

Q: How is heat energy transferred from place to place?

A: *(See Fact Sheet for conduction, convection and radiation.)*

Q: How many ways can heat move?

A: *(See Fact Sheet.)*

Q: How does convection / conduction / radiation work?

A: *(See Fact Sheet.)*

Q: Which kind of heat transfer does not require particles?

A: *(Radiation, which uses infra-red electromagnetic waves.)*

How does the human body lose heat?

Q: What happens when we get hot?

A: *(We produce sweat and our capillaries bring more blood to the skin. See Fact Sheet.)*

Q: How does our heart and blood help us to lose heat?

A: *(Pumping blood to the skin moves heat from within our body. See Fact Sheet.)*

Q: How does our skin help us to lose heat?

A: *(Evaporating sweat uses the heat energy brought to the surface of the skin by our blood. See Fact Sheet.)*

A cooling suit or vest

Q: What kind(s) of thermal transfer will your suit or vest use?

A: (Pupils should choose, e.g. evaporation or conduction.)

Q: How will it lose this heat into the surrounding air?

A: (Pupils to explain.)

Q: What materials will you use?

A: (A material that facilitates the form of heat transfer that pupils have chosen, e.g. water for conduction or convection.)

Q: What will power the suit?

A: (Pupils to explain. A battery or solar panel could power a small electric pump.)

Q: How does the suit or vest absorb heat from a hot soldier's body?

A: (Pupils to explain.)

Q: How will the soldier wear the suit or vest alongside their VIRTUS kit?

A: (Pupils to explain. It should attach to the hip belt, spine, or go in or on a rucksack.)

Numeracy Ideas

- Pupils can measure and calculate the surface area of a simplified human body, thinking of this as a sphere, with a cylindrical torso and cylindrical arms and legs. (Some pupils may be sensitive to body measurement: use a volunteer.) Surface area of a sphere = $4\pi r^2$ and surface area of a cylinder = $2\pi r^2 + 2\pi r \times \text{length}$.
- The metabolic rate, or human body heat or power production, is often measured in the unit "Met". 1 Met = 66 W/m^2 . Using 1.8 m^2 as an average body surface area, pupils can calculate Mets and total heat power output for a soldier walking with a heavy load (300 W/m^2) or digging (400 W/m^2) (or further activities listed at http://www.engineeringtoolbox.com/met-metabolic-rate-d_733.html)
- Humans have around 300 eccrine sweat glands per cm^2 on average. How many do pupils have on an arm? Torso? How can pupils estimate or calculate this?
- Humans can produce 2-4 litres of sweat per hour. Working 8-hour days, how much might a soldier need to drink simply to replace this sweat, on a 1-month mission?

SCIENCE CHALLENGE

SOLUTION SHEET

NAME

CLASS

DATE

BASE BRITISH ARMY SUPPORTING EDUCATION

CHALLENGE

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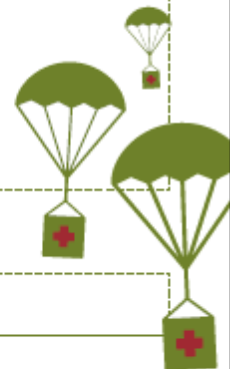
SUCCESS CRITERIA

- I have addressed all of the points in the design brief.
- I can explain how my design helps soldiers.
- I can explain the science behind my design.

SOLUTION

Draw and label your solution. Use more paper if you need to.

[Large dashed box for drawing solution]



LIST THREE SCIENCE FACTS THAT HAVE HELPED YOU.

1.

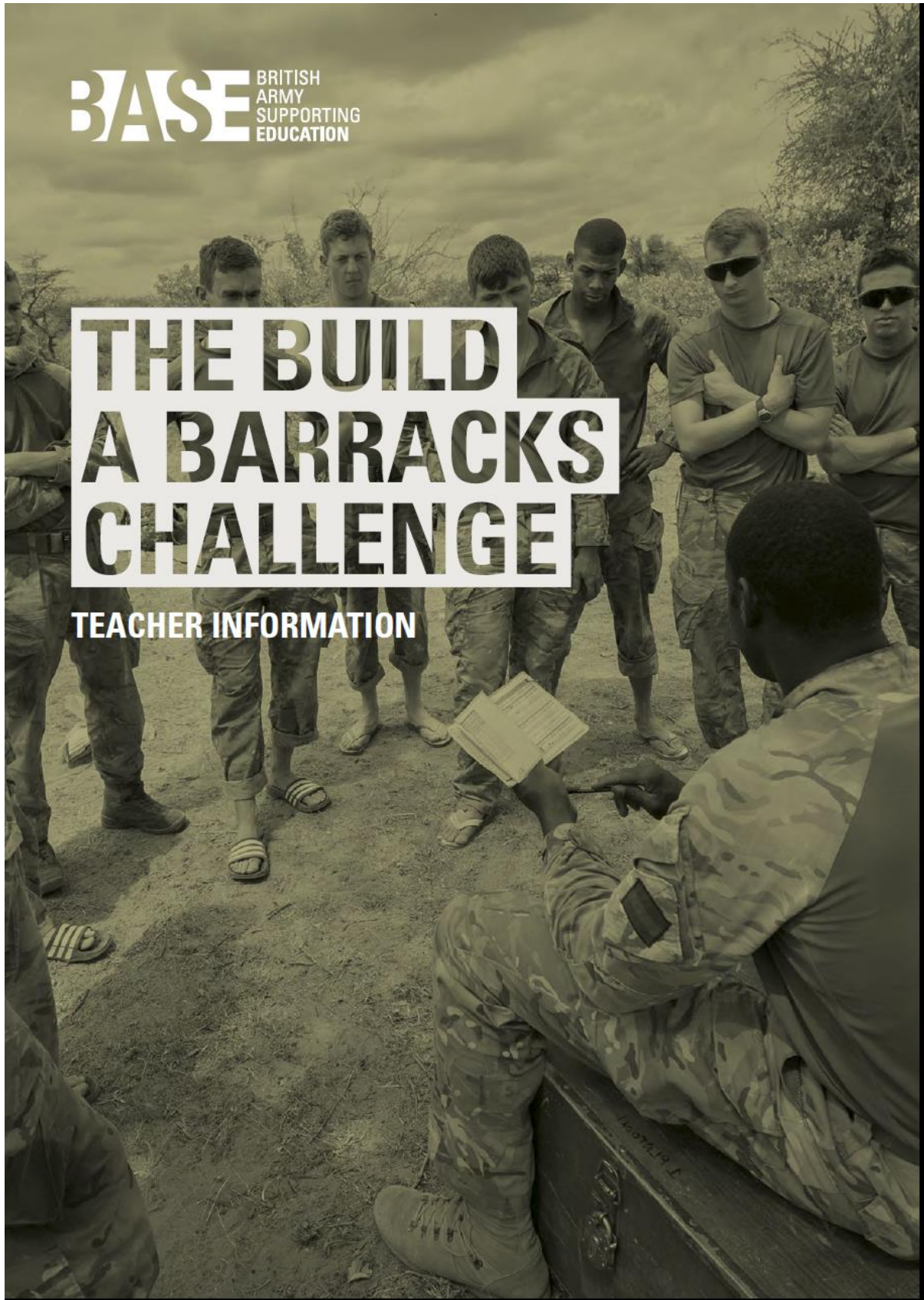
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BASE BRITISH
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THE BUILD A BARRACKS CHALLENGE

TEACHER INFORMATION



THE BUILD A BARRACKS CHALLENGE IS DEVELOPED BY THE ARMY FOR KEY STAGE 4 AND 5 STUDENTS (AND HOME NATION EQUIVALENTS). THE CHALLENGE IS PERFECT FOR COLLAPSED TIMETABLE DAYS FOCUSED ON ENTERPRISE OR EMPLOYABILITY SKILLS. IT IS DESIGNED TO BE CROSS-CURRICULAR AND SUPPORTS THE BUSINESS AND ENTERPRISE, MATHEMATICS, DRAMA, ENGLISH, DT, GEOGRAPHY AND PSHE CURRICULA. IT IS ALSO USEFUL FOR CAREERS EDUCATION.

THE DAY IS LED BY A TEAM OF ARMY PERSONNEL WHO WILL SUPPLY ALL THE NECESSARY MATERIALS AND SUPPORT FOR THE STUDENTS. THERE IS NO CHARGE.

A MAXIMUM OF 60 STUDENTS CAN BE ACCOMMODATED IN ONE DAY. THE ACTIVITIES CAN ALSO BE USED WITH SMALLER GROUPS OF AROUND 30.

HOWEVER, THE DAY WON'T BE QUITE AS MUCH FUN – OR HAVE QUITE THE SAME COMPETITIVE EDGE – WITH GROUPS OF LESS THAN 30. IF YOU HAVE A GROUP THAT IS LARGER THAN 60 THEN YOU COULD HOLD THE CHALLENGE OVER TWO CONSECUTIVE DAYS.

THE BUILD A BARRACKS CHALLENGE

INTRODUCTION

The Build a Barracks Challenge requires students to work in teams of up to seven to take on the role of a specialist design and construction company, which has been asked to present proposals for building a brand new Army barracks.

Team members each take responsibility for a particular part of the proposal and have their own assigned tasks throughout the day. The roles are:

- Team Leader
- Designers
- Finance Managers
- Public Relations Managers.

There should be just one Team Leader and one or two of each of the other roles. The team task is to work through a series of activities which lead to a final presentation of their proposal at the end of the day.

During the early part of the challenge, the whole team works together to make decisions about the location of their barracks, the type of buildings required and how much of the budget to set aside as a contingency fund.

The team deemed to have the best ideas that can be delivered within a budget of £250m will 'win the contract'.



THE BUILD A BARRACKS CHALLENGE

WHICH STUDENTS WOULD BENEFIT?

The Build a Barracks Challenge is designed for students at Key Stage 4 or 5 (and home nation equivalents). It can also be adapted for use at Key Stage 3.

The tasks are quite challenging and there is a lot of information to read and digest.

The activities cater for a range of learning styles with many of the tasks being essentially visual and practical.

Students who are less confident with English will need support to interpret and respond to the brief and team roles. If a significant number of the students taking part have English as an additional language, please provide additional support for reading and writing. The Army teams are not qualified to support students with significant communication difficulties, so they will need your help.

It is expected that those students who particularly enjoy working with numbers will take on the role of Finance Manager. The calculations require the students to work with big budgets and to balance a spreadsheet to £250m.

WHAT YOU NEED TO DO BEFORE THE CHALLENGE

- Sort out the groups and team roles. The team role quiz is a skills and personality activity which will help individuals to identify which role would suit them best. Please ensure that students are assigned to a group and to one of the team roles before the day itself. A good time to do this might be during tutor time on the day of the challenge.
- Arrange to take over a big space such as the hall or gym and have two spaces available for presentations.
- You will need ICT equipment to play the film.

HOW WILL IT WORK ON THE DAY?

Your Army representative will run the day and keep to time. There must be at least one teacher present throughout the day. Please ensure that students with learning or other difficulties are supported by a teaching assistant or teacher. You need to provide your school's schedule to the Army representative prior to the day, so they know when break and lunch times are. The session will last approximately four hours (excluding lunch break).



THE BUILD A BARRACKS CHALLENGE

PROGRAMME OF ACTIVITIES

Teams are welcomed by the Army representative who explains a bit about their role in the Army and plays the introductory film.	15 mins
The Army representative explains the brief verbally to make sure the students understand the scoring system. They explain the Wild Cards and what the teams should be aiming for during their final presentations.	15 mins
Teams work on their tasks, which include team meetings, Wild Cards and making first drafts of their plans and ideas.	125 mins
LUNCH	
Teams regroup and continue with their tasks. They work towards their final presentation and support each other to make sure documents are finished.	10 mins
Each group has five minutes to present their proposals to the Army representative who will score the work, and to the rest of the group. Note: five minutes per presentation should be taken as a guideline, if more time is available or if you have low numbers of students, you may want to increase this to ten minutes.	5 mins each team (max 50 minutes)
Certificates for all participants are presented along with the prize for the winning team. Optional Q&A session with the Army representative.	10 mins

EACH TEAM'S PROPOSALS SHOULD INCLUDE:

- Where the barracks will be located and why that area has been chosen. This will relate to land values and existing facilities at the chosen location.
- What sorts of buildings will be included on the barracks.
- A scale drawing of the new barracks.
- A spreadsheet showing detailed costs.
- A sample press release.

These tasks are given a score during the final presentation and the team with the most points wins.

The team – and individuals within it – also has a chance

to earn bonus points by playing Wild Cards. These are challenges that relate to unforeseen circumstances and which affect the proposals so far. For example, a 3% increase in labour costs and materials, the sudden acquisition of an additional piece of land, or new requests from 'the client'. Additional points are also awarded for good teamwork and taking the initiative.

There are two marker's assessment sheets which should be completed for each team:

- one during the challenge
- one during final presentations.

Discuss with your Army representative who would be best to complete this marking or whether you would like to do it together as a team.

IF YOU HAVE ANY QUESTIONS PLEASE CONTACT YOUR LOCAL ARMY CAREERS CENTRE.

THE BUILD A BARRACKS CHALLENGE

WHAT DO YOU NEED TO PROVIDE?

The students will need to work in a large space such as the school hall or gym, with a whiteboard/projector set up with the appropriate audio and tech requirements to play a film from a USB stick. They will need to be provided with a calculator per team.

The Army will set up a Command Centre in the space, from where they will give out the Wild Card challenges and observe the students' skills in working as a team. They will also be attaching several large sheets of paper to walls around the room.

Although the Army representative will run the event and support the students in their tasks, they will need support from two teachers. Learning Support staff may also be needed to help those students with special needs or behavioural difficulties.





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EDUCATION

THE BUILD A BARRACKS CHALLENGE

FINANCE MANAGER INFORMATION

THE BUILD A BARRACKS CHALLENGE

FINANCE MANAGER

YOUR ROLE

- Your job is to work out how much everything your team wants to include in the barracks' costs.
- You will need to know the costs of the land, the roads and each building included on the Designer's plan.
- Your team won't win if you propose to spend more than the £250m budget.
- You will need to talk to the Designer and the Team Leader if you need to reduce or increase the number of buildings or other facilities.
- You must produce a spreadsheet as part of the presentation. This needs to show how you have arrived at your costs. You can assume that all your costs include labour.
- You will need to set aside 5–10% of your total budget as a contingency fund.

WARNING – CONTINGENCY FUND

Building always costs more than you bargained for and you'll need some money to cope with unforeseen circumstances. This is called a contingency fund. Decide how much money you will put aside. This should be somewhere between 5 and 10% of the total.

USE THE SQUARED PAPER PROVIDED FOR YOUR CALCULATIONS, THEN CREATE A TABLE OF COSTS TO KEEP TRACK OF YOUR SPENDING

Remember: To calculate the cost of your buildings, you need to calculate the area in square metres (length x breadth) and multiply the area by the cost per square metre.

THE BUILD A BARRACKS CHALLENGE

BUILDINGS – COSTS LIST

Barracks for 545 single soldiers and officers and 55 families. All costs include materials and labour.

Buildings Type	Size	Cost
ACCOMMODATION		
One family house or accommodation for two soldiers	10m x 10m	£200,000/unit
SPORTING		
Gym	25m x 50m	£10,000/m ²
Running track	400m	£20,000/10m
Obstacle course	50m x 50m	£500/m ²
** Sports field	200m x 100m	£200/m ²
Olympic size swimming pool	25m x 50m	£10,000/m ²
** EDUCATION CENTRE	15m x 15m	£10,000/m ²
** GUARD ROOM	10m x 10m	£7,500/m ²
** PLACE OF WORSHIP	15m x 15m	£7,500/m ²
WELFARE FACILITIES		
** Medical centre	10m x 15m	£12,000/m ²
** Crèche	15m x 15m	£7,500/m ²
** Small shop	15m x 15m	£7,500/m ²
** Hairdressers	10m x 5m	£7,500/m ²
RECREATIONAL FACILITIES		
** Cook house/canteen	20m x 20m	£10,000/m ²
** Sergeants' and officers' mess	30m x 30m	£8,000/m ²
** Social hub	15m x 15m	£8,000/m ²
TECHNICAL/MAINTENANCE		
Workshops	100m x 50m	£5,000/m ²
Vehicle garages/warehouse/store	50m x 50m	£3,000/m ²
Aircraft hangars/flight simulator	50m x 50m	£3,500/m ²
Armoury	10m x 10m	£7,500/m ²
Offices	50m x 50m	£7,500/m ²
Parade square/helicopter launch pad/car park	50m x 50m	£500/m ²
Fuel point	20m x 20m	£6,000/m ²
TRANSPORT LINKS		
Car park with CCTV	50m x 50m	£600/m ²
Roads		£20,000/10m
Cycle way		£10,000/10m
TOTAL COST OF LAND	See map	

To save space on your ground plan you may decide to make buildings more than one storey high.

Calculate the cost of building second and third storeys in the same way.

** You can choose to make these buildings larger or smaller.

THE BUILD A BARRACKS CHALLENGE

FINANCE MANAGER'S CHECKLIST

- **HAVE YOU KEPT THE COSTS WITHIN THE BUDGET OF £250M?**
- **HOW MUCH HAVE YOU PUT ASIDE IN YOUR CONTINGENCY FUND?**
- **WHICH BUILDINGS HAVE YOU SPENT THE MOST MONEY ON AND WHY?**

MARKING CRITERIA

Your role will be assessed by the following criteria.

For top marks, make sure you have:





- kept the final costs under the budget and clearly shown this on a spreadsheet; high points will be awarded if you have kept under the budget and within £20 million of the target £250 million
- included a contingency fund (should be between 5 and 10%)
- presented your ideas well by speaking clearly and showing well-considered reasons for your choices explained any issues that arose where changes to costs had to be made (if a finance Wild Card was given).

THE BUILD A BARRACKS CHALLENGE

SELF-EVALUATION

Tick the box you think reflects your performance (1 = poor, 4 = excellent)

How well do you think you performed...

	 1	 2	 3	 4
in your role?				
as a group?				
in delivering your presentation?				

What do you think was the best thing you contributed during the challenge?

.....

.....

.....

What do you think you could have done better during the challenge?

.....

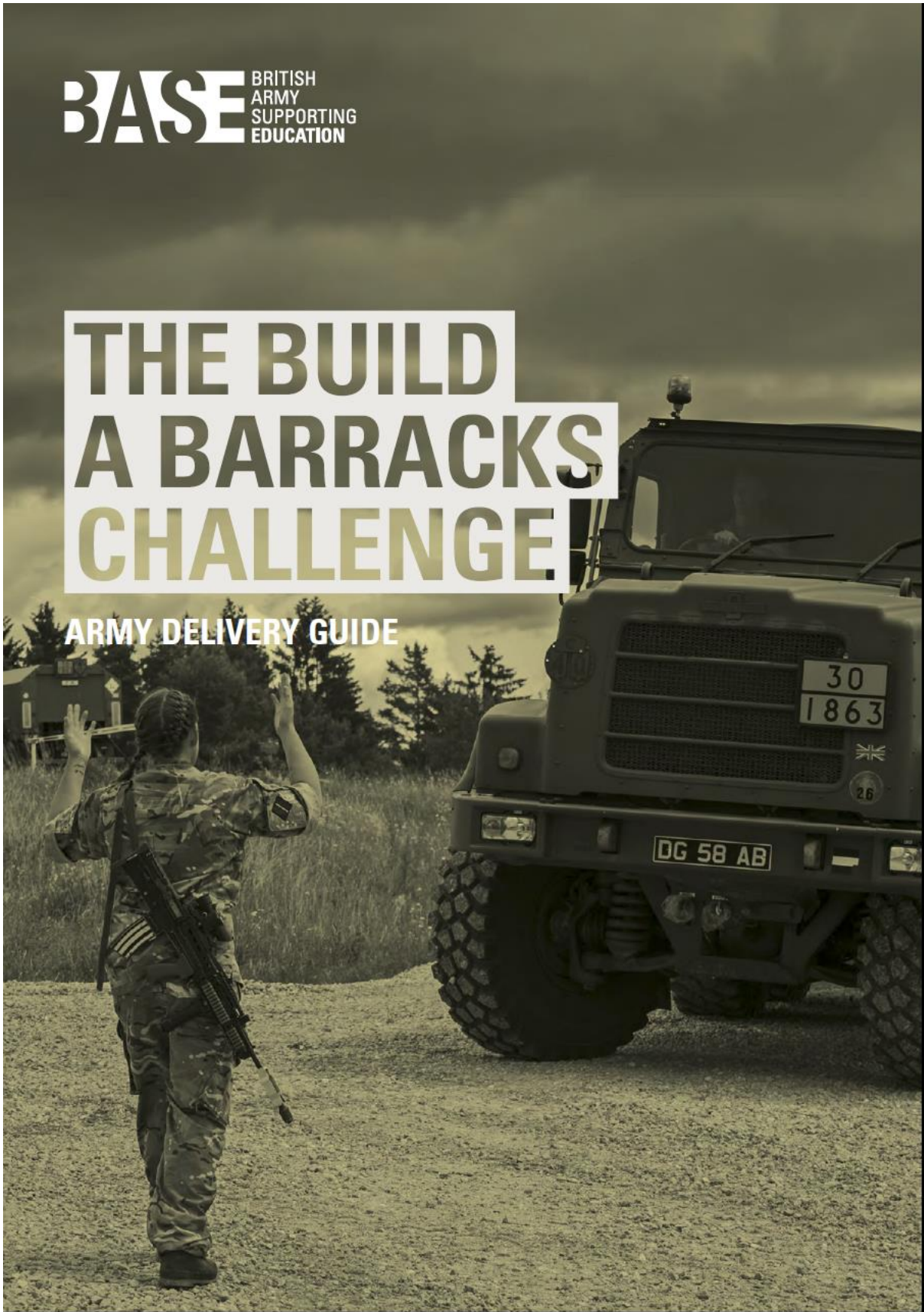
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THE BUILD A BARRACKS CHALLENGE

ARMY DELIVERY GUIDE



THE BUILD A BARRACKS CHALLENGE

THE BUILD A BARRACKS CHALLENGE HAS BEEN DEVELOPED FOR THE ARMY TO DELIVER IN SCHOOLS WITH STUDENTS AGED 14+, TO BOOST STUDENTS' ENTERPRISE, EMPLOYABILITY AND INTERPERSONAL SKILLS. THE CHALLENGE INVOLVES STUDENTS WORKING IN SMALL TEAMS TO TENDER TO BUILD A NEW ARMY BARRACKS SOMEWHERE IN THE UK.

THE ROLE OF THE ARMY REPRESENTATIVE ON THE DAY IS TO SET UP THE CHALLENGE AND ASSIST THE TEAMS WITH THEIR TASKS, AS WELL AS TO CONVEY AS MUCH INFORMATION AS POSSIBLE ABOUT A CAREER IN THE ARMY, IN ORDER TO BRING THE MATERIALS TO LIFE FOR STUDENTS.

THE BUILD A BARRACKS CHALLENGE

The overall aim of the Build a Barracks Challenge is to teach students the skills needed to deal with uncertainty and respond positively to change.

The buzz words are:

- Innovation
- Creativity
- Risk management
- A 'can-do' attitude
- The drive to make things happen.

Key skills that will be developed are:

- Enterprise capability – responding to change and implementing new ideas
- Financial literacy – understanding how money works and managing a budget
- Economic and business understanding – understanding how businesses work
- Interpersonal skills – being able to communicate well with others.

Taking part in the Build a Barracks Challenge will involve four stages:

1. Understanding the task and solving problems
2. Planning
3. Putting the plan into practice
4. Evaluating the process.

NOTE:

The Build a Barracks Challenge is particularly designed for students aged between 14 and 16 years. However, your local Army representative may arrange for the activity to be delivered in further education colleges, 6th forms or to Key Stage 3 students.

The maximum number of students you should work with in a day on this challenge is 60.

There should be at least one teacher working with you all day – preferably two. In schools where a large number of the students don't speak English as their first language there needs to be at least two teachers working with you all day.

The challenge is designed to run for a whole school day. You will need a minimum of four hours (excluding a lunch break).

The students will have been put into their groups before the challenge begins.

THE BUILD A BARRACKS CHALLENGE

BACKGROUND

Students should work in teams of between four and seven people. Each team is a design and construction company specialising in building for the Armed Forces.

They have been invited by the Army to present a proposal for building a brand new Army barracks. They can choose to build the barracks in one of five different locations around the United Kingdom.

The teams will be competing against each other. The company with the best ideas and who can produce the best designs within the budget will win the contract.

THE BRIEF

The Army wishes to build a new state-of-the-art barracks to increase its combat capability. We are looking to commission proposals for the design and build of a new barracks which will house 600 soldiers from any of the following:

- Royal Electrical and Mechanical Engineers
- Royal Logistic Corps
- Royal Corps of Signals
- Army Air Corps.

There are five possible locations for the barracks and the exact location is still to be decided. Consideration of best value for money will be a key part of the successful company's proposals. Land values will clearly be a major consideration.

The new barracks will need to house a total of 600 soldiers. This includes accommodation for 55 families and single living accommodation (SLA) for 545 soldiers and officers.

The maximum budget is £250 million and the successful company will come in close to that budget and make the best use of the money.

Each member of the team takes on a role:

- Team Leader (one student)
- Designer (one or two students)
- Finance Manager (one or two students)
- Public Relations Manager (one or two students).

In teams larger than four, students should work with a partner. There should only be one Team Leader.

REQUIRED MATERIALS

Display materials

- Barrack type cards
- Building price list
- Location maps
- UK map

Student materials

- Team Leader information
- Finance Manager information
- Designer information
- Public Relations Manager
- Self-evaluation sheet
- Team role quiz
- Question sheets (only necessary if you are not holding Team Leader briefings)
- Final spreadsheets (only necessary if students require a template to work from)

Other materials

- Certificate
- Marker's assessment sheet – during the challenge
- Marker's assessment sheet – during the presentation
- Wild Cards
- 30cm rulers
- 1cm squared paper
- Calculators
- Scissors
- Blue tack
- Marker pens

THE BUILD A BARRACKS CHALLENGE

BEFORE THE DAY

The Army representative should:

1. Check that the school is prepared. The teachers should have sorted out the teams and the team roles, using the team role quiz on the day of the challenge.
2. Check with the school beforehand that they have allocated a large space for the day, two teachers to support you and any teaching assistants that may be needed to support students with additional needs. Also ensure that the space has the audio and tech capabilities to show a short film.
3. Confirm how many students will be taking part on the day.
4. Check you have enough print materials and stationery.
5. Decide whether or not you are going to hold Team Leader briefings or not. If not, then make sure to bring enough question sheets for one per group.
6. Decide whether you are going to provide final spreadsheets as a template for Finance Manager calculations (alternatively teams should be encouraged to create their own spreadsheets). The school will be able to give you guidance on whether this is necessary. If you do require them then make sure to bring enough final spreadsheets for one per group.
4. When students arrive, introduce yourselves and establish classroom management. Each Army representative should give their first name, explain what corps/regiment they are from and describe a couple of their career highlights.
5. Introduce the Build a Barracks Challenge, give students a bit of background and then play the introductory film.
6. Explain the brief to the students and check whether there are any questions.
7. Give out the student materials. Teams read their own team roles, then read out their roles to each other. Who are the:
 - Team Leaders
 - Finance Managers
 - Designers
 - Public Relations Managers?
8. Check that they understand what they have to do.
9. Show the large map of the UK. Point out where the large location maps are around the room and explain in brief what each location is like.
10. Show the plan of the completed Inverness site. Point out:
 - Where the living accommodation is
 - Where the workshops/hangars are
 - Any interesting points about how it has been planned.

ON THE DAY

Read the step-by-step guide below on how to deliver the challenge. These steps should take you half an hour.

1. Arrive early and set out the space for the day, this will be your 'Command Centre'. Tables and chairs should be arranged so that teams can sit around table(s) which fit the large location maps. Make early contact with the teacher with whom you have been liaising to check numbers, any likely issues and matters of 'housekeeping' such as times of breaks and lunch.
2. Display the following materials on the wall:
 - Large map of the UK showing five locations
 - Example completed design for Inverness
 - Large price list.
 - Location mapsIf you don't have enough wall space, lay out one of each of the five large location maps on tables around the room.
3. Place the following on each table:
Pens/pencils, rulers, calculator, squared paper, scissors, card.
11. Show the buildings price list. Show the link between this list and some of the buildings on the Inverness site.
12. Remind them that the Team Leaders will also have to accept two Wild Card challenges during the day.
13. Explain how students can win. Talk them through how you will be scoring them so that they know what they are aiming for. Remind them it's not about building the cheapest barracks.
14. Check that everyone understands what to do and then set the teams off.

During your explanation of the challenge make sure:

- all teams have team names
- all teams have barrack cards
- everyone understands what a contingency fund is.

THE BUILD A BARRACKS CHALLENGE

TEAM TASKS RUNNING ORDER

1. Team Leaders check their materials to ensure they know what the group and individual tasks are. They must pay particular attention to the maps, plans and locations so they can make sensible decisions about where to build their specialist barracks.	10 mins
2. The team decides on a location. Before making a final decision they should answer the questions on the questions sheet or that you will give during the Team Leader briefings (see page 12). Once they have decided, they visit Command Centre to obtain a large map of their chosen location. The Team Leader needs to hand in their first checklist.	20 mins
3. The team chooses their buildings.	20 mins
4. The team agrees the contingency fund.	5 mins
5. The team work on role-specific tasks, make sure you hand out a wild card some time during this time.	60 mins
6. Team review meetings	10 mins
LUNCH	
7. Team meeting	10 mins
8. Final presentations (could split the group into two locations) Note: five minutes per presentation should be taken as a guideline, if more time is available or if you have low numbers of students, you may want to increase this to ten minutes.	5 mins each team
9. Army debrief	10 mins

Somewhere in the hall you might want to write down the general timings that the teams will be working to somewhere in the hall so they can all see them during the day.

CONTINGENCY FUND

A contingency fund is to cover unexpected costs such as higher than expected labour costs, demands for more facilities etc. The contingency fund should be between 5 and 10%.

THE BUILD A BARRACKS CHALLENGE

WILD CARDS

The teams can win bonus points for responding to Wild Card challenges. Decide with your fellow Army representatives when you will blow the whistle to announce a Wild Card challenge. You should issue one challenge in the morning and one in the afternoon.

YOUR ROLE DURING THE CHALLENGE TASKS

Along with the teachers who will be working with you during the day, your chief role is to support the teams with completing their tasks on time and to complete an assessment sheet for each team.

- Make sure the Team Leader is keeping track of progress, noting down the points that will need to be included in the final presentation and completing their checklists.
- The Designers may need your input on the types of storage and garage facilities they'll need and how big the vehicles etc. are. Make sure they understand the scale of the maps (1cm = 10m).
- Encourage the Finance Managers to keep a note of their workings out, and to use the calculator supplied to check their figures. Ensure they understand how to calculate

building costs from the cost per square metre (i.e. length x breadth x cost per square metre). They may also need help with filling out the spreadsheet.

- If you see good examples of teamwork, support for each other or excellent problem solving, award bonus points and make sure all the other students can hear you praising that person, so that they are all encouraged to work well together.
- One Army representative should be in charge of timekeeping, giving five minute warnings prior to the end of each task.
- If you have decided to hold Team Leader briefings then make sure to call all Team Leaders together at three points during the day; recommended timings and questions to ask are provided at the end of this guide. If you are not holding briefings then remind Team Leaders to fill in the question sheet to help with their planning.

THE BUILD A BARRACKS CHALLENGE

GOOD THINGS TO SAY...

...AS THE TEAMS ARE WORKING

Encourage the students to think things through logically. For example ask them:

- Would you put workshops or aircraft hangars next to the living accommodation?
- Will the officers live in the same buildings as private soldiers?
- What facilities are close by in the nearest town? Does that affect what you build?
- What will your barracks have that is new to the area, e.g. a swimming pool, obstacle course, gym?
- How could you save space (by building upwards)?

...TO THE TEAM LEADERS

- Remind them that they should be planning the final presentation.
- Do they know what everyone is doing at the moment?
- Have they made all the decisions they need to make as a team?
- Can they explain why they have chosen this particular location?

...TO THE FINANCE MANAGERS

- Have they decided how much of the budget to put aside as a contingency fund? The contingency fund should be between 5 and 10%.

...TO THE DESIGNERS

- Have they tried out their designs by cutting out shapes and moving them around before completing their drawing?
- Are they working towards their final outline plan?
- Have they told the Finance Managers how big the buildings are so they can work out how much they will cost?
- What is the special/best thing about their design?

...TO THE PUBLIC RELATIONS MANAGERS

- Have they read the background information about the area on their map?
- Have they read the sample press release which is in their packs?
- Have they talked to the rest of the team about what will be special about the new barracks – and what might make a good news story? Have they thought about how they would answer the questions on the checklist?

...TO ALL THE STUDENTS

- Remind them that they should fill in their checklists as these will help them to work out what to say during their final presentation.

THE BUILD A BARRACKS CHALLENGE

JUDGING THE TEAMS

The best way to judge the teams is to have a judging panel made up of Army representatives, teachers and/or others.

In order to ensure continuity of judging the panel should see all the teams' five minute presentations.

Once you have discussed who the winning team is, congratulate all the students for their teamwork and effort. Present all participating students with their certificates and hold a Q&A session with them in case they have any questions about the Army.

SCORING

- Marker's assessment sheet – during the challenge: this should be used during the course of the day to keep track of each team's progress.
- Marker's assessment sheet - during the presentation: this should be used to score each individual/team at the presentation stage.

Before or during the presentation, you should have sight of:

- Designed barracks
- Finance spreadsheet
- Team Leader's checklists
- Press release and interview questions.

The winning team will have come in on – or just under – budget.

They will also have put aside somewhere between 5 and 10% of the budget as a contingency fund to cover any unexpected costs such as increased labour charges.

You should be looking out for whether teams successfully completed their two Wild Card challenges.

You are not looking for brilliant design – the students will only be able to produce outline plans and put buildings in sensible places.

The Team Leader will be able to explain clearly why their team chose that particular location (e.g. facilities that already exist in the local area, price of land, suitability for local residents).

The Designers will be able to explain why they have decided to include particular buildings and the reasons why they should be built in a certain position on the site (e.g. roadways, shops, sports facilities).

The Finance Manager will have completed a spreadsheet showing a breakdown of costs for e.g. purchasing the land, putting in roads and buildings etc. If a team is over budget they can't win the challenge.

You will also want to give points for examples of good teamwork, for taking the initiative or being supportive etc.

After the presentations, the Army representatives and teachers should discuss their observations and scores in order to decide on a winning team.

EVALUATION

At the end of the day, ensure all students complete the self-evaluation sheet and hand it in to the Army representative or teacher.

THE BUILD A BARRACKS CHALLENGE

INVERNESS EXAMPLE – COSTS

Buildings Price List	Size	Cost	Totals
ACCOMMODATION 1 family house or accommodation for two soldiers	10m x 10m	£200,000/unit	55 family units: £11,000,000 546 SLA (one extra room): £54,600,000
SPORTING			
Gym	25m x 50m	£10,000/m ²	£12,500,000
Running track	400m	£20,000/10m	n/a
Obstacle course	50m x 50m	£500/m ²	£1,250,000
** Sports field	200m x 100m	£200/m ²	£4,000,000
Olympic size swimming pool	25m x 50m	£10,000/m ²	£12,500,000
** EDUCATION CENTRE	15m x 15m	£10,000/m ²	n/a
** GUARD ROOM	10m x 10m	£7,500/m ²	£750,000
** PLACE OF WORSHIP	15m x 15m	£7,500/m ²	n/a
WELFARE FACILITIES			
** Medical centre	10m x 15m	£12,000/m ²	£1,800,000
** Crèche	15m x 15m	£7,500/m ²	£1,687,500
** Small shop	15m x 15m	£7,500/m ²	£1,687,500
** Hairdressers	10m x 5m	£7,500/m ²	n/a
RECREATIONAL FACILITIES			
** Cook house/canteen	20m x 20m	£10,000/m ²	£4,000,000
** Sergeants' and officers' mess	30m x 30m	£8,000/m ²	£7,200,000
** Social hub	15m x 15m	£8,000/m ²	£1,800,000
TECHNICAL/MAINTENANCE			
Workshops	100m x 50m	£5,000/m ²	(1) £25,000,000
Vehicle garages/warehouse/store	50m x 50m	£3,000/m ²	(4) £30,000,000
Aircraft hangars/flight simulator	50m x 50m	£3,500/m ²	n/a
Armoury	10m x 10m	£7,500/m ²	£750,000
Offices	50m x 50m	£7,500/m ²	£18,750,000
Parade square/helicopter launch pad/car park	50m x 50m	£500/m ²	£1,250,000
Fuel point	20m x 20m	£6,000/m ²	£2,400,000
TRANSPORT LINKS			
Car park with CCTV	50m x 50m	£600/m ²	£1,500,000
Roads		£20,000/10m	(1km) £2,000,000
Cycle way		£10,000/10m	n/a
LAND COST			£3,000,000
NB: These figures are for Army representative eyes only and are based on buildings drawn in sketch map on Inverness site. ** You can choose to make these buildings larger or smaller.			TOTAL £199,425,000 CONTINGENCY 10%: £25,000,000 GRAND TOTAL: £224,425,000

THE BUILD A BARRACKS CHALLENGE

LAND VALUES

Location	Price per Hectare	Area in Hectares	Total Land Cost
SALISBURY PLAIN	£170,000	20	£3,400,000
CATTERICK	£150,000	15	£2,250,000
BRECON BEACONS	£120,000	20	£2,400,000
COLCHESTER	£160,000	10	£1,600,000
INVERNESS	£100,000	30	£3,000,000

STANDARD BUILDING COSTS

NB: Costs based on standard sized buildings and facilities. Students may make the buildings with asterisks larger or smaller, in which case standard costs will not apply.

Some plans will also require more than one of each building.

Buildings	Size	Cost	Totals
55 x family house	10m x 10m	£200,000 per unit	£11,000,000
273 x accommodation for single soldiers x 545	10m x 10m	£200,000 per unit	£54,600,000
Gym	25m x 50m	£10,000/m ²	£12,500,000
Running track	400m	£20,000/10m	£800,000
Obstacle course	50m x 50m	£500/m ²	£1,250,000
* Sports field	200m x 100m	£200/m ²	£4,000,000
Olympic sized swimming pool	25m x 50m	£10,000/m ²	£12,500,000
* Education centre	15m x 15m	£10,000/m ²	£2,250,000
* Guard room	10m x 10m	£7,500/m ²	£750,000
* Place of worship	15m x 15m	£7,500/m ²	£1,687,500
* Medical centre	10m x 15m	£12,000/m ²	£1,800,000
* Crèche	15m x 15m	£7,500/m ²	£1,687,500
* Small shop	15m x 15m	£7,500/m ²	£1,687,500
* Hairdressers	10m x 5m	£7,500/m ²	£375,000
* Cook house/canteen	20m x 20m	£10,000/m ²	£4,000,000
* Sergeants' and officers' mess	30m x 30m	£8,000/m ²	£7,200,000
* Social hub	15m x 15m	£8,000/m ²	£1,800,000
Workshops	100m x 50m	£5,000/m ²	£25,000,000 per workshop
Vehicle garages/warehouse/store	50m x 50m	£3,000/m ²	£7,500,000 per garage
Aircraft hangar/flight simulator	50m x 50m	£3,500/m ²	£8,750,000 per hangar
Armoury	10m x 10m	£7,500/m ²	£750,000
Offices	50m x 50m	£7,500/m ²	£18,750,000
Parade square/helicopter launch pad/car park	50m x 50m	£500/m ²	£1,250,000
Fuel point	20m x 20m	£6,000/m ²	£2,400,000
Car park with CCTV	50m x 50m	£600/m ²	£1,500,000

THE BUILD A BARRACKS CHALLENGE

TEAM LEADER BRIEFING NOTES

If you decide to hold Team Leader briefings throughout the day then use the information below for guidance on timings and questions to ask. When the briefing is called make sure to ask Team Leaders to bring their note pads/spare paper and inform them that they will need to take notes of the questions you'll be asking. Answering these questions will help their preparation for the final presentations as well as with their organisation.

Brief one: Deciding on a location

Timing: Before teams choose their locations

Before teams make their final decision, make sure they have considered the following points.

Questions to ask:

1. What are the specialist requirements for your barracks e.g. hangars and engineering workshops?
 2. How much does land cost in different parts of the country?
 3. How much family accommodation and how much single living accommodation will you need to build?
 4. Which existing facilities, such as schools and shopping facilities, will be useful to your barracks?
 5. What other issues might you need to think about?
- Also inform them they will need to put aside 5–10% of their total budget as a contingency fund. You might need to explain what a contingency fund is.

A contingency fund is a pot of money set aside to use in case of unforeseen circumstances which might increase total building costs. 5–10% is a safe amount to set aside for this purpose.

Brief two: Initial plans

Timing: At the beginning of the role tasks

Questions to ask:

1. Have you written down the names and roles of all your team members?
2. What type of barracks have you been asked to work on?
3. Where will your barracks be built?

4. What are the team's ideas about the sorts of buildings to include?
5. Why do you need a contingency fund?
6. What do you consider to be the major strengths of the team so far?

Brief three: Team task list

Timing: After lunch break, before the afternoon team meeting

This brief is for Team Leaders to make sure each team member is aware of what they will need to prepare for the presentations.

Question to ask:

Have you assigned a team member to each of the following tasks?

- Reasons why you chose a particular country
- Reasons why you chose particular buildings
- A scale drawing of the proposals
- Spreadsheet showing detailed costs
- A sample press release
- A list of questions and answers in preparation for a TV interview
- A plan for your final presentation
- Wild Card challenges completed

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THE BUILD A BARRACKS CHALLENGE

DESIGNER INFORMATION



THE BUILD A BARRACKS CHALLENGE

DESIGNER

YOUR ROLE

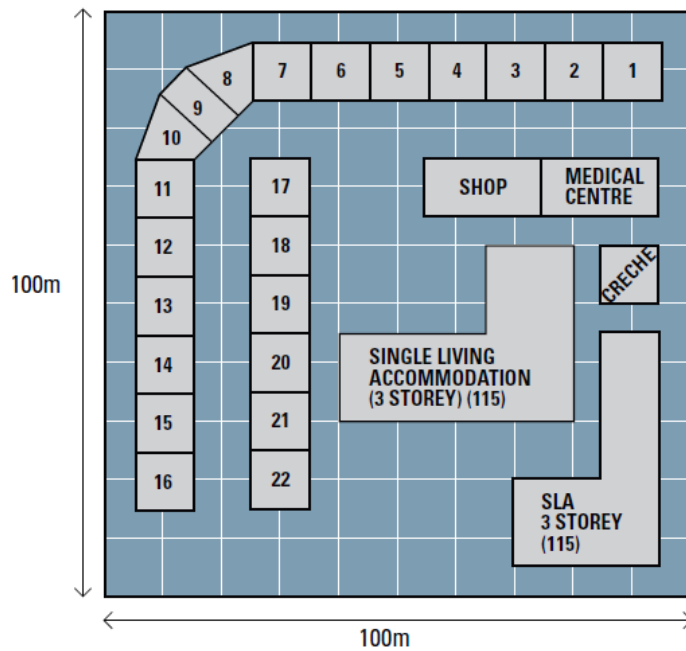
- Your first job is to plan the infrastructure. Which roads will you need? Where will they be in relation to the buildings?
- You also have to work out where each of the buildings your team has agreed to include should go. Where would be the best place for the gym or education block for example?
- You must then make a scaled, labelled drawing of your design for the barracks. You should mark in roads, entrances and exits.
- Before attempting your scale drawing ask the Command Centre for the large scale plan showing your chosen location. Make sure you know what a hectare looks like. It's a good idea to decide on the buildings you want to include and cut out their shapes from paper and place them on the big plan. Try and do this to scale. This will make your final drawing easier.



THE BUILD A BARRACKS CHALLENGE

SAMPLE PLAN

SKETCH PLAN SHOWING USE OF 1 HECTARE



EXAMPLE COSTS (APPROX.)

Small shop*

20m x 10m @ £7,500/m²
= £1,500,000

Family housing

22 @ £200,000/unit
= £4,400,000

Medical centre*

20m x 10m @ £12,000/m²
= £2,400,000

Single living accommodation (SLA) for 230 soldiers

115 units @ £200,000
= £23,000,000

Crèche*

10m x 10m @ £7,500/m²
= £750,000

* This Designer has chosen to make items larger or smaller than standard.

THE BUILD A BARRACKS CHALLENGE

Before you draw your final design, you might want to cut out some shapes with these dimensions to plan where the buildings and facilities should go.



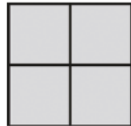
10m x 10m (e.g. 1 house or medical centre)



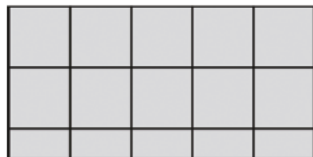
10 houses or 20 single living accommodation (SLA)



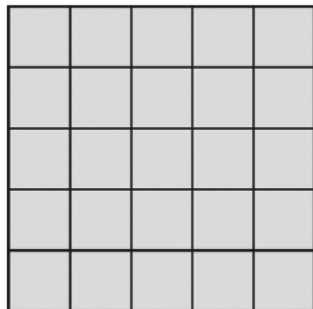
15m² (e.g. crèche)



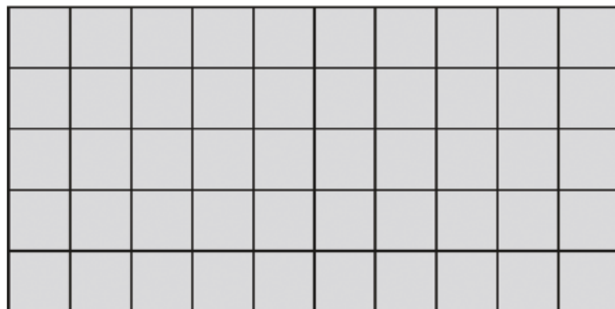
20m² (e.g. canteen)



50m x 25m (e.g. swimming pool)



50m² (e.g. obstacle course)



100m x 50m (e.g. workshop)

THE BUILD A BARRACKS CHALLENGE

DESIGNER'S CHECKLIST

- **WHAT KINDS OF THINGS DID YOU TAKE INTO CONSIDERATION WHEN YOU WERE PLANNING WHERE THE BUILDINGS SHOULD GO?**
- **HAVE YOU MADE SEPARATE AREAS FOR FAMILIES AND SINGLE SOLDIERS?**
- **HOW WILL PEOPLE AND VEHICLES MOVE AROUND YOUR NEW BARRACKS?**
- **WHAT DO YOU THINK IS THE BEST THING ABOUT YOUR DESIGN?**



THE BUILD A BARRACKS CHALLENGE

MARKING CRITERIA

Your role will be assessed by the following criteria.

For top marks, make sure you have:

- provided facilities that aren't available close by
- provided living areas separate to work areas
- included adequate roadways and linked the base to a major road
- included all required buildings for the barrack type
- completed an accurate scale drawing of the barracks
- presented your ideas well by speaking clearly and showing well-considered reasons for your choices explained any issues that arose where changes to design had to be made (if a design Wild Card was given).

THE BUILD A BARRACKS CHALLENGE

TEAM ROLE QUIZ

Have a go at this quiz to find out which team role would suit you best. When you've answered all the questions, turn over to find your ideal role.

1. *You and your mates decide to go on a weekend trip away. What do you prefer to do?*

- Plan every detail in advance
- Make an overall plan and decide if you can afford it
- Make a list of all the 'must-do' activities
- Research the area on the internet

2. *You have volunteered to do all the food shopping for the trip. Which of the following fits you best?*

- You keep a rough tally of the cost in your head as you put the goods in the trolley
- You make a detailed list of everything you need to buy
- You make a rough list to jog your memory
- You buy the essentials first and then add a few luxury items

3. *You are having a party at your house and you want to make sure that everyone knows how to get there. Some people are travelling from other areas. How would you give them directions?*

- Draw a detailed map that shows things like roundabouts
- Provide a printed map from Google maps with street names and written instructions
- Call or message everyone and tell them how to get there
- Send directions including timetables and fares for public transport and estimated travelling times

4. *Which set of words best describes you?*

- Realistic, enthusiastic and reliable
- Inventive, imaginative and original
- Creative, friendly and thorough
- Practical, dynamic and decisive

5. *You and your mates have decided to put on a gig to raise money for charity. The following jobs need doing; which one would you do best?*

- Sending out the fliers and posters, contacting the local media
- Being in charge of ticket sales
- Making sure the stage, lighting and sound system are all in place
- Making sure the bands, front-of-house crew, and back stage crew have everything that they need

6. *Which of these words describes you best?*

- Realistic
- Efficient
- Imaginative
- Visionary

7. *It's the end of term and you decide to go out in a group and celebrate. No one is sure what to do. How would you react?*

- You would find out what's going on that night and let everyone know
- You would find out how much everyone wants to spend
- You would get everyone together, talk it through, and suggest a vote on the most popular option
- You would like to try something new as long as everyone else was in agreement

THE BUILD A BARRACKS CHALLENGE

8. A new football club is recruiting staff. Which job do you think you would apply for?

- Company accountant
- Manager
- Coach
- Media liaison, spokesperson

9. You have won a book token. Which of the following books would you be most likely to choose?

- How things work
- My life in TV
- The life and times of Richard Branson
- How to make your first million

10. You have the chance to be on a reality TV show. Which one would you choose?

- Crusoe: Surviving on a desert island
- Scrapheap Buster: making an all-terrain vehicle out of a set of items
- Name it: A quiz show which you can win on the basis of your talent and wit
- Bulls & Bears: A show where you are the first to make £50,000 by playing the stock market

ANSWERS

YOU SCORED MOSTLY CIRCLES

You are well organised. You like to plan ahead and take notice of even the smallest details. You are confident and don't mind speaking on behalf of your team. You make an effort to listen to others and encourage them to work together as a team.

YOU COULD BE A GOOD TEAM LEADER

YOU SCORED MOSTLY TRIANGLES

You have a good grasp of practical issues. You are able to work with plans and scale drawings. You have vision and can imagine how an area might look in reality, even when it is at the draft stage.

YOU COULD BE A GOOD DESIGNER

YOU SCORED MOSTLY SQUARES

You like working with numbers and making calculations. You have a common-sense attitude to estimating costs. You see the value in keeping accurate records. You have a good eye for detail.

YOU COULD BE A GOOD FINANCE MANAGER

YOU SCORED MOSTLY DIAMONDS

You like to research and have all the relevant facts at your fingertips. You are good at communicating ideas in writing, and by talking to other people. You like to learn and to discuss your ideas with others. You are usually enthusiastic about everything you do. You are also a good listener.

YOU COULD BE A GOOD PUBLIC RELATIONS MANAGER

If more than one person is suited to the same role then hold a group discussion to decide who should take on the role. Remember: You need at least one person assigned to each team role.



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THE BUILD A BARRACKS CHALLENGE

TEAM LEADER INFORMATION

THE BUILD A BARRACKS CHALLENGE

HIGHLY CONFIDENTIAL

THE BRIEF

You are a design and construction company specialising in building for the Armed Forces.

You have been invited by the Army to present a proposal for building a brand new Army barracks. You can choose to build the barracks in one of five different locations around the United Kingdom.

You will be competing against other companies. The company which presents the best ideas at the end of the day and which can work best with the budget will win the contract.

The specifications:

- The Army wishes to build a new, state-of-the-art barracks to increase its combat capability. We are looking to commission proposals for the design and build of a new barracks which will house 600 soldiers.
- The exact location of the new barracks is still to be decided. Consideration of best value for money will be a key part of the successful company's proposals.
- The new barracks will need to house a total of 600 soldiers. This includes accommodation for 55 families as well as single living accommodation for 545 soldiers and officers.
- The maximum budget is £250 million.
- This document must be treated with the highest level of confidentiality and the details must not, under any circumstances, be disclosed to any other party.



THE BUILD A BARRACKS CHALLENGE

TEAM LEADER

YOUR ROLE

- Your main task is to coordinate the team's work, and to make sure the final presentation that you are required to make to the Army is well structured.
- Your job is not to stand around giving orders, but to help, support and encourage your team as they work through their jobs. You'll need to be a good 'multi-tasker' and well organised.
- Other members of your team may need your help, so you need to know what's going on all the time.
- As you and your team work through the tasks, you can also earn extra points by responding to Wild Card challenges which can be issued at any time by the Command Centre. You should decide who in your team should work on the challenges. You have 20 minutes to respond to each.
- At the same time, you should (from the beginning) be working towards your presentation.
- Start by making a list of the things you need to include in your presentation and check that someone is taking responsibility for each of them.
- You may want to set deadlines for each task to make sure you finish on time.



THE BUILD A BARRACKS CHALLENGE

TEAM RESPONSIBILITIES

YOUR TEAM

In your team you have:

- Designers
- Finance Managers
- Public Relations Managers.

PUBLIC RELATIONS MANAGER

- This is an important job because wherever you decide to build the new barracks, the local people and the media will have something to say about it.
- The most important job of the Public Relations Manager is to demonstrate how they would present the barracks in a positive light to local people and the press.
- Press releases giving good news are essential and your presentation should include an example.
- They will also need to prepare a list of questions they think are likely to be asked during a live TV interview and how they would respond.
- They will need to know what sorts of buildings and facilities the Designers are planning so that they can report accurately.

DESIGNER

- They will work out what sort of buildings to include on the barracks and where these buildings should go.
- They must produce a labelled, scale drawing of the layout of the new barracks which should include roads and access areas.

FINANCE MANAGER

- This person has to price up the job and make sure your team's proposals are achievable within the budget of £250 million.
- Costs must include the price of the land on which the barracks will be built and the cost of buildings and roads and should allow for a contingency.

WARNING – CONTINGENCY FUND

Building always costs more than you bargained for and you'll need some money to cope with unforeseen circumstances. This is called a contingency fund. Your Finance Manager should decide how much money you will put aside. This should be somewhere between 5 and 10% of the total.



THE BUILD A BARRACKS CHALLENGE

PRESENTATIONS

At the end of the day, your team will need to pitch your barracks to the Army. The presentations should be no more than five minutes per team. Each member of your team will be expected to talk about their role and the decisions they made.

THE TEAM LEADER...

needs to explain what type of barracks you had, why your team chose your location (facilities that already exist in the local area, price of land, suitability for local residents etc.) and other key decisions.

A full list of marking criteria for your role has been provided on the last page of this booklet.

THE PUBLIC RELATIONS MANAGER...

must be able to explain what potential issues the locals and media might have with the location of the barracks, and explain briefly what their press release contained.

A full list of marking criteria for this role has been provided on the last page of the Public Relations booklet.

THE DESIGNER...

must explain why they have decided to include particular constructions (roads, shops, sports facilities etc.) and the reasons why they should be built in a certain position on the site.

A full list of marking criteria for this role has been provided on the last page of the Designer's booklet.

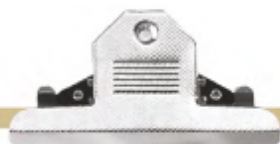
THE FINANCE MANAGER...

will have completed a spreadsheet showing a breakdown of costs for purchasing the land, putting in roads, buildings etc. They must briefly discuss this, and talk about their contingency fund.

A full list of marking criteria for this role has been provided on the last page of the Finance Manager's booklet.



THE BUILD A BARRACKS CHALLENGE



TEAM TASKS RUNNING ORDER

MORNING

1. Check your team materials and make sure you know what the group and individual tasks are. You'll need to pay particular attention to the maps, plans and locations so you can make sensible decisions about where to build your specialist barracks.	10 mins
2. Agree as a team where you will build your barracks and why. You will need to study the plans showing different locations first. Once you've decided, ask at the Command Centre for the large map of your chosen location.	20 mins
3. Agree as a team which buildings to include and why.	20 mins
4. Agree what percentage of the £250m budget you will put into the contingency fund.	5 mins
5. Role tasks – these are explained in each booklet.	60 mins
6. Team meeting to review progress.	10 mins

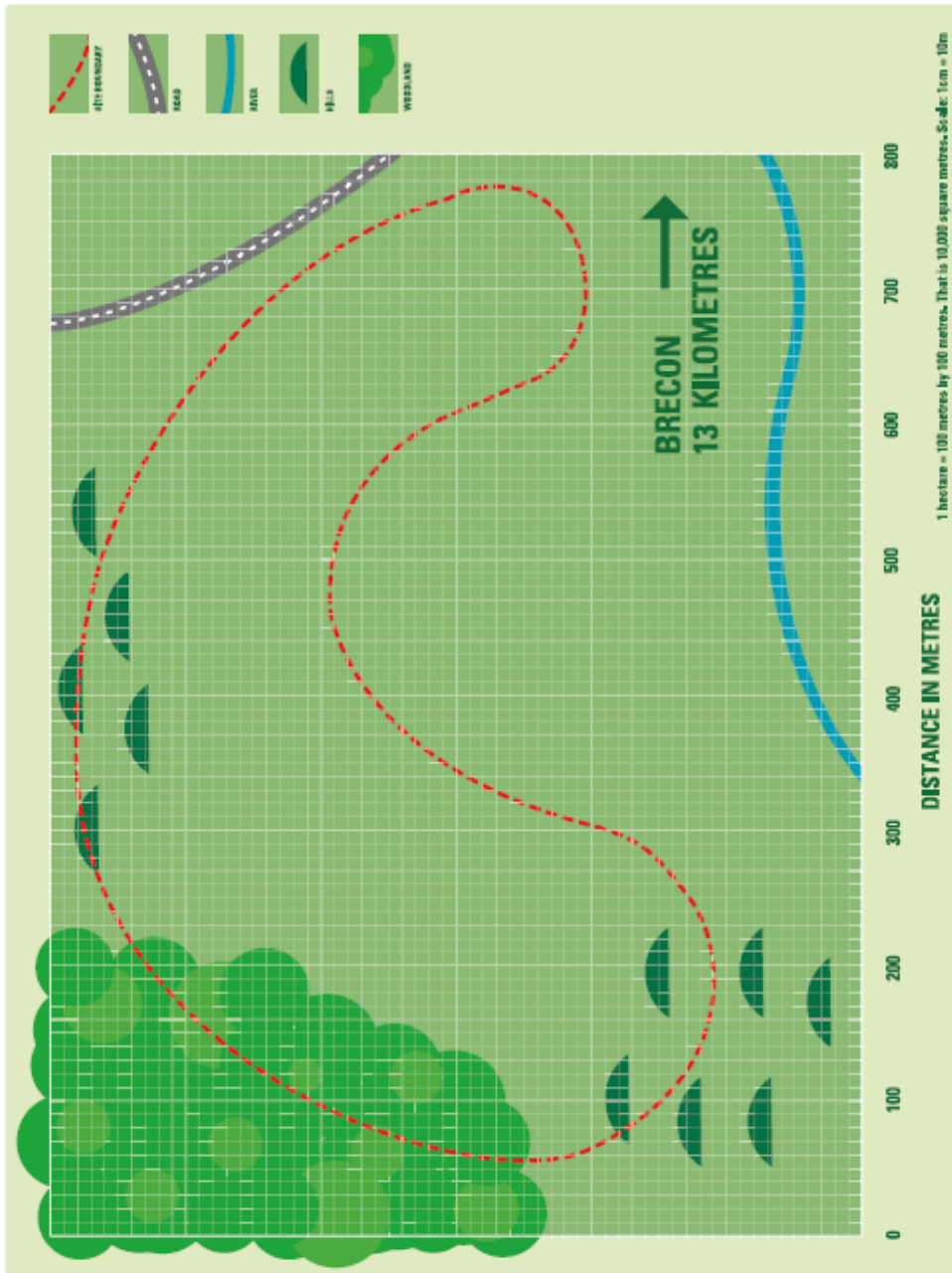
LUNCH

AFTERNOON

7. Team meeting	10 mins
8. Final presentations	5-10 mins each team
9. Army debrief	10 mins

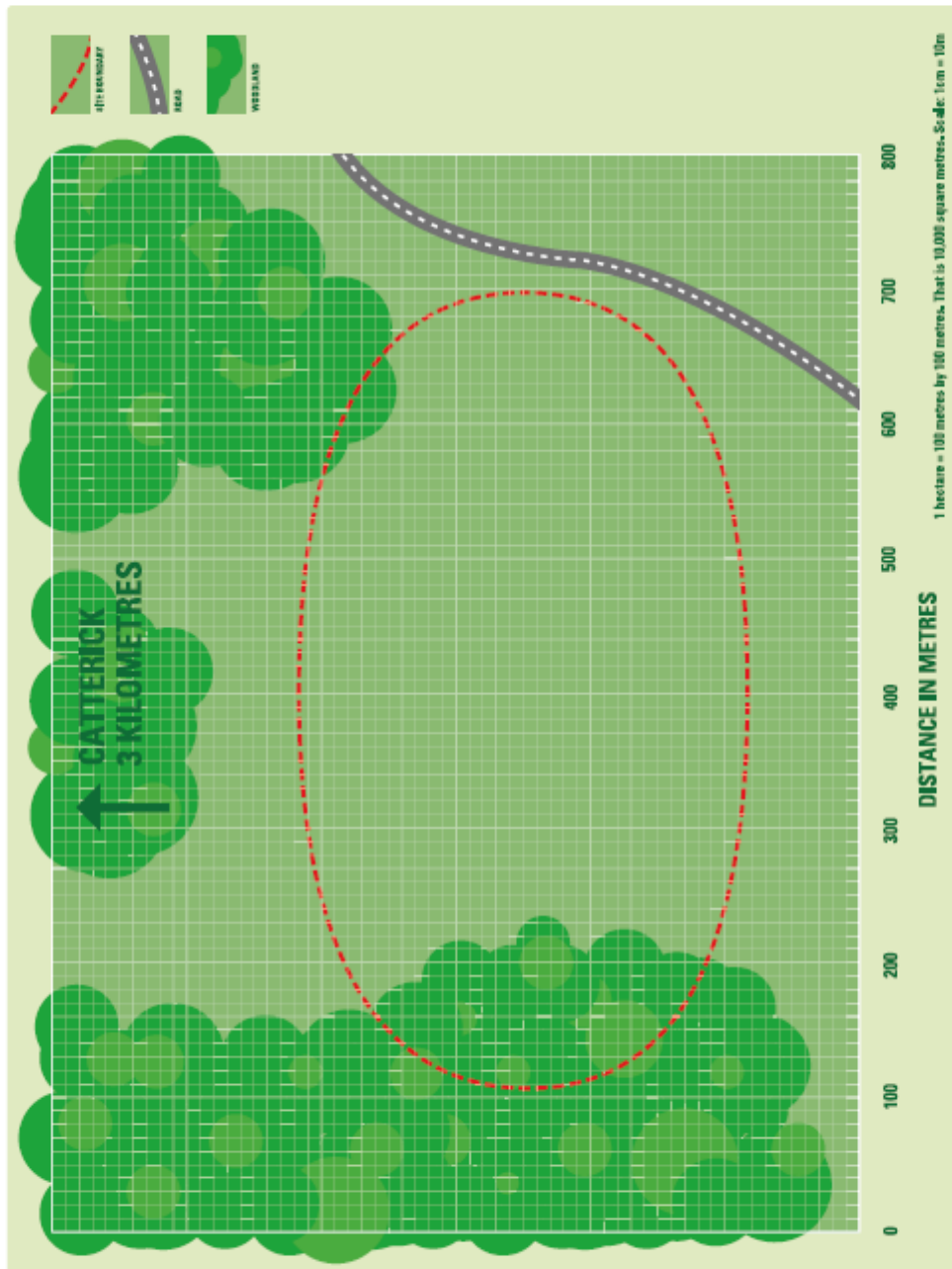
THE BUILD A BARRACKS CHALLENGE

BRECON BEACONS



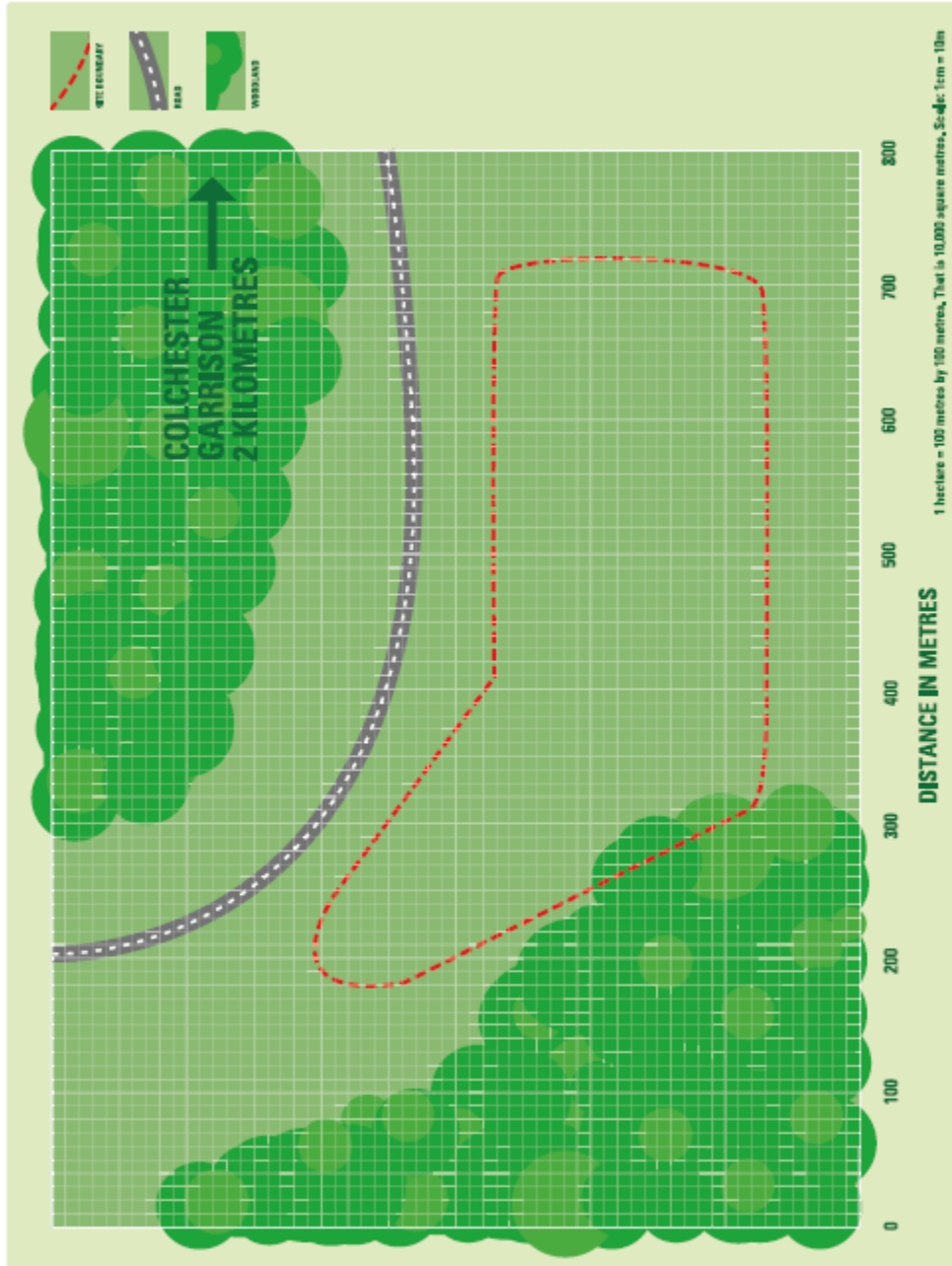
THE BUILD A BARRACKS CHALLENGE

CATTERICK



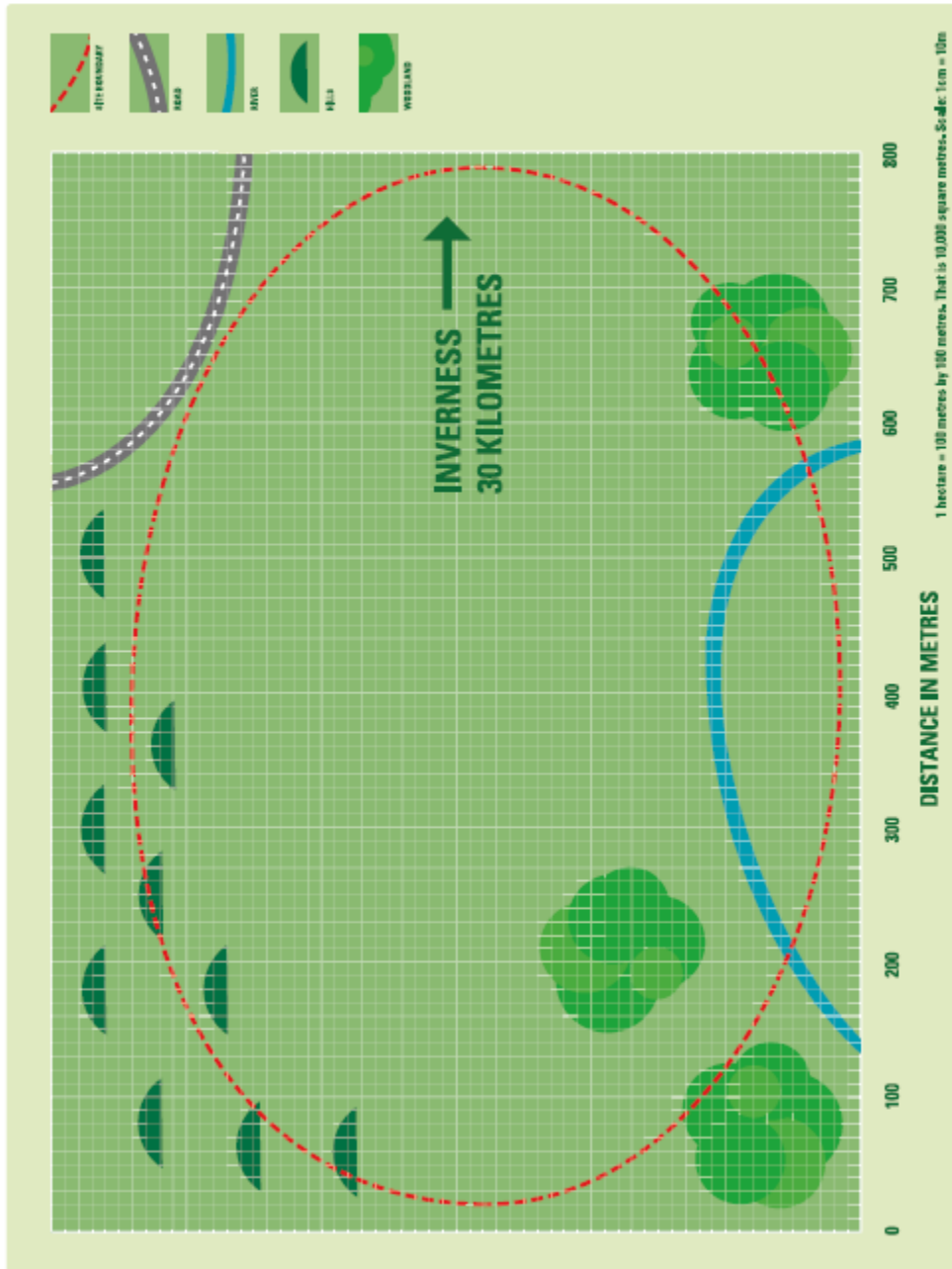
THE BUILD A BARRACKS CHALLENGE

COLCHESTER



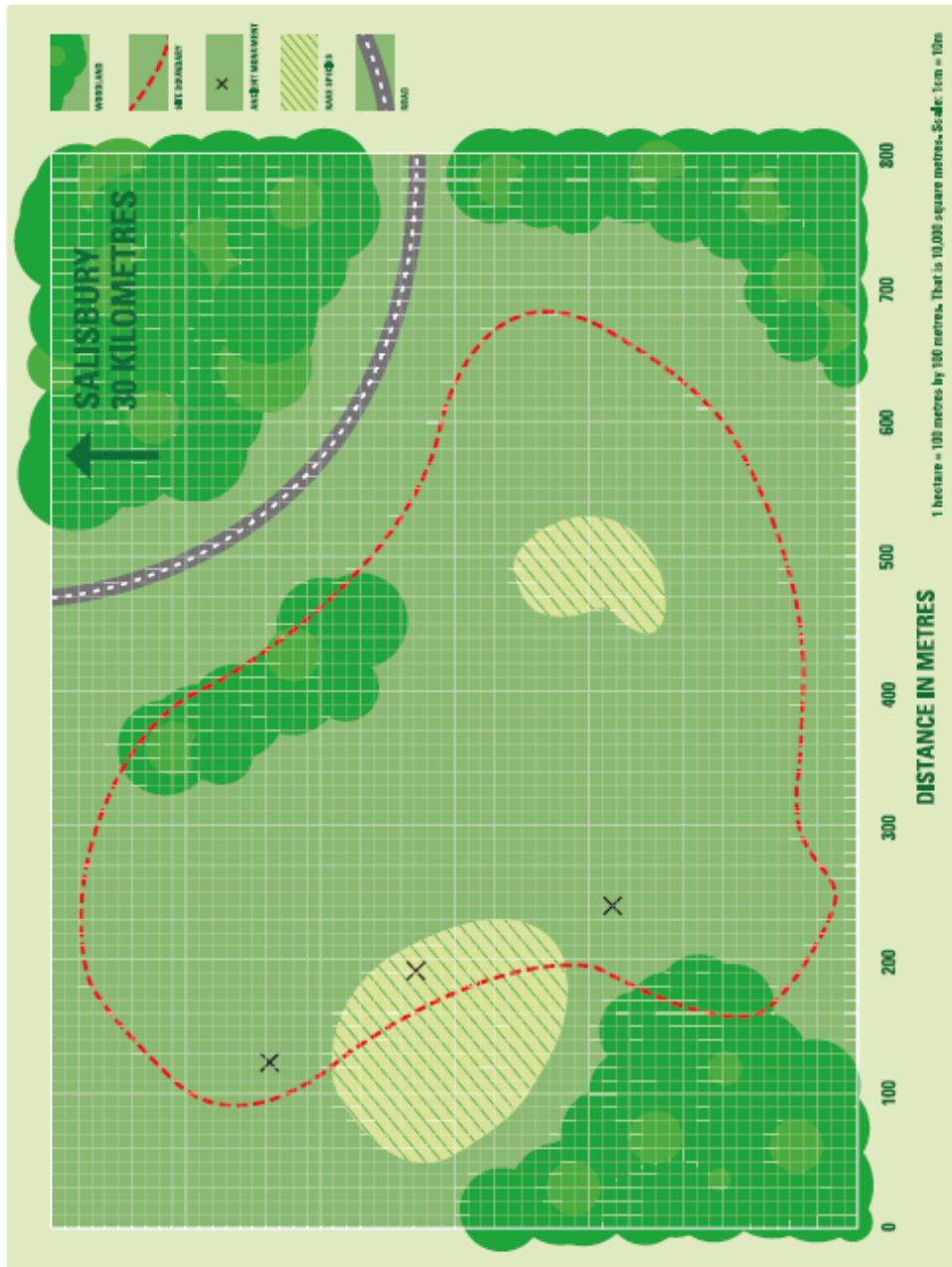
THE BUILD A BARRACKS CHALLENGE

INVERNESS



THE BUILD A BARRACKS CHALLENGE

SALISBURY



THE BUILD A BARRACKS CHALLENGE

TEAM ASSESSMENT

The questions below will be used to evaluate your challenge. During the challenge you should ask yourself and your teammates the following questions and judge the responses.

TEAM LEADER

- Who is doing what in your team?
- Why have you chosen this site?
- Have you held a team meeting?
- Have you finished Wild Card challenge (1)?
- Have you finished Wild Card challenge (2)?

PUBLIC RELATIONS MANAGER

- How are you getting on with the press release?
- Have you thought of questions for a TV interview?

FINANCE MANAGER

- Can I see your calculations so far?
- How have you calculated the cost of (living accommodation/workshops etc.)?

DESIGNER

- How do you know your buildings are to scale?
- Where have you put the (living accommodation/workshops etc.) and why?
- Have you made any buildings bigger or smaller?
- Where will the roads go?

MARKING CRITERIA

Your role will be assessed by the following criteria.

For top marks, make sure you have:

- got a well thought through reason for your chosen location
- presented your ideas well by speaking clearly and showing well-considered reasons for your choices
- shown good teamwork
- taken the initiative
- asked good questions
- completed the Wild Card challenges successfully.

Your teammates' marking criteria can be found on the back page of their booklets.



BASE BRITISH
ARMY
SUPPORTING
EDUCATION

THE BUILD A BARRACKS CHALLENGE

PUBLIC RELATIONS MANAGER INFORMATION

THE BUILD A BARRACKS CHALLENGE

PUBLIC RELATIONS MANAGER

YOUR ROLE

- This is an important job because wherever you decide to build the new barracks the local people and the media will have something to say about it.
- Your most important job is to demonstrate how as the person in charge of public relations you would present the barracks in a positive light to local people and the press. You need to highlight the benefits of this exciting development to the local community.
- You must produce an example of a press release you have written about the opening of the new barracks.
- You must also produce a list of questions you think you are likely to be asked during a live TV interview and how you would respond.



THE BUILD A BARRACKS CHALLENGE

This is an example of a press release that a Public Relations Manager sent to a local newspaper about a new barracks.

You will need to write something similar in your own press release. The 'hook' for your story could be the extra employment opportunities that the new barracks will bring, or maybe the fantastic facilities that will be open to the public at certain times.

You might want to film your press release like a news report and show it during the presentations. If you don't have the equipment to film you could create a storyboard of your script and content of your news report.

COUNCIL CHIEFS SALUTE ARMY BARRACKS PLAN

The Chief Executive of Coldover Council yesterday welcomed the news that a state-of-the-art Army barracks is to be built in the area.

Chief Executive, Martin Grenadine said, "This is great news for the Lothians. The new barracks will bring increased employment opportunities to local people. We are also delighted that the new barracks will share some of its sports and leisure facilities with the local community."

The barracks is to be built on 20 hectares of land 15 miles from Edinburgh. It will house up to 400 soldiers including some 55 families.

Headteacher of nearby Stradmore Primary School, which will be expected to provide places for up to 30 additional children said,

"It will push our resources to the limit, but we look forward to welcoming new children into our school. We have already begun negotiations with the Army about using their sports and swimming facilities to improve our children's PE lessons."

Not everyone is convinced. Local resident, and chair of the Wildlife Preservation Society, Mary Broadbent believes that the new barracks is a threat to the local wildlife and will cause huge disturbances on the roads and in the town centre.

"What people don't realise is that this will be a massive garrison with soldiers going out on training and manoeuvres at all times of the day and night. The town already has a significant problem with youth crime,

and I cannot see how this will improve things. Quite simply this is the wrong location at the wrong time."

Colonel Hill, who will command the new barracks, reassured local people that the Army would respect the peace and tranquillity of the area. "We are not here to disturb the peace, quite the opposite. We are keen that our new facilities will improve the quality of life in the area."

For more details contact:
Jenni Catchphrase,
Public Relations Manager,
HM Armed Forces
Catterbury SC32 1AT.
Tel 09834 236677
email catchphrase@army.co.uk

THE BUILD A BARRACKS CHALLENGE

PUBLIC RELATIONS MANAGER'S CHECKLIST

WHAT WOULD YOU SAY TO PUT LOCAL PEOPLE'S MINDS AT REST ABOUT EACH OF THE FOLLOWING?

- **NOISE – WILL THE BUILDING CREATE A LOT OF DISTURBANCE AT NIGHT FOR EXAMPLE? WILL THERE BE NIGHT-TIME EXERCISES?**
- **OVERSTRETCHING OF RESOURCES – WILL THE NUMBER OF SOLDIERS PUT A STRAIN ON PUBLIC TRANSPORT OR SHOPPING FACILITIES IN THE AREA?**
- **IMPACT ON HOUSE PRICES – WILL THE NEW BARRACKS REDUCE OR INCREASE THE VALUE OF PROPERTIES IN THE AREA?**
- **IMPACT ON CRIME**
- **IMPACT ON SCHOOLS**

MARKING CRITERIA

Your role will be assessed by the following criteria.

For top marks, make sure you have:

- demonstrated an understanding of the issues that would be key to the local community – facilities, environment, education etc.
- produced an interesting press release
- produced interesting interview questions
- presented your ideas well by speaking clearly and showing well-considered reasons for your choices explained any issues that arose (if a public relations Wild Card was given).

THE BUILD A BARRACKS CHALLENGE

TEAM NAME

MARKER'S ASSESSMENT SHEET – DURING THE CHALLENGE

During the challenge, ask the questions below to each team and judge their responses (you should use a separate sheet for each team). Put a tick if the answer is satisfactory; add any notes to help with the final judging.

	SATISFACTORY ANSWER?	NOTES
TEAM LEADER:		
Who is doing what in your team?		
Why have you chosen this site?		
Have you held a team meeting?		
Have you finished the Wild Card challenge (1)?		
Have you finished the Wild Card challenge (2)?		
PUBLIC RELATIONS MANAGER:		
How are you getting on with the press release?		
Have you thought of questions for a TV interview?		
FINANCE MANAGER:		
Can I see your calculations so far?		
How have you calculated the cost of (living accommodation/workshops etc.)?		
DESIGNER:		
How do you know your buildings are to scale?		
Where have you put the (living accommodation/workshops etc.) and why?		
Have you made any buildings bigger or smaller?		
Where will the roads go?		

THE BUILD A BARRACKS CHALLENGE

TEAM NAME

MARKER'S ASSESSMENT SHEET – DURING THE PRESENTATION

During the presentations you should use the following criteria to assess each team.

FINAL BUDGET	£	
Score 1 – 5 for each category/answer, with 1 = poor and 5 = excellent.	SCORE	NOTES
TEAM LEADER:		
Well thought-through reasons for their chosen location.		
Presenting their ideas well. For example speaking clearly, showing well-considered reasons for their choices.		
Bonus points (up to 5) e.g. for: <ul style="list-style-type: none"> • Good teamwork • Taking the initiative • Asking good questions • Successful Wild Card challenges. 		
DESIGNER:		
Appropriateness of buildings for their chosen location, for example: <ul style="list-style-type: none"> • Providing facilities that aren't available close by • Living areas separate to work areas • Including buildings of more than one storey • Including adequate roadways and linking the base to a major road • Including all required buildings for their barrack type, e.g. hangars and workshops for vehicles. 		
Completing an accurate scale drawing of the barracks.		
Presenting their ideas well. For example speaking clearly, showing well-considered reasons for their choices.		
If design Wild Card was given: <ul style="list-style-type: none"> • Explaining any issues that arose where changes to design had to be made. 		

THE BUILD A BARRACKS CHALLENGE

	SCORE	NOTES
FINANCE MANAGER:		
Final costs are under the budget. This is clearly shown on a spreadsheet. Award high points if they have kept under budget and within £20 million of the target of £250 million.		
Including a contingency fund (should be between 5 and 10%).		
Presenting their ideas well. For example speaking clearly, showing well-considered reasons for their choices.		
If finance Wild Card was given: <ul style="list-style-type: none"> • Explaining any issues that arose where changes to costs had to be made. 		
PUBLIC RELATIONS MANAGER:		
Demonstrating an understanding of the issues that would be key to the local community – facilities, environment, education etc.		
Producing an interesting press release.		
Producing interesting interview questions.		
Presenting their ideas well. For example speaking clearly, showing well-considered reasons for their choices.		
If public relations Wild Card was given: <ul style="list-style-type: none"> • Explaining any issues that arose 		
TOTAL		

EXAMPLES OF QUESTIONS TO ASK THE TEAMS AT THE END OF THEIR PRESENTATIONS

1. Did you have a second choice of location? What were the good features of this location?
2. Which locations did you completely rule out and why?
3. If there was one building or feature on your design that had to be omitted, what would it be and why?
4. What did you find the most difficult part of the challenge?
5. Which part of your design are you most pleased with?
6. Now that you've finished your design do you think that the budget was easily achievable?
7. What is the unique selling point of your team? Why should we appoint you rather than your competitors?

THE BUILD A BARRACKS CHALLENGE

THE ROYAL ELECTRICAL AND MECHANICAL ENGINEERS

Your team has been asked to design a barracks to house 600 male and female Royal Electrical and Mechanical Engineers (REME). This must include accommodation for 55 families.

REME Engineers are all trained, skilled tradespeople with many specialisms, which include vehicle mechanics, armourers, recovery mechanics, metalsmiths, electronics technicians and avionics technicians.

YOU WILL WORK AS A TEAM. MARKS WILL BE GIVEN FOR:

- completing the proposal within the budget
- teamwork
- completing the proposal on time
- the quality of your final presentation.

You have a total budget of

£250 MILLION

(Remember this includes the purchase of the land.)

IF YOU HAVE ANY FURTHER QUESTIONS, REPORT TO THE COMMAND CENTRE. GOOD LUCK!

TO ACCOMMODATE:



4 Heavy recovery vehicles
(Challenger Armoured Repair and Recovery Vehicle)



22 Large lorries
(Enhance Palletised Load System (EPLS))



9 Fifteen-tonne lorries



10 Medium armoured vehicles
(Warrior)



38 Six-tonne lorries



30 Land Rovers



12 Recovery support vehicles



28 Nine-tonne lorries

YOU WILL NEED:
2 Workshops (100m x 50m) • 2 Vehicle garages (50m x 50m)

IN ADDITION YOU MUST THINK ABOUT ACCOMMODATION, SPORTING, RECREATION, WORSHIP AND WELFARE FACILITIES, AND TRANSPORT LINKS.

YOUR FIRST TASK IS TO DECIDE UPON THE BEST LOCATION FOR YOUR BARRACKS.

BARRACK TYPE CARDS

BASE BRITISH ARMY
SUPPORT THE
REGIMENT

THE BUILD A BARRACKS CHALLENGE

THE ROYAL CORPS OF SIGNALS

Your team has been asked to design a barracks to house 600 men and women in the The Royal Corps of Signals. This must include accommodation for 55 families.

IT and communication is a critical part of the UK's defence capability. The Royal Corps of Signals provide vital communications and IT support whether it be on the battlefield, coordinating humanitarian aid after natural disasters or leading the way in electronic warfare.

YOU WILL WORK AS A TEAM. MARKS WILL BE GIVEN FOR:

- completing the proposal within the budget
- teamwork
- completing the proposal on time
- the quality of your final presentation.

You have a total budget of

£250 MILLION

(Remember this includes the purchase of the land.)

IF YOU HAVE ANY FURTHER QUESTIONS, REPORT TO THE COMMAND CENTRE. GOOD LUCK!

YOU WILL NEED:

3 Vehicle garages (50m x 50m) • 1 Workshop (100m x 50m) 1 Store (50m x 50m)

TO ACCOMMODATE:



40 Bowman vehicles (Land Rovers)



12 Bulldog armoured vehicles



20 Falcon vehicles



230 Satellites



516 Computers



650 Bowman radios

IN ADDITION YOU MUST THINK ABOUT ACCOMMODATION, SPORTING, RECREATION, WORSHIP AND WELFARE FACILITIES, AND TRANSPORT LINKS.

YOUR FIRST TASK IS TO DECIDE UPON THE BEST LOCATION FOR YOUR BARRACKS.

THE BUILD A BARRACKS CHALLENGE

THE ROYAL LOGISTIC CORPS

Your team has been asked to design a barracks to house 600 men and women in the Royal Logistic Corps (RLC). This must include accommodation for 55 families.

Logistics is the area of the Army dealing with the procurement, distribution, maintenance and resupply of equipment, material and personnel providing vital support to keep any military operation going, in any part of the world, at any time.

YOU WILL WORK AS A TEAM. MARKS WILL BE GIVEN FOR:

- completing the proposal within the budget
- teamwork
- completing the proposal on time
- the quality of your final presentation.

You have a total budget of

£250 MILLION

(Remember this includes the purchase of the land.)

IF YOU HAVE ANY FURTHER QUESTIONS, REPORT TO THE COMMAND CENTRE. GOOD LUCK!

YOU WILL NEED:

4 Vehicle garages (50m x 50m) • 1 Workshop (100m x 50m)

TO ACCOMMODATE:



24 Large lorries (Enhanced Palletised Loading System (EPLS))



55 Fuel tankers



37 Fork lift trucks



96 Nine-tonne support vehicles



30 Communication vehicles

IN ADDITION YOU MUST THINK ABOUT ACCOMMODATION, SPORTING, RECREATION, WORSHIP AND WELFARE FACILITIES, AND TRANSPORT LINKS.

YOUR FIRST TASK IS TO DECIDE UPON THE BEST LOCATION FOR YOUR BARRACKS.

THE BUILD A BARRACKS CHALLENGE

THE ARMY AIR CORPS

Your team has been asked to design a barracks to house 600 men and women in the Army Air Corps. This must include accommodation for 55 families. The Army Air Corps has multiple roles both in the air and on the ground. Pilots fly Army helicopters from the small Squirrel training helicopter to the large Apache attack helicopter whilst ground crew could be responsible for communications, refuelling or re-arming the aircraft.

YOU WILL WORK AS A TEAM. MARKS WILL BE GIVEN FOR:

- completing the proposal within the budget
- teamwork
- completing the proposal on time
- the quality of your final presentation.

You have a total budget of
£250 MILLION
(Remember this includes the purchase of the land.)

IF YOU HAVE ANY FURTHER QUESTIONS, REPORT TO THE COMMAND CENTRE. GOOD LUCK!

TO ACCOMMODATE:



9 Wildcat helicopters



3 Apache attack helicopters



7 Gazelle reconnaissance helicopters



20 Six-tonne lorries



40 Land Rovers



6 Fuel tankers



1 Recovery support vehicle

IN ADDITION YOU MUST THINK ABOUT ACCOMMODATION, SPORTING, RECREATION, WORSHIP AND WELFARE FACILITIES, AND TRANSPORT LINKS.

YOUR FIRST TASK IS TO DECIDE UPON THE BEST LOCATION FOR YOUR BARRACKS.

YOU WILL NEED:
4 Aircraft hangars (50m x 50m) • 1 Workshop (100m x 50m)

THE BUILD A BARRACKS CHALLENGE

Barracks for 545 single soldiers and officers and 55 families. All costs include materials and labour.

Buildings Price List	Size	Cost
ACCOMMODATION		
One family house or accommodation for two soldiers	10m x 10m	£200,000/unit
SPORTING		
Gym	25m x 50m	£10,000/m ²
Running track	400m	£20,000/10m
Obstacle course	50m x 50m	£500/m ²
** Sports field	200m x 100m	£200/m ²
Olympic size swimming pool	25m x 50m	£10,000/m ²
** EDUCATION CENTRE		
	15m x 15m	£10,000/m ²
** GUARD ROOM		
	10m x 10m	£7,500/m ²
** PLACE OF WORSHIP		
	15m x 15m	£7,500/m ²
WELFARE FACILITIES		
** Medical centre	10m x 15m	£12,000/m ²
** Crèche	15m x 15m	£7,500/m ²
** Small shop	15m x 15m	£7,500/m ²
** Hairdressers	10m x 5m	£7,500/m ²
RECREATIONAL FACILITIES		
** Cook house/canteen	20m x 20m	£10,000/m ²
** Sergeants' and officers' mess	30m x 30m	£8,000/m ²
** Social hub	15m x 15m	£8,000/m ²
TECHNICAL/MAINTENANCE		
Workshops	100m x 50m	£5,000/m ²
Vehicle garages/warehouse/store	50m x 50m	£3,000/m ²
Aircraft hangars/flight simulator	50m x 50m	£3,500/m ²
Armoury	10m x 10m	£7,500/m ²
Offices	50m x 50m	£7,500/m ²
Parade square/helicopter launch pad/car park	50m x 50m	£500/m ²
Fuel point	20m x 20m	£6,000/m ²
TRANSPORT LINKS		
Car park with CCTV	50m x 50m	£600/m ²
Roads		£20,000/10m
Cycle way		£10,000/10m
TOTAL COST OF LAND		
	See map	

To save space on your ground plan you may decide to make buildings more than one storey high. Calculate the cost of building second and third storeys in the same way.

** You can choose to make these buildings larger or smaller.

THIS IS TO CERTIFY THAT



TOOK PART IN

**THE BUILD A
BARRACKS CHALLENGE**

AND DEMONSTRATED THE FOLLOWING:

Teamworking skills | Problem-solving skills | Communication skills | Enterprise capability
Financial literacy | Time management skills

SIGNED

SALISBURY PLAIN

The Army training area at Salisbury Plain is the largest live firing training area in the United Kingdom and there are facilities for armoured vehicles, artillery, engineers, infantry and aircraft.

The Army has preserved a fascinating archeological landscape with many ancient monuments, and rare species of plants and wildlife.

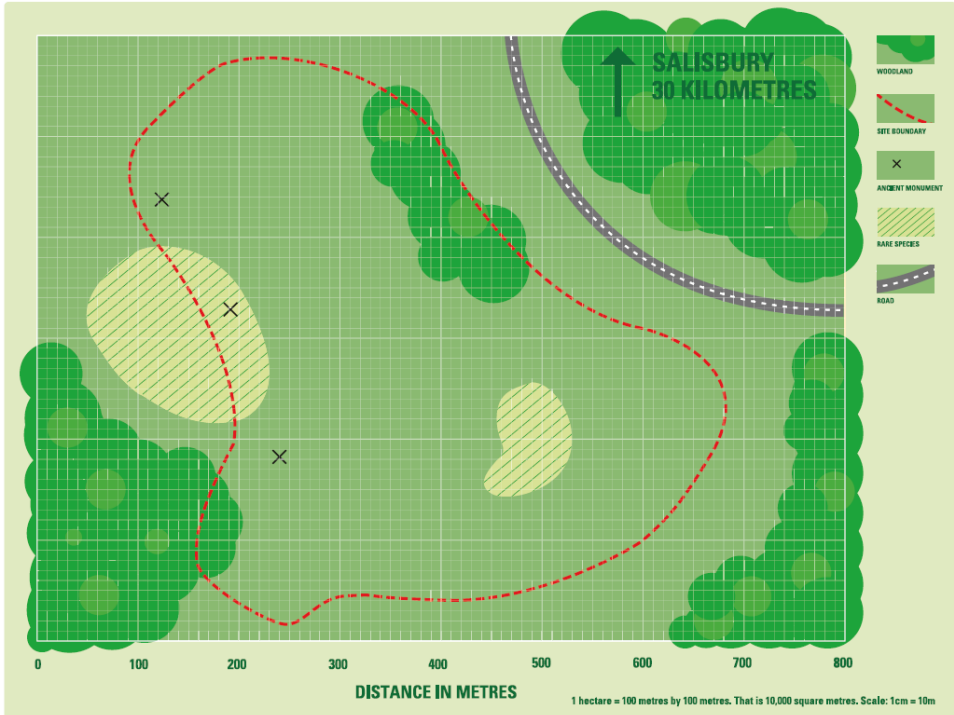
Any development must ensure that existing Sites of Special Scientific Interest are preserved. The Army is also committed to managing noise disturbance to the local community, especially during military exercises.

The proposed development site is an area of 20 hectares (that's about the same size as 15 football pitches). It is in the middle of the Salisbury Plain area.

The closest towns are:
 • Salisbury (30 kilometres)
 • Andover (20 kilometres)
 • Amesbury (13 kilometres)

There are limited local facilities three kilometres away including a chemist, hairdresser, garage, pub and mini market.

**COST OF LAND
£170,000
PER HECTARE**



CATTERICK

Catterick is the Army's largest base, located a few kilometres from the A1 in North Yorkshire.

It is on the edge of the Yorkshire Dales and close to the North Yorkshire Moors. Within an hour, you can reach Newcastle, the Metro Centre at Gateshead and the historic cities of York and Leeds. Closer to Catterick are the market towns of Darlington, Richmond and Northallerton.

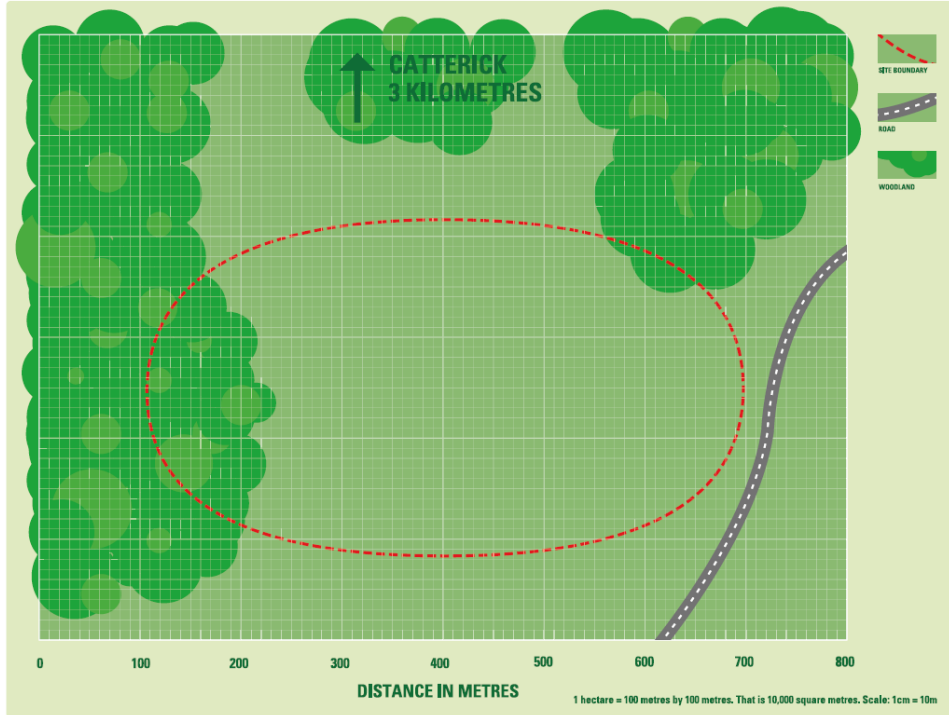
Catterick Garrison is one of the large 'Super Garrisons'. It is also the home for the Infantry Training Centre where training is conducted for every British and Gurkha infantry soldier.

There is a development site with a total area of 15 hectares, a few kilometres from the existing garrison.

The proposed site is close to a Site of Special Scientific Interest under the Wildlife and Countryside Act. This means the developer must take measures to maintain half a hectare of woodland, and build cycleways between the new barracks and the garrison at Catterick. It is anticipated that soldiers will be able to make use of the extensive existing facilities in Catterick. The town itself is well equipped with supermarkets, sporting facilities, a cinema, bars and schools.

**COST OF LAND
£150,000
PER HECTARE**

LOCATION MAPS



**THE BUILD
A BARRACKS
CHALLENGE**

TEAM NAME



BRECON BEACONS

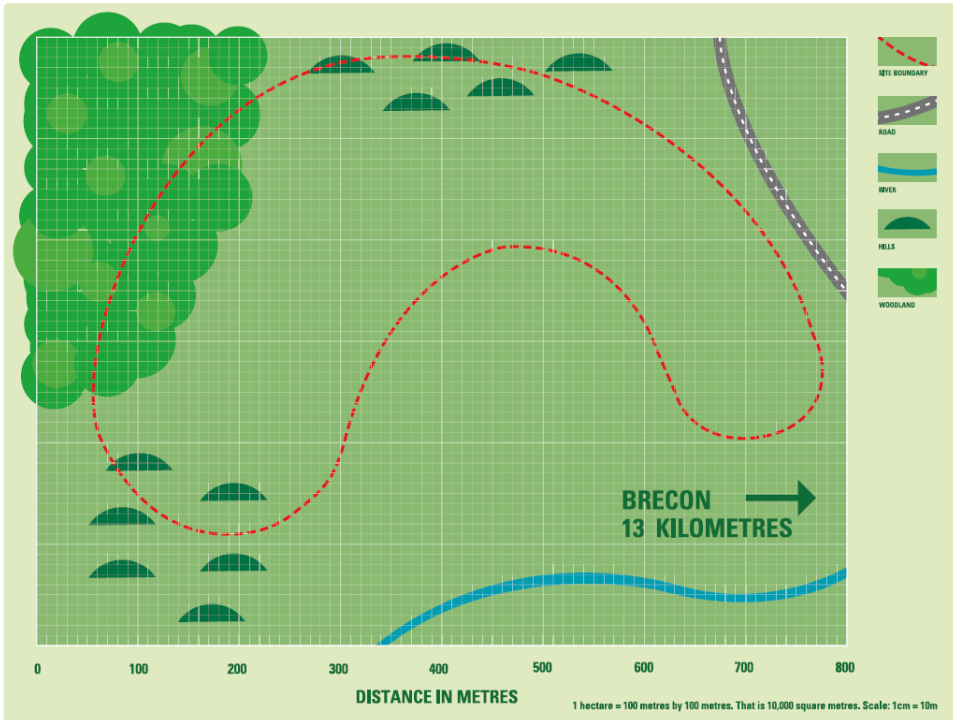
A development site of 20 hectares (that's about the same size as 15 football pitches) has become available in the Brecon Beacons.

The Army carries out military training exercises in the area. It is one of the best places to practise survival skills.

The Army also has a long tradition of working with both the Brecon Beacons National Park Authority and the National Trust. Any soldiers based at the new barracks will be encouraged to spend some of their spare time conducting conservation and environmental work in the Welsh countryside.

The nearest town is Brecon (13 kilometres). This is an ancient town and a popular centre for tourists. It is home to an annual jazz festival. It has a modern leisure centre, good pubs, restaurants and cinemas. Golf, fishing and riding facilities are also located in the area.

**COST OF LAND
£120,000
PER HECTARE**



LOCATION MAPS

THE BUILD A BARRACKS CHALLENGE

TEAM NAME



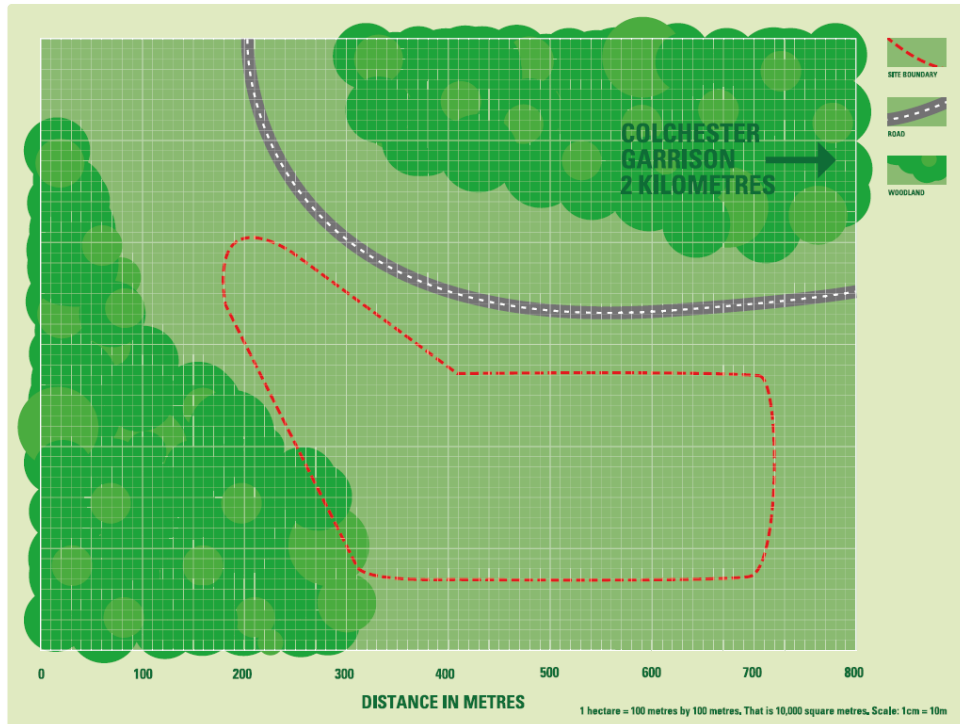
COLCHESTER

The town of Colchester in Essex has long military associations. Colchester Garrison is one of the major bases of the British Army.

Colchester is a thriving city with first-class shopping, cultural and sporting facilities. It is well served by transport links and is near to Stansted Airport. There are many hotels, restaurants, schools and churches.

10 hectares of land (that's about the size of 7.5 football pitches) have become available just two kilometres from the existing Colchester Garrison. It is anticipated that the developer will make the most of the excellent facilities already in place at the Garrison. The development should include effective transport links between the two sites.

COST OF LAND
£160,000
PER HECTARE



LOCATION MAPS

**THE BUILD
A BARRACKS
CHALLENGE**

TEAM NAME



INVERNESS

An area of up to 30 hectares (that's about the size of 22 football pitches) has become available in the Highlands of Scotland. This is a remote spot. The nearest town of any size is Inverness, which is approximately 30 kilometres away.

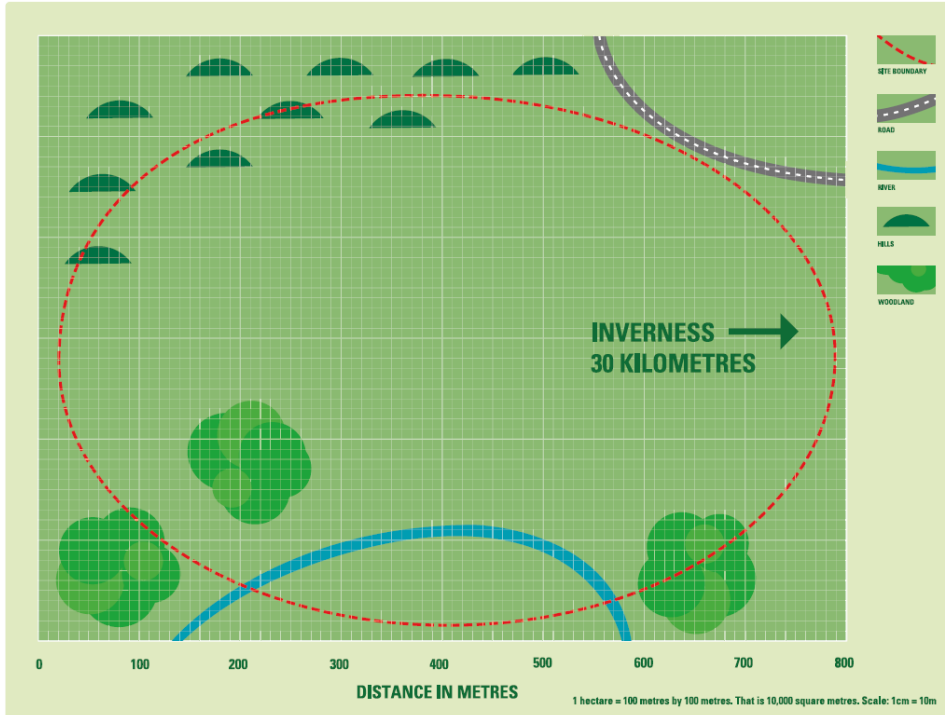
There are limited local facilities in a nearby village, approximately three kilometres away. There is a church, pub, local shop and primary school.

This will be a new locality for the Army, and there appears to be mixed feelings amongst the small local population about the benefits of developing the area as a barracks. Some residents welcome the opportunity for more employment, but others are concerned that the peace and quiet of the local area will be destroyed. The Public Relations Manager on your team will have to put forward a particularly strong argument if the plans are to be accepted.

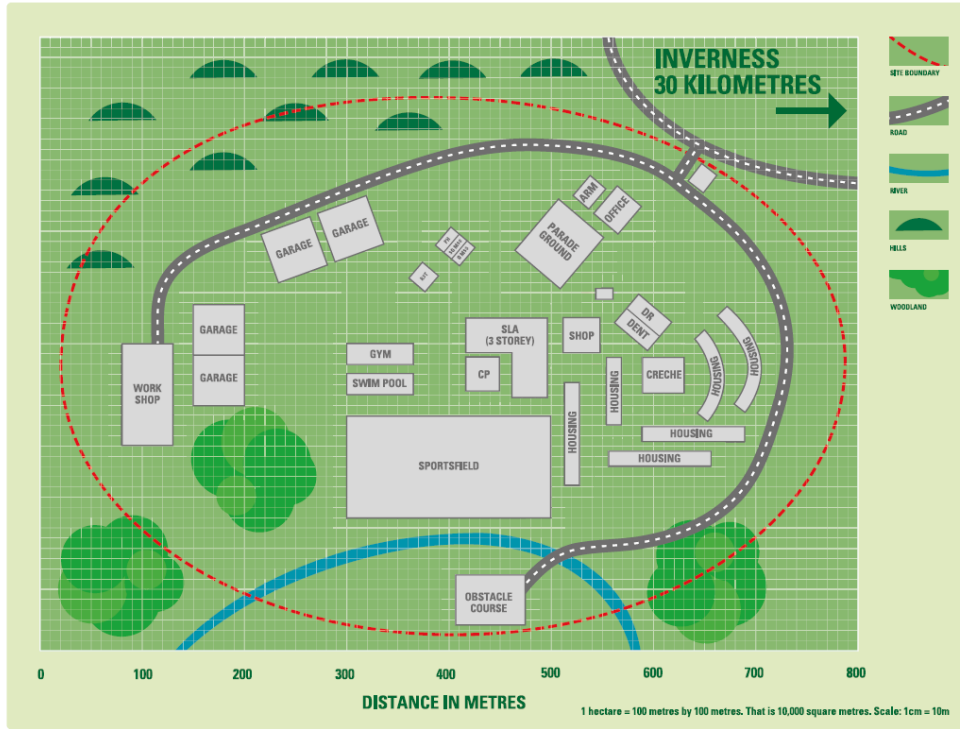
There has also been some interest in developing a wind farm in the area.

**COST OF LAND
£100,000
PER HECTARE**

LOCATION MAPS



**INVERNESS
EXAMPLE PLAN**



LOCATION MAPS

THE BUILD A BARRACKS CHALLENGE



UK MAP



1

BUILDING MATERIAL AND LABOUR COSTS HAVE GONE UP BY 5% SINCE YOU STARTED WORK ON YOUR PROPOSALS. YOU'LL HAVE TO ADJUST YOUR SPENDING!

WILD CARDS

BASE THE
CONSTRUCTION
FOUNDATION

2

THERE HAS BEEN A LOCAL OUTCRY AGAINST THE NEW BARRACKS. PEOPLE SAY IT WILL LEAD TO A DROP IN THE VALUE OF THEIR HOUSES.

WRITE THE ANSWER TO THIS QUESTION THAT A REPORTER HAS ASKED YOU:

“ISN'T IT TRUE THAT THE PRESENCE OF A LARGE, UGLY ARMY BARRACKS ON THE OUTSKIRTS OF TOWN WILL REDUCE THE VALUE OF PEOPLE'S HOUSES?”

WILD CARDS

ASE AMERICAN SOCIETY OF ENVIRONMENTAL ENGINEERS

3

THE ARMY HAS JUST INFORMED YOU THAT THEY WISH TO INCLUDE A RIDING SCHOOL MEASURING 50M² ON YOUR BARRACKS. THE COST OF THIS WILL BE AROUND £50,000. YOU'LL HAVE TO FIND A WAY OF ADJUSTING YOUR PRICES TO FIND THE EXTRA MONEY. SOMETHING MAY HAVE TO GO!

4

THE ARMY HAS JUST INFORMED YOU THAT AN EXTRA FOUR HECTARES OF LAND HAS BECOME AVAILABLE NEXT TO YOUR PROPOSED LOCATION. THEY WANT YOU TO TELL THEM HOW MUCH THIS LAND WOULD COST TO BUY.

WILD CARDS

BASE CLIP
ARTWORK

5

**ANOTHER TWO HECTARES OF LAND
ADJOINING YOUR CHOSEN LOCATION
HAS BEEN BOUGHT BY THE ARMY.
THEY HAVE ASKED YOU TO COME UP
WITH SOME GOOD IDEAS FOR THE
BEST USE OF THIS EXTRA LAND.**

6

LOCAL RESIDENTS HAVE COMPLAINED ABOUT THE AMOUNT OF DISRUPTION THAT WILL BE CAUSED DURING THE BUILDING OF THE BARRACKS.

HOW WILL YOU ALLAY THEIR FEARS IN A LETTER TO THE LOCAL PAPER?

WILD CARDS

ASE AMERICAN SOCIETY OF ENGINEERS

7

PARENTS AT THE LOCAL PRIMARY SCHOOL ARE WORRIED THAT CLASS SIZES WILL INCREASE AND THAT THEIR CHILDREN'S EDUCATION WILL SUFFER WITH SO MANY NEW ARMY FAMILIES COMING TO LIVE IN THE AREA. HOW WOULD YOU ANSWER THAT POINT AT A MEETING?

WILD CARDS

BASE FOR
ARMY
COMMUNITY

8

LABOUR COSTS HAVE ROCKETED UP SINCE YOUR LAST JOB. IN YOUR COSTS YOU WILL HAVE TO ALLOW FOR A 3% INCREASE IN BUILDING COSTS.

WILD CARDS

BASE GROUP
CONSTRUCTION
CORPORATION

9

YOU SHOULD INCLUDE A GYM AND FITNESS CENTRE THAT IS OPEN TO THE PUBLIC. IF THE MEMBERSHIP FEE IS £25 PER MONTH AND 98 MEMBERSHIPS ARE TAKEN OUT IN THE FIRST YEAR, HOW MUCH MONEY WOULD IT BRING IN?

10

**THE ARMY HAS JUST TOLD YOU TO
INCLUDE AN ASSAULT COURSE IN
YOUR PLANS.**

WILD CARDS

BASE THE GREAT
DIVISION OF
MODERN

11

THE COMMUNITY WHERE YOUR NEW BARRACKS WILL BE LOCATED NEEDS A SWIMMING POOL. CAN YOU AFFORD THE SPACE AND THE MONEY TO INCLUDE ONE? WILL YOU ALLOW THE LOCAL COMMUNITY TO SHARE THE POOL AT CERTAIN TIMES?

WILD CARDS

BASE BRITISH ARMY
SUPPORT
ELEMENT

12

YOU HAVE HAD AN EMAIL FROM THE ARMY ASKING IF YOU HAVE REMEMBERED THEIR REQUIREMENT FOR AN EDUCATION CENTRE TO BE INCLUDED AT THE NEW BARRACKS.

WILD CARDS

ASE ASSOCIATION OF
SCHOOL
EDUCATION

DECIDING ON A LOCATION

BEFORE MAKING YOUR FINAL DECISION, MAKE SURE YOU CAN ANSWER THE FOLLOWING POINTS:

- 1 What are the specialist requirements for your type of barracks, e.g. hangars and engineering workshops?

- 2 How much does land cost in different parts of the country?

- 3 How much family accommodation and how much single living accommodation will you need to build?

- 4 Which existing facilities, such as schools and shops, will be useful to your barracks?

- 5 What other issues might you need to think about?

WARNING – CONTINGENCY FUND

Building always costs more than you bargained for and you'll need some money to cope with unforeseen circumstances. This is called a contingency fund. Decide how much money you will put aside. This should be somewhere between 5 and 10% of the total.

YOUR TEAM – INITIAL PLANS

- 1 Write down the names and roles of all your team members and their roles.
.....
.....
- 2 What type of barracks have you been asked to work on?
.....
- 3 Where will your barracks be built?
.....
- 4 What are the team's ideas about the sorts of buildings to include?
.....
.....
- 5 Why do you need a contingency fund?
.....
- 6 What do you consider to be the major strengths of the team so far?
.....
.....

TEAM TASK LIST

TASK	WHO'S DOING IT?
Reasons why you chose a particular part of the country	
A list of reasons why you chose particular buildings	
A scale drawing of the proposals	
Spreadsheet showing detailed costs	
A sample press release	
A list of questions and answers in preparation for a TV interview	
A plan for your final presentation	
Wild Card challenges completed	

THE BUILD A BARRACKS CHALLENGE

FINAL SPREADSHEET

Buildings Type	Size	Number or Area	Cost	Total Cost
ACCOMMODATION				
One family house or accommodation for two soldiers	10m x 10m		£200,000/unit	
SPORTING				
Gym	25m x 50m		£10,000/m ²	
Running track	400m		£20,000/1.0m	
Obstacle course	50m x 50m		£500/m ²	
** Sports field	200m x 100m		£200/m ²	
Olympic size swimming pool	25m x 50m		£10,000/m ²	
** EDUCATION CENTRE	15m x 15m		£10,000/m ²	
** GUARD ROOM	10m x 10m		£7,500/m ²	
** PLACE OF WORSHIP	15m x 15m		£7,500/m ²	
WELFARE FACILITIES				
** Medical centre	10m x 15m		£12,000/m ²	
** Crèche	15m x 15m		£7,500/m ²	
** Small shop	15m x 15m		£7,500/m ²	
** Hairdressers	10m x 5m		£7,500/m ²	
RECREATIONAL FACILITIES				
** Cook house/canteen	20m x 20m		£10,000/m ²	
** Sergeants' and officers' mess	30m x 30m		£8,000/m ²	
** Social hub	15m x 15m		£8,000/m ²	
TECHNICAL/MAINTENANCE				
Workshops	100m x 50m		£5,000/m ²	
Vehicle garages/warehouse	50m x 50m		£3,000/m ²	
Aircraft hangars/flight simulator	50m x 50m		£3,500/m ²	
Armoury	10m x 10m		£7,500/m ²	
Offices	50m x 50m		£7,500/m ²	
Parade square/helicopter launch pad/car park	50m x 50m		£500/m ²	
Fuel point	20m x 20m		£6,000/m ²	
TRANSPORT LINKS				
Car park with CCTV	50m x 50m		£600/m ²	
Roads			£20,000/1.0m	
Cycle way			£10,000/1.0m	
COST OF LAND				
	See map			
CONTINGENCY FUND				
TOTAL				

