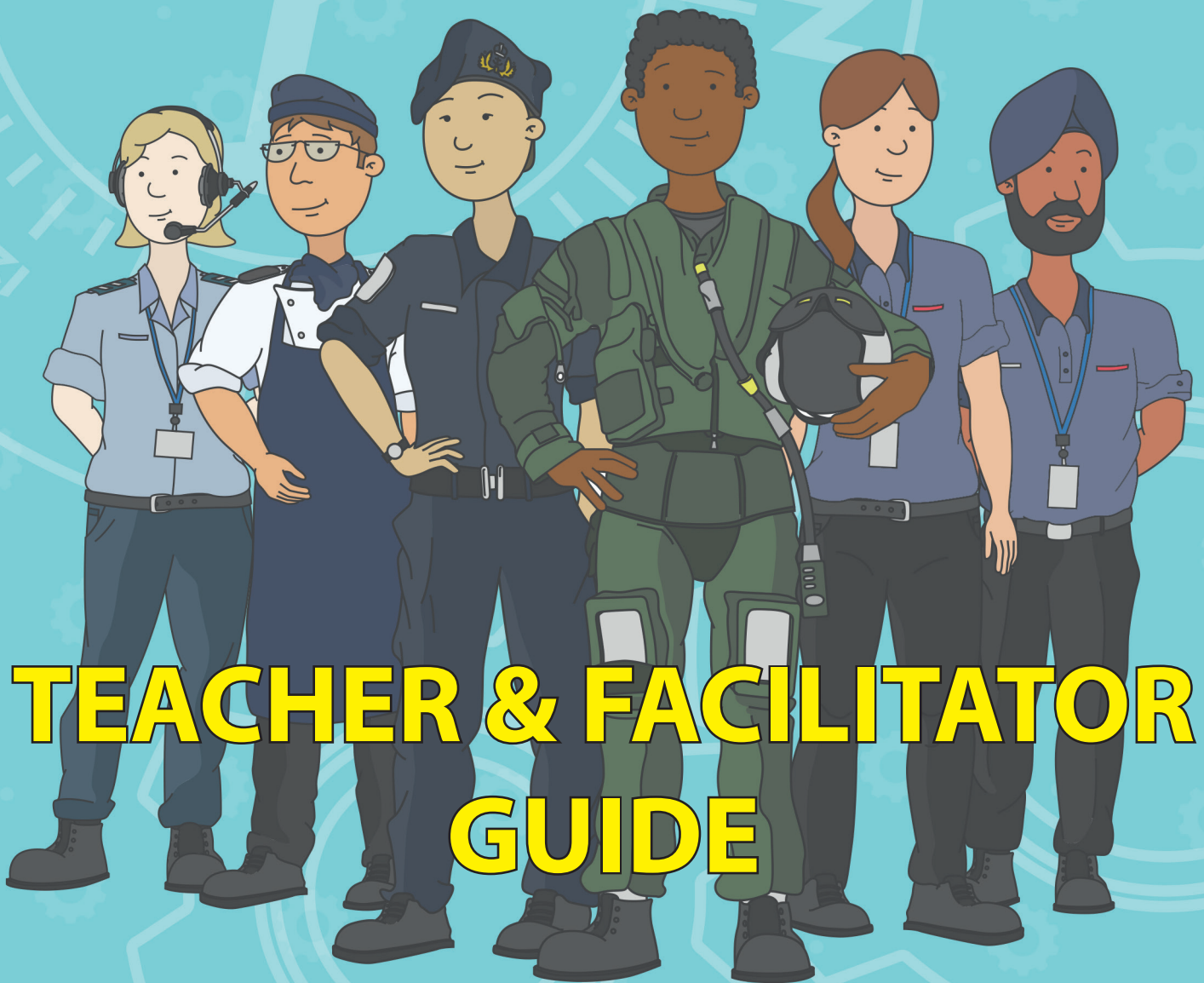


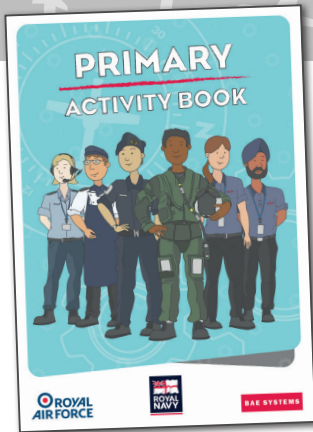
# PRIMARY

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# ACTIVITY BOOK

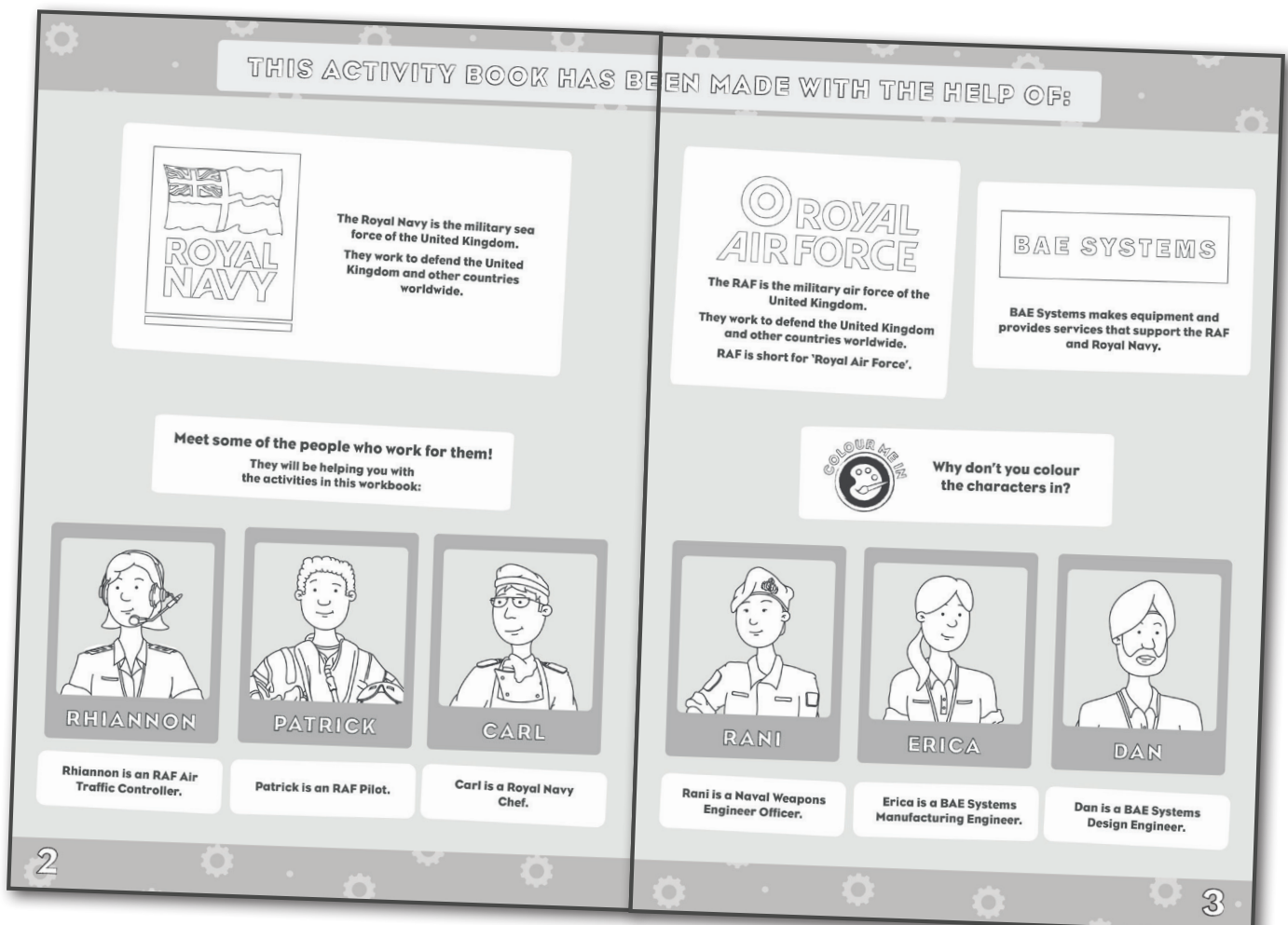
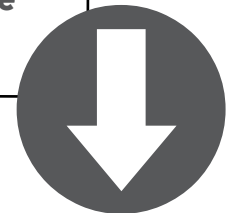


## TEACHER & FACILITATOR GUIDE



**Our activity book introduces a number of characters from our sponsors.**

**Each character has a different job and they are representative (in terms of gender and ethnicity) of the people who work for the RAF, NAVY and BAE Systems.**



## LOADING THE AIRCRAFT CARRIER

The Royal Navy has two aircraft carriers, the HMS Queen Elizabeth and the HMS Prince of Wales. These are designed and built by BAE Systems engineers.

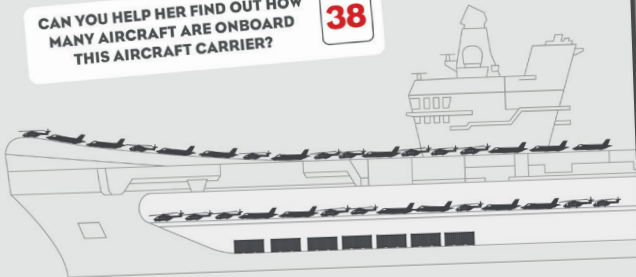
An aircraft carrier is a ship that can carry helicopters, other aircraft and supplies. It has a flight deck on which aircraft can land and take off from.

This aircraft carrier below is where Rani the Naval Weapons Engineer Officer works.



CAN YOU HELP HER FIND OUT HOW MANY AIRCRAFT ARE ONBOARD THIS AIRCRAFT CARRIER?

38



HOW MANY JETS IS IT CARRYING?



15

HOW MANY HELICOPTERS IS IT CARRYING?



16

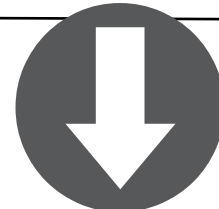
HOW MANY SUPPLY CONTAINERS IS IT CARRYING?



7

4

Throughout this guide, we have included the 'answers' to the tasks set, along with additional contextual information.



## HOW MANY WORDS?

Carl thinks it is fun to make smaller words out of the letters of a bigger one.

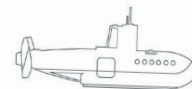
He has made ten words from the word HELICOPTER and ten words from the word SUBMARINE.

He was very clever as one of the words he found from HELICOPTER is linked to the military. Maybe you will find that one too.



CARL

How many smaller words can you make out of the letters of these long words?



### HELICOPTER

### SUBMARINE

WRITE YOUR HELICOPTER WORDS...

Choir Pitch Tip  
Chop Polite To  
Clip Porch Top  
Helper Port Trip  
Hit Price  
Hop Recipe  
Ice Reel  
Lip Rich  
Lit Ripe  
Lot The  
Petrol Tie  
Piece  
Pilot

WRITE YOUR SUBMARINE WORDS...

Air Numbers  
An Nurse  
Are Rain  
Arms Remains  
Bean Run  
Bear Surname  
Brains Use  
Bruise  
Bun  
Is  
Menus  
Miner  
Name

DEFINITION

A submarine is a boat designed to stay under the sea for long periods of time. It has a periscope sticking out of the top so the crew can see above the water too.

DEFINITION

A periscope is a set of lenses, mirrors or prisms on a tube allowing the viewer to see objects reflected on the other end.

6

## CIRCUIT BOARD GAME



DAN

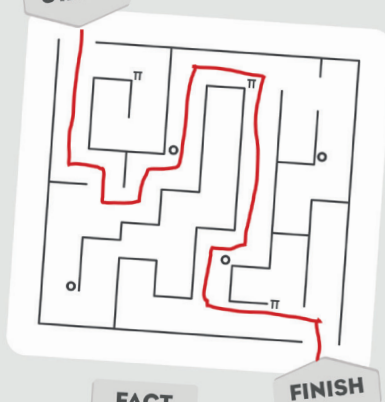
Dan the BAE Systems Design Engineer has found an old circuit board whilst looking through some rubbish.

He thinks it would be fun to play with it and turn it into a maze game.

He would like you to help him to find the way from the start to the finish.

Be careful though as there are lots of dead ends!

START



FACT

FINISH

A circuit board is a thin rigid board that contains electrical parts to enable machines to be powered.

BAE Systems use circuit boards when they are manufacturing equipment.

5



## WORDSEARCH

N K P I L O T U C D  
 B J D L O R C M T P  
 C D E F E N C E P O  
 L G E M X A O C Q R  
 L B P I O V B R D T  
 J L N K Y I M E Q A  
 P O U L K G P H G J  
 R G P W E A T H E R  
 C I V T R T Q E M A  
 N S W G W I E D S F  
 A T E L Q O T Y T B  
 S I D Q N N B B A T  
 I C L Z M E Y E R E  
 O S H R A N K W B W  
 B T K E C L P I O M  
 R U I E L U R I A K  
 E H Y F O N G O R J  
 J F L I G H T S D H  
 T Z R Q U B C W H Y  
 F U S E L A G E T W  
 Q R I H N F M D V A  
 T E C H N O L O G Y

CAN YOU HELP CARL TO FIND THESE WORDS?

**TECHNOLOGY**

**LOG**

**WEATHER**

**PORT**

**FUSELAGE**

**RANK**

**LOGISTICS**

**DEFENCE**

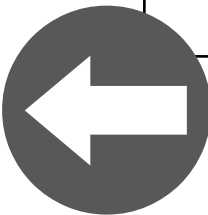
**NAVIGATION**

**STARBOARD**

There are more words to find that are not listed. Can you find TWO of them?

7

Two additional words in the wordsearch are **PILOT** and **FLIGHT**.



## UNION JACK - COLOUR ME IN

Erica the BAE Systems Manufacturing Engineer has been asked to paint a picture of the Union Jack to hang on the wall.

She has not had time to finish it.

Can you colour it in for her?

She has left these instructions for you.

**FACT**

The Union Jack is the national flag of the United Kingdom. It was designed by putting together the flags of England, Scotland and Northern Ireland.

**FACT**

Most people call our flag the Union Jack but it is really called the Union Flag. It is known as the Union Jack when the Royal Navy attach it to a jack staff.

All the triangle shapes are blue, the big cross in the centre is red and the four diagonals that go to the corners are red.

The rest of the flag is white.

ERICA

8


## SILHOUETTES


Erica can see lots of silhouettes of equipment. Can you help her to identify what each one is?


**JET** **SUBMARINE**


**HELICOPTER** **PARACHUTE**


**HELMET** **DESIGN EQUIPMENT** **TOOL KIT**


**SUBMARINE** 


 **JET**

**HELICOPTER** 

 **DESIGN EQUIPMENT**

**PARACHUTE** 

 **TOOLKIT**

**HELMET** 

**DEFINITION**

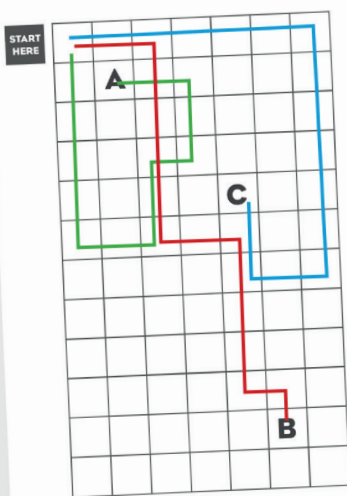
A silhouette is a dark, solid shape that you see when it has a bright light behind it.

9



## ERICA

Can you help her to find her way to her meetings by using the compass and directions she has been given?



**C** Dorothy the Driver

Who did Erica meet?

Who did Erica meet?

**Who did Erica meet?**

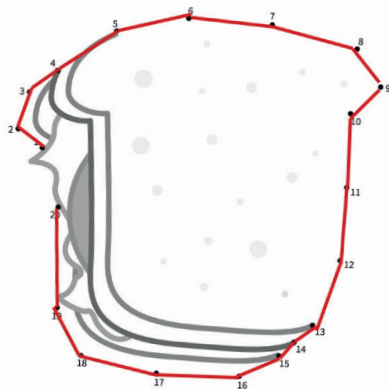
C

10

Carl the Chef has just arrived in the mess.  
This is what the dining room is called in the military.  
Can you think why they might call it that?  
The real reason it is called the mess is because the word  
mess meant a portion of food in the English language many  
years ago.



He has chosen a lovely fresh sandwich for his lunch.  
Can you join the dots to stop all the filling from falling  
out and making more mess?  
Colour it in to make it look really tasty.



11

Try to match as many as you can by drawing a line between the word and the right definition.



RANI

**MATCH THE WORDS TO THE RIGHT DEFINITION**

## PASSWORD

A software package used on a computer. = E

12

5

## THE PHONETIC ALPHABET

The Phonetic Alphabet is a code system used over the radio or telephone to ensure communication is understood correctly. Air Traffic Control are one of the teams who use this system.

Some letters sound very similar. For example, the sounds of the letters M and N. So, this system helps to prevent a misunderstanding. The radio operator would say Mike for the letter M and November for the letter N.



RHIANNON

### PHONETIC ALPHABET

A - Alpha	F - Foxtrot	M - Mike	T - Tango
B - Bravo	G - Golf	N - November	U - Uniform
C - Charlie	H - Hotel	O - Oscar	V - Victor
D - Delta	I - India	P - Papa	W - Whiskey
E - Echo	J - Juliet	Q - Quebec	X - X-ray
	K - Kilo	R - Romeo	Y - Yankee
	L - Lima	S - Sierra	Z - Zulu

Write your name using the Phonetic Alphabet here:

### DEFINITION

The word 'phonetic' means speech sounds.

Write a list of words using the Phonetic Alphabet that spell out your best friend's name, or the name of your pet:

13

## SPOT THE DIFFERENCE

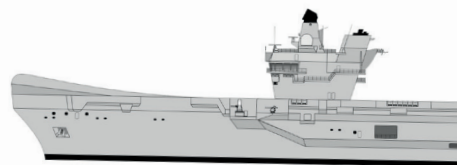
Erica and Rani are having a walk because it is a nice day.

Rani has taken two photographs, but they are slightly different and she has asked Erica to tell her where the 10 differences are.

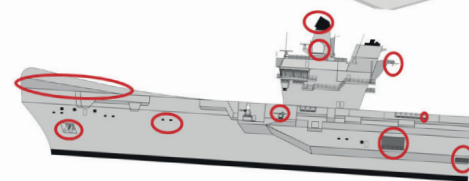
Can you help Erica by circling on the second photograph where the differences are?



ERICA



CIRCLE THE 10 DIFFERENCES



15

## FLIGHT SIMULATOR



PATRICK

Patrick the Pilot is having a training session in the RAF Flight Simulator.

Can you read the control panel and answer the questions below?

### DEFINITION

A 'Flight Simulator' is a machine designed to look like the inside of an aircraft with a screen that shows the pilot's view and the aircraft's motion. It is used for training pilots.

### ALTITUDE INDICATOR



How high is the aircraft?  
(CLUE: 1 = 1000 feet)

3000 feet

### FUEL INDICATOR



How much fuel does Patrick have left?

1/2 (half) tank of fuel

### DIRECTION INDICATOR



What direction is the aircraft flying?  
(CLUE: N = NORTH)

West

### HELICOPTER AIR SPEED INDICATOR



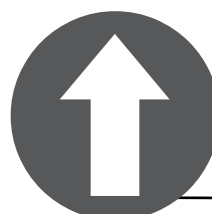
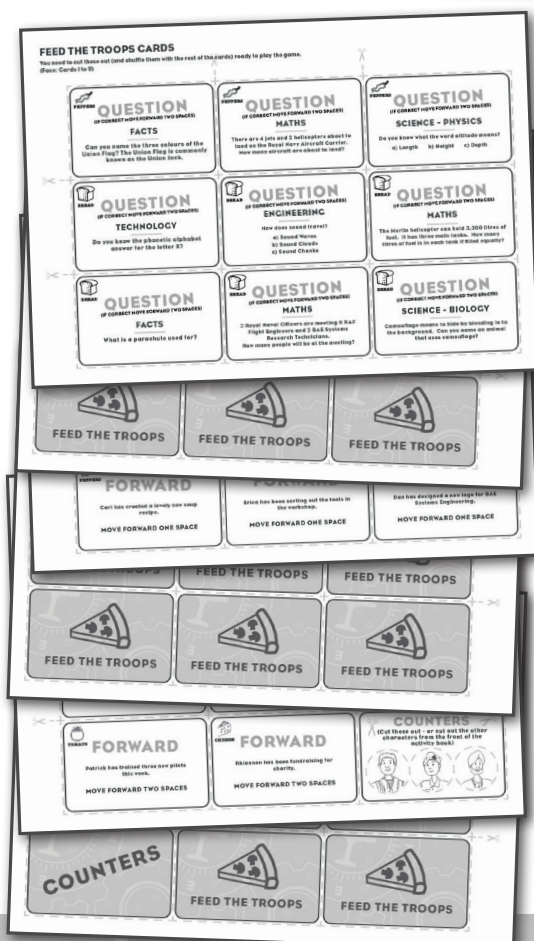
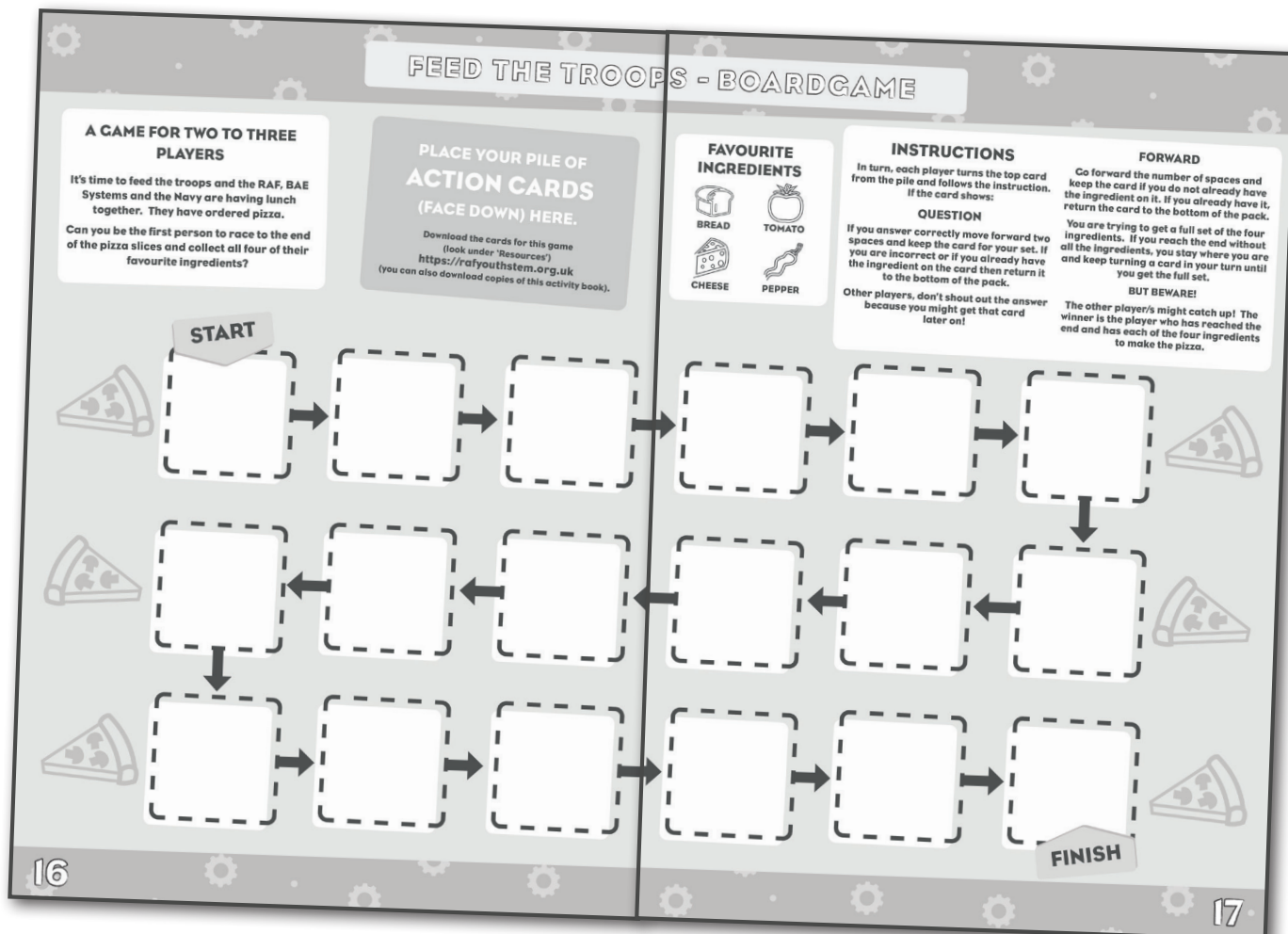
How fast is the aircraft travelling?  
(CLUE: Airspeed is measured in 'knots')

75 knots



If the aircraft was travelling twice as fast, where would the indicator be?  
(Draw this in here.)

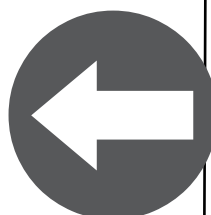
14



Our boardgame on the centre pages of the activity book can be played by two or more pupils.

Each player selects one of our characters as a counter for the game.

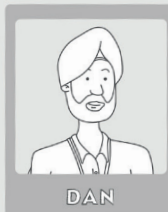
'Action cards' for the game can be downloaded from <https://rafyouthstem.org.uk>.





## COLOUR BY NUMBERS

Using the colour key below can you help Dan the BAE Systems Design Engineer to colour in these logos?  
Can you see how the colours are the same as the ones in the Union Jack?



DAN



**BAE SYSTEMS**

### FACT

The Union Jack is the national flag of the United Kingdom. It was designed by putting together the flags of England, Scotland and Northern Ireland.

Most people call our flag the Union Jack but it is really called the Union Flag. It is known as the Union Jack when the Royal Navy attach it to a jack staff.

### COLOUR KEY

- 1 RED
- 2 WHITE
- 3 BLUE

**ROYAL AIR FORCE**

18

## FILL IN THE CAPS

### THE RESCUE MISSION

Some of the words have dropped out of this story. Patrick the Pilot would like to read it so has asked if you can help to put the words back into their correct places?



PATRICK

### COMPLETE THE STORY

It was the early hours of the morning. An urgent call came in over the radio. A flood had caused a river to burst its banks and water was getting into some of the houses.

Patrick and his team loaded the aircraft with food, water and equipment. Off they flew to reach the people who needed rescuing.

When they landed, they joined other rescue teams with inflatable boats and set out to find the people and lead them to safety. They set up temporary shelters and gave them food and water.

Once all the people had been found and led to safety, the teams worked together to tidy up the mess made by the water. They worked together to make sure the power supplies were safely switched back on. The people would then be able to return home safely.

### WORD BANK

power

radio

water

aircraft

morning

food

people

safety

19

## THE PHONETIC ALPHABET

Earlier in this workbook, Rhiannon the RAF Air Traffic Controller asked you to write your name using the phonetic alphabet.  
This time she would like you to help her work out the words below:



RHIANNON

ROMEO OSCAR YANKEE ALPHA LIMA  
NOVEMBER ALPHA VICTOR YANKEE

**ROYAL NAVY**

ROMEO OSCAR YANKEE ALPHA LIMA  
ALPHA INDIA ROMEO FOXTROT OSCAR  
ROMEO CHARLIE ECHO

**ROYAL AIR FORCE**

ALPHA ECHO ROMEO OSCAR SIERRA  
PAPA ALPHA CHARLIE ECHO

**AEROSPACE**

ECHO NOVEMBER GOLF INDIA  
NOVEMBER ECHO ECHO ROMEO

**ENGINEER**

### PHONETIC ALPHABET

- A - Alpha
- B - Bravo
- C - Charlie
- D - Delta
- E - Echo
- F - Foxtrot
- G - Golf
- H - Hotel
- I - India
- J - Juliet
- K - Kilo
- L - Lima
- M - Mike
- N - November
- O - Oscar
- P - Papa
- Q - Quebec
- R - Romeo
- S - Sierra
- T - Tango
- U - Uniform
- V - Victor
- W - Whiskey
- X - X-ray
- Y - Yankee
- Z - Zulu

20

## TOOLS IN THE WORKSHOP



ERICA

Erica the BAE Systems Manufacturing Engineer has a group of young apprentices starting work at BAE Systems tomorrow. She thinks it would be a good idea to help them to get settled in by giving them a fun task to do.

She is going to ask them to label the tools in the workshop. Do you think this is something you could do too?

Write the correct word in the box.



TOOLBOX



TAPE MEASURE



SCREWDRIVER



SAW



PLIERS



PAINT



PAINT BRUSH



HAMMER



DRILL

PLIERS

HAMMER

SAW

TAPE MEASURE

TOOLBOX

DRILL

PAINT

PAINT BRUSH

SCREWDRIVER

21

## SAILING SUM

Rani the Weapons Engineer Officer is sailing across the sea towards an island in the Atlantic Ocean.

Her ship can travel 20 knots per hour and she has to travel 200 nautical miles to reach the island. A knot measures speed and is the same as one nautical mile per hour.

How many hours will she be sailing for?

Write your answer in the box.

10 hours



RANI

DRAW  
RANI'S SHIP

If Rani was travelling half as fast, can you work out how long (in hours) it would take her to reach the island?

Write it in the box here:

20 hours

23

## KRISS CROSS PUZZLE



ERICA

Erica the BAE Systems Manufacturing Engineer really enjoys these puzzles where the words cross over each other. She has left this one for you to complete and hopes you enjoy it too.

See if you can fit the listed words into the grid.

EQUIPMENT

MACHINE

PERSONNEL

MERLIN

UNIFORM

RECRUIT

RESCUE

GEAR

SIERRA



22

## CRACKING THE CODES



RHIANNON

Encryption has been used by the RAF and the Royal Navy for many years to send secret messages. Encryption is a way of changing information into code to keep it safe and secure. In some code systems symbols are used in place of letters.

Rhiannon the Air Traffic Controller was wondering if you could work out these words using the codes below?

### CODE 1



### CODE 2



### CODE 3



### KEY



24

## SEMAPHORE

Semaphore is a system of sending messages by holding two flags in certain positions. Each letter of the alphabet is displayed in a different position. Semaphore is used to send messages when voices cannot be heard. It is used for communicating to pilots before they take off.

Rani the Weapons Engineer Officer has set you a challenge. Can you work out what words are being communicated here?



RANI



25

## AIRCRAFT ALTITUDE

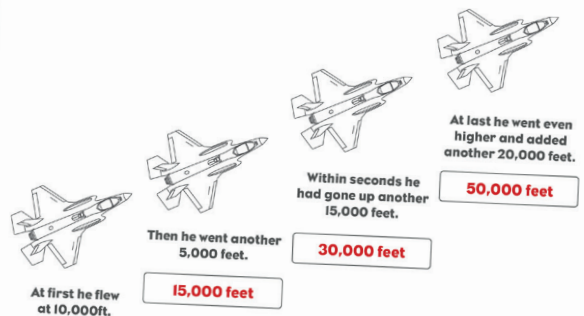


PATRICK

Today Patrick the Pilot has flown an F35 Lightning Stealth Aircraft. Can you work out what altitude he reached today?

### DEFINITIONS

The word ALTITUDE means the height reached above sea level or ground level. The word FEET is a measurement term used by the military. One FOOT equals 30.48 cms.



If you work out this answer correctly you will learn that this is the maximum altitude of the F35 Lightning Stealth Aircraft.

MAXIMUM ALTITUDE:

50,000 feet

26



## WHO DOES WHAT?

Lots of people work for the RAF, Royal Navy and BAE Systems. They all do different jobs.  
Can you help Rani the Weapons Engineer Officer to match the job titles with the job description?



RANI

### JOBS

HELICOPTER PILOT **D**

MANUFACTURING OFFICER **H**

PURCHASING SPECIALIST **E**

ELECTRICIAN **F**

LOGISTICS OFFICER **A**

MEDICAL OFFICER **C**

SYSTEMS SECURITY SPECIALIST **G**

RADIO CONTROLLER **B**

AEROSPACE ENGINEER **I**

### JOB DESCRIPTIONS

**A** Your job is to make sure the troops have what they need, when they need it. That means everything including vehicles, equipment, clothes, fuel and food.

**B** Your job is to use radio and communication equipment to send clear messages to your teams to ensure that operations run smoothly.

**C** Your job is to make sure everyone stays healthy and is given any medicines they require.

**D** Your job is to fly helicopters and to deliver equipment to places.

**E** Your job is to purchase equipment and other supplies, and manage stock levels.

**F** Your job is to look after and repair any electrical equipment.

**G** Your job is to ensure that computers and information are kept secure.

**H** Your job is to make large pieces of equipment using machinery.

**I** Your job is to check the designs of aircraft and test them before they go into service.

27

## RADAR REFLECTIONS



RHIANNON

Rhiannon the Air Traffic Controller is checking her Radar system to see if she can spot the presence of any ships or aircraft.

Can you put the words into the correct order to show what RADAR stands for?

AND  
RANGING  
RADIO  
DETECTION

**R**  
**A**  
**D**  
**A**  
**R**

### DEFINITION

Radar is a system for showing the presence, direction, distance and speed of aircraft, ships, and other objects. It works by sending out pulses of radio waves which are reflected off the object back to the source.

The objects show up as dots on a screen.



28

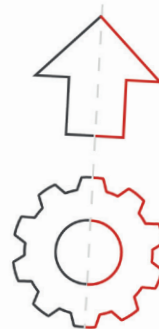
## DESIGN AND SYMMETRY

Dan the BAE Systems Design Engineer is having a tea break and is doodling. He has asked you to join him.

Can you complete the other side of these boxes to match and complete the arrow and the gear cog?  
Can you make a fancy pattern on each that is the same on both sides?



DAN



### FACT

A cog is one of several wheels in a machine that have prongs on their edges. When they turn, the prongs push each other and transfer movement. This makes the parts of the machine move.

### DEFINITION

A picture or thing is symmetrical when it is the same on both sides. A shape has symmetry if a central dividing line can be drawn on it and both sides match.

29

## WHICH WAY?

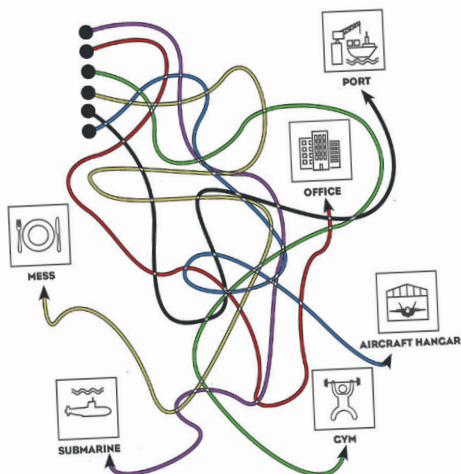


PATRICK

Patrick the Pilot needs to make his way to the office and then the aircraft hangar (where the aircraft are kept).

Can you help him by colouring in the correct paths he should take?

WHICH PATHS SHOULD PATRICK TAKE?



30

## BE A DESIGNER

Design is a large part of military work and the teams are always working hard to research, plan and develop new design ideas.

At BAE Systems they develop important new designs to improve equipment and machines. Dan the BAE Systems Design Engineer works for BAE Systems and he is always thinking of ideas to build something new.

Would you like to design something? Use your imagination and see what you can create.



DAN

DRAW YOUR DESIGN HERE:

SOME IDEAS IF YOU NEED HELP DECIDING:

You could design a helicopter, ship or aircraft.

You could design a radio or some communication equipment.

You could design a brand new encryption system (like the Phonetic Alphabet or Semaphore).

You could design a machine with lots of gadgets and tools.

You could even design a new kitchen layout for Carl the Chef and his team to work in.

31



Developed by Research Toolkit Limited  
Partners: The Royal Air Force, The Royal Navy, BAE Systems  
Activities created and developed by Carrie Jackson  
Design and Illustration by Knotwork



BAE SYSTEMS