

6

The Immune System

The Blights of Camelot



Get Ready to Visit Arthurian England

HEAR YE, HEAR YE, in this adventure, you'll arrive in fictional sixth-century England and the legendary lands of Camelot. Unearth the particulars about the immune system.

Hello Adventurer!

Welcome to Adventure 6 - The Immune System.

During this adventure, you will explore Arthurian England and your body's immune system. There will be information to read and activities to complete to help you learn, and quizzes when you are ready to challenge yourself! Take your time along the way - spend as much or as little time as you like on each activity, and do not forget to use the additional resources to learn more about the topics you are interested in.

My name is Dr. Bonyfide. I'm lost in the space-time continuum! Help my friends search for me, and learn about history and science along the way.



Wilcume!*

That means "Welcome!" in Old English.

***Say it like this: "wil-coom."**

*Syllables in bold are the strongest.

GET READY TO

LEARN ABOUT

The Immune System

Armed with a cellular battalion, your body protects itself from invasion.

GET READY TO

VISIT

Arthurian England

In a mysterious mist, a kingdom fraught /
And a strange affliction caught /
With Merlin's help, our heroes sought /
How Germs are rid of on the spot!

GET READY TO

MEET

King Arthur

The Knights of the Round Table, Merlin, and a few other extraordinary characters.



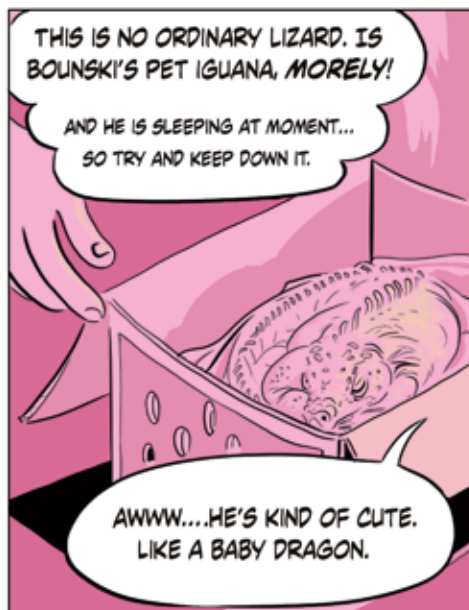
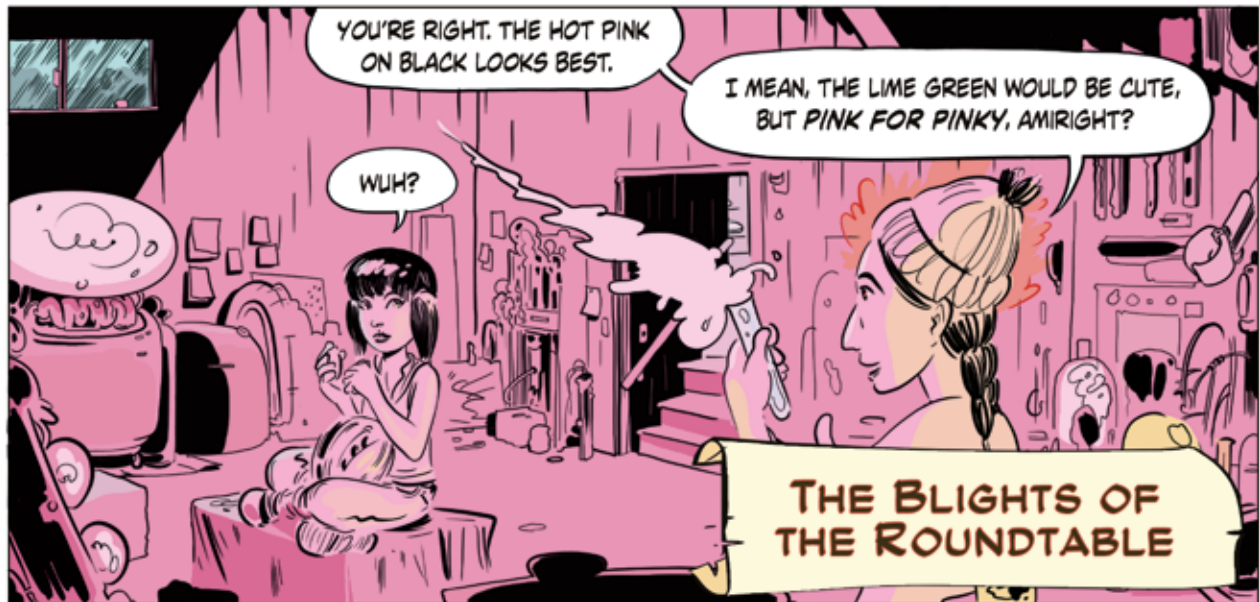


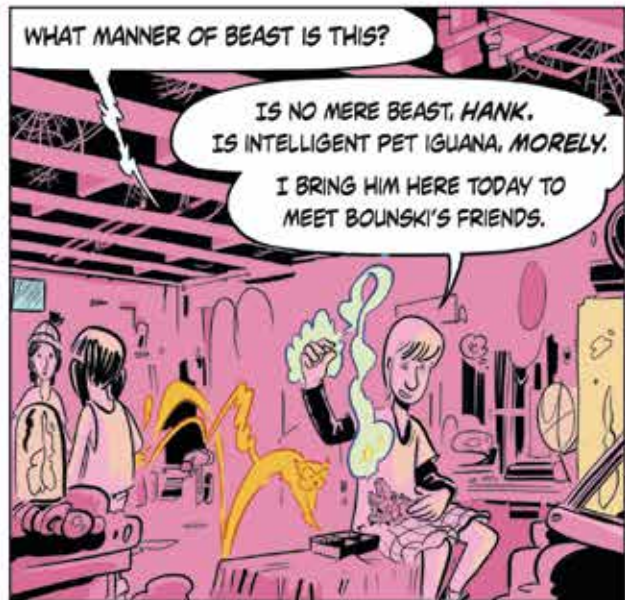
*Are you ready for
a new Adventure?*

**Enter
this portal**



**for
Time Skaters Adventure 6...**

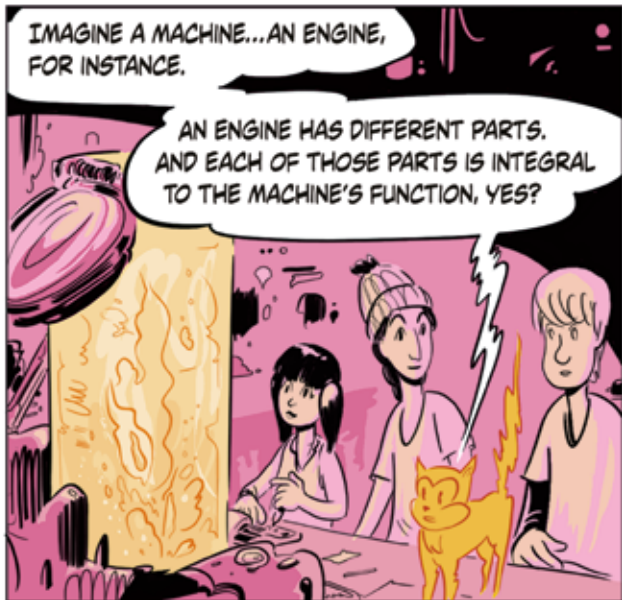






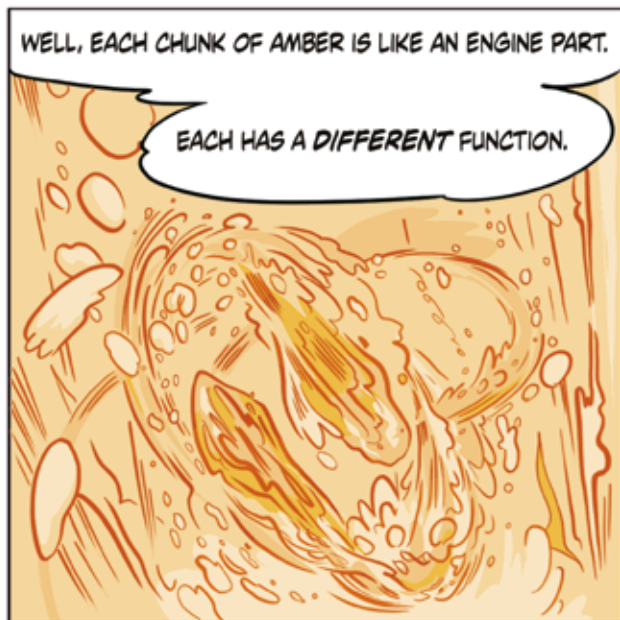
THESE BITS OF AMBER, THEY'RE NOT PIECES, AS MUCH AS PARTS.

WHAT'S THE DIFFERENCE?



IMAGINE A MACHINE...AN ENGINE, FOR INSTANCE.

AN ENGINE HAS DIFFERENT PARTS. AND EACH OF THOSE PARTS IS INTEGRAL TO THE MACHINE'S FUNCTION, YES?



WELL, EACH CHUNK OF AMBER IS LIKE AN ENGINE PART.

EACH HAS A DIFFERENT FUNCTION.



I DON'T KNOW WHAT THOSE FUNCTIONS ARE YET, BUT WHENEVER YOU BRING ONE BACK FROM YOUR ADVENTURES, THE OTHERS GRAVITATE TOWARDS IT.



I FEAR THAT IF I DON'T LET THEM JOIN TOGETHER LIKE THEY WANT, THEY'LL FIND A WAY TO DO SO ON THEIR OWN.



REMEMBER THAT EARTHQUAKE THE OTHER DAY?

UNFORTUNATELY.

CLICK!

WE...DON'T WANT ANOTHER ONE OF THOSE.

Know Your Old English



Did you notice the word “**wyrm**” in Time Skaters 6? That’s Old English for **dragon**. Or, how about when Merlin said “**friesende!**” that means “**freeze!**”

Here are a few other fun words, Old English style:

Durst - to be daring or bold enough to enact something

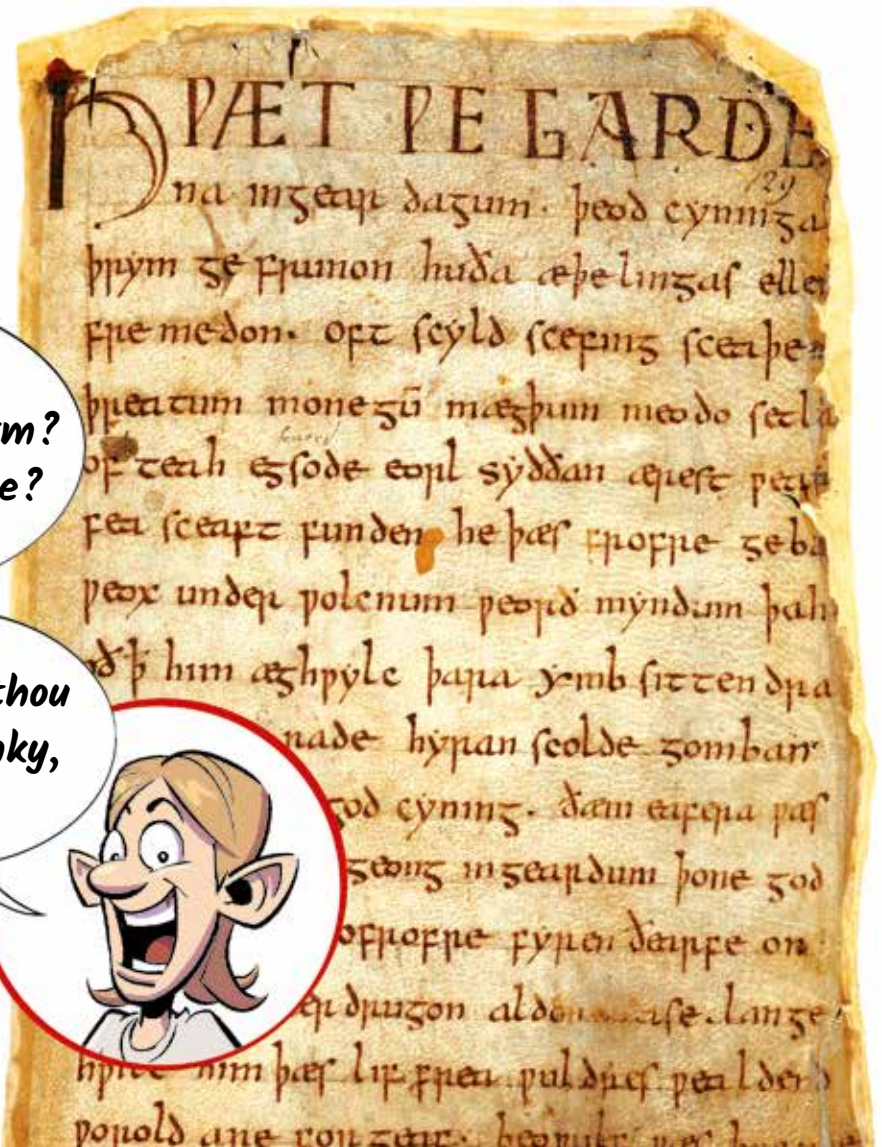
Whither - to where

Imagine Pinky and Bounski practicing Old English...



*Durst we approach the wyrm?
Is it friend or foe?*

*Whither thou goest Pinky,
I go.*



A page from the original Beowulf

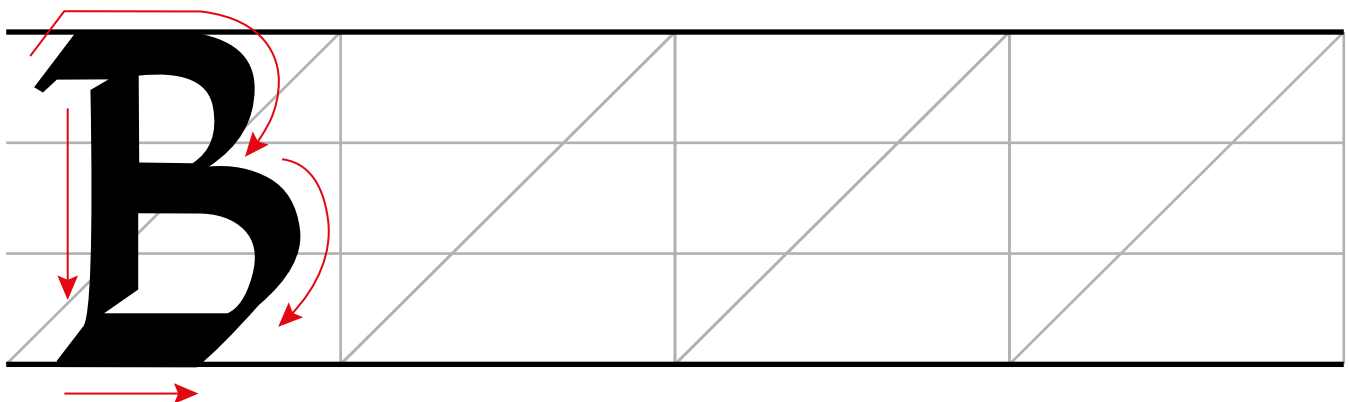
If this Adventure Guide existed in the Middle Ages, only monks and the most highly educated people would be able to read it. We couldn't read it either, because the Anglo-Saxons used a language we call Old English. Old English, also called Anglo-Saxon, is the language spoken by the English inhabitants of Britain from about 500 to 1100 CE. Much of Old English doesn't even look like English at all.

Beowulf is a very famous poem written in Old English. The opening line, shown below, means "over the whale's road." What kind of road could that be?



Not only was literacy a privilege, but since the printing press hadn't been invented yet, books had to be copied by hand! Only a few people knew how to write, and the process of copying a text took a long time. On the plus side, writing by hand allowed people to develop beautiful styles of text.

Now you can practice writing this Old English letter:



Know Your Immune System

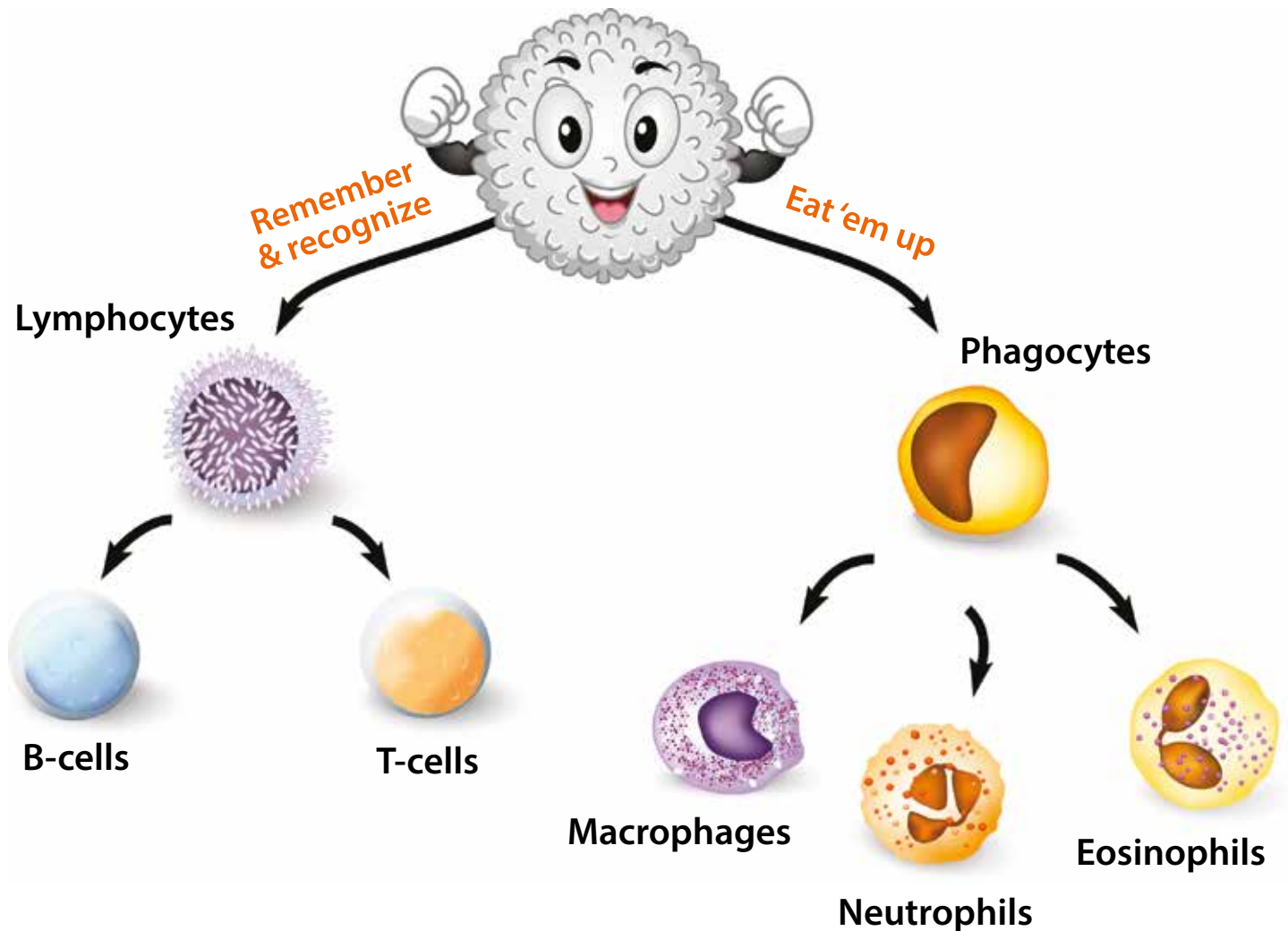
Like an invisible shield, the immune system protects you from germs and illness. It's made of cells, tissues, and organs that work together to keep you healthy. You might think of things like swelling or fever as signs of infection, but they are actually signs your immune system is working. When bacteria or viruses penetrate your skin through a cut or opening and start multiplying inside your body, different types of white blood cells rally to your body's defense.



When your immune system finds germs or any substances that aren't part of your body, white blood cells coordinate to attack the invaders and also remember how to react to a specific invader in the future.

White blood cells, also known as **leukocytes***, start out in your bone marrow, growing from stem cells, and can also be found in your blood and lymph. There are different kinds of leukocytes, each with a different job in the immune army.

White Blood Cells (Leukocytes)



There are two types of leukocytes: lymphocytes and phagocytes. Lymphocytes “remember and recognize” while phagocytes “eat up” invaders.

There are different types of phagocytes like **macrophages*** and **neutrophils***. The neutrophils move around your blood, look for antigens, and create a liquid known as pus to help eat up bacteria in a wound. They’re the biggest group of all the white blood cells.

Bacteria Gone Wild

Which is bigger?

Two germs growing exponentially like this, 2^5 ,
or multiplying like this, 2×5 ?

One of the reasons germs and bacteria, in particular, can be so alarming is because they multiply like crazy! Unlike regular multiplication by just one number, this kind of growth is way more powerful.

We can represent the results using exponents, often called “powers,” and, in this case, the base number 2. Your lymphocytes and phagocytes know all about bacteria’s so-called “powers.” They work together to fight invading germs before exponential growth really takes over, your temperature rises, and you have to call in a supporting cast of doctors and medicine.

Here’s an example of bacteria gone wild! Once it’s reached a total number of 128, simple remedies may no longer work. Can you fill in the blanks and determine which day that is?

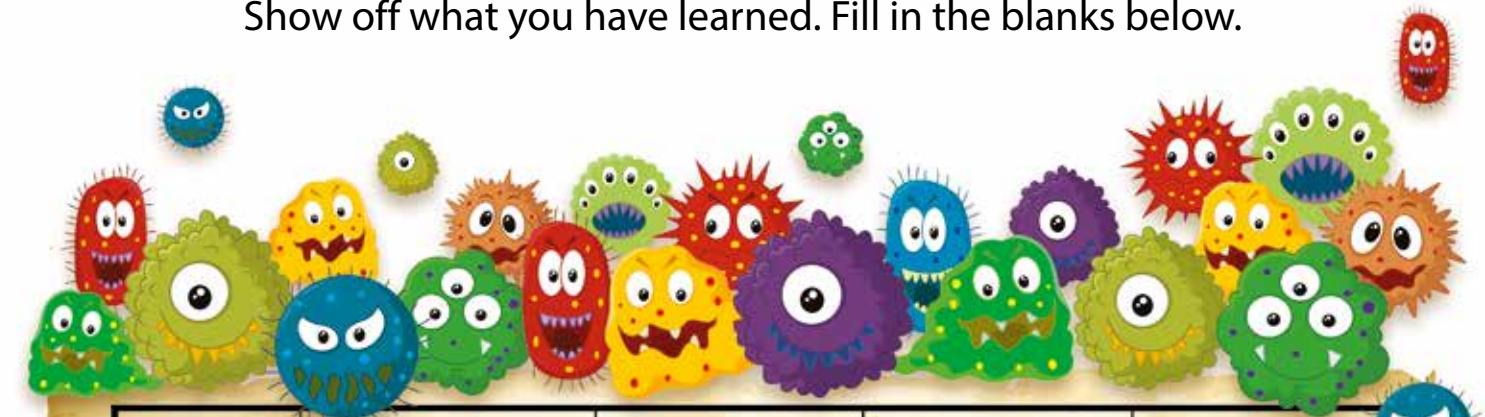


Dr B.'s Note

Depending on your age and your unique environment,
there are **300 to 1,000** different kinds
of “good” bacteria living in your gut.

Strength in Numbers

Show off what you have learned. Fill in the blanks below.

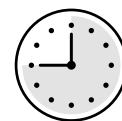


What day is it?	How are the bacteria growing?	How many copies of 2 get multiplied by itself?	What is the total number of bacteria?	How is growth written with exponents?
0	1	0	1	2^0
1	2	1	2	2^1
2	2×2			2^2
3	$2 \times 2 \times 2$		8	
4			16	2^4
5	$2 \times 2 \times 2 \times 2 \times 2$	5		
6				2^6
7		7		
8				

Baked Apples with Oats



Serves 4



**Total time:
45 minutes**

Ingredients:

- 4 apples
- 1 cup quick rolled oats
- 1/3 cup brown sugar
- 1/3 cup butter
- 1 tsp ground cinnamon



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