

Exchange Surfaces and Breathing

7.1 Specialised Exchange Surfaces

- Large multicellular organisms have a higher metabolic rate than small unicellular organisms because they have more cells.
- The demand for O_2 and glucose to be supplied and CO_2 to be removed much higher
- In large multicellular organisms the surface area to volume ratio is too small and the diffusion differences are too large and therefore the rate of diffusion is too slow to meet these demands alone
- Therefore, they have exchange surfaces like the lungs linked up to the organs by transport systems eg. blood

Specialised Exchange surfaces:

- Compact
- Very large surface area
- Maintains gradients — ventilation (breathing) movements and movements of blood
- Reduced barriers (only 2 layers of cells so few cell membranes)
- Good blood supply
- Short diffusion distance — alveoli and capillary wall 1 cell thick, and cells are thin (squamous epithelium)
- Surface must be permeable — cell membranes are
- Way to pick up O_2 easily — respiratory pigment

7.2 The Mammalian Gaseous Exchange System

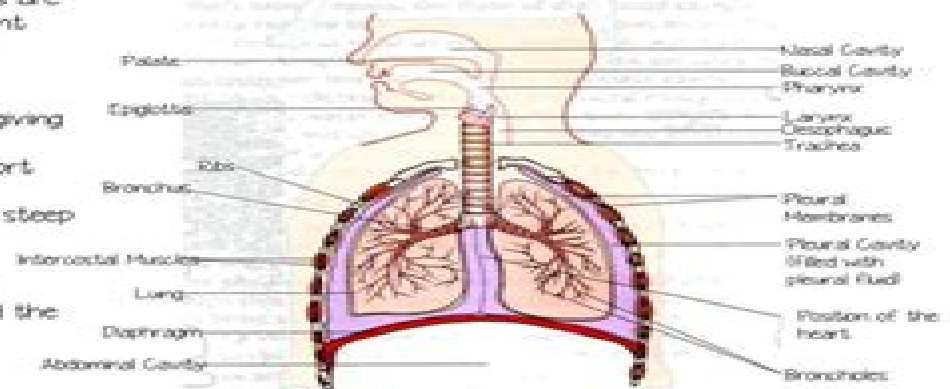
- Exchange surfaces have:
 - o Increased/large surface area — giving more area for diffusion
 - o Thin 1 cell thick wall — giving short diffusion pathway
 - o Good blood supply — maintains a steep concentration gradient
 - o Good ventilation — maintains steep gradients for O_2 and CO_2 between the blood in the air and the lungs

7.1 SPECIALISED EXCHANGE SURFACES

7.2 THE MAMMALIAN GASEOUS EXCHANGE SYSTEM

7.3 MEASURING THE PROCESS

7.4 VENTILATION AND GAS EXCHANGE IN OTHER ORGANISMS



Tissue	Function/Adaptation in the lungs
Cartilage	<ul style="list-style-type: none"> - Holds the lumen of the trachea and bronchi open/gives support - Prevents collapse of the trachea/bronchi during inhalation
Goblet Cells	<ul style="list-style-type: none"> - Secrete mucus to trap bacteria, viruses and dust particles. Mucus contains water and mucin proteins
Ciliated Epithelium	<ul style="list-style-type: none"> - Move in a coordinated way to move/sweep mucus up from the lungs towards the throat
Squamous Epithelium	<ul style="list-style-type: none"> - Very thin lining cells found in alveoli - Provides short diffusion distance for gas exchange
Elastic Tissue	<ul style="list-style-type: none"> - Stretched during inhalation - Recoil during exhalation to help increase air pressure/help air be expelled from the lungs

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SA Adler



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Table of Contents Ocr Biology Gcse 2013 Answers

1. Understanding the eBook Ocr Biology Gcse 2013 Answers
 - The Rise of Digital Reading Ocr Biology Gcse 2013 Answers
 - Advantages of eBooks Over Traditional Books
2. Identifying Ocr Biology Gcse 2013 Answers
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Ocr Biology Gcse 2013 Answers
 - User-Friendly Interface
4. Exploring eBook Recommendations from Ocr Biology Gcse 2013 Answers
 - Personalized Recommendations
 - Ocr Biology Gcse 2013 Answers User Reviews and Ratings
 - Ocr Biology Gcse 2013 Answers and Bestseller Lists

5. Accessing Ocr Biology Gcse 2013 Answers Free and Paid eBooks
 - Ocr Biology Gcse 2013 Answers Public Domain eBooks
 - Ocr Biology Gcse 2013 Answers eBook Subscription Services
 - Ocr Biology Gcse 2013 Answers Budget-Friendly Options
6. Navigating Ocr Biology Gcse 2013 Answers eBook Formats
 - ePub, PDF, MOBI, and More
 - Ocr Biology Gcse 2013 Answers Compatibility with Devices
 - Ocr Biology Gcse 2013 Answers Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Ocr Biology Gcse 2013 Answers
 - Highlighting and Note-Taking Ocr Biology Gcse 2013 Answers
 - Interactive Elements Ocr Biology Gcse 2013 Answers
8. Staying Engaged with Ocr Biology Gcse 2013 Answers
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Ocr Biology Gcse 2013 Answers
9. Balancing eBooks and Physical Books Ocr Biology Gcse 2013 Answers
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Ocr Biology Gcse 2013 Answers
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Ocr Biology Gcse 2013 Answers
 - Setting Reading Goals Ocr Biology Gcse 2013 Answers
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Ocr Biology Gcse 2013 Answers
 - Fact-Checking eBook Content of Ocr Biology Gcse 2013 Answers
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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