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Great Ways to Learn Anatomy and Physiology

Charmaine McKissock





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Foreword

Dear reader,

Like many others, you have chosen this book to help you study Anatomy and Physiology (A&P) for career purposes. This is *not* just another A&P textbook to add to the growing pile. It is a special resource put together for you, based on the work of lecturers and students who know how tough it can be to study.

Understanding how bodies work (or don't) is fascinating, but remembering thousands of facts, numbers, spellings and diagrams can be very challenging; especially nowadays, when we are all bombarded by so much information that we have to absorb, understand, evaluate, store and eventually use.

As your time and energy are limited, we only present to you proven ways to make studying easier for yourself. You will be able to train your brain to function better, whilst relaxing your mind and enjoying learning more.

Basically, you already have what it takes to succeed in your goals:

- a limited amount of time for trying out options to see what suits you best;
- an open mind to add new ideas to the ones that already work for you;
- a desire to have a relaxed mind and body this will help your brain to function much better;
- a sense of humour it will keep you sane;
- some sticking power the motivation, self-belief and determination to succeed;
- some **good A&P textbooks** and **human beings** to talk to are also essential.

We have organized this book around 10 chapters – based on the 10 Top Tips for learning that have already worked for countless students in your situation. Keep this resource close to you as you study, and dip in and out whenever you need it. We hope that you will succeed with this unique approach to learning Anatomy and Physiology . . .

Chapter 1

Relax and take control



OVERVIEW

In this chapter, you will have the opportunity to explore how your state of mind can affect your learning ability, and how to use this information to your advantage.

You will find out:

- √ how to understand your own stress;
- ✓ what the nervous system has to do with stress;
- ✓ what really makes us act the way we do;
- √ how positive and negative emotions alter brain function;
- √ how to maximize your energy and get rid of harmful feelings;
- √ how to reduce exam stress;
- ✓ some visualization routines to calm you down.

Understanding your own stress

Do you constantly worry about the mountains of information that you need to absorb? Do you panic at the mere thought of your exams? Does your head start swimming as stress chemicals flood into your bloodstream? Does a nagging voice at the back of your mind keep putting you down? With constant practice, you can train yourself to slip into a positive relaxed state of mind, where you feel in control. The rest of this section covers lots of different stress-busting solutions that have really worked for other students. But first, it's important to fully explore your own stress . . .

What is stress?

It's the feeling – physical or mental – that comes when demands are made on you. The unpleasant effects of stress hit you when there's a gap between the demands made on you and your ability to cope with them.

How much stress can you take?

Every person reacts differently to challenges and changes: they are not necessarily bad for you, except if you start feeling really out of control. Anything that happens to you – whether winning the lottery or losing your job – can throw you off balance.

Can you cause your own stress?

External events that you can't control – like falling ill or losing somebody you love – can cause a lot of stress. But often we are our own worst enemy: the way we act or think about ourselves can be very damaging; for example, when:

- our standards are impossible to meet;
- we want approval from others all the time;
- we give others the power to control us;
- we blame external circumstances and others for the way we feel;
- we over-react and are inflexible;
- we always expect to fail . . .

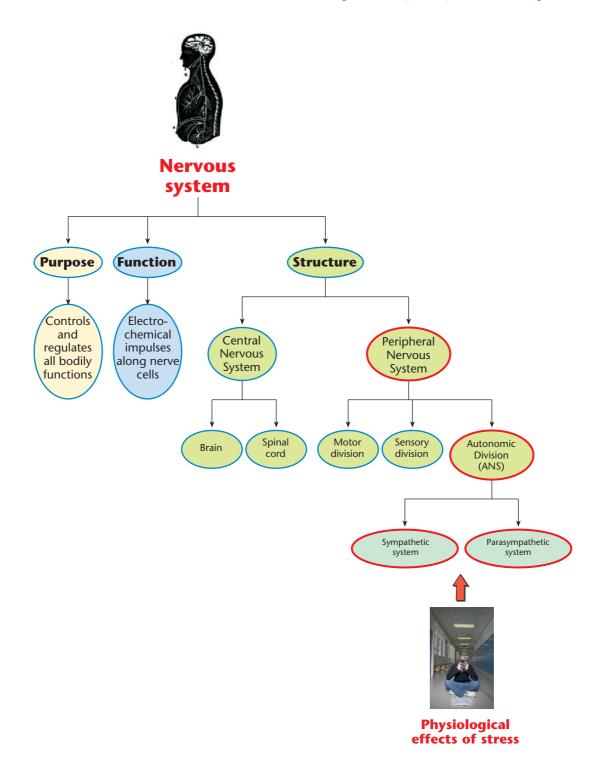
Questionnaire: Symptoms of stress

Do you routinely suffer from any of the common symptoms of stress?

- Are you getting headaches?
- Do you often have a sore neck, shoulders and back?
- Do you continually feel run down or ill?
- Does your heart sometimes beat very hard and do you feel panicky?
- Do you sometimes feel dizzy, nauseous or breathless?
- Do you feel irritable and get angry easily?
- Do you feel anxious or depressed?
- Are you eating, drinking or smoking excessively?
- Do you keep putting off tasks and finding it hard to concentrate?
- Do you constantly feel tired and have sleep problems?
- Are you having problems managing your time and belongings?
- Do you lack confidence and have a lot of negative thoughts?

When you feel threatened. stress chemicals flood into your bloodstream. If this happens too often, you can get physical or mental problems. If you regularly suffer from any of the symptoms, first check them out with your GP. If any of your symptoms are stress related, there's lots you can do: you can reduce the demands made on you and increase your coping systems: both ways work. Many solutions are suggested in this book.

Stress and the Autonomic Nervous System (ANS): Summary



What job does the ANS do in the body?

Your ANS is always working for you, without you knowing it, day or night. It keeps you functioning properly by regulating all involuntary functions (heartbeat, blood pressure, breathing, body temperature, hunger, thirst, sleep, emotions, water, sugar, salt levels, muscle tone, hormones, etc.). The process of maintaining a constant internal state despite external changes is called homeostasis.

The ANS keeps your body safe from immediate danger by preparing it for 'fight or flight' via the **Sympathetic Nervous System (SNS)**. When you feel threatened by something real or imagined, stress chemicals flood into your bloodstream.

The ANS then restores your body to a resting state via the **Parasympathetic Nervous System (PNS)**.

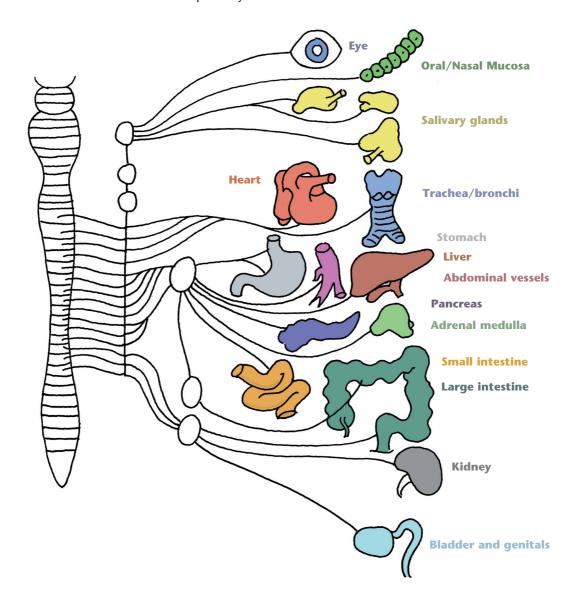
AUTONOMIC NERVOUS SYSTEM: fight or flight response			
Structure	Effects of stimulated Sympathetic Nervous System	Effects of stimulated Parasympathetic Nervous System	
Eye	Pupils dilate; eyes focus on distant objects (scanning for danger and escape route).	Pupils constrict; eyes focus on nearby objects.	
Salivary glands	Saliva decreases: mouth gets dry.	Saliva increases.	
Nose	Nasal glands produce less mucus.	Nasal glands produce more mucus.	
Heart	Heart rate and blood pressure increase: more oxygen and blood to muscles.	Heart rate and blood pressure decrease.	
Lung	Bronchial muscles relax; blood vessels dilate; breathing is faster.	Bronchial muscles contract and blood vessels constrict: breathing slows.	
Stomach & intestines	Less digestive juices produced. Movement of food slows down.	More digestive juices produced. Movement of food increases.	
Liver	Glucose released.	Glucose stored.	
Bladder & kidneys	Sphincter closed. Less urine output.	Sphincter relaxed. More urine produced.	
Adrenal glands	Produce stress hormones adrenalin and noradrenalin. Immune and reproductive systems suppressed.	Body brought to rest. Immune and reproductive systems active.	
Skin	Blood vessels constrict; hair stands on end; sweating.	Blood vessels dilate. Sweat pores close.	

What is the structure of the Parasympathetic Nervous System (PNS)?

The organs of the body have *separate* sympathetic and a parasympathetic nerve supplies.

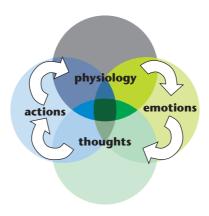
The **SNS** consists of ganglia (a collection of nerve cells) connected from the spinal cord – from the thoracic to the lumbar area – and branching off to the organs

The **PNS** is connected at the sacral and cranial areas and branches off to the organs via different neural pathways.



What really makes us act the way we do?

Most of us want to be better at something. It could be exams, relationships, dieting, exercise, time management, whatever! But the crazy fact is that we know exactly what we should do, but we don't do it. The reason is that we may be unaware of the strong physical, emotional and thinking patterns that affect our actions, often unknown to ourselves. Understanding our basic physiology can help us make changes that really last. For example, when you think 'I'm just rubbish at exams' you must first feel anxious about your own abilities. In order to feel anxious, the body's physiology must react with a rapid heart beat, irregular shallow breathing and tense muscles. Emotions feed thoughts and thoughts feed emotions in a continuous loop fuelled by your basic physiological systems: this circuit affects all your actions. Any attempt to just change our actions will inevitably be doomed to superficial and short-term changes.



What drives your best performance?

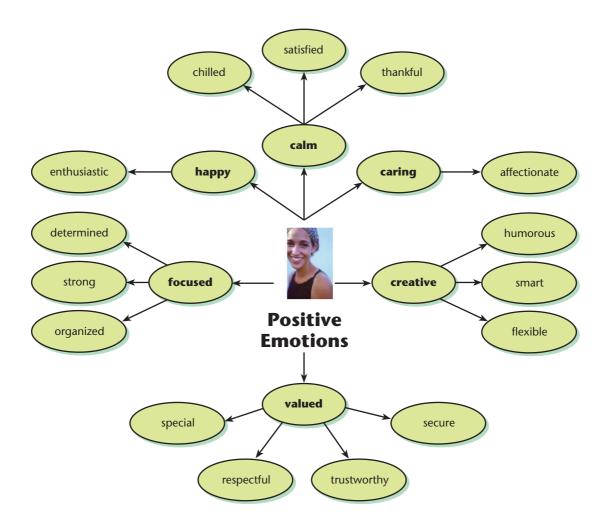
One person may say that they perform best when they are aroused under pressure (in this state, adrenaline is released into the bloodstream). Another may need to feel relaxed (when acetylcholine is released into the bloodstream). Both are right and both are wrong: excessive arousal (fear/aggression) and excessive relaxation (apathy) will affect performance negatively. Dr Alan Watkins, a neuroscientist, has said that what really drives performance is whether the individual is in an *anabolic* or a *catabolic* state. Anabolic hormones (DHEA) are secreted when the individual is in a **positive** state of mind, and catabolic hormones (cortisol) are secreted when you are in a **negative** state of mind. The effect of high cortisol levels can be immense, ranging from weight gain, high cholesterol, depleted immune system, depression and, most importantly, impaired brain function. This is the reason why you may perform badly in exams when you are over-anxious, angry or lacking motivation.



You'll give your best performance when you are aroused with positive emotions or relaxed with positive emotions. Look at the following pages to explore your positive and negative emotions.



There are over 3000 emotions in English. Can you think of any more **positive** emotions to add to this map?

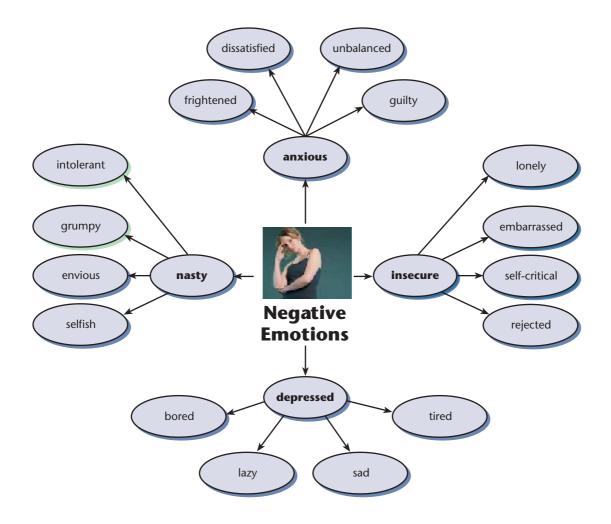




Remember: Positive emotions mean good chemicals flowing round your body and boosting your brainpower.



Can you think of any more negative emotions to add to this map?



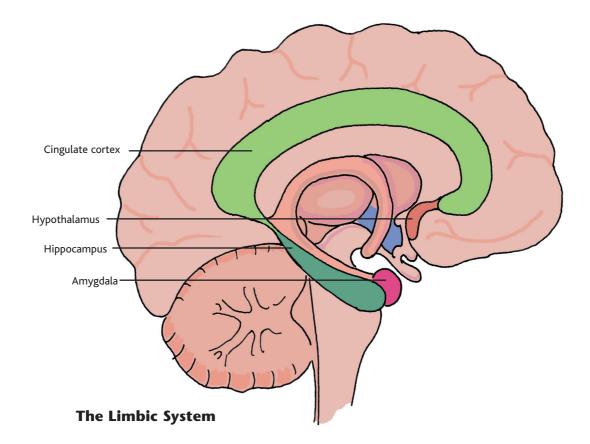


Remember: Negative emotions mean harmful chemicals flowing round your body and decreasing your brainpower.

How do your emotions alter brain function?

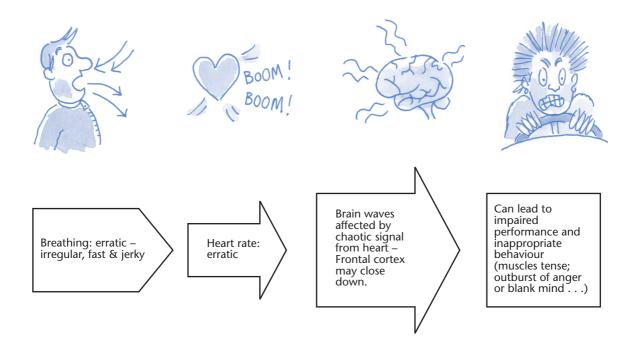
The **Limbic System** includes several brain areas that are in charge of controlling emotions. These areas include the Cingulate cortex, the Hypothalamus, the Hippocampus, and the Amygdala. The Amygdala is involved in memory, emotion and fear. The Hippocampus is involved in the forming and storing of memories. This shows the important relationship between memory and emotion. Strong emotions bring back memories and strong memories bring about emotions.

However, when emotions become extreme, your primitive instinctive brain area takes over and thinking processes become impaired. Your heart beats in an *erratic* manner, causing learning blocks. This kind of heart beat, where your heart signal goes up and down erratically, is associated with a catabolic state of mind. In this state, your **Frontal cortex** ceases to function effectively. The Frontal cortex is used for working-memory, time, sequence, planning, organization and attention shifting. This is why you get impaired decision-making, problem-solving, creativity, and energy reserves. On the other hand, a *coherent* heart beat rate – one which is smooth and rhythmic -improves your thinking processes.



What is the fastest way to boost brain function?

You can calm your heart beat by controlling your breathing. You need to make your breathing <u>rhythmic</u>, <u>regular and smooth</u>. This **rhythmic breathing** is a very important life skill as it will help you keep your cool in challenging situations. It will stop your brain shutting down, allow you to maintain energy and help you identify and change your unwanted feelings. Look below at the rapid chain of reactions in your body when you feel threatened.





Rhythmic breathing takes a little practice at first (see page 21 for guidance). About 8 breaths per minute are beneficial for women and about 6 for men. It's a good idea to first practise rhythmic breathing alone with your eyes closed, then with others around you, so that you can use it in emergency situations.

How to maximize your energy

You can protect your energy by doing things that reduce tension and boost energy. Did you know that a single walking session can reduce tension as effectively as a tranquilizer?



Make a quick list of those activities that drain your energy. Then make a list of those that boost you. Aim to balance these out each day, to prevent exhaustion, poor performance or illness.

Controlling unwanted emotions

The ability to change your emotional states when you want to is an extremely useful life skill. It is not helpful to wait till somebody or something else changes the way you feel: this just reinforces a feeling of powerlessness and dependency. Many people turn to alcohol, drugs, shopping, food, TV, or offloading their feelings on others to shift the way they feel. But these strategies are not always available in the heat of the moment, their effects can be short-lived and they can often leave you feeling worse than before. Your body and mind are your best medicine cabinet. Dr Alan Watkins, neuroscientist and expert in Health and Performance, suggests following a 'SHIFT Procedure', similar to the one described below:

Stop whatever you are doing or thinking, and shift your attention to your

Heart area and practise your Rhythmic Breathing from there.

Induce a positive feeling by remembering something, somebody or somewhere that makes you feel really good.

Feel this emotion in your body – notice all the details.

Turn to your thoughts again.

Notice how different you feel after this procedure. It will help you become calm and clear-thinking.

Questionnaire: How do you cope with stress?

Does your lifestyle help you deal with stress? To find out, answer the questions below truthfully. Tick the columns on the right that apply to you.

Are you looking after yourself?	Always	Usually	Sometimes	Never
Do you get enough sleep?				
Do you do something to relax completely every day?				
Do you take some exercise at least twice a week?				
Do you eat 3 times a day, with at least one balanced meal a day (carbohydrates, proteins, greens and fruit)?				
Do you drink at least a litre of water a day?				
Do you try to drink tea, coffee, or cola drinks in moderation?				
Do you smoke less than five cigarettes a day?				
Do you talk to somebody you trust when you are worried or angry?				
Do you recognize your own good qualities and appreciate the good things in your life?				
Do you know your weaknesses, but without beating yourself up about them?				
Do you try to focus on the present without always thinking about the past or worrying about the future?				
Do you try to succeed in what you do, while being able to learn positively from your mistakes?				
Do you say 'no' without feeling guilty, when asked to do something you really don't need to do?				
Do you manage your money and space well?				
Do you manage your time and energy well?				
Do you set yourself short-term and long-term goals?				
Do you use as many study strategies as possible: e.g. technology, memory techniques, relaxation techniques, help from others, etc?				

If you have answered mostly 'yes' or 'usually', you seem to be dealing well with stress and you're looking after yourself.

If you have answered 'sometimes' or 'never', your lifestyle may not be helping you deal with stress effectively. Don't beat yourself up about it: take action. You can help yourself straight away by trying out some of the ideas and techniques presented in this chapter.

Instant calmer



If you are feeling anxious, you will find it hard to think clearly. Here is a quick technique to practise as often as possible. You can use it anytime, anywhere – in an emergency, when you need to quickly calm down, relax your body and clear your mind. You can do it sitting, lying down or even standing up. When you are first learning the routine, it helps to get somebody to read the words out to you very slowly. You can also record it for yourself and play it back until the routine becomes automatic.



Start by closing your eyes.

Firmly say 'stop' to any anxious feelings or thoughts going round in your head. Let your mind go blank. Let go of any thoughts of the past.

Free your mind of any worries about the future.

Now just focus on your breathing for a few seconds, without trying to change anything . . .

Feel cool air going in through your nostrils and out through your mouth . . . Then feel your chest rising and falling, with each breath into and out of your heart area . . .

Next focus on your belly rising and falling, with each breath in and out.

Now squeeze your tummy muscles in as tight as you can and count to 4. Then release your muscles and relax your tummy completely.

Now clench your hands and press your elbows tightly into your body. Breathe in as you count to 4. Hold it for a second. Now breathe out for 6, as you let your hands and arms relax completely . . .

Push your feet hard into the floor.

Breathe in as you count to 4. Hold it for a second.

Now breathe out for 6, as you let your feet and legs relax completely . . .

Drop your neck gently forward, back and sideways.

Now lift your shoulders to your ears.

Breathe in as you count to 4. Hold it for a second.

Now breathe out for 6, as you let go of your shoulders and relax . . .

Now return to normal rhythmic breathing.

Imagine breathing in calm, and breathing out your worries.

Rest in this calm feeling for a few moments . . .

Now slowly become aware of where you are now.

Feel your weight on your seat or on the ground.

Feel your clothes against your body.

Then open your eyes, ready to meet the world, relaxed but energized.

How can you reduce your exam stress?

First, find out what are the four big enemies of exam revision . . .



Time Bandits are activities that steal your time away. They interfere with your progress, energy and concentration in the most wicked ways.





To defend yourself from Time Bandits, see Chapter 3 on 'Timing is everything'.

Lack of memory techniques

Research shows that you can forget a frightening 95% of what you learn within 24 hours, if you don't use specific memory techniques.



To become an efficient learner, practise Bodymapping and the other memory techniques shown in this book.

Poor notes

If your notes are visually boring, too long or difficult to read/find, you'll be making it harder for yourself to absorb information.



To liven up your notes and your brain, see Chapter 2 on 'Bodymaps'.

Negative emotions and Stress

Research has shown that negative emotions and stress can seriously affect your memory and concentration. You may also have unrealistic ideas about exams and little confidence in yourself.



First check your current stress levels: see pages 10 and 20. Next, check your beliefs about exams in the 'Exploring myths about exams' questionnaire. Then learn to practise the stress management techniques in this section.

Questionnaire: Exploring myths about

pe Be ex ag	erfor low pec ree	ted worries about exams can interfere with your mance, as well as making you really miserable. is a series of questions to help you identify if you are ting too much of yourself. Tick the statements you with, and then look at the answers at the end book.	
1		Having a really good memory is all that counts in an exam. Some answers in Anatomy and Physiology do rely on remembering pure facts. But usually you'll get better marks if you can show good understanding of your subject.	
2	a.	Examiners like to trick you into making mistakes. If you show any weaknesses, they'll try to fail you. It's not fair.	
	b.	Examiners want you to pass: they'll give you marks for making a reasonable attempt at key points.	
3	a.	You should answer only the specific aspect of the question that is asked of you – without waffling and padding.	
	b.	In exam answers, you should put down at great speed everything you know about the subject in question.	
4	a.	You can do a very quick brainstorm plan, but there's no time to write out a carefully crafted answer.	
	b.	For each question, you need to write a plan, then an introduction, a middle and a conclusion.	
5	a.	You will be marked mostly for content, but you may lose some marks if your writing or diagrams are difficult to understand.	
	b.	The presentation of your work must be very neat and attractive, with perfect spelling, punctuation, and grammar.	
6	a.	As you get older, your prior knowledge and experience of the world can really help you learn new things.	
	b.	The older you get, the worse your memory gets.	
7	a.	The more cramming you do the night before your exams, the better marks you will get.	
	b.	The important thing is to work 'smarter' not 'harder'. It's best to revise little but often, over a long period of time. It's a good idea to keep away from people who try to wind you up before the exam!	

Calming exam nerves



Professional sports people use this technique to prepare for big events. The more you can practise a situation in your mind (this is called 'visualization'), the easier it will get. You are giving your brain the positive signals that it needs, to cope effectively with a difficult situation.



Ask somebody to slowly read the sequence below to you, or record your own voice. First practise the 'Instant Calmer' (p. 21) till you are very familiar with it, and then tag this on the end. Make sure you are comfortable and won't be disturbed for at least 15 minutes.

You are feeling very relaxed and safe now.

It is easy for you to concentrate and see pictures clearly in your mind.

New thoughts help you change the things that you want to change.

These new thoughts go deep into your mind and stay with you long after you open your eyes.

They allow you to cope better and better with life, day by day.

Now imagine you are lying on your own private golden beach.

Feel the sun gently warming your body. Feel a cool breeze on your face.

Listen to the sea, coming in and out, in and out, as you breathe in and out.

Breathe in calm, and breathe out any anxiety you have.

Smell the scent of the air. You feel safe and warm and happy and relaxed.

A little cloud appears in the blue sky, just watch it floating away.

If an unwanted thought pops into your mind at any time, just watch it float away without attaching to it. You are totally safe, feeling calm and chilled out.

In a few moments, you feel quite ready to leave the beach, full of energy and confidence . . .

You are going to take a walk in your mind along a little path, shaded by trees.

In the distance, you see an attractive looking building. What does the building look like? You enter the building, which feels calm and welcoming.

You look around and see a sign saying: 'Exam room'. If you feel any tension, let it go now. You breathe in calm, and breathe out any worries you have.

You stay feeling totally calm, and eager to see inside the room.

You open the door of the exam room and enter, feeling totally relaxed.

What does the room look like? Take a good look round. Look at the windows, the pictures on the walls, the floor, the furniture, the people in it . . .

A friendly-looking person comes over to you and welcomes you by name. Who is this person? Is it a man or a woman? Is this person somebody you know today or somebody who has passed on?

This person gives you something to bring you luck. What is it?

Now see yourself looking calm and confident as you take your seat.

You see an exam paper on the table before you. You calmly read the instructions and questions on it, feeling relieved. You just want to get started.

Enjoy that feeling of relief in your body. Enjoy the feeling of enthusiasm.

See yourself writing the answers as though you are watching yourself on a big cinema screen . . . You are coping so well. Your ideas are flowing.

Your memory is flowing. Your writing is flowing. You find the words you need.

Enjoy that feeling of flow and concentration.

Now you finish the paper and are ready to leave.

With each out breath, make the picture of the exam room get smaller and smaller. And now the building is getting smaller and smaller, as you walk away down the same little path you arrived by. Now the building is completely out of sight, like a pin head. All gone.

You find yourself back on your private beach.

In a moment, you feel quite ready to go home.

You will start to count backwards from 5 to 1.

When you hear the number 1, you begin to open your eyes.

You continue to feel relaxed, but energetic and well rested.

You feel ready to cope with any worries you have.

You feel confident and positive that you can give your best in any challenge that is thrown in your path. Enjoy that feeling of confidence in your body.

You know you can return to your own private beach anytime you want.

You feel calm and positive every time you think of the word 'exam'.

Now count backwards from 5 to 1.

Open your eyes slowly, move your body very slowly,

and come back to the room in your own time, feeling calm and rested.



You can adapt this visualization for any difficult situation, fear or weakness. It really works. Use your own words and preferred images.

How to get rid of harmful feelings and stress - now!

Here are some strategies that students found worked for them:

- Don't wait for anybody to make life better for you. Take control and take action
 despite obstacles or negative past experiences.
- Choose a role model carefully and don't put off talking to someone you trust, when you need to.
- Be kind to yourself (and others!) especially if anything goes wrong. Ask yourself, 'What can I learn from this?' You can't always change a situation, but you can change your attitude to it then your feelings will also change.
- You don't always have to say 'yes', when asked to do something you really don't want to do. Practise saying: 'I choose to' instead of 'I have to', and feel the difference . . .
- Use your time and energy wisely. Simplify your life as much as possible; delegate to others what you can't do yourself. Get rid of unrealistic ambitions, but don't discard hope, as you work with persistence and enthusiasm towards your aims.
- Set aside some time to be alone to review your current stress levels and evaluate your activities and goals.
- **Look after your body and mind.** Walk as much as possible especially in natural surroundings. Don't treat your body like a rubbish bin. Drink lots of water.
- Use every free opportunity to **relax and do something you love**: laughing releases anti-stress chemicals into your bloodstream. Practise a relaxation and breathing technique regularly, so that you can use it automatically in an emergency or before an exam.
- Recognize the good bits in yourself and the world around you. Don't allow yourself to get locked into practising negative feelings and thoughts over and over again. You could make yourself fail if you repeat negative statements about yourself, day in day out. You may be carrying around old messages that you received as a child, and still be behaving as though they were true. We are all resistant to changing these messages, as we sometimes prefer to hold onto a familiar idea of ourselves rather than take a risk of changing.
- Actively practise positive feelings and actions. If you get caught up in a negative thought, give yourself the command to 'stop!' Then reframe that thought into a positive one, for example:

'Everyone seems to learn things faster than I do . . .' turns into:

'It doesn't matter about the others. I'm doing my best.'

'I'm absolutely useless at exams, I know I'm going to panic' turns into:

'There's nothing I can do about the past. But I do have control over the next 20 minutes. I'm going to practise my relaxation technique.'

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