

Clear**Revise**[®]

OCR Cambridge Nationals **Sport Science**

Illustrated revision and practice

Levels 1/2
J828 (R180)

Reducing the risk of sports injuries and dealing with
common medical conditions

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PREFACE

Absolute clarity! That's the aim.

This is everything you need to ace the examined components in this course and beam with pride. Each topic is laid out in a beautifully illustrated format that is clear, approachable and as concise and simple as possible.

Each section of the Sport Science R180 specification is clearly indicated to help you cross-reference your revision. The checklist on the contents pages will help you keep track of what you have already worked through and what's left before the big day.

We have included worked exam-style questions with answers for almost every topic. This helps you understand where marks are coming from and to see the theory at work for yourself in an exam situation. There is also a set of exam-style questions at the end of each section for you to practise writing answers for. You can check your answers against those given at the end of the book.

LEVELS OF LEARNING

Based on the degree to which you are able to truly understand a new topic, we recommend that you work in stages. Start by reading a short explanation of something, then try and recall what you've just read. This has limited effect if you stop there but it aids the next stage. Question everything. Write down your own summary and then complete and mark a related exam-style question. Cover up the answers if necessary but learn from them once you've seen them. Lastly, teach someone else. Explain the topic in a way that they can understand. Have a go at the different practice questions – they offer an insight into how and where marks are awarded.

ACKNOWLEDGMENTS

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THE SCIENCE OF REVISION

Illustrations and words

Research has shown that revising with words and pictures doubles the quality of responses by students.¹ This is known as 'dual-coding' because it provides two ways of fetching the information from our brain. The improvement in responses is particularly apparent in students when they are asked to apply their knowledge to different problems. Recall, application and judgement are all specifically and carefully assessed in public examination questions.

Retrieval of information

Retrieval practice encourages students to come up with answers to questions.² The closer the question is to one you might see in a real examination, the better. Also, the closer the environment in which a student revises is to the 'examination environment', the better. Students who had a test 2–7 days away did 30% better using retrieval practice than students who simply read, or repeatedly reread material. Students who were expected to teach the content to someone else after their revision period did better still.³ What was found to be most interesting in other studies is that students using retrieval methods and testing for revision were also more resilient to the introduction of stress.⁴

Ebbinghaus' forgetting curve and spaced learning

Ebbinghaus' 140-year-old study examined the rate at which we forget things over time. The findings still hold true. However, the act of forgetting facts and techniques and relearning them is what cements them into the brain.⁵ Spacing out revision is more effective than cramming – we know that, but students should also know that the space between revisiting material should vary depending on how far away the examination is. A cyclical approach is required. An examination 12 months away necessitates revisiting covered material about once a month. A test in 30 days should have topics revisited every 3 days – intervals of roughly a tenth of the time available.⁶

Summary

Students: the more tests and past questions you do, in an environment as close to examination conditions as possible, the better you are likely to perform on the day. If you prefer to listen to music while you revise, tunes without lyrics will be far less detrimental to your memory and retention. Silence is most effective.⁵ If you choose to study with friends, choose carefully – effort is contagious.⁷

1. Mayer, R. E., & Anderson, R. B. (1991). Animations need narrations: An experimental test of dual-coding hypothesis. *Journal of Education Psychology*, (83)4, 484–490.
2. Roediger III, H. L., & Karpicke, J.D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, 17(3), 249–255.
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CONTENTS AND CHECKLIST

R180: Reducing the risk of sports injuries and dealing with common medical conditions

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Specification point			✓
1.1	Extrinsic factors	2	<input type="checkbox"/>
1.1.2	Coaching, instructing and leading.....	4	<input type="checkbox"/>
1.1.3	Environment.....	6	<input type="checkbox"/>
1.1.4	Equipment.....	8	<input type="checkbox"/>
1.2.1	Intrinsic factors	10	<input type="checkbox"/>
1.2.2	Psychological factors.....	12	<input type="checkbox"/>
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1.2.4	Mental strategies	16	<input type="checkbox"/>
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Specification point			✓
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2.2.2	Psychological benefits of a warm up	22	<input type="checkbox"/>
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2.4	Physiological benefits of a cool down	26	<input type="checkbox"/>
	Examination practice: Topic area 2	28	<input type="checkbox"/>

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Specification point			✓
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COMMAND VERBS

The exam paper will use the following command verbs in each question.

You may understand lots about a topic, but if you do not answer each question in the correct way, the mark you receive may be very low.

Study each of the command verbs below along with their meanings and how they are used to answer a question.

Analyse / Discuss

1. Separate or break down information into parts and identify their characteristics or elements.
2. Explain the pros and cons of a topic or argument and make reasoned comments.
3. Explain the impacts of actions using a logical chain of reasoning.

Use full paragraphs.

The full answer will usually be around a page of text.

The risk of injuries and medical conditions in sport is ever present.

Analyse the strategies used to help reduce the risk of sports injuries and medical conditions. [8]

- 1) *One strategy to reduce risk is an athlete medical.*
- 2) *A medical is an examination by a doctor to assess an athlete's physical health and fitness levels.*
- 3) *Regular medical evaluations can help detect early signs and symptoms of specific medical conditions, such as diabetes, for early intervention, thereby reducing the impact on the athlete.*



The exemplar answer given is only a guide with a single point. Your response should be more detailed, with more examples to support your judgments.

Choose or Circle

Select an answer from an option given.

Which **one** of the following is **not** an extrinsic factor of injury risk? [1]

- A Coaching
- B Environment
- C Equipment
- D Technique

Compare and contrast

Give an account of the similarities and differences between two or more items or situations.

Compare and contrast an open fracture and a closed fracture. [2]

Both fractures involve a broken bone from an impact injury. (Compare = 1) However, the bone pierces the skin in an open fracture, but does not pierce the skin in a closed fracture. (Contrast = 1)

Evaluate / Justify

Make a reasoned qualitative judgement considering different factors and using available knowledge / experience.

1. Write down all the factors or events that apply to a given context.
2. Consider the strengths and weaknesses of each.
3. Identify those that are most important.
4. Give a reasoned conclusion supported by evidence.

You should use full paragraphs to answer these questions.

The full answer will usually be around a page of text.

The PRICE therapy is a treatment method for acute sporting injuries.

It is commonly applied when dealing with soft tissue injuries.

Evaluate the use of PRICE therapy for a soft tissue injury. [8]

- 1) PRICE is an acronym for Protection, Rest, Ice, Compress and Elevate commonly used in the management of acute sporting injuries such as sprains and strains.
- 2) One benefit of applying ice to an injured area is to help reduce pain, swelling and inflammation associated with acute injuries. However, ice may not always be available.
- 3) I believe the ice component in PRICE therapy is most relevant as it causes blood vessels to constrict or narrow, reducing blood flow to the injured area, reducing swelling and bruising.
- 4) In conclusion, although all stages of the PRICE therapy are needed, the ice stage stands out for its ability to numb pain and act as an anti-inflammatory.



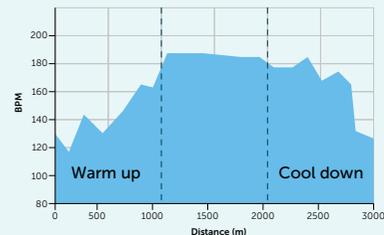
The exemplar answer given is only a guide, your response should be more detailed, with more examples to support your judgments.

Draw / Create / Annotate / Label

Add information to a table, diagram or graph.

Figure 1 shows the heart rate of an runner pre- and post exercise.

Label the warm up and cool down phases of activity. [2]



MARK ALLOCATIONS

Green mark allocations^[1] on answers to in-text questions throughout this guide help to indicate where marks are gained within the answers. A bracketed '1' e.g. ^[1] = one valid point worthy of a mark. In longer answer questions, a mark is given based on the whole response. In these answers, a tick mark [✓] indicates that a valid point has been made. For a mark, a judgement should be made using the levels-based mark scheme on **page 82**. There are often many more points to make than there are marks available so you have more opportunity to max out your answers than you may think.

TOPICS FOR THE EXAM

Unit R180: Reducing the risk of sports injuries and dealing with common medical conditions

Information about the externally assessed exam:

Specification coverage

The importance of fitness for sports performance, fitness testing to determine fitness levels, and different fitness training methods.

The content for this assessment will be drawn from the essential subject content in sections A to D of Component 3 in the specification.

Assessment

Written exam: 75 minutes

70 marks

All questions are mandatory

40% of the qualification grade

Questions

A mix of short answer and longer answer questions assessing knowledge, understanding and skills in contextual scenarios building on all components within the qualification.

COACHING, INSTRUCTING AND LEADING

Coaching is essential for shaping athlete performance, combining skill development, strategic planning, proper technique and injury prevention measures. Well-structured programs enhance abilities and reduce risk.

Knowledge of techniques, rules and regulations

Coaches with a high understanding of **techniques, rules** and **regulations** can guide performers effectively, minimising injury risks. For instance, a football coach with an in-depth knowledge of the rules can prevent players from engaging in dangerous play, reducing the likelihood of serious injuries such as fractures or concussion (**pages 34–35**).



A coach lacking comprehensive knowledge may inadvertently encourage rule violation or improper techniques, leading to increased injury risks. A basketball coach unaware of proper shooting technique could potentially cause chronic shoulder strain (see **page 36**). A poorly informed boxing coach may teach that it is legal to hit below the belt.

Experience

Experienced coaches bring a wealth of insight, recognising potential hazards and employing effective training methods. A seasoned gymnastics coach, for instance, can guide athletes to perform complex routines safely, minimising the risk of injuries.



Novice coaches, with few or no official coaching badges, may struggle to perform a proper risk assessment, increasing the likelihood of injuries. In weightlifting, an inexperienced coach may fail to recognise poor lifting form, contributing to acute injuries **page 29**.

Communication

Coaches with **strong communication skills** foster understanding and cooperation, ensuring performers quickly understand instructions and safety protocols. Effective communication can **prevent misunderstanding** of explanations, tactics and drills, reducing the risk of collisions and subsequent injuries.



Poor communication may lead to confusion, with athletes unsure of instructions or safety guidelines. In a team sport, such as rugby, unclear communication from the coach may result in players executing plays improperly, increasing the risk of concussion (**page 35**) or fractures (**page 34**).



Supervision

Careful **supervision** by coaches during training sessions ensures everyone follows proper techniques and adheres to safety guidelines. In a swimming context, proper supervision can **prevent accidents** including drowning, and head injuries (**page 36**) from diving errors.



Inadequate supervision may result in performers engaging in risky behaviours. For example, a lack of supervision during a trampolining or weightlifting session could lead to unsafe use of equipment, increasing the risk of injury.

Ethical standards and behaviour

Coaches with **high ethical standards** prioritise performer safety and well-being, and they **discourage dangerous practices** and **promote fair play**. In boxing, a coach with strong ethical behaviour ensures athletes engage in controlled, safe sparring in training to avoid serious injuries.



An unethical sports coach may encourage players to play on with an injury, or promote the use of performance enhancing drugs which would contribute to longer term health issues, including cardiovascular problems.

Explain how an inexperienced trampoline coach could increase the risk of injury during a trampoline routine. Provide specific examples to highlight the potential impact. [2]

A coach may fail to provide proper technical guidance, increasing the risk of injuries.^[1] For example, they may not teach landing techniques properly, leading to an awkward movement.^[1] / They may not consider the individual's abilities and limitations, pushing them beyond their capability.^[1] An example could be asking them to attempt a double forward somersault, leading to an awkward landing and injury.^[1]



PSYCHOLOGICAL BENEFITS OF A WARM UP

While warm ups are primarily associated with physiological benefits, they also have psychological advantages that contribute to an overall improved mental state and readiness for physical activity. Some of those psychological benefits include:

Heighten or control arousal levels



This is also known as 'getting in the zone'. A warm up can create a positive state of arousal, increasing alertness and mental readiness. For others, a warm up can serve as a tool to manage anxiety associated with the physical activity ahead.

Improve concentration / focus



A warm up allows an individual to shift their focus from a resting state to an active and alert state. This transition can enhance concentration and mental readiness for the physical activity ahead.

Increase motivation



Participating in a warm up boosts motivation by signalling the start of physical activity, intensifying the drive to perform well, and encouraging greater effort.

Increase confidence



Completing a warm up can instill a sense of accomplishment and boost self-confidence. This positive mindset can carry over into the main physical activity, contributing to better performance.

Mental rehearsal

This is a cognitive technique where individuals mentally visualise and simulate the upcoming physical activity or performance. It involves creating a mental image of the actions, movements, and successful execution of the activity before engaging in it.



Negative effects if no warm-up is performed

Skipping a warm-up before engaging in physical activity can have several negative effects on the body. Potential consequences of not warming up include:



Describe how a warm up contributes to a badminton player's focus and concentration during a match. [2]

It will shift their mental state from rest to an active / alert mode,^[1] enhancing readiness for strategic and precise shots.^[1]



ACUTE INJURIES

Acute injuries are sudden and immediate injuries that occur because of a specific **trauma** or incident. These injuries typically happen suddenly, are often unforeseen, and can range from mild to severe.

Acute injuries are intricately linked with both extrinsic (1.1) and intrinsic (1.2) factors. Extrinsic factors, such as the type of activity, the quality of coaching, the environment and the equipment can significantly contribute to the likelihood and severity of acute injuries. Simultaneously, intrinsic factors and individual variables play a crucial role in determining their susceptibility to such injuries.

Sudden trauma

Sudden trauma refers to a forceful and unexpected event or injury that occurs abruptly, often resulting in immediate damage or harm to the body. This type of trauma is characterised by its rapid onset, and it can be caused by various incidents such as falls, collisions, impacts, or other accidents.

Immediate impact and pain

Immediate impact and pain are fundamental aspects of acute injuries resulting from sudden trauma. When an injury occurs, the body experiences a rapid and forceful interaction with an external force, leading to an immediate impact on the affected area. At the same time, the body's nervous system responds to the trauma by transmitting signals of pain to the brain. Pain serves as a protective response, signalling the presence of damage.

Trauma refers to the physical damage or injury to the body that occurs as a result of forceful impact.



USE OF X-RAYS TO DETECT INJURY

X-rays play a crucial role in the detection of injuries in sport. They are commonly used to assess and identify skeletal injuries, such as fractures, dislocations and damage to growth plates.

Injuries seen through x-ray

You are not expected to know how x-rays work.

Fractures

X-rays are highly effective at revealing **fractures** in bones. Whether it is a fracture from overuse or a traumatic fracture resulting from an impact, x-rays provide detailed images that help diagnose and assess the severity of the break.

Fracture of the right humerus



Dislocations

X-rays are very helpful in detecting joint **dislocations**, where bones that normally articulate at a joint are displaced. This is particularly relevant in sports with a high risk of joint injuries, such as football or basketball.

Dislocation of the right shoulder



Growth plates

Growth plates are areas of cartilage located at the end of bones in younger people, and are more vulnerable to injury than mature bone. X-rays are crucial in detecting injuries in growth plates, such as fracture or disruptions.

Growth plates on the right femur and tibia and fibula at the knee



EXAMINATION PRACTICE

Topic area 5: Causes, symptoms, and treatment of medical conditions

- Which **one** of the following is a common symptom of asthma? [1]
 - A – Excessive sweating
 - B – Headaches
 - C – Unconsciousness
 - D – Wheezing
- Identify **four** symptoms of hypothermia. [4]
- Draw a straight line to match each medical condition to the correct description. [3]

Sudden Cardiac Arrest	●
Heat exhaustion	●
Dehydration	●

●	The body is unable to cool itself efficiently.
●	The body loses more fluids than it takes in.
●	The body loses heat faster than it can produce heat.
●	The heart suddenly stops beating due to a malfunction with its electrical system.

- Compare and contrast Type 1 and Type 2 diabetes. Consider the age of onset and lifestyle factors in your response. [4]
- State **two** causes of a sudden cardiac arrest (SCA). [2]
- A sportsperson has epilepsy.
 - Describe **two** common symptoms of an epileptic seizure. [4]
 - Explain **one** possible treatment to manage the likelihood of seizures. [2]

NON-EXAM ASSESSMENT (NEA)

Unit R181: Applying the principles of training:
fitness and how it affects skill
performance

Information about the non-examined assessment

Assessment

Assessed by teachers, moderated by OCR.

80 marks

40% of the qualification grade

For Unit R181, you'll complete five assessments or tasks in total.

Task 1 Components of fitness applied in sport (Marks available: 12)

In Task 1, you are required to conduct fitness tests to assess your own level of fitness in **both** of your selected sporting activities, selected from the approved activity list:

Team sports: *Acrobatic gymnastics, association football, badminton, basketball, camogie, cricket, dance, figure skating, futsal, Gaelic football, handball, hockey, hurling, ice hockey, inline roller hockey, lacrosse, netball, rowing, rugby league, rugby union, sailing, sculling, squash, table tennis, tennis, volleyball, water polo.* **Specialist sports:** *blind cricket, goalball, powerchair football, table cricket, wheelchair basketball, wheelchair rugby.*

Individual sports: *Amateur boxing, athletics, badminton, canoeing, cross country running, cycling, dance, diving, equestrian, figure skating, golf, gymnastics, kayaking, rock climbing, sailing, sculling, skiing, snowboarding, squash, swimming, table tennis, tennis, trampoline, windsurfing.* **Specialist sports:** *Boccia, polybat.*

To do this, you must research and select the tests that are appropriate for each of your selected activities, before completing the selected fitness tests and interpret your results data.



- Explain the different tests and their associated components of fitness.
- Include examples that are appropriate for each of your selected sporting activities.
- Explain what the data tells you about your fitness levels in relation to **both** of your selected activities.
- Compare your data to normative data.

Evidence required for Task 1

- Written report or presentation



EXAMINATION PRACTICE ANSWERS

Topic Area 1: Different factors which influence the risk and severity of injury

1. **D** – Motivation. [1]
2. (a) Three from: Gender / age / experience / weight / fitness levels / technique / nutrition / hydration / medical conditions / sleep / previous or recurring injuries. [3]
(b) Increased fatigue,[1] will decrease the athlete's physical and mental alertness, leading to a greater risk of injury.[1] / Impaired decision making,[1] will affect an athlete's ability to process information quickly, leading to a greater risk of injury. [1] / Reduced recovery,[1] lack of sleep will slow down muscle repair and the release of growth hormones, hindering the body's ability to heal.[1] [2]
3. Two from: Temperature / playing surface / human interaction from other performers / officials / spectators. [2]
4. (a) Mental rehearsal. [1] (b) Fostering a sense of confidence and self-belief. [1] (c) Selective attention. [1] [3]
5. Proper technique ensures efficiency, [1] allowing athletes to execute movements with optimal effectiveness. [1] / Correct technique encourages proper joint and muscle alignment during movements, [1] decreasing the risk of sports injuries. [1] / Constant correct technique promotes long term musculoskeletal health, [1] decreasing the cumulative stress on joints and tissues leading to chronic injuries. [1] [2]
6. High anxiety may lead to muscle tension / impaired decision making / decreased coordination, [1] increasing the risk of injuries through mistimed movements / collisions. [1] [2]
7. Pressure creates a heightened sense of urgency and expectation. [1] Athletes may feel compelled to take more risks / adopt aggressive tactics to meet these external demands. [1] Example: In a football match, players may use forceful tackles and confrontations, driven by the expectations of the coaches and fans. [1] [3]
8. In sport, equipment can enhance athlete performance and help ensure safety. However, there is potential for harm when not used correctly.

Protective equipment: plays a crucial role in safeguarding athletes during sporting activities. [✓] Designed to reduce the risk and severity of injuries, protective gear such as helmets, pads, and guards [✓] serves as a barrier between the athlete's body and potential impacts. [✓] These items are especially vital in contact sports [✓] like football and hockey. [✓] The significance of protective equipment lies in its ability to absorb and distribute force, [✓] reducing the impact [✓] on vulnerable body parts. When used correctly, protective equipment can significantly help injury prevention, allowing athletes to engage in their respective sports with a reduced likelihood of severe harm. [✓]

Performance equipment: is used to enhance an athlete's capability [✓] and optimise their performance. [✓] From specialised rackets in tennis to aerodynamic cycling helmets, [✓] the equipment is designed to provide athletes with a competitive edge. [✓] The significance of performance equipment lies in its potential to improve an athlete's skills and overall game. [✓] However, it is essential to emphasise the importance of proper training and supervision [✓] when using performance equipment, as its misuse or overreliance may lead to injuries or reduce the intended benefits. [✓]

Clothing: serves both functional and protective purposes in sports. [✓] Beyond its role in maintaining comfort and regulating body temperature, [✓] sports clothing can contribute to injury prevention. Compression garments, [✓] for example, provide support to muscles and joints, [✓] reducing the risk of strains and sprains. [✓] Additionally, appropriate clothing can minimise the impact of environmental factors, such as cold or wet conditions. [✓] The significance of sports clothing in athlete safety is highlighted by its ability to enhance performance, aid in injury prevention, and promote overall well-being during sport. [✓]

Footwear: is a very important part of an athlete's equipment, influencing performance and safety. Proper footwear provides stability, support, and traction. [✓] reducing the risk of slips, trips, and falls. [✓] Different sports require specific types of footwear tailored to the demands of the activity, [✓] whether it's running shoes with proper cushioning or studded football boots for grip on a pitch. [✓] The significance of footwear in athlete safety lies in its ability to prevent common injuries, such as ankle sprains and stress fractures, [✓] by offering the necessary support. However, selecting the wrong type of footwear or neglecting its maintenance can potentially lead to injuries. [✓]

In conclusion, sports equipment plays a significant role in reducing the risk and severity of injuries in sports when used correctly. [✓]

This question should be marked in accordance with the levels-based mark scheme on page 82. [8]

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EXAMINATION TIPS

When you practice examination questions, work out your approximate grade using the following table. This table uses a rounded approximation of boundaries for this qualification. Be aware that boundaries vary for each exam series by a few percentage points either side of those shown.

	Level 2				Level 1		
Grade	Distinction*	Distinction	Merit	Pass	Distinction	Merit	Pass
Code	2*	D2	M2	P2	D1	M1	P1
Boundary	90%	80%	70%	60%	50%	40%	30%

1. Be prepared with a black pen and a ruler.
2. Read each question carefully. Make sure you understand what the question is asking and follow the instructions. You cannot get marks for giving an answer to a question you think is appearing rather than the actual question.
3. Avoid simply rewriting the question or repeating examples that are already given in the question.
4. *Identify, outline* and *state* questions require you to recall a short piece of key information. No explanation is required. There will be one mark for each point you make.
5. Remember that *explain* questions have two marks. You need to make a point for the first mark, and then expand this point with a linked development for the second mark. To help you develop your responses, aim to include words such as 'because' or 'therefore'.
6. There is one long answer question on the exam paper worth 8 marks and could use the command verbs *analyse, discuss, or evaluate*. Remember that the answers to these questions need both advantages and disadvantages. An 'evaluate' question also needs a conclusion.
7. Answer questions in the spaces provided. If this is not possible e.g. due to deleting a wrong answer, indicate the location of the corrected answer on the paper (e.g. 'see next page' or 'my answer is on the last blank page').
8. Do not use the space allocated for answers to write plans for your answers, and do not add extra pages to your answer book with plans/scribbles/items that will not be marked.
9. Don't spend too much time on one question or leave any questions unanswered. If you have time left at the end, check your answers and make any corrections.
10. Before you hand in your paper, read over your answers and check for any mistakes or gaps.
11. Make sure your handwriting is clear and legible.
12. Cross out any errors neatly.
13. Don't let your nerves get the better of you. Remember that you have prepared well, and you can do this.
14. Lastly, try to relax, breathe deeply and focus on the task at hand. Don't compare yourself to others or worry about what they are doing.

Good luck!

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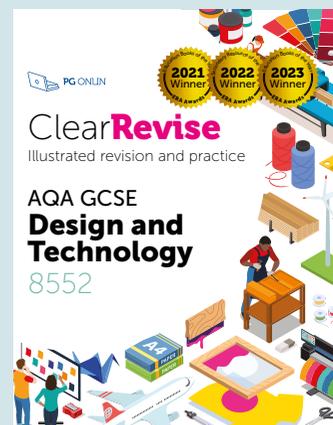
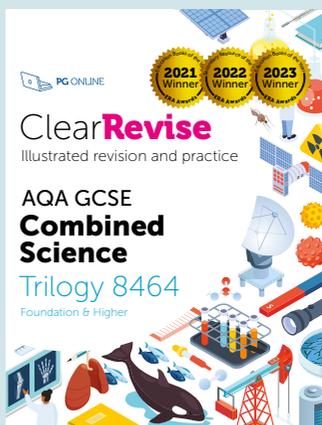
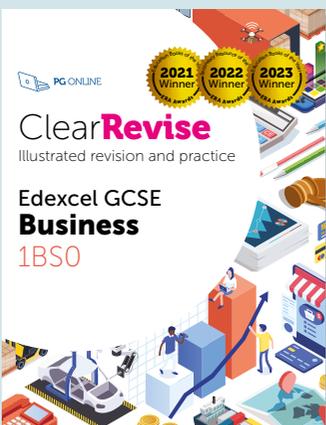
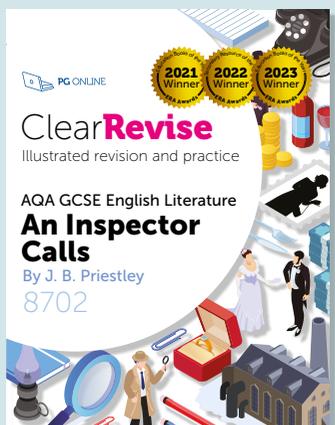
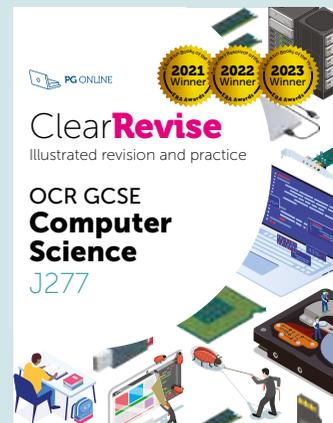
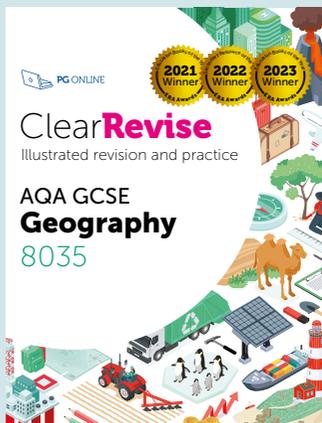
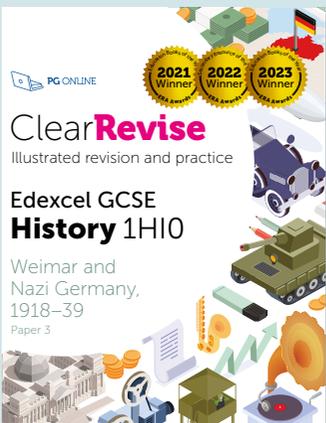
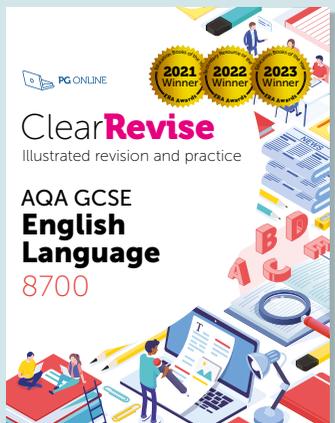
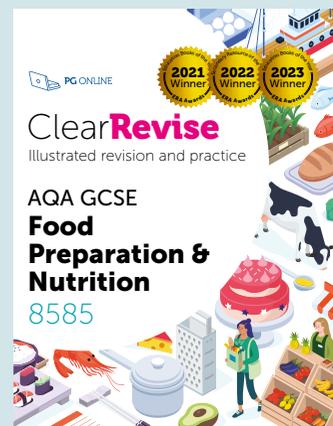
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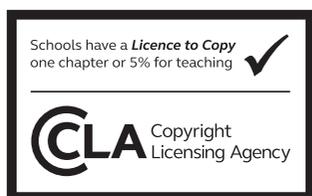
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