

Cambridge TECHNICALS LEVEL 3

Cambridge  
TECHNICALS  
2016

# SPORT AND PHYSICAL ACTIVITY

Combined feedback on the January 2017  
Exam Paper

Unit 1 – Body systems and the effects of physical activity

Version 1

## CONTENTS

Introduction	3
General examiner comments on the paper	4
Section A	5
Questions 1, 2 and 3	5
Question 4, 5 and 6	6
Question 7, 8, 9 and 10	7
Examiner comments	8
Questions 11 and 12	9
Mark scheme guidance	10
Examiner comments	10
Question 13 and 14	11
Mark scheme guidance	12
Examiner comments	12
Question 15	13
Mark scheme guidance	13
Examiner comments	13
Question 16	14
Mark scheme guidance	15
Examiner comments	15
Questions 17 and 18	16
Mark scheme guidance	17
Examiner comments	17
Questions 19 and 20	18
Mark scheme guidance	18
Examiner comments	18
Question 21	19
Mark scheme guidance	20
Examiner comments	20

# INTRODUCTION

This resource brings together the questions from the January 2017 examined unit 1, the marking guidance, the examiners comments and the exemplar answers into one place for easy reference.

The marking guidance and the examiner's comments are taken straight from the Report to Centre for this question paper.

The Question Paper, Mark Scheme and the Report to Centre are available from Interchange.

<http://www.ocr.org.uk/qualifications/cambridge-nationals-ict-level-1-2-j800-j810-j820/>

**OCR**  
Oxford Cambridge and RSA

**Level 3 Cambridge Technical in Sport and Physical Activity**  
05826/05827/05828/05829/05872

**Unit 1: Body systems and the effects of physical activity**

**Monday 9 January 2017 - Morning**  
Time allowed: 1 hour 30 minutes

You may use:  
• A calculator

First Name  Last Name   
Centre Number  Candidate Number   
Date of Birth

**INSTRUCTIONS**

- Use black ink.
- Complete the boxes above with your name, centre number, candidate number and date of birth.
- Answer all the questions.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).

**INFORMATION**

- The total mark for this paper is 70.
- The marks for each question are shown in brackets [ ].
- This document consists of 12 pages.

FOR EXAMINER USE ONLY	
Question No	Mark
Section A: 1-10	/10
Section B: 11	/4
12	/4
13	/3
14	/3
15	/5
16	/8
17	/5
18	/8
19	/4
20	/5
Section C: 21	/10
<b>Total</b>	<b>/70</b>

© OCR 2017. 80177000-1, 80177000-3, 80177000-5, 80177000-7, 80177000-9  
C40017701 OCR is an exempt charity Turn over

**OCR**  
Oxford Cambridge and RSA

**Cambridge Technicals**

**Sport**

Unit 1: Body systems and the effects of physical activity

Level 3 Cambridge Technical Certificate/Diploma in Sport  
05826-05829, 05872

**Mark Scheme for January 2017**

Oxford Cambridge and RSA Examinations

**OCR**  
Oxford Cambridge and RSA

**Cambridge Technicals in Sport and Physical Activity**

Level 3 Cambridge Technicals Certificates in Sport and Physical Activity  
05826, 05827

Level 3 Cambridge Technicals Diplomas in Sport and Physical Activity  
05828, 05829, 05872

**OCR Report to Centres - January 2017**

Oxford Cambridge and RSA Examinations

## GENERAL EXAMINER COMMENTS ON THE PAPER

In this first series of the examination, many learners were well prepared for questions in most aspects of the specification. For some learners, however, there are significant gaps in their knowledge and understanding of body systems and the effects of physical activity.

The majority of learners managed their time well with relatively few who seemed to have run out of time. Learners were particularly sound in answering 'recall' type questions, for example the multi-choice questions and Question 11 on identifying the muscles shown in a diagram. Learners performed less well on questions that demanded an explanation with many simply describing, for example for Question 18(a) on the mechanics of breathing.

The quality of written communication was mostly sound, although some merely wrote notes in bullet form for Question 21 which demanded an analysis which went further than identification of individual points. Those that wrote fluently and in paragraphs were more likely to score in the higher levels of the banded mark scheme for this question.

## Questions 1, 2 and 3

## Section A

Answer **all** questions. Put a tick (✓) in the box next to the **one** correct answer for each question.

1 Which one of the following is **not** part of the pelvis?

(a) Ischium

(b) Pubis

(c) Femur

(d) Ilium

[1]

2 Which one of the following bones is part of the appendicular skeleton?

(a) Humerus

(b) Sacrum

(c) Cranium

(d) Ribs

[1]

3 Which of the following bones form the elbow joint?

(a) Humerus, femur and ulna

(b) Humerus, tibia and fibula

(c) Humerus, radius and fibula

(d) Humerus, radius and ulna

[1]

## Questions 4, 5 and 6

4 Which one of the following describes flexion at a joint?

(a) Elbow movement during the downward phase of a press up

(b) Movement at the shoulder when bowling in cricket

(c) Turning the palms of the hands to face downwards

(d) Lifting the head to look upwards to take a high catch

[1]

5 Which one of the following is an effect of a cool down after exercise?

(a) Reduces adrenaline

(b) Speeds up the removal of lactic acid

(c) Slows down the breathing rate

(d) Reduces oxygen uptake

[1]

6 Which one of the following will benefit most from a high percentage of slow twitch muscle fibres?

(a) Shot put

(b) 800m race

(c) Marathon

(d) 50m swimming race

[1]

## Questions 7, 8, 9 and 10

7 Which one of the following components of blood carries oxygen as its primary function?

(a) White blood cells

(b) Red blood cells

(c) Platelets

(d) Plasma

[1]

8 Which one of the following respiratory structures warms and moistens air as it is inhaled?

(a) Larynx

(b) Pharynx

(c) Epiglottis

(d) Nasal cavity

[1]

9 What type of joint is found at the base of the thumb?

Saddle (joint)..... [1]

10 What is meant by the term 'isometric muscle contraction'?

No movement produced / static or doesn't shorten / lengthen or holds position..... [1]  
.....

## EXAMINER COMMENTS



### Section A: Questions 1 – 10

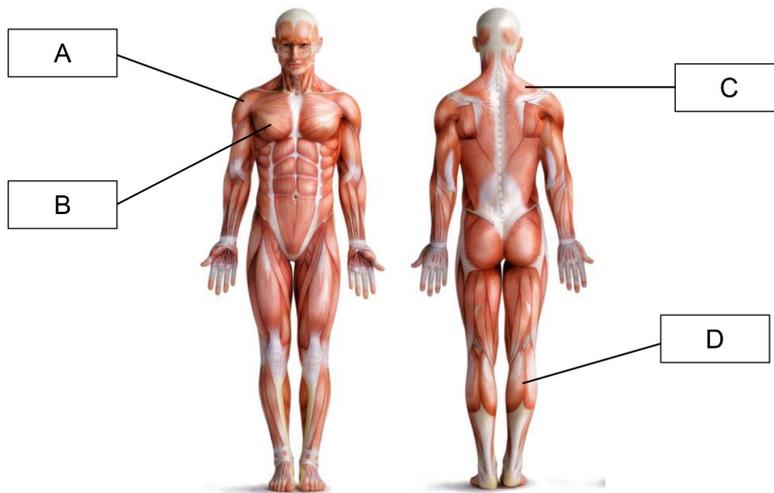
Questions 1 – 8 were multiple-choice questions. A very small minority did not respond to one or more of these, with the vast majority answering them well. The questions that proved the most challenging in this section were 5, 8 and 9. On question 5, many learners gave 'slows down the breathing rate' rather than 'speeds up the removal of lactic acid'. Simply stopping the exercise would slow down the breathing rate and so the **most appropriate** answer is (b). Learners are reminded to read all the possible responses in each multiple-choice question before they select the most accurate response to the question. Question 8 also proved to be difficult for some with many unaware of the respiratory structures and their functions. **Question 9 was often answered incorrectly, with some learners failing to recognise the base of the thumb to be a saddle joint. Most answered question 10 correctly stating that isometric muscle contraction means that no movement is produced.**

Questions 11 and 12

**Section B**

Answer **all** questions.

**11** Fig. 11.1 shows the major skeletal muscles of the body.



**Fig. 11.1**

Identify the muscles labelled A, B, C and D.

- A... deltoid .....
- B... pectoralis major .....
- C... trapezius .....
- D... gastrocnemius or soleus .....

[4]

**12** Complete the table by identifying the structural type of each bone below.

Bone	Type of bone
Vertebra	Irregular
Carpals	1. Short
Cranium	2. Flat
Patella	3. Sesamoid
Phalanges	4. Long

[4]

**MARK SCHEME GUIDANCE**

**11** B – pecs or pectorals = no benefit of the doubt (NBD).

C – traps = NBD.

D – calf = NBD.

Accept minor misspellings = benefit of doubt (BOD)

**12** Point 2 – small = no marks

Point 4 – big = no marks.

**EXAMINER COMMENTS**

**11** This was answered well by most learners, although some used unacceptable abbreviations for the names of muscles. Learners should use the correct terminology to be sure of scoring marks when identifying muscles. For example, some learners wrote 'pecs' or 'pectorals' instead of pectoralis major and therefore did not score the mark available for B on the diagram. Some learners also wrote 'traps' for trapezius for C on the diagram. The spellings of the muscles were also inaccurate for a minority of learners and although examiners accepted misspelling as long as the name was phonetically recognisable, learners should be reminded of the importance of correct spelling when identifying key anatomical structures or physiological terms.

**12** Most completed the table accurately identifying the appropriate type of bone, although a significant minority did mistake phalanges as a short bone rather than a long bone.

### Questions 13 and 14

13 Fig.13.1 shows the upward phase of an arm curl.



Fig. 13.1

Identify **one** agonist and **one** antagonist during this phase, and state the type of muscle contraction taking place in the agonist.

Agonist: biceps (brachii).....

Antagonist: triceps (brachii).....

Type of Muscle contraction: concentric.....

[3]

14 In a team game such as volleyball, a player will use different muscle fibre types for different skills and situations.

Using a team game of your choice, identify **three** skills or situations when a player would use their fast glycolytic fibres.

Team game e.g. football.....

1 (Powerful) shot at goal.....

2 Sprinting into space to receive ball.....

3 A strong tackle.....

or diving to save ball.....

[3]

## MARK SCHEME GUIDANCE

**13** 'Isotonic' on its own = no benefit of doubt (NBD).

**14** Must use team sport with examples that suggest speed/power/explosive strength is being used.

Running for the ball = NBD

Beating a player = NBD.

## EXAMINER COMMENTS

**13** The diagram showed a bicep curl and most learners could identify the agonist and antagonist but a small minority identified the type of muscle contraction to be 'flexion' rather than a concentric contraction. Learners should be reminded to read each question carefully to ensure that the requirements of the question are fully understood.

**14** This question was completed extremely well by the vast majority of learners. Three relevant skills or situations were well described by most when a player in a team game might use their fast glycolytic muscle fibres. Most chose football scenarios but a whole range of activities were accurately described. This question demanded learners' application of their knowledge to a sporting activity. In this case, there had to be some suggestion of fast or powerful movement e.g. a powerful shot at goal in football. 'Running' on its own does not indicate high or low intensity so cannot be linked to any particular muscle type.

## Question 15

15. Complete the table below to show the functions of various structures of the heart.

Structure of heart	Function
1. Right atrium	Deoxygenated blood enters here from the venae cavae
Tricuspid valve	2 Prevents blood being pumped back into right atrium
Left ventricle	3 Pumps blood to the muscles/tissues/rest of the body OR Pumps blood out into aorta
4. Pulmonary artery	Blood vessel that carries deoxygenated blood towards the lungs
5. Aortic valve	This valve prevents blood flowing back into the left ventricle

[5]

**MARK SCHEME GUIDANCE**

Point 2 – prevents backflow (on its own) = no benefit of doubt (NBD)

Point 3 – to rest of body (on its own) = NBD

Point 5 – semilunar valve = NBD

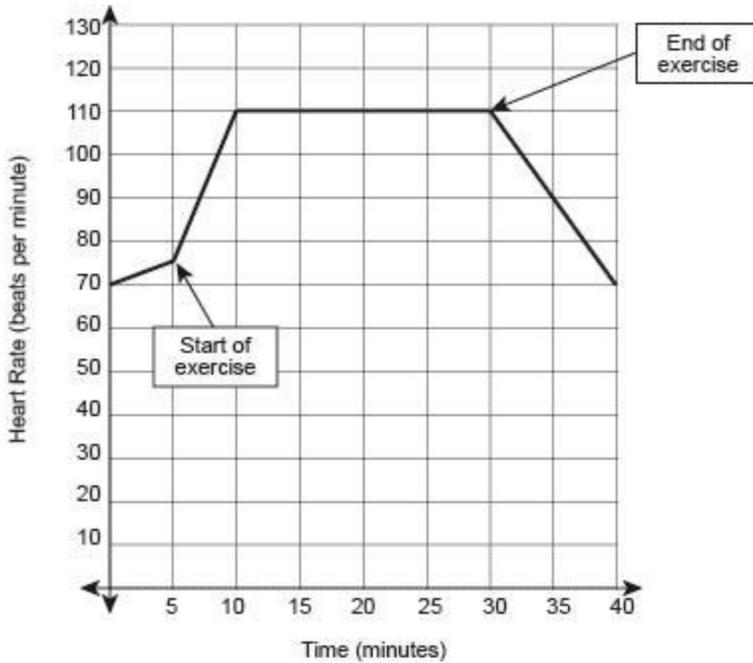
**EXAMINER COMMENTS**

Only a minority of learners scored the full five marks available for this question. Many learners were unaware of specific roles of valves in the heart, and a significant number left part or all of the table incomplete.



Question 16

16 The graph below shows the heart rate of a performer before, during and after a period of aerobic exercise.



(a) Using the graph, give the duration of the exercise.

25 minutes ..... [1]

(b) Explain the changes in the performer's heart rate before, during and after exercise.

1. (Before exercise) anticipatory rise in heart rate .....
2. (Caused by) increased adrenaline/noradrenaline .....
3. (1st 5 minutes) rapid increase in heart rate .....
4. (Caused by) shortage of oxygen / anaerobic / oxygen deficit or oxygen supply < demand .....
5. (10-30 minutes) steady rate or heart rate plateaus or heart rate remains constant .....
6. (Because) oxygen supply = demand or enough oxygen at muscles .....
7. (After exercise) heart rate gradually decreases or heart takes longer to recover than the  
10 rise in heart rate at the start of exercise .....
8. (As) exercise has stopped or repaying oxygen debt / EPOC / removal of LA .....

.....  
 .....  
 .....



(c) Assuming a constant stroke volume of 150ml during the exercise, calculate the performer's cardiac output when their heart rate is 110bpm. Show your working.

1. (Cardiac output) = heart rate / HR x stroke volume / SV or 110 x 150

2. (Cardiac output/Q) = 16500ml/min or 16.5l/min or /lmin-1

[2]

### MARK SCHEME GUIDANCE

**16**  Must include minutes/mins.

**16b** Six marks for six.

Point 1 – only give if response relates to anticipatory rise

Point 8 – 'end of exercise' = no benefit of doubt (NBD).

**16c** Point 2 – units are required

16.5l/m = benefit of doubt (BOD).

### EXAMINER COMMENTS

Although most interpreted the graph well to answer part (a) giving the correct duration of exercise, many learners struggled to explain the changes in the performer's heart rate before, during and after exercise, with many leaving out one or more of these exercise phases. The better learners recognised the anticipatory rise and that this was caused by adrenaline, although some mistook this as being part of a warm-up, even though the start of exercise was after five minutes' duration on the graph. In part (b), an explanation required learners to say what happens **and why**, but few were able to say why the changes in the graph occurred. In part (c), many learners did the calculation correctly but did not give the correct units and therefore could not score the full marks. Learners are reminded that the correct labelling of units must accompany any such calculation.

### Questions 17 and 18

17 The following paragraph describes the mechanics of breathing during expiration.

Complete the paragraph using the word bank below.

<b>contract</b>	<b>upwards</b>	<b>relax</b>	<b>decreases</b>	<b>increases</b>
<b>decrease</b>	<b>downwards</b>	<b>inhaled</b>	<b>increase</b>	<b>exhaled</b>

The diaphragm and the external intercostal muscles ..1.Relax.....

This causes the rib cage to move ..2.Downwards..... and in.

The volume of the thoracic cavity ..3.Decreases.....

This causes the pressure in the lungs to ..4.Increase....., which means that air is

5.Exhaled..... from the lungs.

[5]

18 (a) Explain how the mechanics of breathing change during exercise, including the use of other respiratory muscles.

1. Breathing gets faster and deeper or increased rate and depth of breathing.....

2. Respiration becomes active (during exercise) or greater volumes of air moved or more air is entering the lungs.....

3. (inspiration) diaphragm or external intercostals contract with greater force.....

4. (inspiration) scalene/sternocleidomastoid/pectoralis minor contract.....

5. (inspiration) causing the rib cage to be drawn further up and out.....

6. (inspiration) causing greater volume in thoracic cavity or lower pressure in the lungs.....

7. (expiration) internal intercostals/rectus abdominis contract.....

8. (expiration) causing rib cage to be pulled down / diaphragm pushed in / up.....

9. (expiration) causing greater reduction in volume in thoracic cavity or higher pressure in the lungs.....

.....

..... [5]



**(b) Give three short-term effects of exercise on the respiratory system.**

1... Increased tidal volume or more air taken in/out per breath or increase in depth of breathing..

2... Increased respiration / breathing rate or breathes quicker or more breaths per minute.....

3. Increased minute ventilation or more air taken in / out per minute

.....

.....

..... [3]

## MARK SCHEME GUIDANCE

**17** For point 3 accept decrease.

For point 4 accept increases.

**18a Comparative terms** needed for points 3, 5, 6, 8 and 9 to differentiate from what happens during mechanics of breathing at rest.

Only give point 1 if the two variables are identified e.g. faster **and** deeper.

**18b** Point 1 heavy breathing = no benefit of doubt (NBD)

Point 2 respiration speeds up = NBD.

## EXAMINER COMMENTS

**17** This proved to be challenging for many learners, but the best learners were able to link the appropriate words from the word bank and apply them to the sentences provided. Learners should read the question carefully in this case to check whether inspiration or expiration is to be described, with some learners mixing up the two phases of breathing.

**18** In part (a) many learners struggled to highlight the differences from breathing during exercise instead of merely at rest. Examiners were pleased to see additional muscles named but, unfortunately for some, responses which did not link 'contract' or 'relax' to the correct phase of breathing lost valuable marks. In part (b), too many learners wrote about cardiovascular or other responses to exercise rather than linking to the respiratory system. Some described long-term rather than short-term effects. Learners are reminded that when a specific number of answers are requested, credit can only be given up to that limit of responses i.e. if the question states 'give **three**...' then Examiners will only mark the first three responses.

## Questions 19 and 20

19 Complete the table below to show the characteristics of two of the energy systems.

System	Chemical or food fuel	Type of reaction	Amount of ATP produced
1. ATP-PC/ alactic	Phosphocreatine	2. Anaerobic	1
Aerobic	3. Glucose/fats/glycogen/ carbohydrates/CHO/ triglycerides/fatty acids	Aerobic	4. 36-39

[4]

20 Identify the dominant energy system used during the following sporting activities:

Gymnastics floor routine ..... Lactic acid

Javelin throw ..... ATP-PC or alactic

50km walk ..... Aerobic

Rugby tackle ..... ATP-PC or alactic

400m sprint ..... Lactic acid

[5]

## MARK SCHEME GUIDANCE

19 Point 1 – ATP/CP accept

Do not accept ATP (on its own) for point 1.

20 If more than one i/d then no marks except points 2 and 4.

LAS = ~~BOD~~ for Lactic Acid system

Accept ATP / CP

Do not accept ATP on its own.

## EXAMINER COMMENTS

19 This was generally well-answered, although few knew how much ATP is produced in the aerobic system. Marks were often lost by learners just writing ATP rather than ATP-PC when identifying the energy system.

20 This was a well-answered question and showed a good awareness of the appropriate energy systems and the ability to link theory to practical examples. Learners should be reminded that 'ATP' is not a system. Some learners stated 'anaerobic' or 'aerobic', not realising there are two anaerobic systems.

## Question 21

## Section C

21 Fig. 21.1 shows two basketball players jumping for the ball.



Fig. 21.1

Analyse the movements at the knee and ankle as shown in Fig. 21.1.

Your answer should include:

- joint types
- articulating bones
- joint movements
- muscles acting
- muscle functions
- types of contraction

[10]

**(Joint types and articulating bones)**

Knee is hinge joint

Femur, tibia (and patella)

- Fibula outside joint capsule of knee
- Ankle is hinge joint
- Tibia and talus (and fibula)
- Fibula not an integral part of joint.

**(Joint movements)**

(During jump/upward phase)

- Ankle plantarflexion
- Knee extension.

**(Muscles acting and function)**

(Upward phase knee extension) quadriceps shorten

- (Isotonic) concentric contraction
- Rectus femoris/vastus medialis/vastus lateralis/vastus intermedius
- Are agonists or prime movers.

(Upward phase knee extension) hamstrings lengthen

- Biceps femoris/semimembranosus/semitendinosus
- Are antagonists **Fixator muscles stabilise joints**
- E.g. gluteus maximus (stabilises femur/hip joint)
- Credit any given fixator stabilising femur/hip joint
- E.g. Rectus abdominus/erector spinae (stabilise trunk)
- Isometric contraction.

(Upward phase ankle plantarflexion) soleus/astrocnemius shorten

- (Isotonic) concentric contraction
- Are agonists or prime movers.

(Upward phase ankle plantarflexion) tibialis anterior lengthens

- Is antagonist.

(Ankle) Fixator muscles stabilise tibia

- quadriceps or hamstrings as fixators
- rectus abdominus/erector spinae (stabilise trunk)
- Isometric contraction.

## MARK SCHEME GUIDANCE

### Level 3 (8–10 marks)

#### A comprehensive answer:

- Detailed knowledge and understanding.
- Effective analysis/critical evaluation and / or discussion / explanation / development.
- Clear and consistent practical application of knowledge.
- Accurate use of technical and specialist vocabulary.
- High standard of written communication.

#### At Level 3 responses are likely to include:

- Detailed knowledge and understanding of both knee and ankle joints, articulating bones, joint movements, muscles and their functions.
- **At the top of this level** some reference may be made to the role of fixators and types of contraction for both joints.
- **At the bottom of this level** both joints are addressed and agonists and antagonists are likely to be identified for both joints.

### Level 2 (5–7 marks)

#### A competent answer:

- Satisfactory knowledge and understanding
- Analysis / critical evaluation and/or discussion / explanation / development attempted with some success
- Some practical application of knowledge
- Technical and specialist vocabulary used with some accuracy
- Written communication generally fluent with few errors.

#### At Level 2 responses are likely to include:

- Satisfactory knowledge and understanding of how joint movements occur at these joints.
- There may be a lack of balance between the parts of the question with some absences or inaccuracies.
- **At the top of this level** both joints may be covered in some detail, or one joint is covered in depth while the other is more superficial.
- **At the bottom of this level** at least six valid points have been made.

## EXAMINER COMMENTS

This ten-mark question is marked using a levels of response mark scheme with descriptors that enable examiners to pinpoint a mark from the responses they read. Many learners only partially answered this question. Learners are reminded that all variables in the question are taken into consideration when awarding a mark for a particular response. The question requires an analysis of the movements of the knee and ankle and so both joints are expected to be referred to in the answer. The question also lists other variables that should be included – again these must be included by the learner if a top-level mark is to be achieved. For example, some learners did not identify the types of contraction involved or were vague in their identification of joint movements – consequently their mark would not reach the top levels. Many learners, however, made a good attempt at trying to give a comprehensive answer and those that wrote with fluency and accuracy scored well.

The best answers used the variables listed by the bullet points given in the question and worked through their movement analysis in a structured way. They included agonists, antagonists and at least one fixator muscle in their answers for both joints, showing the types of contraction in both the agonist and antagonist muscles.

Some learners produced lists of bones and muscles, showing some knowledge but a lack of application to the movement shown. These answers were mostly limited to level 1 on the mark scheme. Many learners did not know that the ankle is a hinge joint, and there was often confusion between the roles of the quadriceps and the hamstrings during the extension of the knee joint.



We'd like to know your view on the resources we produce. By clicking on the 'Like' or 'Dislike' button you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click 'Send'. Thank you.

Whether you already offer OCR qualifications, are new to OCR, or are considering switching from your current provider/awarding organisation, you can request more information by completing the Expression of Interest form which can be found here:

[www.ocr.org.uk/expression-of-interest](http://www.ocr.org.uk/expression-of-interest)

#### OCR Resources: *the small print*

OCR's resources are provided to support the delivery of OCR qualifications, but in no way constitute an endorsed teaching method that is required by OCR. Whilst every effort is made to ensure the accuracy of the content, OCR cannot be held responsible for any errors or omissions within these resources. We update our resources on a regular basis, so please check the OCR website to ensure you have the most up to date version.

This resource may be freely copied and distributed, as long as the OCR logo and this small print remain intact and OCR is acknowledged as the originator of this work.

OCR acknowledges the use of the following content:  
Square down and Square up: alexwhite/Shutterstock.com

Please get in touch if you want to discuss the accessibility of resources we offer to support delivery of our qualifications:  
[resources.feedback@ocr.org.uk](mailto:resources.feedback@ocr.org.uk)

#### Looking for a resource?

There is now a quick and easy search tool to help find **free** resources for your qualification:

[www.ocr.org.uk/i-want-to-find-resources/](http://www.ocr.org.uk/i-want-to-find-resources/)

www.org.uk

OCR Customer Contact Centre

#### Vocational qualifications

Telephone 02476 851509

Facsimile 02476 851633

Email [vocational.qualifications@ocr.org.uk](mailto:vocational.qualifications@ocr.org.uk)

OCR is part of Cambridge Assessment, a department of the University of Cambridge. *For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored.*

© OCR 2017 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office 1 Hills Road, Cambridge CB1 2EU. Registered company number 3484466. OCR is an exempt charity.



Cambridge  
Assessment

