1.1 — Healthy, active lifestyles

1.1.1 Healthy, active lifestyles and how they could benefit you

Worksheet 1: Positive effects of exercise, Level B

1. d, i  
2. b, n  
3. h, m  
4. g, o  
5. f, l  
6. a, p  
7. e, k  
8. c, j

Homework 1: Why do people take part in sport?

1. Rugby player – b, c, h  
2. Middle-distance runner – a, d, f  
3. Leisure club member – e, g, i

Extension 1: Positive effects of physical activity

<table>
<thead>
<tr>
<th>Helps physical development</th>
<th>Helps mental development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps a person to look and feel good</td>
<td>Provides enjoyment</td>
</tr>
<tr>
<td>Provides a physical challenge</td>
<td>Can provide stimulation and excitement</td>
</tr>
<tr>
<td>Can help relieve stress and tension</td>
<td>Gives opportunities for aesthetic appreciation</td>
</tr>
<tr>
<td>Helps to improve body shape</td>
<td>Provides opportunity for competition</td>
</tr>
<tr>
<td>Contributes to good health</td>
<td>Helps social development</td>
</tr>
<tr>
<td>Allows a person to take part in a sport</td>
<td>Encourages social mixing</td>
</tr>
<tr>
<td></td>
<td>Gain membership to a particular sports club</td>
</tr>
<tr>
<td></td>
<td>Improves team and cooperation skills</td>
</tr>
<tr>
<td></td>
<td>Encourages friendship</td>
</tr>
</tbody>
</table>

Helps social development

- Encourages social mixing
- Gain membership to a particular sports club
- Improves team and cooperation skills
- Encourages friendship

1.1.2 Influences on your healthy, active lifestyle

Worksheet 1: Parents, teachers and peers, Levels A and B

Parent

- You’ll be the only one that does not play!
- I played for the local team just like my father.
- We will give you the chance to experience the use of local facilities.

Teacher

- I can show you how to live a healthy life.
- You will have the opportunity to take part in sport at different levels.
- I can see ability in you, so try this sport.

Peer

- What are you scared of?
- We lacked confidence at the beginning, but once we got to know people it was fine.
- Come with us – you’ll really enjoy it!

Worksheet 2: Social reasons affecting participation, Levels A and B

2. a) C  
b) A  
c) C  
d) B  
e) C  
f) A  
g) B  
h) C  
i) B
3. (Level A only)
Possible answers include:

- travelling to facilities
- access to facilities
- integrating in general sessions

Worksheet 3: Joining a club, Level B

2. a) The facilities at our club are the best in the county.
   b) Membership is rising fast, since the new coach arrived.
   c) The people at the club are so friendly; we always go out for a drink after the matches.
   d) I feel so relaxed, satisfied and calm after a good workout.
   e) By joining the club, it means that we can come and play whenever we like.
   f) I never thought I was competitive until I started to join in the club competitions.
   g) I was shy to begin with, but the people at the club made me feel so welcome that I have grown in confidence.

Worksheet 5: Experience different ways to enjoy sport, Level B

2. a) healthy life  
    b) broad range of experiences
    c) providing extra time  
    d) experience of being the leader
    e) I am responsible for recording  
    f) compose my own routines
    g) communication skills  
    h) tests my knowledge of the rules

Homework 1: Female role models

Possible answers include:

- Rebecca Adlington would give a wholesome image to the product being advertised.
- She is seen as a role model to look up to and emulate. This in turn can encourage people to lead a healthy lifestyle, which includes exercise.
- The activity associated with her is brought to the public eye too. The effect can make that activity more popular.
- People make the link between a successful woman and a successful company.

Extension 1: The sports participation pyramid

2. • Foundation – school – about 5–16 – Physical education/Dragon sport/Active recreation – recreational
   • Participation – school/leisure centres/fitness clubs – about 11–18 – team/club participation
   • Performance – local clubs/regional centres – about 16+ – coaching, training and competition at regional level
   • Elite – National centres of excellence and international centres – about 16+ – coaching, training and competition to national and international level.

Extension 3: Different roles in sport: clubs and committees

- Results secretary – Inform of scores and league position
- Governing body/council representative – Represent the players in meetings
- Captain/vice captain – Play in full range of games in a season
- Secretary – Record meetings
- Chairperson – Run and keep order in a meeting
- Treasurer – Keep check on club finances
- Community officer – Create links with various groups
1.1.3 Exercise and fitness as part of your healthy, active lifestyle

Worksheet 1: Sporting activities and health-related exercise, Level A

1. Possible answers include:

<table>
<thead>
<tr>
<th>Component</th>
<th>Positive effects</th>
<th>Negative effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular fitness</td>
<td>The body can meet the demands of exercise and keep working without losing skill such as in skiing.</td>
<td>Body cannot transport oxygen to the working muscles so they tire easily before the end of the race.</td>
</tr>
<tr>
<td>Muscular strength</td>
<td>The vaulter has a good grip and can pull his body weight to help clear the bar.</td>
<td>Poor hand strength prevents the vaulter keeping a grip on the pole.</td>
</tr>
<tr>
<td>Muscular endurance</td>
<td>Allows the rower to keep form throughout the race without tiring.</td>
<td>The rower will not be able to keep to the standard required.</td>
</tr>
<tr>
<td>Flexibility</td>
<td>The jumper can arch their back to clear the bar.</td>
<td>Poor flexibility limits the amount the back can arch and could lead to the competitor knocking the bar off.</td>
</tr>
<tr>
<td>Body composition</td>
<td>A tall netball player will be able to reach to defend the shots.</td>
<td>A shorter, heavier player may not be able to keep up with the goal shooter and prevent them scoring.</td>
</tr>
</tbody>
</table>

Worksheet 2: Components of skill-related fitness, Levels A and B

1. a) Power   b) Agility   c) Balance   d) Reaction time   e) Speed   f) Coordination
2. Gymnastics – balance, agility and power;
   Hockey – speed, power and agility;
   Javelin – power, speed and coordination;
   Golf – coordination, balance and power;
   Racket sports – agility, power and reaction time;
   Running – speed, power and reaction time.

Worksheet 3: skilled performance, Levels A and B

1. • Efficiency: minimal effort/thought/time
   • Pre-determined: skills practised/performed in predicted situations/maximum certainty of success
   • Coordinated: control of large and small muscles/perform complex skills
   • Fluent: graceful/ease/fluent movements
   • Aesthetic: whole action looks good

Homework 1: Effects of health-related exercise on skill-related fitness

Possible answers include:
• **Cardiovascular fitness**: link the length of the event/match/extra time keeping oxygen to working muscles so they can still function – coordination/reaction time.
• **Muscular strength**: using body weight as resistance/power/balance – strength of muscles keeping body balanced.
• **Muscular endurance**: muscles cannot function if not trained – lack of oxygen present/lactic acid build up/link with length of event – if trained keep working over long periods – coordination/reaction time/power/speed.
• **Flexibility**: joints able to move in full range – player can stretch for the ball/gymnastics able to assume difficult positions/able to keep agile and balanced.
• **Body composition**: can affect the range of movement available so affect agility.
Extension 1: Health-related exercise and sports

2.

<table>
<thead>
<tr>
<th></th>
<th>Sprinter</th>
<th>Gymnast</th>
<th>Marathon runner</th>
<th>Hockey player</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular fitness</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Muscular endurance</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Muscular strength</td>
<td>7</td>
<td>10</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Flexibility</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Body composition</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

3. Possible answers include:
- Sprinter – combines strength with speed for power.
- Gymnast – flexibility required for different positions.
- Marathon runner – keep standard over long events using cardiovascular fitness.
- Hockey player – all necessary without extremes.

Extension 2: Health-related exercise components

2. a) move the joints to the full range of movement.
   b) tiring, losing effectiveness or reaching their maximum effort load.
   c) apply force and overcome resistance.
   d) supply oxygen to the working muscles over long periods of time.
   e) is the fastest rate a person can complete a task or cover a distance.

3. Possible answers include:
- A gymnast needs flexibility to move their joints through the full range in order to achieve the correct body shape required for their sport.
- Tennis players need muscular endurance to play well throughout a long match in order to win.
- A javelin thrower needs muscular strength combined with speed to make a throw powerful and get good distance.
- Rugby players need cardiovascular fitness to keep their muscles supplied with oxygen so they can work effectively and perform skills effectively in the game.
- A football goalkeeper needs the correct body composition – height and weight – in order to be effective in goal.

1.1.4a Physical activity as part of your healthy, active lifestyle: training principles and goal setting

Worksheet 1: Principles and planning, Levels A and B

1. Training principles are important because they:
- Plan for the individual
- Are safe for individuals as exercises are set for them so helps to avoid injury
- Can specify which part of the body is to be improved
- Encourage an understanding of the body systems in order to get the programme right
- Can gradually increase the intensity of the programme
- Can be progressive so the stages are not too large and lead to injury
- Are specific to the activity
- Help plan for progress
### Worksheet 2: Classifying principles, Level A

<table>
<thead>
<tr>
<th>2.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Muscular strength is improved by matching the actions of the game/event.</td>
</tr>
<tr>
<td>PO</td>
<td>The exercise is performed above the threshold of training.</td>
</tr>
<tr>
<td>PO</td>
<td>Further training has to be planned.</td>
</tr>
<tr>
<td>S</td>
<td>Exercise matches the actions of the sport.</td>
</tr>
<tr>
<td>RR</td>
<td>Effects of training are lost three times faster than any gain made.</td>
</tr>
<tr>
<td>PO</td>
<td>After six weeks, training changes to become harder.</td>
</tr>
<tr>
<td>PO</td>
<td>Exercise becomes more intense by increasing the frequency, intensity and time.</td>
</tr>
<tr>
<td>PO</td>
<td>Changes made to the programme are gradual to avoid injury.</td>
</tr>
<tr>
<td>RR</td>
<td>Muscle tissue and cells have time to repair.</td>
</tr>
<tr>
<td>RR</td>
<td>Injury or illness can stop training and so the athlete loses fitness.</td>
</tr>
<tr>
<td>S</td>
<td>Training is at the pace of a competitive game.</td>
</tr>
<tr>
<td>RR</td>
<td>If training stops, muscles atrophy.</td>
</tr>
<tr>
<td>I</td>
<td>Training programmes are designed around a person's fitness and needs.</td>
</tr>
<tr>
<td>PO</td>
<td>Body works harder than normal.</td>
</tr>
</tbody>
</table>

### Worksheet 2: Classifying principles, Level B

|---|----------------|-------------------------|-------------------------|----------------|---------------------|------------------------|---------------------|------------------------|---------------------|------------------------|----------------|------------------------|-------------------------|------------------------|------------------------|---------------------|

### Worksheet 3: The FITT principle, Levels A and B

1. | a) Frequency | b) Intensity | c) Time | d) Type | e) Specificity | f) F – Frequency | g) Gradual increases in exercise undertaken | h) 60–80 per cent |
|---|-------------|----------|--------|--------|----------------|-----------------|-----------------------------|------------------|
2. | a) five     | b) 20     | c) 60–80 per cent | d) 80 per cent | e) progressive overload | f) atrophy          | g) moderation                  |

### Homework 1: Principle of progressive overload

- more than usual
- FITT
- length of the session
- gradual
- frequency
- type
- threshold of training
- how difficult

### Extension 1: Three principles

**Specificity**
- matching
- actions at that pace
- same way
- no better substitute
- same speed

**Progressive overload**
- more than usual
- frequency
- type
- testing
- threshold of training
- how difficult
- improve and adjust
- systematically planned
- FITT
- length of the session
- demanding
Reversibility
- training stops
- atrophy
- shape and tone
- less time

Extension 2: Two principles

Specificity
- If the skills are practised too slowly then only actions at that pace will be reproduced.
- For specific, skilled activities, such as cycling, there is no substitute activity for the competitor.
- This principle relies on the activity matching the actions used in the game.
- The actions must be performed in the same way and at the same speed as the competition.

Progressive overload
- By regularly performing the training session, the body will improve and adjust.
- The session can be systematically planned to add the necessary changes.
- Changes will include adjustments to FITT.
- By testing the athlete at the beginning of the programme and five to six weeks later, changes the body has made can be recorded.
- After weeks of successful training the sessions need to be made more demanding.

Extension 3: Short test

1. Frequency, Intensity, Time and Type
2. • Frequency – how often the exercise is done in a week
   - Intensity – how difficult the exercise is
   - Time – how long the exercise session lasts
   - Type – the particular exercises used

3. The gradual exercising of the body more than it is normally used to.
4. Training threshold
5. a) Atrophy  b) Reversibility
6. 80 per cent

1.1.4b Physical activity as part of your healthy, active lifestyle: assessing fitness and developing an exercise programme

Worksheet 1: Interval training, Levels A and B

1. After a complete warm-up:

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–15 secs</td>
<td>bursts of sprints</td>
</tr>
<tr>
<td>15–60 secs</td>
<td>slow running</td>
</tr>
<tr>
<td>60–75 secs</td>
<td>bursts of sprints</td>
</tr>
<tr>
<td>75–120 secs</td>
<td>slow running</td>
</tr>
<tr>
<td>120–135 secs</td>
<td>bursts of sprints</td>
</tr>
<tr>
<td>135–180 secs</td>
<td>slow running</td>
</tr>
<tr>
<td>180–195 secs</td>
<td>bursts of sprints</td>
</tr>
<tr>
<td>195–240 secs</td>
<td>slow running</td>
</tr>
<tr>
<td>240–255 secs</td>
<td>bursts of sprints</td>
</tr>
<tr>
<td>255–435 secs</td>
<td>slow running between sets</td>
</tr>
</tbody>
</table>

Each set takes 7 minutes 15 secs to complete. The whole session repeats four sets of the above.
2. a) Swimming; any game's skill  
   b) 29 minutes  
   c) Stopwatch

Worksheet 2: Circuit training, Levels A and B
Possible answers include:
- Football: heading; kicking to a target; dribbling round cones; kicking and trapping the ball; kick ups; throw on against a wall to a target; dribble and pass against a bench; collect and dribble back; chipping to a target; two touch against a bench; run, pass ball against a bench, control and stop ball, run back and repeat.
- Basketball: dribbling the ball to a line and back; ball circles around the waist; set shots to a ring; rebound jumps against a wall/backboard; dribble and turn round a cone; bounce passes against a wall; static dribbling using both hands; chest passes against a wall; lay up shots; dribble and pass against a wall.
- Hockey: pass against a bench; Indian dribble round cones; pass and control against a bench/wall; dribble and shoot; flick to a target; pass ball between markers; static tap and reverse stick ball control; dribble, pass and run to collect; pushing ball to a target; reverse stick against the wall/bench.

Worksheet 3: Weight training, Levels A and B
1. regularly; used to the weights; adapted; gradually; progressively; repetitions; sets; three; repetitions; completed; weight
2. a) free (FW)  
   b) both (B)  
   c) free (FW)  
   d) machine (M)  
   e) both (B)  
   f) machine (M)  
   g) free (FW)  
   h) machine (M)  
   i) both (B)  
   j) machine (M)  
   k) free (FW)  
   l) machine (M)  
   m) free (FW)  
   n) both (B)  
   o) free (FW)  
   p) machine (M)

Worksheet 4: Fartlek training, Levels A and B
1. <graph>
2. speed play; Swedish; woodland; hillsides; sand dunes; vary; intensity; anaerobic respiration; recover; aerobic system; match; games; cycling; swimming; adapts; frequently; harder level; rests; progressing; FITT.

Worksheet 5: Fartlek, cross and continuous training, Levels A and B
- (Hockey player) Fartlek – “I enjoy training outside.” “My event needs me to change speeds.” “I have good aerobic and anaerobic fitness.”
- (Long-distance runner) Continuous – “I like to work on the rower and the stepper.” “I need to improve my cardiovascular systems training methods.” “I am exercising for my general health.”
- (Jogger) Cross – “I like to vary the way I train.” “My general fitness is important to me.” “My joints are not what they used to be so I change activities to rest them.”
Worksheet 6: Personal Exercise Programme (PEP), Levels A and B

1. 1. What is the purpose of the training?
   2. Take into account the age of the person.
   3. Take into account the experience of the person.
   4. Has the person got any training preferences?
   5. Understand the pulse and find the resting pulse.
   6. Find out how efficient the lungs are by working out the VO$_2$ max.
   7. Assess the ability of the person in several areas by testing various skills.
   8. Analyse test.
   9. Set tasks for the subject.
   10. Re-assess by checking the effects of the exercise on the original test results.

Worksheet 7: Warm-up, Levels A and B

1. Possible answers include:
   a) gradually gets body ready for action, increasing intensity to match the sport; raises body temperature; raises the pulse near to the working pulse rate; concentrates the mind; chance to practise basic skills of the sport/activity; reduces the risk of injury in the activity; start to work as a team; creates a link between rest and the main activity
   b) Cardiovascular warm-up; stretching; flexibility exercises

2. a) Cool-down  b) Main activity  c) Warm-up
    d) Main activity  e) Cool-down  f) Warm-up

Worksheet 8: Testing protocol, Levels A and B

- **Reliability**: consistent; procedures; recorded; compared; motivated; tired; meal; conditions; season
- **Validity**: meaningfully; measure; relevant; reflection
- **Comparison**: way; legitimately; past; recognized
- **Safety**: conducting; correct; surface; clothing; equipment; lighting

Worksheet 9: Testing and measuring, Levels A and B

1. | Component of health-related exercise | Type of test | Area tested | Anatomical name for area tested |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscular strength</td>
<td>Hand grip test</td>
<td>Grip or forearm strength</td>
<td>The extensors and flexor of the lower arm</td>
</tr>
<tr>
<td>Cardiovascular fitness</td>
<td>Cooper’s 12-minute run test</td>
<td>Heart and lungs</td>
<td>Cardiorespiratory systems</td>
</tr>
<tr>
<td>Muscular endurance</td>
<td>Harvard Step test</td>
<td>Leg muscles</td>
<td>Quadriceps</td>
</tr>
<tr>
<td>Flexibility</td>
<td>Sit and reach flexibility test</td>
<td>Muscles of lower back</td>
<td>Latissimus dorsi and hamstrings</td>
</tr>
</tbody>
</table>

Homework 1: Circuit training
a) A  b) D  c) A  d) A  e) D  f) A  g) A  h) A  i) A  j) A

Homework 2: Fartlek training
2. a) 185  b) 12 minutes  c) three times
    d) 18, 27, 39 minutes  e) 51 minutes  f) two
    g) the heart rate falls  h) 21–24 minutes and 30–36 minutes  i) to give the body a chance to recover
    j) 42 minutes  k) nine minutes
Extension 1: Interval training

3. Possible answers include:
   - Dribble – shoot, jog back
   - Dribbling round cones – jog back
   - Playing a shot – running back to a queue
   - Any appropriate and logical ‘perform, jog and wait’ practices.

Extension 2: Circuit training

Answers to include: cycling, varying time/distance/intensity lasting for over 20 minutes.

1.1.5 Your personal health and well-being

Worksheet 1: Nutrients, Levels A and B

1. a) Instant energy provider  b) Body builder and tissue repair
   c) Store energy  d) Maintaining general health

2. Possible answers include:
   a) Fruit, liver, carrots, vegetable oils  b) Cakes, beer, bread, pasta  c) Meat, fish, beans, nuts

3. a) Carbohydrate loading for endurance events  b) Repair tissue after injury
   c) Keep the balance of fluids in the body  d) As an insulator in extreme weather conditions

4. Sugars and starches – stored as glycogen

Worksheet 2: Marathon runners and diet, Level A

Possible answers include:

a) Carbohydrate loading – allows carbs to be stored as glycogen
b) Two hours before event, eat a small carbohydrate meal

c) fluids/energy drinks taken in
d) high-energy food taken in

Worksheet 2: Marathon runners and diet, Level B

a) 9  b) 5  c) 2  d) 6  e) 10
f) 1  g) 7  h) 3  i) 8  j) 4

Worksheet 3: Sports and diet, Levels A and B

1. a) C  b) E  c) D
   d) B  e) A  f) F

3. (Level A only)
Possible answers include:

Carbohydrate loading
- Linked with long-distance events
- Carbs are easy to digest
- Provide instant source of energy
- Eating more carbs = store of glycogen = reduce levels of fatigue in competition
- Helps maintain performance over a long period of time

High protein
- Used for quick weight loss
- Good for rehabilitation after injury
- Suits rugby players wanting to reduce fat and build up muscle
- Reduces stores of fat in the body
Homework 1: Energy requirements

### Table B

<table>
<thead>
<tr>
<th>Activities (high energy first)</th>
<th>Kilojoules (kJ)</th>
<th>Kilocalories (kcal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running</td>
<td>2033</td>
<td>484</td>
</tr>
<tr>
<td>Circuit training</td>
<td>1806</td>
<td>430</td>
</tr>
<tr>
<td>Cycling</td>
<td>1806</td>
<td>430</td>
</tr>
<tr>
<td>Tennis</td>
<td>1579</td>
<td>376</td>
</tr>
<tr>
<td>Ice skating</td>
<td>1579</td>
<td>376</td>
</tr>
<tr>
<td>Swimming</td>
<td>1357</td>
<td>323</td>
</tr>
<tr>
<td>Gardening</td>
<td>1016</td>
<td>242</td>
</tr>
<tr>
<td>Mowing the lawn</td>
<td>1016</td>
<td>242</td>
</tr>
<tr>
<td>Water aerobics</td>
<td>903</td>
<td>215</td>
</tr>
<tr>
<td>Walking</td>
<td>903</td>
<td>215</td>
</tr>
<tr>
<td>Housework</td>
<td>790</td>
<td>188</td>
</tr>
<tr>
<td>Weight lifting</td>
<td>676</td>
<td>161</td>
</tr>
</tbody>
</table>

Source: Health Discovery, based on a person weighing 112 lbs, exercising for 60 minutes.

### Extension 1: Diet and the sportsperson

E = everyday; LD = long-distance athlete; R = rugby player

<table>
<thead>
<tr>
<th>Toast</th>
<th>E</th>
<th>LD</th>
<th>Bacon</th>
<th>E</th>
<th>R</th>
<th>Peas</th>
<th>E</th>
<th>R</th>
<th>Cucumber</th>
<th>E</th>
<th>LD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamb chop</td>
<td>E</td>
<td>R</td>
<td>Fried eggs</td>
<td>E</td>
<td>R</td>
<td>Sausages</td>
<td>E</td>
<td>R</td>
<td>Jacket potato</td>
<td>E</td>
<td>LD</td>
</tr>
<tr>
<td>Brown rice</td>
<td>E</td>
<td>LD</td>
<td>Baked beans</td>
<td>E</td>
<td>LD</td>
<td>Carrots</td>
<td>E</td>
<td>R</td>
<td>Cake</td>
<td>E</td>
<td>LD</td>
</tr>
<tr>
<td>Grilled fish</td>
<td>E</td>
<td>R</td>
<td>Fruit</td>
<td>E</td>
<td>LD</td>
<td>Cauliflower</td>
<td>E</td>
<td>LD</td>
<td>Gammon ham</td>
<td>E</td>
<td>R</td>
</tr>
<tr>
<td>Pasta</td>
<td>E</td>
<td>LD</td>
<td>Boiled potato</td>
<td>E</td>
<td>LD</td>
<td>Tomatoes</td>
<td>E</td>
<td>LD</td>
<td>Lean minced beef</td>
<td>E</td>
<td>LD</td>
</tr>
<tr>
<td>Lettuce</td>
<td>E</td>
<td>LD</td>
<td>Mashed potato</td>
<td>E</td>
<td>LD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Extension 2: Diet test

1. Carbohydrates, proteins, fats, vitamins, minerals, fibre and water

2. a) 1000 kcal  
   b) 2119 kcal  
   c) 2381 kcal  
   d) 2667 kcal

3. • Week before event: as training reduces, increase carbohydrate intake;  
   • Day before the event: load up on carbohydrates;  
   • On the day of the event: eat larger carbohydrate meal three–four hours before race or lighter meal no less than two hours before event and ensure body fluid levels are high;  
   • During the event, take in fluids to stop dehydration, replace fluid loss with energy drinks and eat high energy food;  
   • Later, a sensible meal should be eaten, depending on the training programme.

4. Raises cholesterol levels; kidney damage for those using high-protein diets for weight loss; possible heart disease, stroke, diabetes and cancer.

5. Reduces flexibility; limits amount of movement which interfere with technique; lowers endurance capability due to having to carry extra weight; reduces speed; affects long-term health including heart disease, high blood pressure and cancer.

### 1.2.1 Physical activity and your healthy mind and body

Worksheet 1: Somatotypes: body characteristics awareness, Levels A and B

1. a) ectomorph  
   b) mesomorph  
   c) mesomorph/endomorph  
   d) mesomorph  
   e) ectomorph  
   f) ectomorph  
   g) mesomorph
Worksheet 2: Effects of drugs, Levels A and B

1. a) physically demanding; calm the nerves  
   b) socially acceptable; impair judgement  
   c) masking agent  
   d) as a relaxant; a steady hand and a calm nerve  
   e) muscle size; bone growth; recover from injury quicker

2. (Level A only) Possible answers include:  
   Personal pressure; fan pressure; peer pressure; natural ability not enough; need for acclaim; desire for high earnings based on results; win at all costs; make most of a short sporting life; desire to be best at all costs; recover quicker from injury

Worksheet 3: Safety in sport, Levels A and B

1. Possible answers include:  
   • Javelin and shot put: all competitors drilled in safety measures – carrying equipment, area to wait in, procedure to retrieve/designated area for javelins/shot not in use, marked out and marshalled areas  
   • Long jump: competitors drilled for safety – waiting area/run up, take-off and landing area checked to be clear and free from obstacles and objects/take-off board in good condition

2. Possible answers include:  
   Safety equipment in clear view and correctly marked and stored/depth change clearly marked on wall and pool side/pool surround clean and free from obstacles/swim aids neat and safely stored

Worksheet 4: Outdoor and adventurous activities, Levels A and B

Possible answers include:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Specialized safety equipment</th>
<th>How the equipment makes the activity safe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mountaineering</td>
<td>Cagoule/waterproof jacket</td>
<td>Helps to keep the wearer dry and so reduce heat loss.</td>
</tr>
<tr>
<td></td>
<td>Boots</td>
<td>Give a good grip and protect feet, especially ankle, from rough terrain.</td>
</tr>
<tr>
<td>Rock climbing</td>
<td>Rope/carabiners</td>
<td>Secures climber to belay so if they lose hold they will not fall far.</td>
</tr>
<tr>
<td></td>
<td>Helmet</td>
<td>Protects head from falling rock.</td>
</tr>
<tr>
<td>Canoeing</td>
<td>Helmet</td>
<td>Helps to protect the head if the wearer capsizes.</td>
</tr>
<tr>
<td></td>
<td>Buoyancy aid</td>
<td>If wearer capsizes, they are kept afloat.</td>
</tr>
<tr>
<td>Sailing/windsurfing</td>
<td>Wetsuit</td>
<td>Keeps the body temperature warm for long periods.</td>
</tr>
<tr>
<td></td>
<td>All-weather protective suit</td>
<td>Protects from severe weather conditions.</td>
</tr>
<tr>
<td>Orienteering</td>
<td>Whistle</td>
<td>To use to attract attention if in difficulty.</td>
</tr>
<tr>
<td></td>
<td>Compass/map</td>
<td>With the correct training, together they pinpoint the orienteer's position.</td>
</tr>
</tbody>
</table>

Worksheet 5: Safety rules, Levels A and B

Possible answers include:

1. Check the conditions for play are safe; check the players are dressed safely; see that the rules of the game are kept; ensure safe play; if conditions change, make decision accordingly; discipline the players

2. Third party – hockey; Blocking – basketball; Contact on the goalie – football; Length of fingernails – Netball; Bouncers too low order batsmen – cricket; Safety throwing areas – athletics; Staying in lane – athletics.
Homework 1: Hazards and playing areas
Possible answers include:
- Litter causing cuts, falls, abrasions
- Personal presentation including untied laces, sharp fingernails, jewellery, no shin pads
- Unbalanced competition: a big boy versus a small boy
- Mix of sports causing balls to fly into other games
- Conditions of area: fence, posts, surface unsuitable for netball, divots to trip on
- Spectators are too close, causing trips, falls or are intimidating
- A dog causing trips and falls

Homework 2: Safety clothing and equipment
Cricketer: helmet; gloves; pads; abdominal protector (box); thigh pad and inner thigh pad; arm guard; chest guard.
Hockey goalkeeper: helmet; hand protectors; kickers; leg guards; body armour/chest protector; padded shorts/smock.

Extension 1: Somatotypes

<table>
<thead>
<tr>
<th>Ectomorph</th>
<th>Mesomorph</th>
<th>Endomorph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jockey</td>
<td>Badminton player</td>
<td>Sumo wrestler</td>
</tr>
<tr>
<td>Badminton player</td>
<td>Hockey player</td>
<td></td>
</tr>
<tr>
<td>Long-distance runner</td>
<td>Sprinter</td>
<td></td>
</tr>
<tr>
<td>Basketball player</td>
<td>Basketball player</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gymnast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Footballer</td>
<td></td>
</tr>
</tbody>
</table>

Extension 2: Banned substances: the facts

<table>
<thead>
<tr>
<th>Drugs in this category</th>
<th>Which athlete would use this drug?</th>
<th>The effect on the athlete</th>
<th>Side effects/dangers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anabolic steroids</td>
<td>Testosterone, Nandrolone, Stanozolol, Boldenone, Clenbuterol</td>
<td>Any needing large muscle mass</td>
<td>Allows harder training sessions, increases aggression, helps rehabilitation from injury</td>
</tr>
<tr>
<td>Stimulants</td>
<td>Amphetamines, Ephedrine, Caffeine, Cocaine, Nicotine</td>
<td>Any athlete relying on reactions and wanting to train harder</td>
<td>Reduces feeling of tiredness and speeds up reactions</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Furosemide, Triamterene, Chlortalidone</td>
<td>Jockey/boxer needing to make a certain weight</td>
<td>Reduces fluid retention, causing rapid weight loss</td>
</tr>
<tr>
<td>Peptide hormones</td>
<td>Human growth hormone (HGH), Erythropoietin (EPO)</td>
<td>Athlete needing to develop the body, recover from injury, endurance event competitor</td>
<td>Increases red blood cells for endurance events, develops muscle, reduces tiredness</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>Atenolol, Nodolol</td>
<td>Target sport competitors such as golfers, snooker players, archers and pistol shooters</td>
<td>Calms and steadies the hands, slows heart rate down</td>
</tr>
<tr>
<td>Narcotic analgesics</td>
<td>Methadone, Pethidine, Morphine</td>
<td>Injured performer wanting to continue training</td>
<td>Hides the pain of injury allowing for participation in training or competitions</td>
</tr>
</tbody>
</table>
Extension 3: Safety and officiating

Possible answers for netball include:
- Before the game: playing areas free from obstacles and objects/posts are safe/netting safe/has correct umpire’s equipment/no jewellery/nails are safe length/hair tied back.
- During the game: rules are kept to court position of players correct.
- After the game: announces final score/concludes the match safely.

Extension 4: Rules for safety, order and fairness

- a) Keeping order
- b) Making play fair
- c) Making play fair
- d) Keeping order
- e) Making play fair
- f) Keeping order/Making play fair
- g) Keeping order/Making play fair
- h) Keeping order/Making play fair
- i) Keeping order
- j) Keeping order
- k) Keeping order
- l) Safety/Making play fair
- m) Keeping order
- n) Keeping order
- o) Keeping order/Making play fair
- p) Safety

1.2.2 A healthy, active lifestyle and your cardiovascular system

Worksheet 1: Learning the parts of the circulatory system, Levels A and B

1.

![Cardiovascular System Diagram]

3. (Level A only)

Answers should include:
- Transports oxygen and nutrients.
- Controls body temperature.
- Removes waste and toxic products from the body.
- Protects body by taking antibodies to fight disease at the site of infection.

Worksheet 2: The pathway of blood in the body, Levels A and B

1. Pulmonary artery – out of the heart; Lungs; Pulmonary vein – into the heart; Left atrium; Left ventricle; Aorta – out of the heart; To the body; Vena cava – into the heart; Right atrium; Right ventricle – to the pulmonary artery again

<table>
<thead>
<tr>
<th>Part of the circulatory system</th>
<th>Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pulmonary artery</td>
<td>Takes deoxygenated blood out of the heart.</td>
</tr>
<tr>
<td>2. Lungs</td>
<td>Blood picks up oxygen and exits lungs via the…</td>
</tr>
<tr>
<td>3. Pulmonary vein</td>
<td>Takes oxygenated blood to the…</td>
</tr>
<tr>
<td>4. Left atrium</td>
<td>Oxygenated blood is pumped to the…</td>
</tr>
</tbody>
</table>
Part of the circulatory system  | Pathway
--- | ---
5. Left ventricle  | Takes oxygenated blood out of the heart.
6. Aorta  | Takes oxygenated blood away from the heart to the...
7. Body  | Oxygen is used by working muscles and then to...
8. Vena cava  | Takes deoxygenated blood back to the heart.
9. Right atrium  | Pumps deoxygenated blood to the...
10. Right ventricle  | Pumps blood out of the heart to the pulmonary artery.

Worksheet 3: Three types of blood vessels, Levels A and B

1.  | Artery | Capillary | Vein
--- | --- | --- | ---
Blood enters at a high pressure  | —  | Works under low pressure
Has a strong pulse  | Walls are semi-permeable  | Has no pulse
Has thick walls  | Walls are one cell thick  | Has thin walls
Has an elastic quality  | Minute internal diameter  | Has a less elastic quality
Takes blood away from the heart  | Fed by the arteries at one end  | Takes blood to the heart
Mostly carries oxygenated blood  | Feeds the veins at the other end  | Carries deoxygenated blood
Does not have valves  | Does not have valves  | Has valves

2. (Level A only)
Possible answers include:
- Artery: thick walls to withstand high blood pressure; flexible for pulse.
- Capillary: thin walls so carbon dioxide can pass through.
- Vein: thinner walls than arteries as they work at low pressure; little pulse so less need for elasticity; have valves to prevent back flow of blood countering the low pressure blood movement.

Worksheet 4: The composition of blood, Levels A and B

1. Red blood cells are called erythrocytes.
- The main function of red blood cells is to transport oxygen.
- In the red blood cells is haemoglobin; this helps the transportation of oxygen to the working muscles.
- White blood cells protect the body by going to the source of infection.
- White blood cells are also called leukocytes.
- White blood cells are produced in both the long bones and the lymph tissue of the body.
- The platelets’ job is to clot the blood.
- Platelets are smaller parts of larger cells.
- Plasma is 90 per cent water and makes up 55 per cent of the volume of blood.
- Plasma contains plasma proteins that help the circulation between cells and tissue.

2. (Level A only)
Answers should include:

**Haemoglobin**
- Found in red blood cells
- Chemicals can attach making oxyhaemoglobin
- It is the means by which oxygen is transported to the working muscles

**Fibrinogen**
- Found in plasma
- Helps clotting
- One of several constituents of plasma

Worksheet 5: Effects of exercise on the heart, Levels A and B

72 beats per minute; resting heart rate; oxygen; stroke volume; cardiac output; increases; 220 – age; 85ml; stroke volume by the heart rate; recovery rate
Worksheet 6: Immediate effects of exercise on the performer, Levels A and B

a) face; dilate  b) stroke  c) sweats  d) blood cells  e) muscles  
  f) Arteries  g) heart rate  h) Salt  i) temperature; heat  j) oxygen

Homework 1: Interpreting a graph

a) 140 bpm  b) 62 bpm  c) 62 bpm  
  d) aerobic  e) after the warm-up  f) 12 minutes  
  g) the pulse rate stays constant  h) nine minutes

Homework 2: Questions on the circulatory system

a) After having sat still for a few minutes.  
  b) Because the body stops its demand for extra blood when sitting down at rest and so slows to the resting pulse.  
  c) Oxygenated blood.  
  d) Pulmonary artery.  
  e) It increases.  
  f) The working muscles demand more oxygen to work and the waste products need to be removed from the body.  
  g) Veins.  
  h) Red blood cells.

Extension 1: Effects of exercise on the heart

Possible answers include:
1. Greater demand of oxygen to working muscles which needs to get there faster.  
2. Greater volume of blood pumped so you are more aware.  
3. Surface blood vessels dilate (open) to help temperature control.  
4. Waste products increase as a result of exercise so are removed by perspiration.  
5. Salt is a waste product and removed via perspiration.  
6. Reducing exercise reduces demand for oxygen in the muscles so heart rate reduces.  
7. Working muscles produce heat – so you’ll feel hot.

Extension 2: Interpreting a graph 1

2. a) i) Heart rate increasing during warm-up  
   ii) Heart rate increasing and decreasing during period of exercise and rest  
   iii) Heart rate decreasing during cool-down  
   b) Shows the end of warm-up followed by increased intensity exercise  
   c) Intense period of effort followed by less intense/rest periods  
   d) Interval training  
   e) Games players/athletes and so on

Extension 3: Interpreting a graph 2

2. a) i) Heart rate increasing during warm-up  
   ii) Heart rate increasing and decreasing during periods of exercise then rest and exercise again  
   iii) Period of highest intensity  
   iv) Heart rate decreasing during cool-down  
   b) Shows the end of warm-up followed by increased intensity exercise  
   c) Varied exercise in time, length and intensity  
   d) Fartlek training  
   e) Any games player, such as footballer, hockey player, rugby player and so on
1.2.3 A healthy, active lifestyle and your respiratory system

Worksheet 1: Air passages, Levels A and B

Worksheet 2: Mechanisms of breathing, Levels A and B

For Level A mark any logical sentence with the following information:

**Inspiration** | **Expiration**
--- | ---
Diaphragm | Diaphragm
Pulls down | Relaxes
Intercostal muscles | Intercostal muscles
Contract | Relax to dome shape
Chest expands | Chest decreases
Pressure decreases | Pressure increases

Worksheet 3: Composition of inhaled and exhaled air, Levels A and B

2. | Inhaled air | Exhaled air |
--- | --- | ---
Oxygen | 20% | 16% |
Carbon dioxide | Trace | 4% |
Nitrogen | 79% | 79% |

3. **a)** Because oxygen has been taken in by the body, to be used by the working muscles.
   **b)** Carbon dioxide is toxic (harmful) to the system and is breathed out.

4. (Level A only)
   Possible answers include:
   Exchange of gases in alveoli more efficient.
   Increases vital capacity of the lungs so:
   - more air is exhaled so more carbon dioxide leaves the body in one breath
   - more oxygen taken in so muscles can work for longer without tiring
   - more oxygen taken up for use by the working muscles.
Worksheet 4: Anaerobic respiration, Levels A and B

1. & 2.

<table>
<thead>
<tr>
<th>Order of events</th>
<th>Letter</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>f</td>
<td>She breathes slowly and respires aerobically.</td>
</tr>
<tr>
<td>2</td>
<td>a</td>
<td>She breathes quickly and respires aerobically.</td>
</tr>
<tr>
<td>3</td>
<td>e</td>
<td>She begins anaerobic respiration in her muscles.</td>
</tr>
<tr>
<td>4</td>
<td>d</td>
<td>Lactic acid forms in the muscles.</td>
</tr>
<tr>
<td>5</td>
<td>b</td>
<td>The oxygen debt is repaid.</td>
</tr>
<tr>
<td>6</td>
<td>c</td>
<td>Her muscles ache.</td>
</tr>
<tr>
<td>7</td>
<td>f</td>
<td>She breathes slowly and respires aerobically.</td>
</tr>
</tbody>
</table>

3. (Level A only)
   1. 100m hurdles
   2. High jump
   3. Shot put
   4. 200m
   5. Long jump
   6. Javelin
   7. 800m

4. (Level A only)
   - Activities using one all-out burst of maximal effort.
   - Activities completed in a short space of time – no more than 45–60 seconds.
   - Immediately after the activity the athlete may gasp for breath.

Worksheet 5: Changes in the athlete during exercise, Levels A and B

1. a) Ribs – with deeper breathing, ribs move out more
   b) Nose – inhale more frequently
   c) Alveoli – exchange of gases increases
   d) Mouth – exhale more frequently
   e) Diaphragm – pulls down more
   f) Lungs – more air passes in and out of them

3. a) increases slightly
   b) hardly changes
   c) increases due to greater demand for air
   d) is the term for the increase of breathing due to exercise

Homework 1: How breathing works

a) 7
b) 2
b) 6
d) 1
e) 4
f) 8
g) 3
h) 5

Homework 2: Aerobic and anaerobic respiration

a) Their breathing would be deeper and regular.
b) Blood takes oxygen to the working muscles faster, cooling the body.
c) Getting rid of waste water and salt from the body and cooling the body.
d) Lactic acid build-up.
e) Oxygen debt/lactic acid build-up.

Homework 3: Aerobic and anaerobic respiration in various sports

1. a) AN
b) AN
c) AN
d) AN
e) AE
f) AN
g) AN
h) AE
i) AN
j) AN

Extension 1: Aerobic and anaerobic training

2. • Aerobic – any long-distance event
   • Anaerobic – athletic field events and sprints
   • Mix – team games
Extension 2: Exercise and the respiratory system

a) Increase/breathing noisier/left gasping  
b) Increase/body needs more oxygen to working muscles  
c) Uses oxygen in muscles already/paid back later/gasping for breath  
d) Will increase as amount of air required has increased  
e) Only increases slightly

Extension 3: Long-term effects of training

1. Possible answers include:

**Aerobic training**
- Exchange of gases more efficient
- Muscles able to work longer at moderate to hard level
- Maintain effort level without tiring
- Vital capacity increased
- More air exhaled – carbon dioxide out
- More oxygen in – to working muscles

**Anaerobic training**
- Short burst of maximal effort leads to oxygen debt
- Interval training uses anaerobic respiration
- New capillaries are formed
- Heart muscle is strengthened
- Delivery of oxygen is improved, stopping build-up of lactic acid
- All leads to ‘oxygen debt tolerance’

2. Long-distance swimming/running/cycling; continuous training/at about 80 per cent of maximum heart rate/practice starts and finish paces/working alone and with others.

1.2.4 A healthy, active lifestyle and your muscular system

Worksheet 1: Types of muscle, Levels A and B

1.  
- Voluntary – striated/consciously controlled/most common
- Involuntary – smooth/automatic/intestines/blood vessels
- Cardiac – heart/involuntary/automatic/never rests

2. (Level A only)  
Answers could include:

a)  
- Never tires
- Pumps blood to working muscles
- Increased heart rate, depending on activity level to cope with extra demand
- Works automatically

b)  
- Determines person’s shape
- Can control their movement: the type of actions made
- Size can be developed – increased bulk and strength for sport
- Can be trained to develop skilled performance

Worksheet 2: Linking muscles to a sport, Levels A and B

2. a) Describe bowling action: rotation of the arm, pectorals contract and latissimus dorsi relaxes as the ball is released
   
b) Describe the sprinting leg action: abdominals contract; as the leg pushes off the ground, gluteals contract. Quadriceps contract to extend the leg whilst the hamstrings contract to flex the leg at the knee
   
c) Describe the kicking action: hamstrings contract to flex at the knee; gluteals contract as the leg prepares itself; quadriceps contract to extend at the knee on contact; abdominals contract to lift the leg on follow through
Worksheet 3: Diagram of the arm, Levels A and B

- a) Origin
- b) Biceps
- c) Radius
- d) Triceps
- e) Humerus
- f) Insertion
- g) Ulna

Worksheet 4: Diagram of the leg, Levels A and B

- a) Extensor
- b) Quadriceps (antagonist)
- c) Femur
- d) Tibia
- e) Tendon
- f) Origin
- g) Hamstring (prime mover)
- h) Flexor
- i) Insertion tendon
- j) Fibula

Worksheet 5: Sport links and twitch muscle fibres, Levels A and B

<table>
<thead>
<tr>
<th>Fast twitch</th>
<th>Slow twitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract fast, producing a powerful action; Tire quickly; Produce short bursts of energy; Suit sprinting and throwing events</td>
<td>Suited to slow, prolonged activity; Stay efficient over long periods; Have a very good oxygen supply; Best for events that take a long time to complete, such as long-distance running, swimming and cycling</td>
</tr>
</tbody>
</table>

2. (Level A only)
   For slow twitch muscle fibres: any long-distance event
   For fast twitch muscle fibres: any explosive, quick, powerful event

Homework 1: Functions of the muscles
- a) extends the foot at the ankle
- b) rotates at the shoulder
- c) adducts at the arms/pulls arms back
- d) extends at the hip

Homework 2: Muscles of the body
1. 
   - a) Trapezius
   - b) Deltoids
   - c) Pectorals
   - d) Latissimus dorsi
   - e) Gluteals
   - f) Hamstrings
   - g) Biceps
   - h) Triceps
   - i) Abdominals
   - j) Quadriceps
   - k) Gastrocnemius
2. a) Biceps/triceps
   Hamstrings/quadriceps
   b) To flex at the elbow – biceps muscle pulls = prime mover contracts and shortens, the other triceps muscle relaxes = antagonist and lengthens. To extend at the knee – quadriceps muscle pulls = prime mover contracts and shortens – hamstrings relax = antagonist and lengthens.

Homework 3: Multiple-choice questions
1. d  2. a  3. d  4. c

Extension 1: Posture
2. Answers should include:

   Good posture:
   • Shoulders and back should be straight and in line with the rest of the body.
   • Head and chin should be up, in line with the body.
   • Hips should be in line with the spine and feet.
   • Spine should be as straight as possible.

   Bad posture:
   • Shoulders are rounded and not in line with the body.
   • Head is positioned forward, straining the neck muscles.
   • Hips are sagging, putting pressure on the spine.
   • Spine is curved, creating a slouched look.

Extension 2: Fast and slow muscle twitch fibres
1. Fast twitch muscle fibres
   1. Not as good supply of oxygen as STMF
   2. Contractions are fast
   3. Fast, powerful action
   4. Tire quickly
   5. Used for speed/explosive events
   6. White in colour

   Slow twitch muscle fibres
   • Good oxygen supply
   • Gets energy by using oxygen
   • Contractions are slow
   • Can work over prolonged periods
   • Can repeat many times
   • Used for endurance events
   • Dark red in colour
   • Use myoglobin/mitochondria

2. Answers could include:
   • Muscles have both types, but the amounts may differ.
   • Nervous system only activates STMF when jogging/slow cycling, and so on.
   • When explosive actions are needed both STMF and FTMF are used.
   • Athletes are fibre tested.
   • Long-distance eventers = STMF
   • Sprinters/jumper/throwers = FTMF
   • Although you cannot change genetic allocation you can train to improve each type efficiency.

Extension 3: Questions requiring short answers
a) pull  e) the insertion
b) shorter  f) antagonistic
c) tendons  g) prime mover
d) the origin  h) antagonist
i) sprinting, javelin, shot-put, high jump
j) any long-distance events like cycling, swimming and running
k) Bursts of energy; explosive events; tires quickly; contract fast; white in colour; only a fairly good oxygen supply
l) Used in prolonged activities; suited to long-distance events; able to work for a long time; contracts slowly; red in colour; very good oxygen supply
m) A state of the muscles’ readiness to work
n) Giving space for the following to work properly: heart beat, digestive system, breathing, bone alignment; helping muscles keep their energy; personal self-esteem
1.2.5 A healthy, active lifestyle and your skeletal system

Bones

Worksheet 1: Protecting bones, Levels A and B
1. • Cranium: brain
   • Ribs: heart, lungs, liver, spleen
   • Pelvic girdle: female reproductive organs, bladder
   • Vertebral column: spinal chord

Worksheet 2: Functions of the skeleton, Levels A and B
a) shape   b) support   c) movements   d) protected   e) produced

Worksheet 3: Grouping and classifying bones, Levels A and B

- **Long bones** – Tibia, fibula, humerus, ulna, femur, radius
- **Short bones** – Phalanges, metatarsals, tarsals, metacarpals, carpals
- **Irregular bones** – Thoracic vertebrae, sacral vertebrae, coccyx, patella, atlas, lumbar vertebrae, axis, cervical vertebrae
- **Flat bones** – Cranium, ribs, sternum, clavicle, scapula

Worksheet 4: Bones that link with sporting actions, Levels A and B
Possible answers include:
- a) scapula, humerus, ulna, radius, carpals, metacarpals, phalanges
- b) scapula, humerus, ulna, radius, carpals, metacarpals, phalanges
- c) pelvis, femur, patella, tibia, fibia, tarsals, metatarsals, phalanges
- d) humerus, ulna, radius
Homework 1: Naming bones

- Sternum
- Humerus
- Pelvis
- Carpals
- Femur
- Patella
- Tarsals
- Metatarsals
- Phalanges
- Scapula
- Ribs
- Radius
- Ulna
- Metacarpals
- Phalanges
- Tibia
- Fibula
- Tarsals
- Patella
- Vertebrae
- Femur
- Clavicle
- Cranium
- Vertebrae

Homework 2: Interpreting information

- a) 33
- b) Thoracic
- c) Lumbar
- d) Help with breathing and protect spinal chord
- e) Sacral and coccyx

Homework 3: Multiple-choice questions

1. c 2. b 3. a 4. c

Extension 1: Bones that protect

1. Cranium – brain
2. Ribs – vital organs in the chest area: heart, liver, spleen, lungs
3. Pelvic girdle – bladder, female reproductive organs
4. Vertebral column – spinal chord
Extension 2: Bones and sport

Possible answers include:

<table>
<thead>
<tr>
<th>Type of bone</th>
<th>Name of bone</th>
<th>Sporting action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long bone</td>
<td>Radius</td>
<td>Rebounds the ball when playing a volleyball dig</td>
</tr>
<tr>
<td>Short bone</td>
<td>Carpals</td>
<td>Help spin the ball in cricket</td>
</tr>
<tr>
<td>Flat bone</td>
<td>Sternum</td>
<td>Rebound the ball when chesting down a ball in football</td>
</tr>
</tbody>
</table>

Extension 3: Questions on bones

a) Shape – gives shape and framework of the body, giving a person their particular build
   Support – gives a rigid framework for parts of the body to hang from and provides the muscles with an anchor to attach
   Movement aid – working with muscles, the different bones of the skeleton allow a variety of movements
   Protection – certain bones form a cage or box to protect the vital organs of the body
   Production of red blood cells – the cells are being used all the time, so a constant production is necessary for the transportation of oxygen to the working parts of the body

b) Possible answer includes: Vertebrae – protect spinal chord. Important in contact sports such as rugby, where impact with other players is common.

c) They are in a position where there is a great deal of movement, therefore they need to be robust to cope with the weight, stress and movement at this area.

d) Scapula, humerus, ulna, radius, carpals, metacarpals and phalanges

e) The shape of the person may suit a particular sport, for example, long – basketball player, short and thin – jockey

Joints

Worksheet 5: Names and locations of synovial joints, Levels A and B

<table>
<thead>
<tr>
<th>Location</th>
<th>Neck</th>
<th>Knee</th>
<th>Hip</th>
<th>Elbow</th>
<th>Shoulder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of joint</td>
<td>pivot</td>
<td>hinge</td>
<td>ball and socket</td>
<td>hinge</td>
<td>ball and socket</td>
</tr>
<tr>
<td>Bones involved</td>
<td>atlas/axis</td>
<td>femur/tibia</td>
<td>pelvis/femur</td>
<td>humerus/ulna</td>
<td>scapula/humerus</td>
</tr>
</tbody>
</table>

Worksheet 6: Types of synovial joint, Levels A and B

a) Hinge joint – femur, tibia, patella
b) Ball and socket joint – scapula, humerus
c) Pivot joint – atlas, axis

d) ball and socket
d) ball and socket
c) hinge
d) hinge
e) pivot

Worksheet 7: Types of movement at a joint, Levels A and B

1. a) 1  b) 2  c) 4  d) 5  e) 3

2. a) ball and socket  b) ball and socket  c) hinge
   d) hinge  e) pivot
### Worksheet 8: Action/movement/joint, Levels A and B

<table>
<thead>
<tr>
<th>Example</th>
<th>Area</th>
<th>Type of joint</th>
<th>Type of movement</th>
<th>Description of the action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kicking a football</td>
<td>Knee</td>
<td>Hinge</td>
<td>Extension</td>
<td>Lower leg moves forward to straighten after contact with the ball.</td>
</tr>
<tr>
<td>Hurdler lifting lead leg to clear a hurdle</td>
<td>Pelvis</td>
<td>Ball and socket</td>
<td>Rotation</td>
<td>Trailing leg clears close to hurdle and lands on the ground in front.</td>
</tr>
<tr>
<td>Swimmer performing front crawl arm action</td>
<td>Shoulder</td>
<td>Ball and socket</td>
<td>Rotation</td>
<td>Shoulder circles to allow the arm to reach forward to pull against the water.</td>
</tr>
<tr>
<td>Shooting arm action when scoring in basketball or netball</td>
<td>Elbow</td>
<td>Hinge</td>
<td>Extension</td>
<td>From a flexed position the triceps pull so the arm extends to pass the ball forward.</td>
</tr>
</tbody>
</table>

### Worksheet 9: Linking muscles to sport, Levels A and B

Possible answers include:

<table>
<thead>
<tr>
<th>Muscle name</th>
<th>Type of movement</th>
<th>Sport example</th>
<th>Description of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biceps</td>
<td>Flexion</td>
<td>Basketball</td>
<td>Flexion of elbow as player prepares to shoot</td>
</tr>
<tr>
<td>Triceps</td>
<td>Extension</td>
<td>Badminton</td>
<td>As angle increases at elbow as racket is in ‘throwing’ action of an overhead clear</td>
</tr>
<tr>
<td>Deltoids</td>
<td>Rotation</td>
<td>Golf</td>
<td>Of shoulder during golf swing</td>
</tr>
<tr>
<td>Pectorals</td>
<td>Abduction</td>
<td>Swimming – breast-stroke</td>
<td>During pull phase of breast-stroke arm action</td>
</tr>
<tr>
<td>Trapezius</td>
<td>Abduction</td>
<td>Swimming – butterfly</td>
<td>Elevation of arms and shoulders during butterfly arm action</td>
</tr>
<tr>
<td>Latissimus dorsi</td>
<td>Adduction</td>
<td>Rowing</td>
<td>Bring arms in during pull phase when rowing</td>
</tr>
<tr>
<td>Abdominals</td>
<td>Flexion</td>
<td>Pole vault</td>
<td>As angle decreases at hip as legs brought upward in pole vault</td>
</tr>
<tr>
<td>Gluteals</td>
<td>Extension</td>
<td>Weightlifting</td>
<td>As angle at hip increases weightlifter comes to a standing position</td>
</tr>
<tr>
<td>Quadriceps</td>
<td>Extension</td>
<td>Sprinting</td>
<td>As angle increases at knee during a kick in football</td>
</tr>
<tr>
<td>Hamstring</td>
<td>Flexion</td>
<td>Sprinting</td>
<td>As angle decreases at knee and prepares to stride forward during sprinting</td>
</tr>
<tr>
<td>Gastrocnemius</td>
<td>Extension</td>
<td>Athletics – long jump</td>
<td>As angle of ankle decreases during take-off</td>
</tr>
</tbody>
</table>

### Homework 4: Description of movement at a joint

1. a) Ball and socket joint  
   b) Hinge joint  
   c) Pivot joint

### Homework 5: Multiple-choice questions on joints

1. b  
2. c  
3. a  
4. c
Homework 6: Common injuries
soft tissue injuries; muscles; joints; ligaments; stretching; Striding; turning; rest; compression; actions; order of
treatment; damage; reduces the swelling; Compressing; throbbing; tendons; sport too much; incorrectly sized

Homework 7: Major injuries

<table>
<thead>
<tr>
<th>Injury</th>
<th>How it happens</th>
<th>When it happens</th>
<th>Where it happens</th>
<th>How to avoid it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torn cartilage</td>
<td>By excessive twisting of the joint.</td>
<td>When a player changes direction at speed.</td>
<td>Common in footballers.</td>
<td>Difficult to avoid – possibly make sure knee is as strong as possible.</td>
</tr>
<tr>
<td>Dislocation</td>
<td>The joint is moved outside its designed range.</td>
<td>After a forceful blow of the joint.</td>
<td>All major joints are vulnerable.</td>
<td>Strength training for muscles and tissues around the joint.</td>
</tr>
<tr>
<td>Fracture</td>
<td>If excessive impact or force is put on the bone.</td>
<td>After a blow or twist of the bone.</td>
<td>Depends on the activity. Football – leg/femur. Rugby – clavicle.</td>
<td>Difficult to avoid in contact sports.</td>
</tr>
</tbody>
</table>

Homework 8: Torn cartilage, dislocation and fractures

Dislocation: a) 5  b) 4  c) 1  d) 6  e) 3  f) 7  g) 2
Fractures: a) 7  b) 3  c) 4  d) 2  e) 6  f) 5  g) 1
Torn cartilage: a) 5  b) 6  c) 3  d) 2  e) 1  f) 4

Extension 4: Synovial joints and the sportsperson

1. Possible answers include:
   - Cartilage stops friction of the bones and acts as a shock absorber, essential when running.
   - Synovial fluid lubricates the joint, making movement in joint smooth.
   - Ligaments join bone to bone and keep the joint together so changing of direction under pressure can occur without injury.
   - Tendons join muscle to bone, allowing movement to take place.

2. Mark answers on own merits.

Extension 5: Types of movement and sports actions

1. Possible answers include:
   1. Flexion  4. Adduction
   2. Extension  5. Rotation
   3. Abduction

2. Possible answers include: Chest passing – extension – angle increases between joints to make the pass – fingers/hinge, elbows/hinge and shoulders/ball and socket.
   Hook shot – rotation – shoulder rolls overhead to make the shot – shoulder/ball and socket.

Extension 6: Questions requiring short answers

1. a) Synovial joints  b) Hinge joint  c) Hip  d) Attach bone to bone
   e) Abduction  f) Flexion  g) Rotation  h) When older