

Class 11 Physical Education NCERT Solutions

*Step-by-step answers for the 2026-27 NCERT
Health and Physical Education textbook*

Chapter 3: Physical and Physiological Aspects of Physical Education and Sports

This chapter explains growth and development, heredity and environment, warm-up, conditioning, cooling down and the effects of exercise on cardiovascular, respiratory, muscular and digestive systems.

Also see for this chapter: [Revision Notes](#)

Assessment

Q 3.1 What is the difference between growth and development? Explain.

SOLUTION

Concept used. Growth is a quantitative biological increase in body size, while development is a wider process of qualitative and quantitative improvement in all aspects of personality.

 Answer cue

Use quantity for growth and quality plus quantity for development.

- Step 1.** Growth means the body becomes larger in height, weight, size, shape and volume.
- Step 2.** Development means progressive improvement in physical, mental, social and emotional capacities.
- Step 3.** Growth is visible and can be measured objectively, but development is observed through mature behaviour.
- Step 4.** Growth happens for a limited period and is strongly limited by heredity.
- Step 5.** Development continues throughout life and is strongly affected by environment, learning and social

experience.

Final Answer: Growth is measurable increase in body size and shape. Development is the wider improvement of physical, mental, social and emotional abilities throughout life.

EXPERT'S SOLUTION : *Ritika Sharma, M.P.Ed,*
University of Delhi

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Growth is a quantitative biological increase in body size, while development is a wider process of qualitative and quantitative improvement in all aspects of personality.

Step 1. Growth means the body becomes larger in height, weight, size, shape and volume.

Step 2. Development means progressive improvement in physical, mental, social and emotional capacities.

Step 3. Growth is visible and can be measured

objectively, but development is observed through mature behaviour.

Step 4. Growth happens for a limited period and is strongly limited by heredity.

Step 5. Development continues throughout life and is strongly affected by environment, learning and social experience.

Step 6. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Growth is measurable increase in body size and shape.

Development is the wider improvement of physical, mental, social and emotional abilities throughout life.

Q 3.2 Define growth and development and explain the factors affecting growth and development.

SOLUTION

Concept used. Growth and development are affected by heredity, environment, gender, nutrition, exercise, hormones, learning and reinforcement.

 Answer cue

Write the definition first, then explain factors in a compact list.

Step 1. Growth is the process through which the body increases in size and shape.

Step 2. Development is the emerging and expanding of an individual's capabilities.

Step 3. Heredity transmits physical and psychological traits from parents to children.

Step 4. Environment includes physical, social and psychological surroundings that shape the child.

Step 5. Gender, nutrition, exercise and hormones affect body composition, maturity, strength and normal

functioning.

Step 6. Learning and reinforcement help the child acquire skills, knowledge, habits and behaviour.

Final Answer: Growth is increase in body size and shape. Development is expansion of abilities. Main factors are heredity, environment, gender, nutrition, exercise, hormones, learning and reinforcement.

EXPERT'S SOLUTION : *Aman Verma, M.P.Ed,
Banaras Hindu University*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Growth and development are affected by heredity, environment, gender, nutrition, exercise, hormones, learning and reinforcement.

Step 1. Growth is the process through which the body increases in size and shape.

Step 2. Development is the emerging and expanding of an individual's

capabilities.

- Step 3.** Heredity transmits physical and psychological traits from parents to children.
- Step 4.** Environment includes physical, social and psychological surroundings that shape the child.
- Step 5.** Gender, nutrition, exercise and hormones affect body composition, maturity, strength and normal functioning.
- Step 6.** Learning and reinforcement help the child acquire skills, knowledge, habits and behaviour.
- Step 7.** Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Growth is increase in body size and shape. Development is expansion of abilities. Main factors are heredity, environment, gender, nutrition, exercise, hormones, learning and reinforcement.

Q 3.3 Explain the effects of exercise on muscular system.

SOLUTION

Concept used. Exercise changes skeletal muscles by increasing size, oxygen use, capillary supply, strength, flexibility and endurance.

 Answer cue

Cover hypertrophy, aerobic changes, anaerobic changes and performance.

Step 1. Regular training causes muscular hypertrophy, where muscle fibres increase in diameter and length.

Step 2. Aerobic training increases myoglobin, so working muscles receive and use oxygen better.

- Step 3.** Trained muscles oxidise glycogen more efficiently and use more fat for energy.
- Step 4.** Anaerobic changes improve tolerance to lactic acid and support energy supply without oxygen.
- Step 5.** Endurance training increases capillary density around muscle fibres.
- Step 6.** The result is better strength, flexibility, endurance and delayed fatigue.

Final Answer: Exercise causes muscular hypertrophy, better oxygen use, increased capillary supply, improved lactic acid tolerance, more strength, flexibility, endurance and delayed fatigue.

EXPERT'S SOLUTION : *Nisha Menon, M.P.Ed,
LNIPE Gwalior*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Exercise changes skeletal muscles by increasing size, oxygen use,

capillary supply, strength, flexibility and endurance.

- Step 1.** Regular training causes muscular hypertrophy, where muscle fibres increase in diameter and length.
- Step 2.** Aerobic training increases myoglobin, so working muscles receive and use oxygen better.
- Step 3.** Trained muscles oxidise glycogen more efficiently and use more fat for energy.
- Step 4.** Anaerobic changes improve tolerance to lactic acid and support energy supply without oxygen.
- Step 5.** Endurance training increases capillary density around muscle fibres.
- Step 6.** The result is better strength, flexibility, endurance and delayed fatigue.
- Step 7.** Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Exercise causes muscular hypertrophy, better oxygen use, increased capillary supply, improved lactic acid tolerance, more strength, flexibility, endurance and delayed fatigue.

Q 3.4 Enlist and explain the effects of exercise on respiratory system.

SOLUTION

Concept used. Exercise increases ventilation and improves oxygen exchange by changing tidal volume, breathing rate, pulmonary ventilation and diffusing capacity.

Answer cue

Use $PV = \text{tidal volume} \times \text{respiratory rate}$ for the core formula.

Step 1. Tidal volume increases during exercise and may rise five to six times during maximal exercise.

Step 2. Respiratory rate increases from the resting range of 12 to 20 breaths per minute to two or three times more.

- Step 3.** Minute ventilation or pulmonary ventilation increases because both tidal volume and respiratory rate rise.
- Step 4.** Pulmonary ventilation equals tidal volume multiplied by respiratory rate.
- Step 5.** Pulmonary diffusing capacity for oxygen increases during exercise.
- Step 6.** Hyperventilation can occur when tidal volume, respiratory rate or both increase.

Final Answer: Exercise increases tidal volume, respiratory rate, pulmonary ventilation and oxygen diffusing capacity. It can also cause hyperventilation during hard effort.

EXPERT'S SOLUTION : *Karan Bedi, M.Sc Sports Science, Punjabi University*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Exercise increases ventilation and improves oxygen exchange by changing tidal volume, breathing rate, pulmonary

ventilation and diffusing capacity.

Step 1. Tidal volume increases during exercise and may rise five to six times during maximal exercise.

Step 2. Respiratory rate increases from the resting range of 12 to 20 breaths per minute to two or three times more.

Step 3. Minute ventilation or pulmonary ventilation increases because both tidal volume and respiratory rate rise.

Step 4. Pulmonary ventilation equals tidal volume multiplied by respiratory rate.

Step 5. Pulmonary diffusing capacity for oxygen increases during exercise.

Step 6. Hyperventilation can occur when tidal volume, respiratory rate or both increase.

Step 7. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Exercise increases tidal volume, respiratory rate, pulmonary ventilation and oxygen diffusing capacity. It can also cause hyperventilation during hard effort.

Q 3.5 Explain physical and physiological changes that take place during different developmental stages.

SOLUTION

Concept used. Developmental stages show changes in body size, maturity, movement control, social behaviour and body systems from childhood to later life.

 Answer cue

Connect age stages with body change and system function.

Step 1. In childhood, growth is fast, bones and muscles develop, and basic motor skills improve.

Step 2. During adolescence, height, weight, body composition and sexual maturity change quickly.

- Step 3.** Boys are generally taller and heavier, while girls often show earlier physical growth during adolescence.
- Step 4.** Young adulthood brings maturity in strength, endurance, coordination and body control.
- Step 5.** Middle and later adulthood show gradual decline in some physical capacities, so activity and health habits become important.
- Step 6.** Physiological systems such as muscular, circulatory and respiratory systems adapt with activity and training.

Final Answer: Different stages bring changes in height, weight, body composition, maturity, movement, strength, endurance, coordination and body-system functioning.

EXPERT'S SOLUTION : Pooja Saini, M.P.Ed,
Kurukshetra University

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body

function, training or student life.

Concept check. Developmental stages show changes in body size, maturity, movement control, social behaviour and body systems from childhood to later life.

Step 1. In childhood, growth is fast, bones and muscles develop, and basic motor skills improve.

Step 2. During adolescence, height, weight, body composition and sexual maturity change quickly.

Step 3. Boys are generally taller and heavier, while girls often show earlier physical growth during adolescence.

Step 4. Young adulthood brings maturity in strength, endurance, coordination and body control.

Step 5. Middle and later adulthood show gradual decline in some physical capacities, so activity and health habits become important.

Step 6. Physiological systems such as muscular, circulatory and respiratory systems adapt with activity and training.

Step 7. Finish with one direct sentence that

can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Different stages bring changes in height, weight, body composition, maturity, movement, strength, endurance, coordination and body-system functioning.

SOLUTION

Concept used. Cardiac output is a cardiovascular measure of how much blood each ventricle pumps in one minute.

 Answer cue

Remember $CO = HR \times SV$.

Step 1. Stroke volume means blood pumped by each ventricle in one beat.

Step 2. Heart rate means heartbeats per minute.

Step 3. Cardiac output combines both measures.

Step 4. The formula is cardiac output equals heart rate multiplied by stroke volume.

Step 5. At rest it is about 5 litres per minute and increases during exercise.

Final Answer: Cardiac output is the amount of blood pumped by each ventricle in one minute. Cardiac output = heart rate $\times$ stroke volume.

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Cardiac output is a cardiovascular measure of how much blood each ventricle pumps in one minute.

Step 1. Stroke volume means blood pumped by each ventricle in one beat.

Step 2. Heart rate means heartbeats per minute.

Step 3. Cardiac output combines both measures.

Step 4. The formula is cardiac output equals heart rate multiplied by stroke volume.

Step 5. At rest it is about 5 litres per minute and increases during exercise.

Step 6. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Cardiac output is the amount of blood pumped by each ventricle in one minute. Cardiac output = heart rate x stroke volume.

Q 3.7 Write down the full form of MV.

SOLUTION

Concept used. In this chapter, MV refers to minute ventilation, also called pulmonary ventilation.

 Answer cue

Minute ventilation is linked with breathing per minute.

- Step 1.** The respiratory-system section explains ventilation during rest and exercise.
- Step 2.** It uses minute ventilation for the breathing process of the lungs.
- Step 3.** Minute ventilation is also represented through tidal volume and respiratory rate.

Final Answer: MV stands for minute ventilation.

EXPERT'S SOLUTION : *Megha Iyer, M.P.Ed,*
University of Mumbai

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. In this chapter, MV refers to minute ventilation, also called pulmonary ventilation.

Step 1. The respiratory-system section explains ventilation during rest and exercise.

Step 2. It uses minute ventilation for the breathing process of the lungs.

Step 3. Minute ventilation is also represented through tidal volume and respiratory rate.

Step 4. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change

and avoids extra off-topic detail.

Final Answer: MV stands for minute ventilation.

Q 3.8 What is Muscle Hypertrophy?

SOLUTION

Concept used. Muscle hypertrophy means enlargement of muscles due to increased size of muscle fibres after training.

Answer cue

Do not confuse muscular hypertrophy with cardiac hypertrophy.

Step 1. Hypertrophy means increase in the volume of an organ or tissue due to enlargement of component cells.

Step 2. Regular exercise enlarges training muscles.

Step 3. Muscle fibre diameter and length increase.

Step 4. Protein, glycogen and enzyme content also increase.

Final Answer: Muscle hypertrophy is enlargement of muscle size due to training, mainly through increased diameter and length of muscle fibres.

EXPERT'S SOLUTION : *Farhan Ali, M.P.Ed,*
Aligarh Muslim University

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Muscle hypertrophy means enlargement of muscles due to increased size of muscle fibres after training.

Step 1. Hypertrophy means increase in the volume of an organ or tissue due to enlargement of component cells.

Step 2. Regular exercise enlarges training muscles.

Step 3. Muscle fibre diameter and length increase.

Step 4. Protein, glycogen and enzyme content also increase.

Step 5. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Muscle hypertrophy is enlargement of muscle size due to training, mainly through increased diameter and length of muscle fibres.

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Q 3.9 List the developmental stages of life.

SOLUTION

Concept used. Developmental stages divide life into broad age periods for studying physical and physiological change.

 **Answer cue**

Write the stages from early life to later life.

Step 1. The chapter discusses changes across childhood, adolescence, adulthood and later life.

Step 2. Childhood lays the early base for

growth and movement.

Step 3. Adolescence brings rapid physical and physiological changes.

Step 4. Adulthood shows maturity and later gradual decline.

Final Answer: The main developmental stages are infancy, childhood, adolescence, adulthood and old age.

EXPERT'S SOLUTION : *Ishita Rao, M.P.Ed,*
Savitribai Phule Pune University

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Developmental stages divide life into broad age periods for studying physical and physiological change.

Step 1. The chapter discusses changes across childhood, adolescence, adulthood and later life.

Step 2. Childhood lays the early base for growth and movement.

Step 3. Adolescence brings rapid physical and

physiological changes.

Step 4. Adulthood shows maturity and later gradual decline.

Step 5. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: The main developmental stages are infancy, childhood, adolescence, adulthood and old age.

Q 3.10 What is general warm-up?

SOLUTION

Concept used. General warm-up uses light rhythmic activity with large muscle groups to raise body temperature and prepare the body.

Answer cue

General means whole-body preparation.

Step 1. General warm-up involves rhythmic movements using large muscle groups.

Step 2. It should include light physical activity.

Step 3. It increases body temperature, heart rate, blood flow and muscle readiness.

Step 4. Examples include jogging, calisthenics and stretching.

Final Answer: General warm-up is light rhythmic activity using large muscle groups, such as jogging and stretching, to prepare the whole body for exercise.

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. General warm-up uses light rhythmic activity with large muscle groups to raise body temperature and prepare the body.

Step 1. General warm-up involves rhythmic movements using large muscle groups.

Step 2. It should include light physical activity.

Step 3. It increases body temperature, heart rate, blood flow and muscle readiness.

Step 4. Examples include jogging, calisthenics and stretching.

Step 5. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: General warm-up is light rhythmic activity using large muscle groups, such as jogging and stretching, to prepare the whole body for exercise.

Q 3.11 What is specific warm-up?

SOLUTION

Concept used. Specific warm-up uses movements that match the main sport or activity.

Answer cue

Specific means matched to the sport.

- Step 1.** Specific warm-up consists of exercises matched to the main activity.
- Step 2.** The exercises have a direct relation with the sport or skill to be performed.
- Step 3.** They prepare the body for the exact movement demands of that sport.
- Step 4.** Examples include bar exercises in weightlifting and lay-up shots in basketball.

Final Answer: Specific warm-up is sport-specific preparation using exercises directly related to the main activity, such as lay-up shots before basketball.

EXPERT'S SOLUTION : *Snehal Thomas, M.P.Ed,*
Mahatma Gandhi University

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Specific warm-up uses movements that match the main sport or activity.

Step 1. Specific warm-up consists of exercises matched to the main activity.

Step 2. The exercises have a direct relation with the sport or skill to be performed.

Step 3. They prepare the body for the exact movement demands of that sport.

Step 4. Examples include bar exercises in weightlifting and lay-up shots in basketball.

Step 5. Finish with one direct sentence that

can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Specific warm-up is sport-specific preparation using exercises directly related to the main activity, such as lay-up shots before basketball.

Q 3.12

Fill in the blank: Growth refers to the process through which body increases in _____ and _____.

SOLUTION

Concept used. The chapter defines growth through increase in body size and shape.

 Answer cue

Use the exact textbook pair.

Step 1. The growth definition says the body increases in size and shape.

Step 2. Both blanks ask for the two words from the definition.

Final Answer: size and shape

EXPERT'S SOLUTION : *Kabir Singh, B.P.Ed,
University of Rajasthan*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. The chapter defines growth through increase in body size and shape.

Step 1. The growth definition says the body

increases in size and shape.

Step 2. Both blanks ask for the two words from the definition.

Step 3. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: size and shape

Q 3.13 Fill in the blank: There are _____ major factors which directly or indirectly influence the growth and development of a _____.

SOLUTION

Concept used. The factors listed include heredity, environment, gender, nutrition, exercise, hormones, learning and reinforcement.

 Answer cue

If your teacher uses child for the second blank, keep the meaning same.

Step 1. Count the factor groups named in the chapter.

Step 2. The list covers seven major factor groups.

Step 3. The chapter frames these factors around a living organism or child.

Final Answer: seven; living organism

EXPERT'S SOLUTION : *Ira Thomas, M.A. Sports Psychology, Kerala University*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. The factors listed include heredity, environment, gender, nutrition, exercise, hormones, learning and reinforcement.

Step 1. Count the factor groups named in the chapter.

Step 2. The list covers seven major factor

groups.

Step 3. The chapter frames these factors around a living organism or child.

Step 4. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: seven; living organism

Q 3.14 Fill in the blank: Hormones play an important role in regulating the process of _____ and _____.

SOLUTION

Concept used. The hormones section states that hormones regulate growth and development.

 **Answer cue**

This pair repeats throughout the chapter.

Step 1. Hormones are chemical substances secreted by endocrine glands.

Step 2. They can increase or decrease activity level of the body or organs.

Step 3. The chapter links them directly with growth and development.

Final Answer: growth and development

EXPERT'S SOLUTION : *Mehul Suri, M.P.Ed Health Education, Panjab University*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. The hormones section states that hormones regulate growth and development.

Step 1. Hormones are chemical substances secreted by endocrine glands.

Step 2. They can increase or decrease activity level of the body or organs.

Step 3. The chapter links them directly with growth and development.

Step 4. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests

exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: growth and development

Q 3.15 Fill in the blank: An increased tidal volume, or increased respiratory rate, or both is referred to as _____.

SOLUTION

Concept used. The respiratory-system section defines hyperventilation through increased tidal volume or respiratory rate.

 Answer cue

Hyper means more than normal.

Step 1. Tidal volume is air per breath.

Step 2. Respiratory rate is breaths per minute.

Step 3. When either or both increase, the chapter calls it hyperventilation.

Final Answer: hyperventilation

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. The respiratory-system section defines hyperventilation through increased tidal volume or respiratory rate.

Step 1. Tidal volume is air per breath.

Step 2. Respiratory rate is breaths per minute.

Step 3. When either or both increase, the chapter calls it hyperventilation.

Step 4. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: hyperventilation

Q 3.16

Fill in the blank: Heart rate

_____ during submaximal exercise
and it is caused due to increase in
_____ activity.

SOLUTION

Concept used. Exercise increases heart rate through increased sympathetic activity.

 Answer cue

Heart rate rises when exercise demand rises.

Step 1. During exercise, heart rate rises above the resting range.

Step 2. This rise is linked with activity of the autonomic nervous system.

Step 3. In submaximal exercise, increased sympathetic activity raises heart rate.

Final Answer: increases; sympathetic

EXPERT'S SOLUTION : Rohan Mehta, M.Sc
Exercise Science, University of Mysore

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body

function, training or student life.

Concept check. Exercise increases heart rate through increased sympathetic activity.

Step 1. During exercise, heart rate rises above the resting range.

Step 2. This rise is linked with activity of the autonomic nervous system.

Step 3. In submaximal exercise, increased sympathetic activity raises heart rate.

Step 4. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: increases; sympathetic

Q3.17 Fill in the blank: _____ with high velocity movement develops exploring strength or power.

SOLUTION

Concept used. High-velocity exercise develops explosive strength or power.

 Answer cue

Read exploring here as explosive strength or power.

Step 1. The sentence describes movement speed and power development.

Step 2. The textbook meaning is exercise with high velocity movement.

Step 3. The intended term is exercise.

Final Answer: Exercise

EXPERT'S SOLUTION : *Sara Khan, M.A.
Education, Jamia Millia Islamia*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. High-velocity exercise develops explosive strength or power.

- Step 1.** The sentence describes movement speed and power development.
- Step 2.** The textbook meaning is exercise with high velocity movement.
- Step 3.** The intended term is exercise.
- Step 4.** Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Exercise

Q 3.18 Match the following: Stroke

Volume.

SOLUTION

Concept used. Stroke volume is part of cardiovascular function.

Answer cue

Stroke volume belongs to the heart.

Step 1. Stroke volume is the amount of blood pumped by each ventricle in each heartbeat.

Step 2. The ventricle is part of the heart.

Final Answer: Stroke Volume matches Heart.

EXPERT'S SOLUTION : *Neel Desai, M.P.Ed Physical Education, University of Mumbai*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Stroke volume is part of cardiovascular function.

Step 1. Stroke volume is the amount of blood pumped by each ventricle in each

heartbeat.

Step 2. The ventricle is part of the heart.

Step 3. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Stroke Volume matches Heart.

Q 3.19 Match the following: Residual Volume.

SOLUTION

Concept used. Residual volume is a lung volume.

 Answer cue

Any air-volume term belongs to lungs.

Step 1. Residual volume refers to air remaining in the lungs after forceful expiration.

Step 2. So it belongs to the lung category.

Final Answer: Residual Volume matches Lung.

EXPERT'S SOLUTION : *Devika Sen, M.A. Child Development, TISS Mumbai*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Residual volume is a lung volume.

Step 1. Residual volume refers to air remaining in the lungs after forceful expiration.

Step 2. So it belongs to the lung category.

Step 3. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Residual Volume matches Lung.

SOLUTION

Concept used. Lactic acid builds up in muscles during intense work.

 Answer cue

Lactic acid is linked with working muscles.

Step 1. The cool-down section explains faster removal of lactic acid from fast-twitch muscle fibre.

Step 2. The muscular-system section also discusses lactic acid tolerance.

Final Answer: Lactic Acid matches Muscles.

EXPERT'S SOLUTION : Arjun Kapoor, B.P.Ed,
University of Lucknow

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Lactic acid builds up in muscles during intense work.

Step 1. The cool-down section explains faster removal of lactic acid from fast-twitch

muscle fibre.

Step 2. The muscular-system section also discusses lactic acid tolerance.

Step 3. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Lactic Acid matches Muscles.

Q 3.21 Match the following: Snatch.

SOLUTION

Concept used. Snatch is a weightlifting movement.

Answer cue

Snatch and clean and jerk are weightlifting terms.

Step 1. Specific warm-up examples include movements related to different games.

Step 2. Snatch is a common lift in

weightlifting.

Final Answer: Snatch matches Weight lifting.

EXPERT'S SOLUTION : *Leela Joseph, M.P.Ed,
Kannur University*

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Snatch is a weightlifting movement.

Step 1. Specific warm-up examples include movements related to different games.

Step 2. Snatch is a common lift in weightlifting.

Step 3. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Snatch matches Weight lifting.

Q 3.22 Match the following: Gliding.

SOLUTION

Concept used. Within the matching options, gliding is paired with basketball.

 Answer cue

Use elimination when four matches are certain.

Step 1. Use the remaining option after matching stroke volume, residual volume, lactic acid and snatch.

Step 2. The answer key by elimination pairs gliding with basketball.

Final Answer: Gliding matches Basketball.

Teaching angle. Read the answer as a Physical Education theory response. Begin with the textbook term, then connect it with body function, training or student life.

Concept check. Within the matching options, gliding is paired with basketball.

Step 1. Use the remaining option after matching stroke volume, residual volume, lactic acid and snatch.

Step 2. The answer key by elimination pairs gliding with basketball.

Step 3. Finish with one direct sentence that can be used in a school examination.

This structure works because the chapter tests exact definitions and cause-effect links. A clear answer names the system, explains the change and avoids extra off-topic detail.

Final Answer: Gliding matches
Basketball.

Key Takeaways

- Growth is measurable increase in body size and shape.

- Development includes physical, mental, social and emotional progress.
- Warm-up prepares the body, while cooling down helps recovery.
- Exercise changes cardiovascular, respiratory, muscular and digestive systems.
- Cardiac output and pulmonary ventilation are key physiological terms.

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- [NCERT Book PDF](#)

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