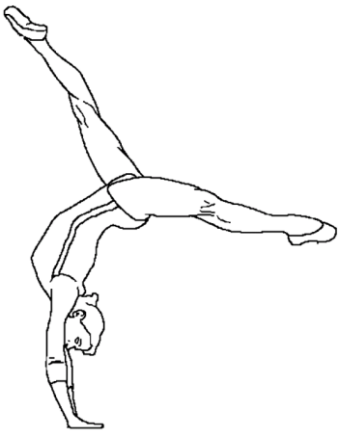
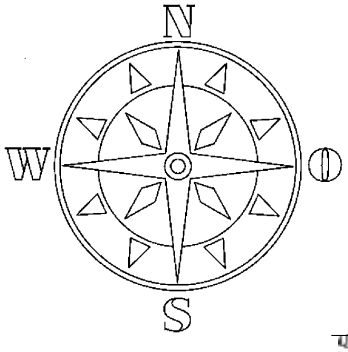
SURNAME, NAME: _____ **GROUP:** _____

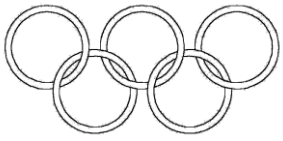
PHYSICAL EDUCATION THEORY

4th E.S.O.

1. BASIC ANATOMY.
2. SPECIFIC WARM UP
3. STRENGTH.
4. FLEXIBILITY.
5. HOW TO ORGANIZE A SPORTS COMPETITION.
6. BADMINTON.
7. HANDBALL.
8. VOLLEYBALL.
9. ORIENTATION.







TEACHER: Alfonso Beamonte

1. BASIC ANATOMY

1.1. *WHAT IS ANATOMY?*

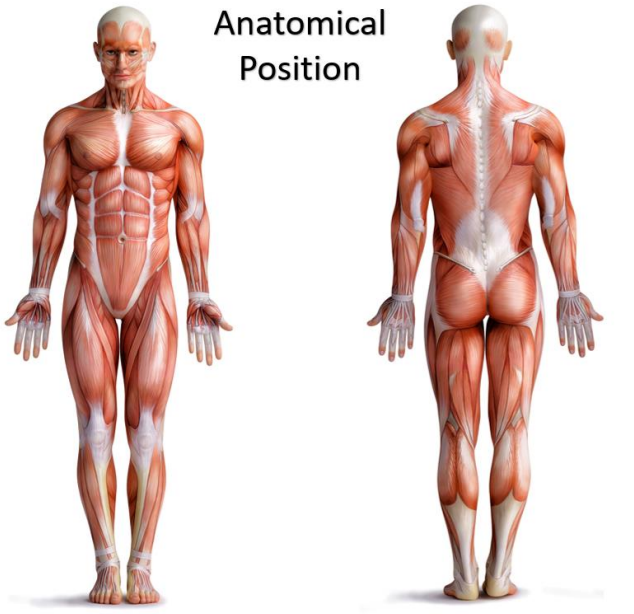
"It is the branch of biology concerned with the study of the structure of organisms and their parts". The study of the structure of the human leg -their muscles, their bones…- is an example of a study in the field of anatomy.

1.2. THE ANATOMICAL POSITION.

The **anatomical position** is "the reference position for the anatomical study of the body". From this position we describe the movements and the body structures.

In this position, a person is standing upright with the lower limbs (extremidades) together or slightly apart. Feet flat on the floor and facing forward. Upper limbs at the sides with the palms facing forward, thumbs (pulgares) pointing away from the body and head and eyes directed straight ahead.

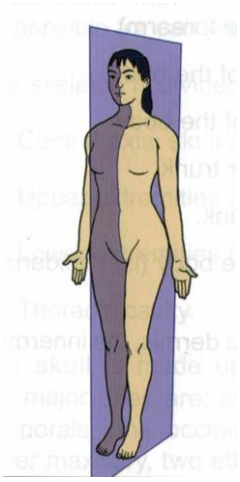
From this position, the front of the body is the anterior part of it (left image), while the back of the body is the posterior part (right image).



Anterior part of the body. Posterior part of the body.

1.3. THE CORPOREAL PLANES.

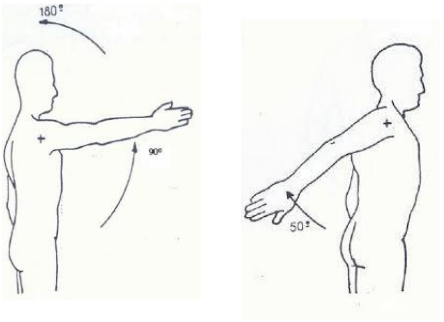
All body movements occur in different corporeal planes. A **corporeal plane** is "an imaginary flat surface running through the body". There are three planes of movement:

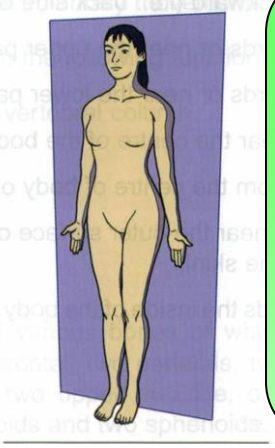


SAGITTAL PLANE

It divides the body into two parts, right and left. A movement in this plane that shifts (desplaza) a body part to the front of the anatomical position is known as **flexion**, whereas a movement towards the back of the anatomical position in this plane is called **extension**.

Shoulder flexion and extension

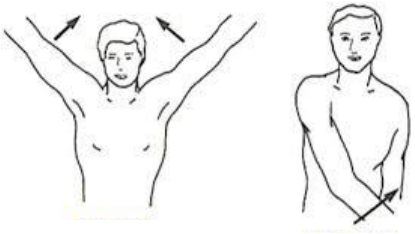




FRONTAL PLANE

It divides the body into two parts, front and back. A movement in this plane that shifts a body part towards the midline of the body is called **adduction**, whereas a movement in this plane that goes far away this midline of is called **abduction**. As regards of (en cuanto a) the neck and the trunk, the movements of these two body parts in the frontal plane are known as **lateral inclinations**.

Shoulder abduction and adduction

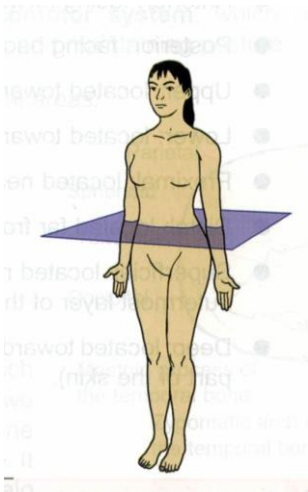


There is a specific movement, called **circumduction** (circunducción), that is made in both planes, sagittal and frontal. This special movement combines flexion, extension, abduction and adduction.

Shoulder's circumduction

Which two movements happen when the arms move backwards?

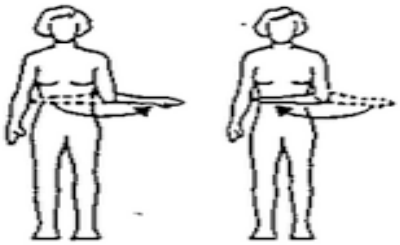
And which two other movements take place when the arms move forward?



TRANSVERSE PLANE

It divides the body into two parts, upper and lower. A movement in this plane that shifts a body part away from the centre of the body is called **external rotation**, whereas a movement towards the centre of the body in this plane is known as **internal rotation**.

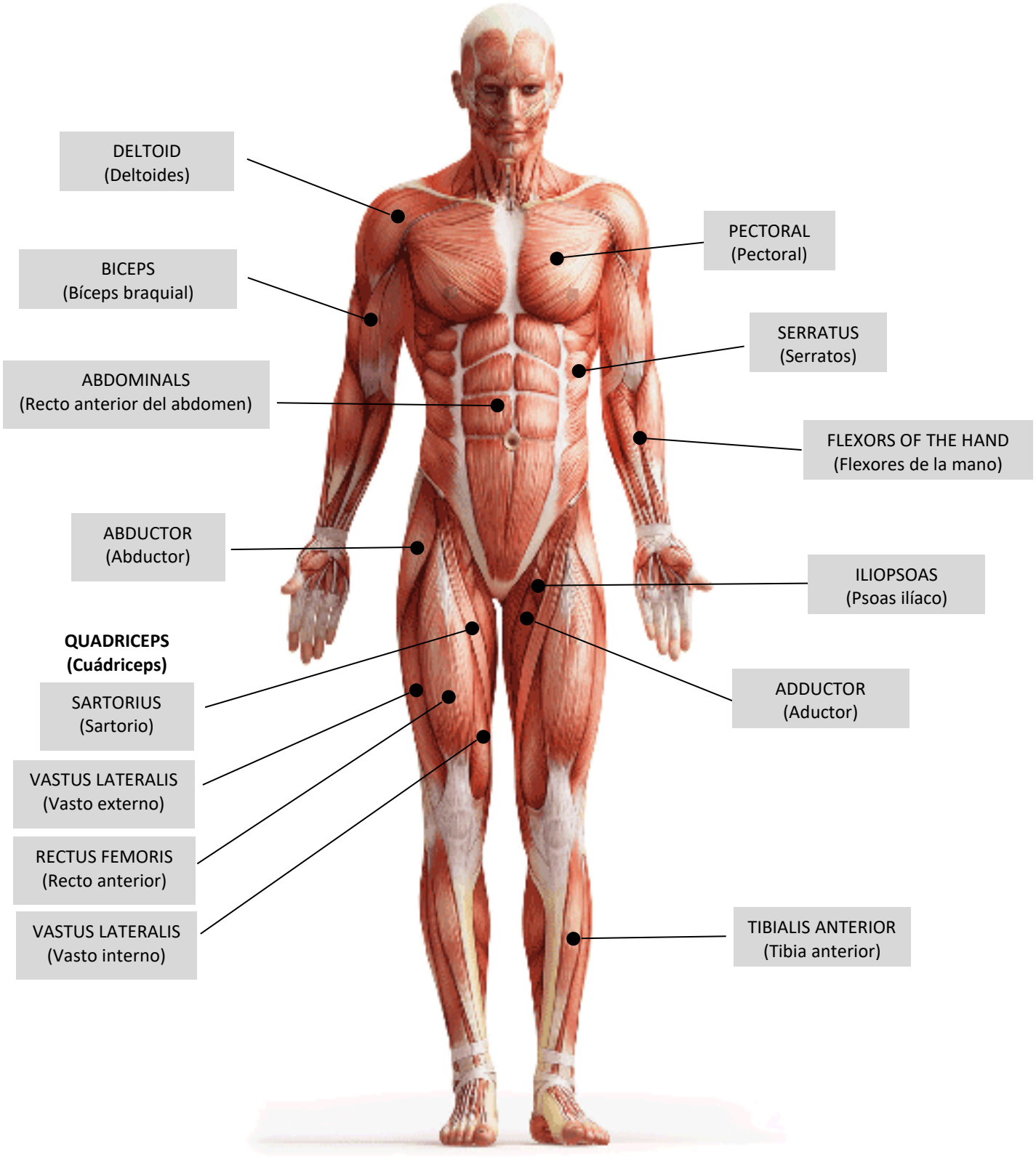
Shoulder external and internal rotation



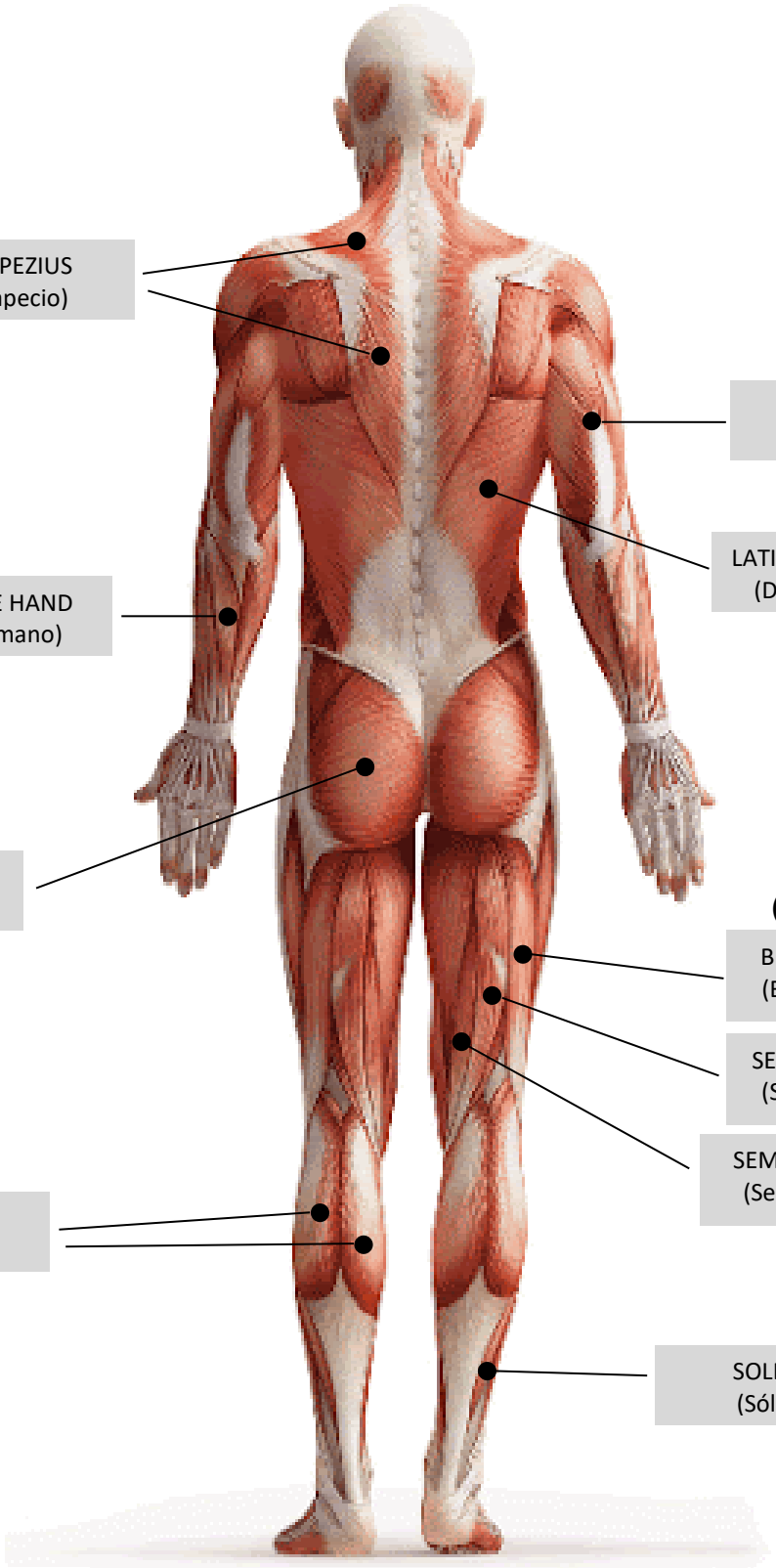
Although all these movements (flexion, abduction, rotation…) imply the shift of a body part (leg, arm…), we must never forget that this movements are generated in the joints. **In this sense, we must not talk of flexion, abduction…, of a body part (arm, leg…), but yes of a specific joint (shoulder, hip…).**

1.4. MAIN HUMAN BODY MUSCLES.

*You have to know the English name (it is always in capital letters).

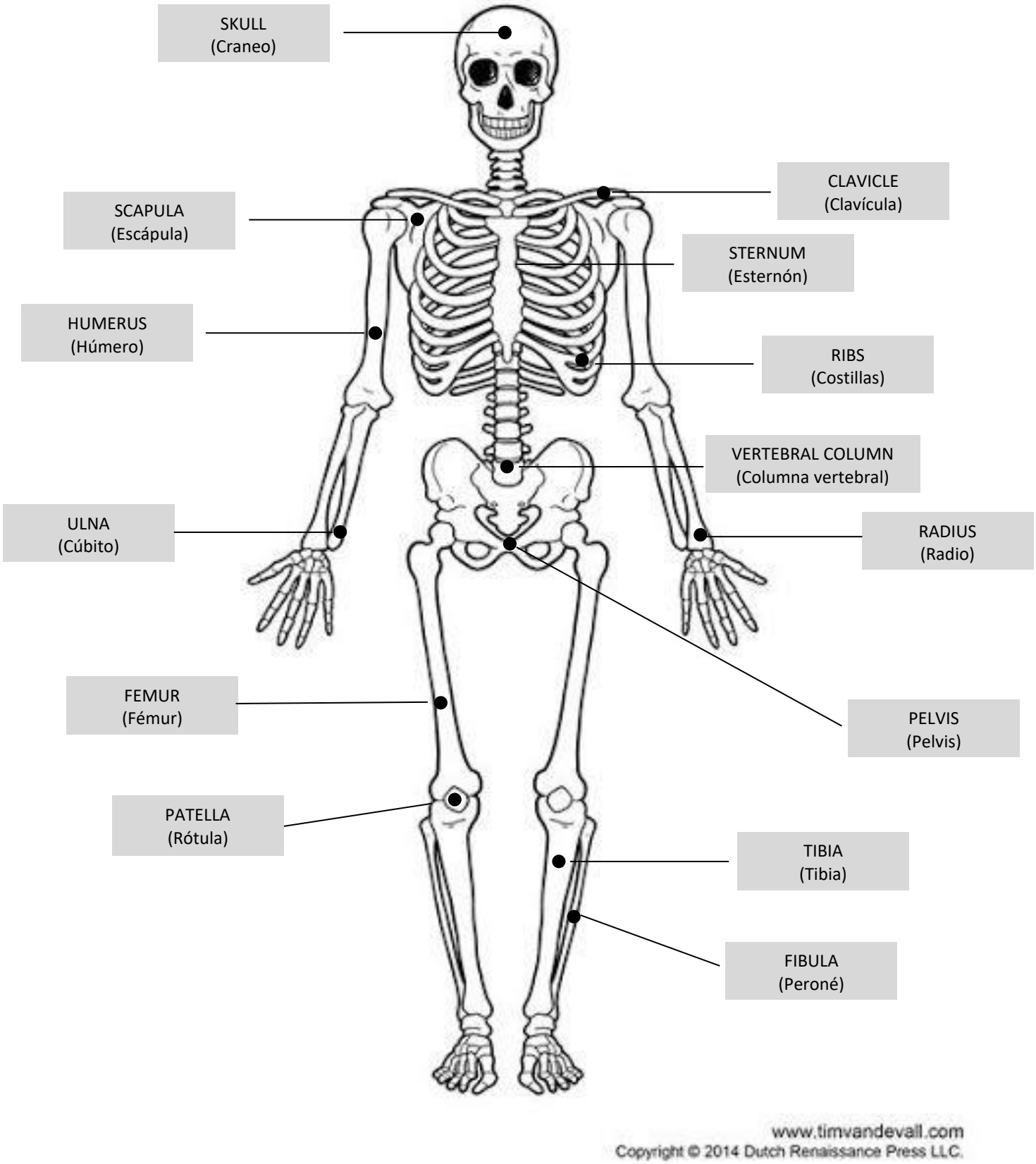


ANTERIOR VIEW



POSTERIOR VIEW

1.5.MAIN HUMAN BODY BONES.



PHALANGES
(Falanges)

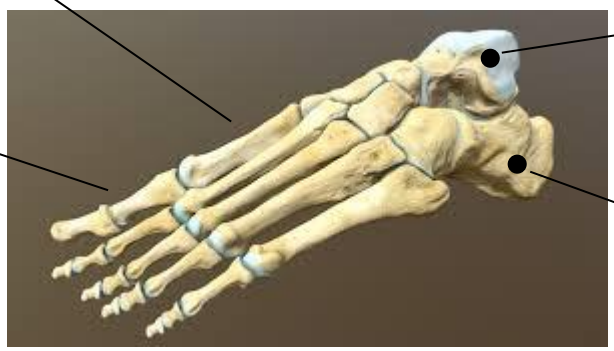
METACARPAL BONES
(Huesos metacarpianos)

CARPAL BONES
(Huesos del carpo)

METATARSAL BONES
(Huesos metatarsianos)

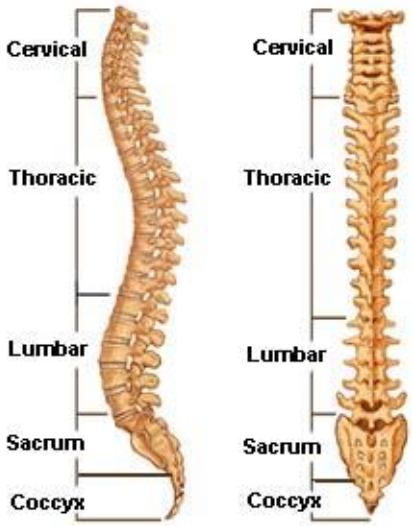
TALUS
(Astrágalo)

PHALANGES
(Falanges)



CALCANEUS
(Calcáneo)

VERTEBRAL COLUMN
(Columna vertebral)



2. SPECIFIC WARM UP

2.1. WHAT IS IT?

It's a kind of activities and physical exercises, general first and specific afterwards, performed to prepare the body for subsequent demanding efforts. The purpose of warm up is to avoid injuries and obtain your best results.

AT THE BEGINNING OF THE CLASS, TRAINING OR MATCH. ALWAYS BEFORE THE MAIN ACTIVITY.

2.2. MAIN WARM UP EFFECTS ON MY ORGANISM: WHAT HAPPENS IN MY BODY?

- **Physiologically**, it activates the circulatory, respiratory, muscular and nervous systems, gradually making the body pass from a state of rest to another of physical activity. This avoids premature fatigue, that is, feeling fatigue when you suddenly do hard exercise after inactivity.
  - It increases the pulse or heart rate (HR) progressively, so the blood goes faster to the muscles.
  - It increases the breathing frequency, improving the arrival of oxygen (O_2) and the elimination of carbon dioxide (CO_2).
  - It reduces the muscular viscosity, allowing a better activation and stretching of the muscles.
  - It accelerates the nervous processes (perception of stimuli and transmission of information), reducing, in turn, the reaction time.
- **Mentally**, it improves concentration and attention.
- **At the motor level** (a nivel coordinativo), as a consequence of practicing the main techniques of the sport it will later be carried out, the muscular coordination gets more efficient.

2.3. MAIN WARM UP OBJECTIVES: WHAT IS IT FOR?

- **Warm up to avoid or prevent injuries.**

  If you warm up progressively there will be less chance of injury during the main activity.

- **Warm up to improve performance.**

  You will need it before training or a competition to be able to do your very best.

2.4. WARM UP PHASES.

1- **Joint mobility**: moving slowly and with amplitude all the joints you will use later. ***For example**: ankle, knees, hip, trunk, wrists, shoulders, neck...*

2- **Pulse rising exercises**: starting with a light jogging, continuing with more intense exercises, as *sidestep (desplazamiento lateral)*, cross step running (carrera cruzando piernas), *heels up*, *knees up*…, and ending with some *short sprints*.

3- **Specific exercises**: to prepare the techniques that we will carry out later during the training or match. *In tennis*, for instance, before a match we would practice forehand and backhand *swings (golpes de derecha y revés)*, *lobs and smashes (globos y remates)*, *serves (saques)*…

2.5. ASPECTS TO CONSIDER:

- Try to warm up your whole body but focus on the body parts that are going to participate most.
- Increase progressively the exercises intensity and technical complexity.
- Warm up should last about a quarter of a whole session (e.g., class, training session…). Before a match or a competition, it should last longer (never less than half an hour).
- You should finish warm up sweating but not tired.

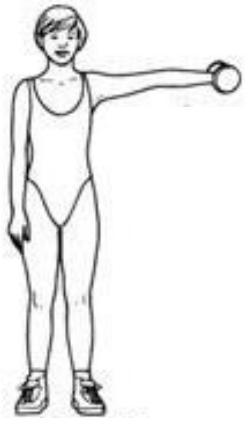
3. STRENGTH

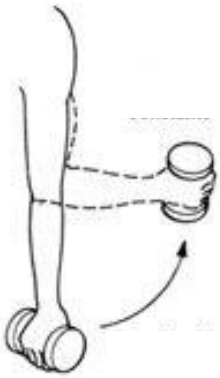
3.1. WHAT IS IT?

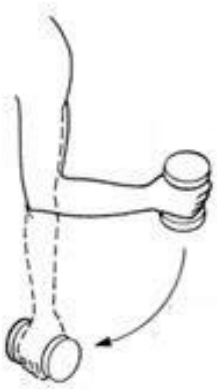
"It's the skeletal muscle capacity to generate intramuscular tension with the objective of support or overcome resistance". E.G.: trying to support a weight which exceeds my strength, bench press (press de banca), high jump, climbing...

3.2. TYPES OF MUSCULAR ACTIVATION.

ISOMETRIC	CONCENTRIC	ECCENTRIC
The muscle length doesn't change.	The muscle length shortens.	The muscle length becomes longer.
There is no movement.	The movement goes in the opposite way of the resistance.	The movement goes in the same way of the resistance.
Strength exerted cannot overcome the resistance.	Strength exerted overcomes the resistance.	Strength exerted opposes the resistance slowing down its movement.







Quadriceps' activation during high jump

3.3. TYPES OF STRENGTH.

From the three types of muscular activations, we can distinguish various types of strength. For us, the main ones are:

A) STATIC OR ISOMETRIC STRENGTH (FUERZA ESTÁTICA O ISOMÉTRICA).

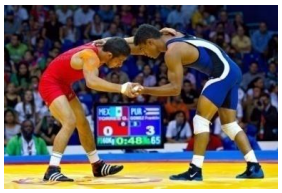
It is the strength in which there is no movement and the resistance cannot be overcome.

B) DYNAMIC STRENGTH (FUERZA DINÁMICA).

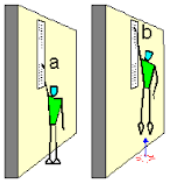
- ***Maximum strength*** (fuerza máxima). It is the skill used by the muscles to overcome high or very high loads (cargas). ***E.G.:*** *weightlifting, stone lifting…*

- ***Explosive or speed strength*** (fuerza explosiva o velocidad). It is the skill used by the muscles to give maximum speed to a load. E.G.; jumps and throws in athletics.

- ***Endurance strength*** (fuerza resistencia). It is the skill used by the muscles to withstand fatigue caused by prolonged effort in which many repetitive muscular activations are performed. E.G.: rowing, swimming, judo…



3.4. TESTS TO ASSESS THE STRENGTH.

1 RM TESTING: *Maximum strength.* The one-repetition maximum test is defined as the maximal weight an individual can lift for only one repetition with correct technique.	
VERTICAL JUMP TEST: *Explosive strength.* It is a lower body power test that measures the vertical jump height jumped.	 $h = h_b - h_a$
FLEXED-ARM HANG TEST: *Endurance strength.* It is an upper body endurance strength test that measures the time the individual can hang with the chin above the bar.	

3.5. STRENGTH TRAINING METHODS.

There are many methods to develop strength. The type to use depends primarily on the type of strength you want to train. In secondary school we basically develop **endurance strength**. The following are the methods we are going to use this year for training this kind of strength:

- ***Bodyweight method*** (autocargas). It is a training method in which you use your own weight to develop the strength. *E.G.: push-ups (flexiones de brazos), abdominals (abdominales), leg curl (sentadillas)...*

- ***Overload training method*** *(método de sobrecargas)*. It is a training method in which we mobilize external loads as barbells (barras), dumbbells (mancuernas), elastic bands (cintas elásticas), medicine balls… At our age we don't need high loads to develop the strength, it is enough to work with elastic bands and medicine balls.

3.6. HOW TO ORGANISE YOUR TRAINING SESSION.

If you go to the gym, you should know the following vocabulary. Your monitor will use it daily to give you the instructions about your workout.

REPS (repeticiones)	It refers to the number of times you have to repeat the movement.
SETS (series)	It refers to the reps as a whole. It says how many times we have to perform the reps.
EXERCISE (ejercicio)	It refers to the sets of reps we have to perform.
REST PERIOD (recuperación)	It refers to the time we need to recover between sets and exercises.

For instance:

DAY 1. MONDAY			
Exercise	**Sets**	**Reps**	**Rest period**
Half squats	3	25	90" (among sets)
Abdominals	3	30	90" (among sets)
Push-ups	3	15	90" (among sets)
…			

The number of sets, reps and rest periods varies depending on our current level and the type of strength I'm developing in the training session.

3.7. EFFECTS OF STRENGTH TRAINING.

- ***It develops the muscle mass***, which allows to support higher loads without the risk of getting injured.
- ***It improves the body posture*** as a consequence of developing abdominals and back muscles (trapezius, latissimus dorsi, rhomboid –romboides-…).
- ***It increases the muscle tone***, avoiding a flaccid (flácido) body and improving personal's image.
- ***It increases the bone density***, hence (por consiguiente) increases the bone strength.

Now, answer the following questions:

IT IS NOT COMPULSORY TO DO IT, BUT IF YOU DO SO, YOU WILL LEARN THE THEORY BETTER. MOREOVER, SOME OF THE QUESTIONS YOU ARE ANSWERING NOW WILL BE IN THE TERM'S THEORETICAL EXAM.

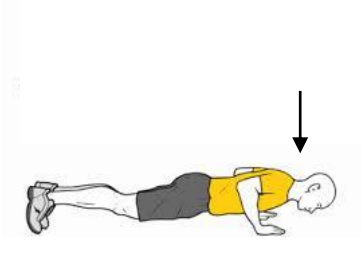
Write the main joint's movement done by the following muscles during their concentric activation (E.g.: flexor of the shoulder, extensor of the wrist…). Take into account that sometimes one muscle does more than one action. If this happens, write maximum two actions. For doing this exercise, you do not need to surf in internet, the best is to practise yourself activating the muscles.

Muscle	Main joint's movement
Deltoids	
Biceps	
Pectorals	
Gluteals	
Hamstrings	

Looking at this image, which muscular activation is the triceps doing while the body is going down and up?

_____  _____

And the pectorals?

_____  _____

4. FLEXIBILITY

4.1. WHAT IS IT?

We define flexibility "as the skill that allows the execution of movements with the maximum possible range".

FLEXIBILITY depends on the joint movement possibilities (**joint mobility**) as well as the muscle elongate capacity (**muscle elasticity**). Thus (así), when I am stretching my shoulder, I am doing it thanks to the shoulder mobility and the elasticity of the shoulder's muscles (principally, the deltoid).

FLEXIBILITY= JOINT MOBILITY + MUSCLE ELASTICITY.

4.2. TYPES OF FLEXIBILITY.

DYNAMIC

The movement's amplitude is managed thanks to repeated movements of the joint.

This kind of flexibility is useful for:

- **Warming up.**
- **Improving the mobility of sport techniques; e.g.: practicing kicks in karate.**

STATIC

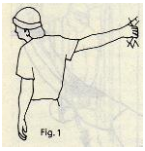
The movement's amplitude is managed thanks to the maintenance of the muscle stretching.

This kind of flexibility is useful for:

- **Increasing the mobility's range.**
- **Reducing the muscle tone (tono muscular).**

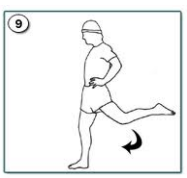
As a consequence of practicing this type of flexibility the muscles move easily and get less injured in case of unexpected movement amplitudes.

In addition to the above information, **STATIC FLEXIBILITY** can be done:

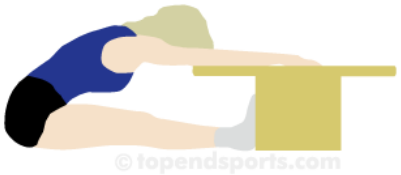


- ***Without external help*** (ACTIVE STATIC FLEXIBILITY), this is, through stretching exercises performed by the individuals themselves.
- ***Or turning to external strength*** such as a class mate (PASSIVE STATIC FLEXIBILITY).

Nevertheless, **DYNAMIC FLEXIBLITY** is normally done through movements performed by the individuals themselves.



4.3. TESTS TO ASSESS FLEXIBILITY.

SHOULDER MOBILITY TEST. It is a shoulder's joint mobility test that measures the distance between the middle fingers of both hands.	
SIT AND REACH TEST. It measures the trunk flexion as a consequence of the lower back and hamstrings flexibility.	

4.4. FLEXIBILITY TRAINING METHODS.

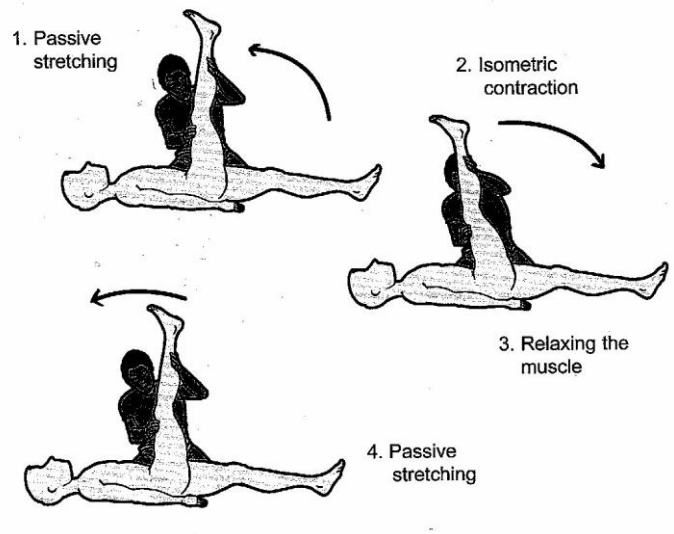
As a consequence of both types of flexibility (dynamic and static), there are three popular flexibility training methods: the dynamic method, the static stretching and the proprioceptive neuromuscular facilitation stretching (PNF).

- ***Dynamic method***. The objective of this method is to achieve mobility of joints through the performance of numerous and various movements as twists (giros), swings (balanceos), throws… This training method must be used with caution; because, when a muscle undergoes violent movement, it responds with a reflex contraction called myotatic reflex (reflejo miotático), as a defence mechanism and it shortens instead of stretching, which can lead to injuries.

- ***Static stretching***. It consists on carrying the joint, progressively, until its movement's limit. At this point, we maintain the position for 20-30 seconds without feeling any harm, but a bearable (tolerable) tension.

- ***PNF stretching***. This method is the most effective form of flexibility training for increasing the range of motion. It consists of four phases:

  1. Performance of a passive static stretching of the muscle for 10 seconds.
  2. Performance of an isometric contraction of the muscle for 5 seconds.
  3. Brief relaxation of the muscle (2-3 seconds).
  4. Performance of a new passive static stretching to increase the initial range of motion and maintenance for 30 seconds.



This method is more effective than other forms of flexibility training, because it facilitates muscular inhibition, a reflex relaxation called inverse myotatic reflex (reflejo miotático inverso), what occurs as a consequence of the isometric contraction and which allows to obtain higher ranges of motion.

4.5. EFFECTS OF FLEXIBILITY TRAINING.

- ***It improves the joint mobility.***
- ***It reduces the muscle tone***, reducing the risk of injuries.
- ***It increases the capacity of athletic performance.*** *If the muscles are not stiff, they can perform* in a rapid, energetic and coordinated manner.

5. HOW TO ORGANIZE A SPORTS COMPETITION

1. BEFORE ORGANIZING THE TOURNAMENT.

You must know three things:

- The maximum number of days you have for developing the competition.
- The time you have each day for developing the competition.
- And the number of courts you have for the competition.

And, as a consequence of this, you have to decide how long each match has to last or the score that has to be obtained to win the match. The less time you have for organizing the tournament, the shorter the matches should be.

In our case:

- **We are going to compete during two complete sessions of three didactic units - badminton, handball and volleyball - (remember that warm up is compulsory at the beginning of the class).**
- **And the teams or players have to play as many matches as possible.**

2. TOURNAMENT STYLES.

There are two basic types of tournaments: the round-robin tournament and the elimination tournament.

In a **round-robin tournament** each competitor plays against all the others. Depending on the number of teams or players that are going to participate in the competition, I can make the teams or players compete all together in a single group or distribute them in several groups. In order to know how many fixtures (encuentros) have to be played depending on the number of competitors, we use this formula:

$$\text{Number of fixtures} = \frac{\text{Number of competitors} \times (\text{number of competitors} - 1)}{2}$$

E.g.: Imagine that I have to organize a 16-team basketball tournament, and that this tournament has to be played in one weekend. What is better: making all the teams play together in a single group or distributing them in several groups? All together in a single group means playing 120 matches, what is impossible in one weekend. However, distributing the teams in, for example, groups of 4, means that 6 matches are going to be played in each group, what is more realistic.

Once we know how the competitors are going to compete -in one or several groups-, we have to establish the matches order. Let's continue with the example above:

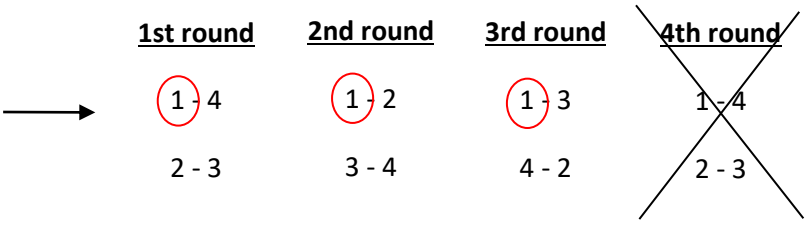
I have decided to distribute the teams in groups of four. To establish the group matches order I have to respect the following steps:

***1st**. I give to each competitor of the group one number from 1 up to the number of competitors that there are in the group. In this case, 1 up to 4.*

***2nd**. I decide the first competition round. E.g.: 1 against 4; 2 against 3.*

3rd. From now on, for each new round all the competitors, except number 1, have to rotate one position clockwise (en el sentido de las agujas del reloj). The competition is over when, after rotating, we are back to the first round.

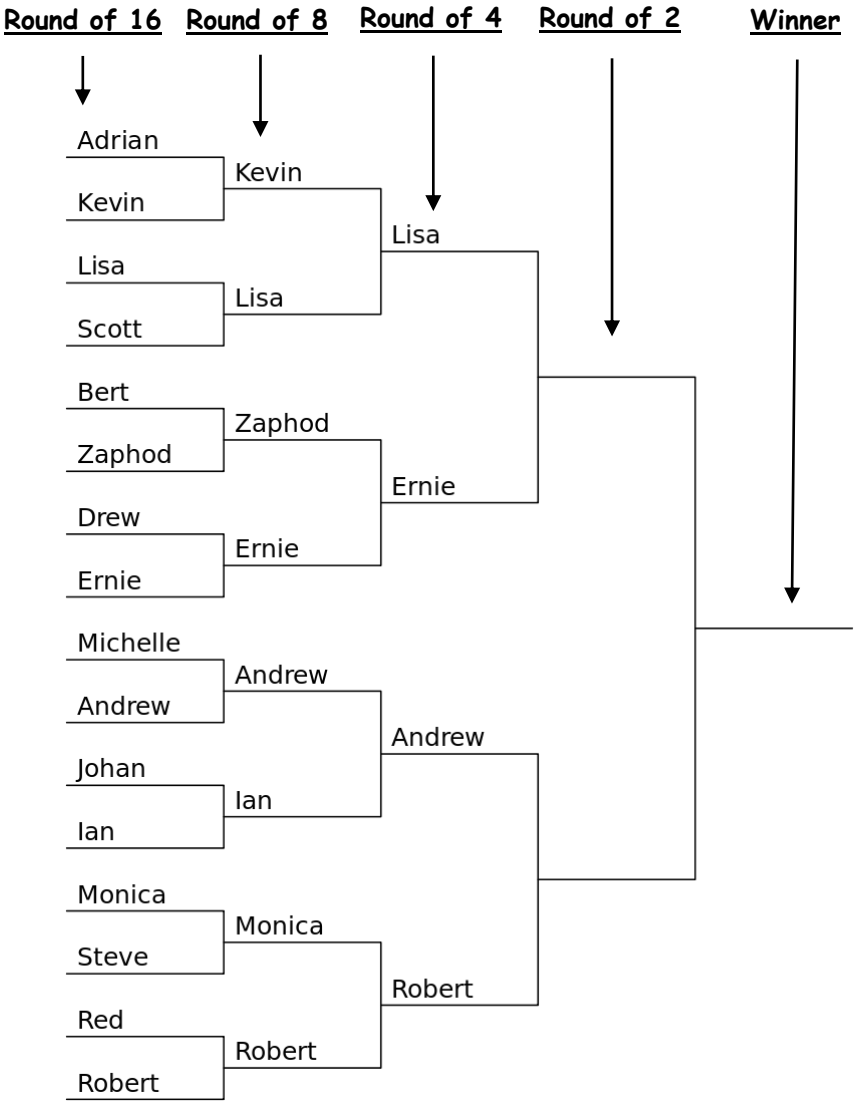
1 – IES Pilar Lorengar.
2 – IES La Azucarera.
3 – IES Valdespartera.
4 – IES Jerónimo Zurita.



The **elimination tournament** is divided into successive rounds. In each round only the winner progresses. As the rounds progress, the number of competitors and fixtures decreases. The final round, usually known as the final or cup final, consists of just one fixture; the winner of which is the overall champion.

In this type of tournament each round is a power of two (potencia de dos):

E.G.: Round of 128 → round of 64 → round of 32 → round of 16 → round of 8 → round of 4 → round of 2 → winner



In order to know how many fixtures have to be played depending on the number of competitors, we use this formula:

Number of fixtures = Number of competitors – 1
E.g.: 16 competitors = 16 – 1 = 15 matches

As you have seen, when the competition is organized with this system, it helps that the number of competitors is a power of 2 (8, 16, 32…). But what happens if this doesn't occur? Is it still possible to play the tournament by the elimination system? Yes, of course. You only have to have into account 2 things:

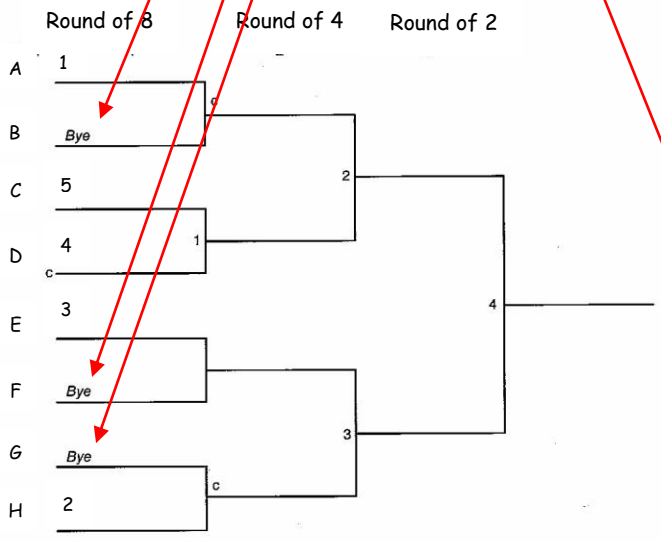
1st. The tournament has to start in the round immediately superior to the number of competitors; e.g.: If there are 14 competitors, the tournament has to start in the round of 16.

2nd. As not all the spaces are going to be filled with players (there are less players than spaces), the best ones (those with best "ranking") will not play the first round and will pass directly to the second one. This is what we call "bye".

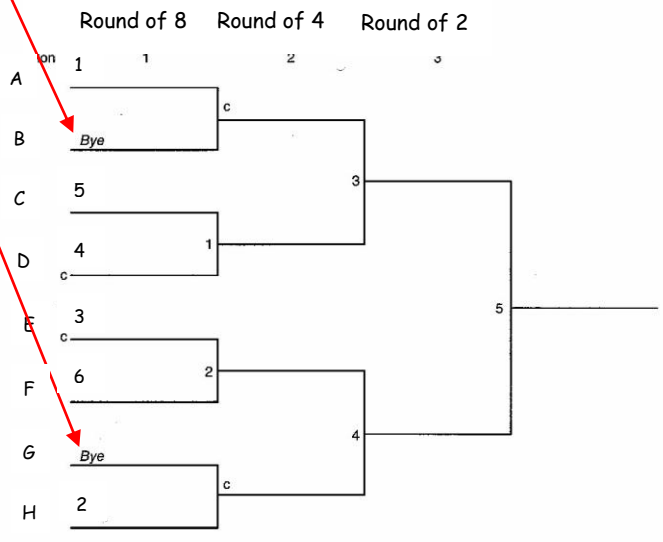
The chart (tabla) below (ready for maximum 16 players), shows us where each "bye" has to be depending on the number of competitors. It also tells us each player's starting position.

Players order and "byes" position in the elimination system tournaments (Organizing successful tournaments. John Byl,2016)

Starting position	Number of competitors												
	4	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
A	1	1	1	1	1	1	1	1	1	1	1	1	1
B	4	B	B	B	6	B	B	B	B	B	B	B	10
C	3	5	5	5	5	B	B	10	11	12	13	14	15
D	2	4	4	4	4	6	6	6	6	6	6	6	6
E		3	3	3	3	5	5	5	5	5	5	5	5
F		B	6	7	8	B	B	B	10	11	12	13	14
G		B	B	6	7	B	B	B	B	10	11	12	13
H		2	2	2	2	4	4	4	4	4	4	4	4
I						3	3	3	3	3	3	3	3
J						B	B	B	B	B	10	11	12
K						9	9	9	9	9	9	9	9
L						8	8	8	8	8	8	8	8
M						7	7	7	7	7	7	7	7
N						B	10	11	12	13	14	15	16
O						B	B	B	B	B	B	10	11
P						2	2	2	2	2	2	2	2



5 competitors' tournament



6 competitors' tournament

Finally, something very common is to start the tournament using the round-robin system and to finish it using the elimination system (play-offs).

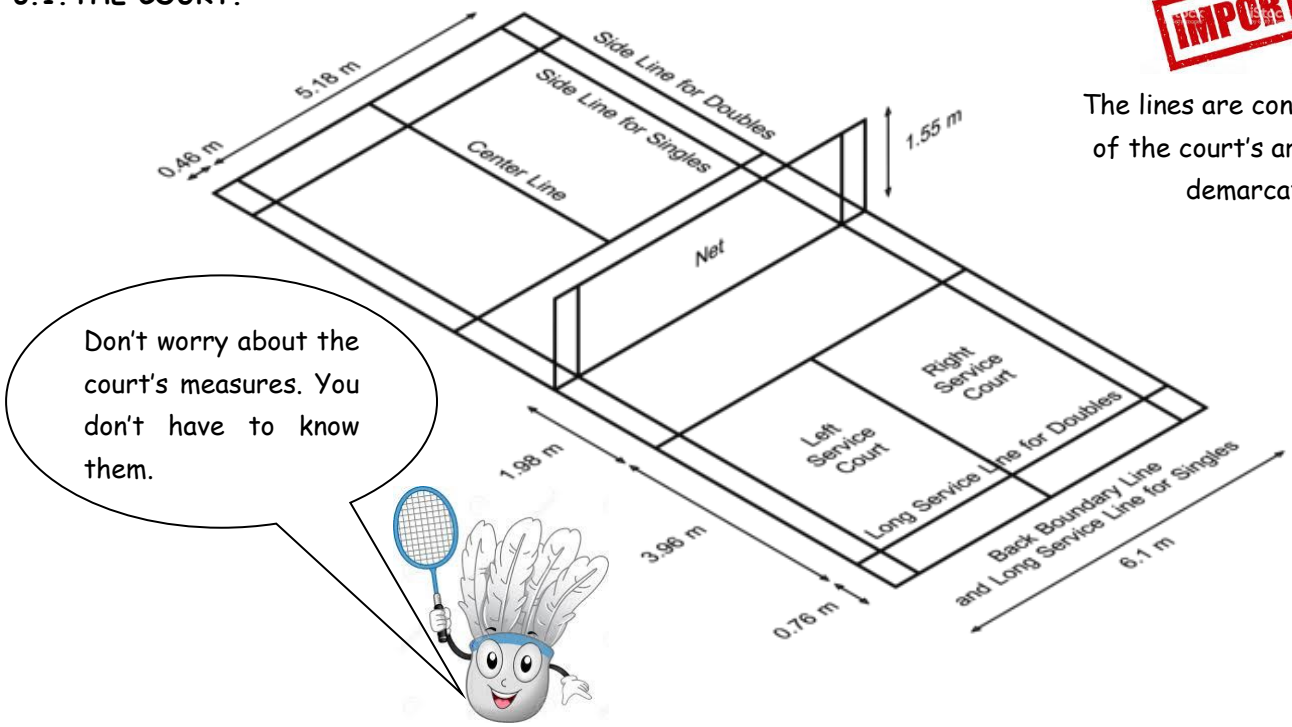
E.g.: Let's go back to the 16-team basketball tournament example, in which the 16 teams have been distributed in 4 groups of 4 teams each one. After playing all the groups fixtures (6 matches) we have, in each group, a group ranking (1st, 2nd, 3rd and 4th). This allows us to decide which teams continue competing and which ones not. In this case, we can decide that only the first two teams in each group continue playing. As eight teams continue playing, the elimination system starts in the round of eight (quarter-finals).

6. BADMINTON

6.1. DEFINITION.

It is an adversary racquet sport played on a rectangular court by two players, or two pairs of players, equipped with long-handled racquets used to strike a shuttlecock (volante) over a high net that divides the court in two halves. The objective of the game is that the shuttlecock touches the adversary's ground, or to strike the shuttlecock in such a way that the other player cannot return it even though they touch it.

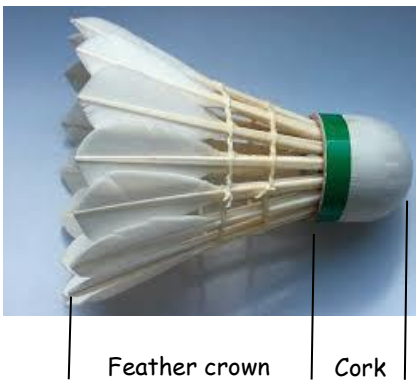
6.1. THE COURT.



IMPORTANT

The lines are considered part of the court's area that are demarcating.

6.2. THE RACQUET AND THE SHUTTLECOCK.



6.3. PUNCTUATION SYSTEM.

A match finishes when one player or pair wins two games of 21 points leading each game, at least, by two points. So, if the score reaches 20-20, the game won't finish until one player or pair leads by two points (22-20, 23-21, 24-22). However, the maximum points for an official badminton game is 30 points. For

example, if the score reaches 29-29, the winner of the next rally (intercambio de golpes) will win the game at 30-29.

Once the game finishes the players or pairs exchange their positions on the court. If the third game has to be played, the players or pairs change once more when the leading score reaches 11 points,

The side winning a game serves first in the next game.

6.4. OTHER RULES.

- The shuttlecock cannot be touched twice in a row (dos veces seguidas).
- If the shuttlecock touches the player's body, the opponent scores.
- A player must not touch the net or its supports with their body or racquet while the shuttlecock is in play.
- A player cannot hold their racquet near the net to block (obstruir) the opponents strike.
- The shuttlecock can not be touched while it is on the opponent's court.
- The shuttlecock must not touch the ceiling or the walls.
- A player can not invade the opponent's court below the net.

6.5. SERVICE RULES.

Before the match starts, the umpire makes a draw to decide who starts serving and the court's side in which each player is going to start playing. The player that wins the draw can choose between:

- Serve first.
- Return first.
- Or the side of the court.

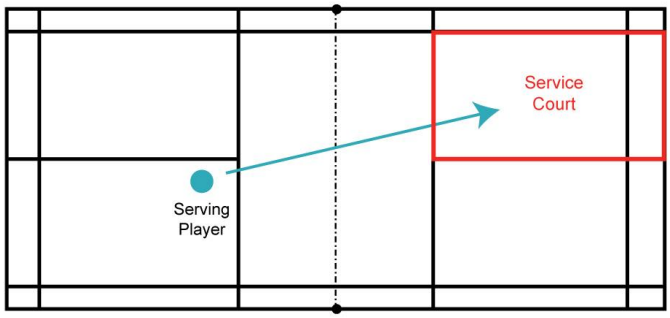
Depending on what the player has chosen, the other player will choose between the other options. *E.g.: If the player that has won the draw has chosen to start playing in one of the sides, the other player can choose between serving or returning.*

At the beginning of the game (0-0) and when the server's score is even (par), the server serves from the right service court. When the server's score is odd (impar), the server serves from the left service court. The player that wins the rally serves and the serve always must be done diagonally. In any case, before serving the server must always make sure that their opponent is ready.

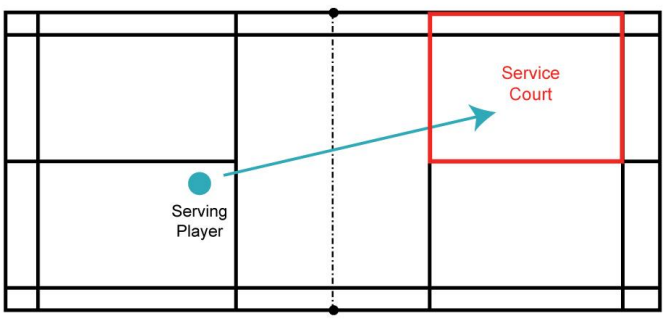
During the service, both the server's and the receiver's feet shall remain in contact with the court and, under no circumstances, no feet can touch the boundary lines of their respective service and reception courts.

When serving, the racquet has to hit the shuttlecock below the waist (cintura), and its head has to be below the handle.

Singles

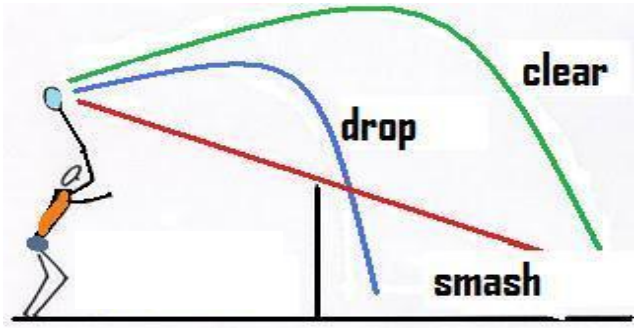


Doubles

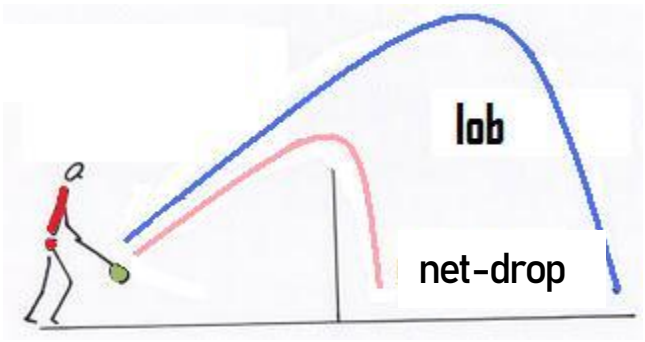


6

Overhead strokes



Underarm strokes



Drive