Competitive Swimming

<u>Organisation of a Lane</u>

General Considerations

- Need for lane discipline
- Number of swimmers to a lane
- Ability of swimmer in a lane
- Activities/stroke(s) to be used
- Aids needed for the session
- Arrangement of lanes/widths

Key points

- All swimmers need to be clear about the direction of travel

- Teachers/coaches should ensure that the ability of the swimmer in each Lane is similar. It is important to note that this may necessitate some changes depending upon what activity is taking place.

- Have a clear and well understood policy for dealing with the situation in which one swimmer catches up with another. Possible solutions are:-

  - The swimmer being caught completes a length then waits to be overtaken. This can result in the slower swimmers experiencing constant interruptions and, therefore, possibly losing some of the beneficial effects of the particular session.

  - The overtaking swimmer crosses over into a space before reaching the end of the pool. Distance or time benefits can be lost in this situation.

  - Sufficient space us left in the middle of the lane to allow for overtaking. This increases the possibility of swimmer colliding and is potentially dangerous.

  NB: No matter which system is adopted it needs to be clearly defined and understood and followed by all swimmers.

- Teachers/coaches need to give careful consideration to the particular strokes which swimmers are asked to perform when swimming in lanes, and to decide when it is advantageous or detrimental to mix strokes. In many pools, for example, where the lanes are quite narrow, the strokes with wide arm actions can cause accidents. It may be, therefore, that on those occasions where the pool is particularly busy, some mixing of the strokes might be helpful. Adopting a system where the swimmers complete one length Butterfly, followed by one on Backcrawl will help overcome this particular problem. The important point is that time has been given to thinking through a variety of organisations structures which will enable the swimmer to complete the set tasks without the risk of injury.

- Increased use of goggles for swimming training can help towards the individuals' awareness of other swimmers in the lane.

Swimmers should be constantly encouraged to use the improved underwater visability provided by the goggles to help towards a safer environment. However, goggles can lead to eye injury if inexperienced swimmers are not given clear instructions as to how to put them on and take them off in a safe manner. It is important to explain the potential dangers of lifting the goggles away from the eyes in order to demist the lenses. It is quite possible for an inexperienced user of goggles, particularly if the hands are cold, to allow the goggles to 'catapult' into the eye and cause serious damage.

- Swimming backcrawl presents more difficulties that the other three stroke since there is an increased possibility of collision with other swimmers, and with the ends of the pool.

- The purpose of timing flags should be fully explained.

- The accepted requirements for the teaching of racing starts with and without starting blocks are detailed in the ASA Competitive Start Award, it is recommended that teachers who deliver competitive starts attend the competitive start CPD

Propulsion and Resistance

Propulsion

Propulsion is achieved by:-

- Paddling
- Sculling

Paddling - pressing in the opposite direction to that which the swimmer wishes to go

Sculling - involves the hand moving in a curved path. Sculling produces propulsion when the hand sweeps inwards, outwards downwards and upwards.

- Fixing the hand in the water by means of a backward force produces a forward movement
- Changing the direction of the hand maintains purchase on the water
- Propulsion is also affected by the speed of the hand or foot through the water

First Law – Inertia

A swimmer will remain stationary, or move with constant speed, unless acted upon by external forces which are not in equilibrium, e.g., the start position.

Second Law – Acceleration

When external forces are not in equilibrium, the swimmer will accelerate in the direction of the resultant (net) force, e.g.,

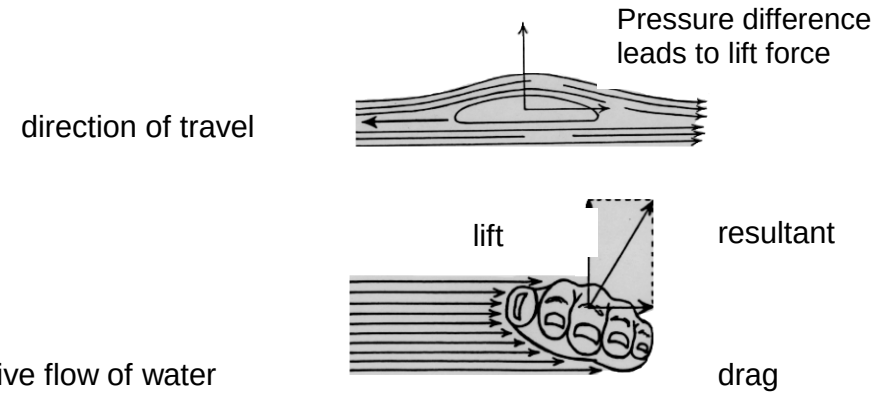
a) propulsive force (p)> resistive force (R) = acceleration
b) propulsive force (P)< resistive force (R) = deceleration

Propulsive Lift Theory (Bernoulli)

Generating lift also aids propulsion

- Hands and feet as hydrofoils
- Reduction in pressure on the upper surface results in lift

e.g., the water flows over the upper surface of the hands faster than over the lower surfaces and, therefore, generates lift



Additional factors influencing the application of the Propulsion theories:-

- Sculling action
- Angle/pitch of the hands, e.g., Frontcrawl arms
- Angle/pitch of the feet, e.g., Breaststroke legs
- Fixing of the hands in the water, i.e., body moves past the hand
- Size and shape of the hands and feet
- Acceleration of hands and feet
- Direction of movement of hands and feet

Resistance

Three main types:-

Viscous resistance

- Frictional force exerted by water as a result of the body moving through it
- Influenced by the nature of the surface of the body moving through the water

Profile resistance

- Resistance governed by the shape of the body
- Influenced by cross sectional area of the submerged section of the body and its shape

Frontal resistance

- Caused by the parts of the body in the water
- Will vary depending upon horizontal v vertical body position

Reducing Resistance

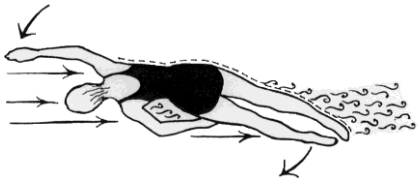
- Horizontal body position (involves head position)
- Streamlined body position
- Limb movements
- Well fitting swimwear

- Wave reduction

NB: increase in speed produces an increase in resistance

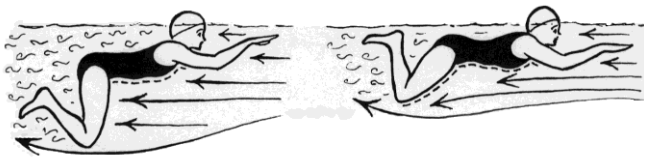
Resistance (Drag) in Swimming

Lateral Deviation

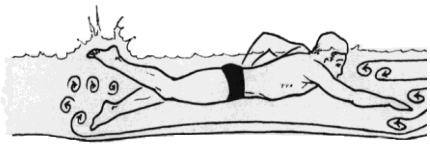


Frontal Resistance

- poor body position - improved body position



Profile Resistance

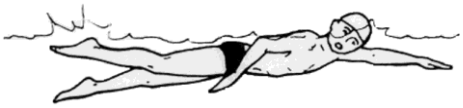


Strokes

Frontcrawl – Key Points:

Body Position

- Flat with a **slight** slope down to the hips. The head is neither buried nor lifted. The waterline is between the eyebrows and natural hairline
- The slight slope down to the hips keeps the kick in the water
- Shoulders roll onto the stroke to utilise the strong chest muscles and to generate a strong propulsive force
- Slight head adjustments change the position of the legs. If the head is lifted the legs will drop and vice-versa



- The legs work almost within body depth. This creates the least resistance to forward motion

Leg Action

The Frontcrawl leg action keeps the body position flat and balances the arm action. It may contribute a little propulsion.

- The leg action starts in the hip joints
- The legs work close together
- There is only a slight bed in the knee
- The ankles are relaxed to allow the toes to point and to give a natural in toeing effect
- The feet kick up to the surface and churn the water up without splashing
- The number of leg kicks for each arm cycle may vary. It is usually six but middle and long distance swimmers often do two

Arm Action

The continuous, alternating arm action is the powerhouse of the stroke and provides constant propulsion.

Entry

- the hand is pitched/turned with the palm facing half outwards for a clean, thumb-first entry
- the hand enters between the head and shoulder line with the arm slightly bent
- the hand reaches forwards under the surface. Care should be taken to avoid over-reaching

Downsweep

- the hand sweeps/sculls downwards and slightly outwards to the catch position
- the hand continues to sweep downwards and outwards
- the elbow begins to bend and it is very important that it is kept high

Insweep

- the pitch of the hand changes and curves smoothly inwards towards the centre line. This is similar to a sculling action
- the elbow bends up to 90E
- the hand accelerates

Upsweep

- when the hand has reached close to the centre line the pitch of the hand changes to outwards and backwards
- acceleration increases through to the thigh
- the arm is almost straight at the end of the upsweep
- the hand exits little finger first

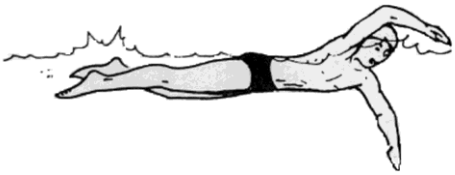
Recovery

- the movement is relaxed and uses the momentum from the upsweep
- the elbow exits first and it is kept higher than the hand throughout
- the hand passes as close to the body as possible. This will depend upon the flexibility of the swimmer

- after passing the shoulder level the arm reaches forwards to the entry position

Breathing

- the head turns smoothly in time with the natural roll of the body
- the head is turned rather than lifted
- the head is turned back to the centre smoothly and as soon as the breath has been taken



- the breath may be released gradually (trickle breathing) or held until just before the next inbreath when it is forcibly released (explosive breathing)
- a breath is normally taken every two arm pulls (one stroke cycle). This is unilateral breathing. It may be taken every three arm pulls (one and a half stroke cycles). This is bilateral breathing

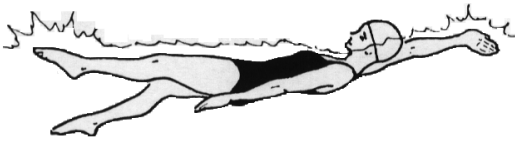
Timing

- there are usually six leg kicks in one stroke cycle, although this may vary. Middle distance and long distance swimmers tend to kick less frequently.

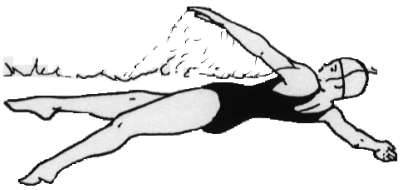
Backcrawl – Key Points:

Body Position

- flat and streamlined
- the head is pillowed on the water, ears just submerged
- the head is kept still, eyes look upwards or slightly backwards in the direction of the feet
- the chin may be tucked down slightly to help keep the legs in the water
- the hips must be close to the surface



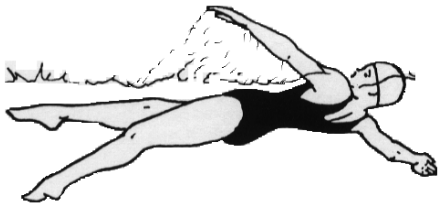
- the shoulders lean or roll into the stroke
- there is a slight slope down from the head to the hips to keep the legs in the water
- the legs tend to sway towards the pulling arm. This is kept to a minimum by an efficient leg action



Leg Action

The leg action helps to maintain the horizontal body position and balances the arm action. This minimises the tendency for the legs to sway from side to side. It also contributes some propulsion.

- the continuous up and down alternating action is initiated at the hips



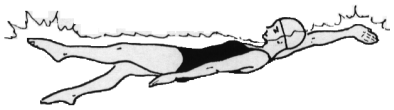
- the legs work close together, big tows nearly brushing past each other
- the legs are almost straight with the knees staying below the surface
- the ankles are relaxed to allow the toes to point (plantar flexed) and to in-toe naturally

- the feet kick to the surface without splashing

Arm Action

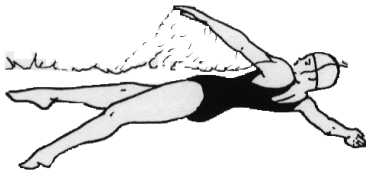
Entry

- little finger first – straight arm, close to the line of the shoulder



Initial Downsweep

- assisted by the roll of the shoulders, the arm sweeps downwards and outwards to the catch
- the palm of the hand is pitched downwards and outwards



Upsweep

- the pitch of the hand changes to sweep inwards and upwards
- the arm bends to a 90E angle at the elbow
- the elbow points to the pool floor

Final Downsweep

- the action accelerates through to the thigh
- fingers point sideways. The hand pitch changes to palm downwards

- sweep ends with downward pressure which helps the body to roll

Recovery

- the hand usually comes out thumb or back of the hand first
- the arm gradually rotates to prepare for the entry with the little finger
- the relaxed, straight arm recovers directly over the shoulder

Breathing

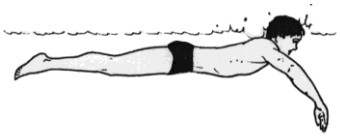
- a breath is taken every arm stroke cycle. Breath holding should be avoided

Timing

- there are usually six leg kicks to one arm stroke cycle

Breaststroke – Key Points:

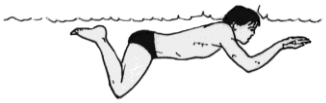
Body Position



- the body should be as near horizontal as stroke movements allow. This means that there is a greater slope down to the seat than in other strokes in order to keep the leg action in the water

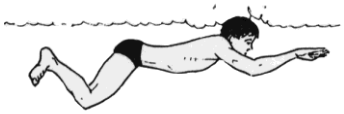
- the shoulders should be horizontal

Leg Action



- the recovery movement starts from the glide position. The heels are drawn towards the seat until the lower legs are perpendicular to the water surface.

- the knees remain behind the line of the hips
- the knees are just wide of the hips



- the feet turn out just before the kick. This is important for propulsion

- the kick is backwards with a circular action. A narrow kick is more efficient than a wide kick

- at the end of the backward circular action the feet come together with the legs straight and the toes pointed (plantar flexed ankles)

- the legs rest and rise towards the surface. Recreational swimmers may hold this glide position longer than those involved in competition

- as in all propulsive actions, the kick accelerates throughout the movement

Arm Action

Outsweep

- from the glide position, the hands are turned (pitched) palms half outwards and sweep outwards and slightly downwards to the catch at a point approximately shoulder width apart

Downsweep

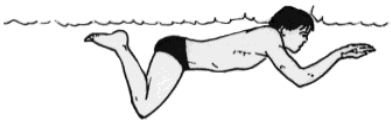
- the brief action sweeps downwards and slightly outwards with the elbows bending and kept high

Insweep

- before the arms reach shoulder level the insweep begins, palms pitched partly inwards. The elbows follow the hands in towards the centre line
- the action accelerates throughout the propulsive phase

Recovery

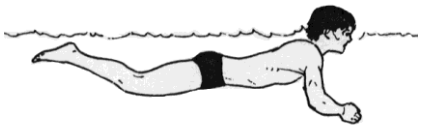
- the recovery can be under, on, or over the water but the elbows must remain in the water except at the turn and the finish



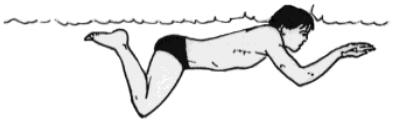
- the arms stretch forwards smoothly, and streamlined with the hands close together
- some swimmers hold this glide position. Competitive swimmers do not usually glide, although they achieve the streamlined position before starting the next stroke

Breathing

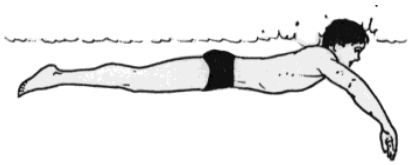
- a breath is normally taken in every stroke
- the chin is pushed forwards and remains in the water
- the inbreath is usually taken at the end of the insweep, the point of maximum acceleration



- the head is then lowered if necessary, to preserve the fairly flat body position

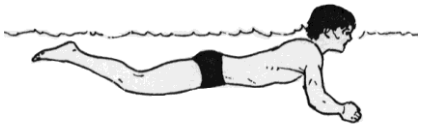


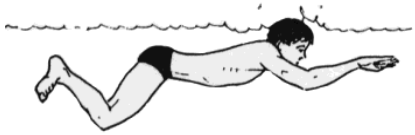
- the air is released gradually (trickle) with a final outbreath (explosive) just before the next inbreath
- the recreational swimmer may breathe earlier in the stroke



Timing

- pull – breathe – kick (glide
- the arms pull while the legs rest
- the breath is taken towards the end of the insweep
- the legs kick as the arms extend forward
- this may be followed by a glide





Butterfly – Key Points:

Body Position

- face down with the crown of the head leading
- horizontal with an undulating wave like movement from head to toe

Leg Action

As in Frontcrawl, the leg action maintains the horizontal body position and balances the arm action. It may also contribute some propulsion.

- the legs work close together
- the leg action starts at the hips
- the legs kick up and down with a bend at the knees. The degree of bend is slightly more than in frontcrawl
- the ankles are relaxed to allow the toes to point and turn in (in toeing)
- the legs straighten as they kick back and down vigorously
- there are usually two down beats during a stroke cycle

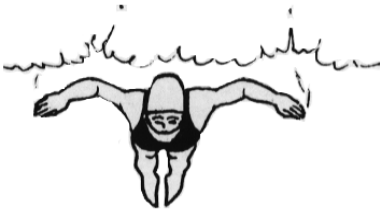
Arm Action

Entry

- the hands are pitched half outwards to permit a clean, thumb-first entry
- the entry is made at shoulder width or a little wider
- the arms are slightly bent, elbows higher than hands

Outsweep

- from an extended position, the hands sweep out and slightly downwards to catch



Downsweep

- from the catch there is a short downsweep. The elbows bend and remain high in relation to the hands

Insweep

- hands pitch inwards and almost meet under the body
- elbows bend to about 90E angle at the end of the insweep

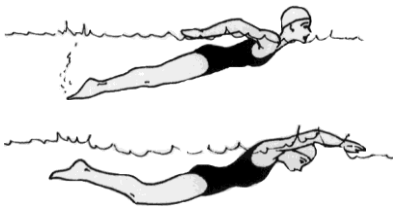
Upsweep

- hands pitch partly outwards again
- elbows straighten
- movement accelerates through to thighs where the arms will be almost straight

Recovery

The range of movement in the shoulder joints plays a role in this part of the stroke

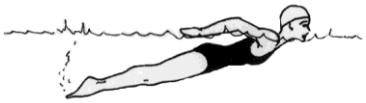
- the arms may be straight or slightly bent
- the hands leave the water little fingers uppermost
- the arms clear the water and travel just above the surface



Breathing

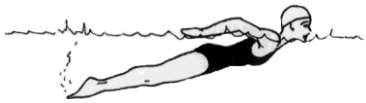
- the breath is usually taken to the front by pushing the chin forwards in the water
- the breath is taken as the arms complete their upsweep
- the head is lowered quickly but smoothly. It is difficult to recover the arms unless the head is lowered

- some breath may be trickled out during the sweeps of the arm action with a final ‘explosion’ just before the next inbreath



Timing

- there are usually two leg kicks to each arm cycle
- the first kick (downbeat) occurs as the arms enter and sweep outwards
- the second kick (downbeat) occurs during the upsweep of the arms



Turns

Safety
- depths
- organisation

Progressions
- the ability to perform a somersault in the water is a necessary pre-requisite
- depending on ability - try the "Whole" turn before breaking down.
- breakdown into elements/phases for practices - but keep trying "whole" from time to time
- perhaps build up - start - swim- turn - finish over widths

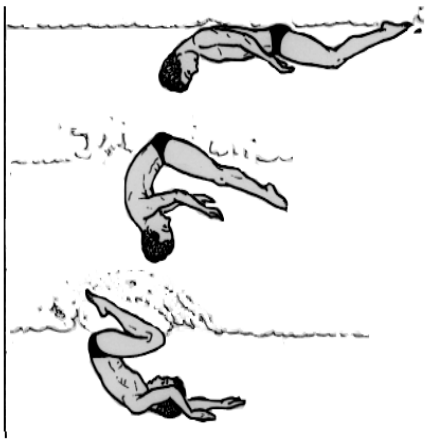
Encourage "proper" turns in sessions at all times, e.g., when swimming more than one width or length

General

Analysing a Turn

- the approach
- the touch/turn
- the push off
- the transition to the stroke

Front Crawl - "tumble turn

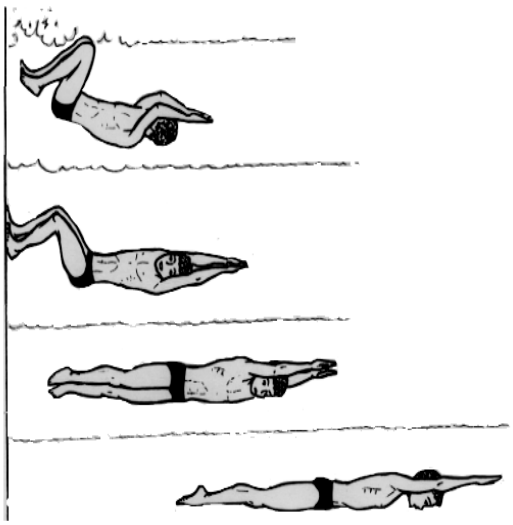


Approach

X normal swimming speed
X head drops to chin on chest during last arm action recovery

Touch/Turn

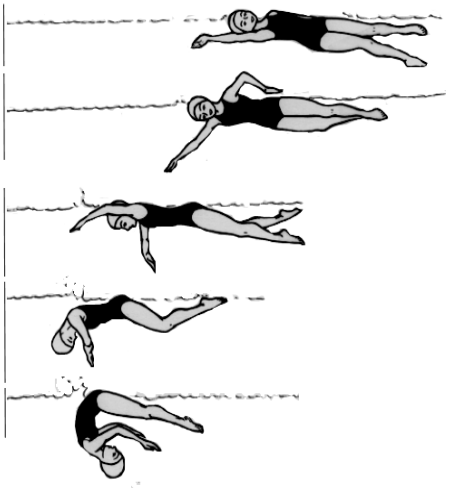
X head down, body piked at hips
X leading arm pulls through to hips
X body tucks
X legs come out of the water
X feet planted firmly on wall



Push Off

X knees bent approximately 90º angle
X arms move to fully extended position beyond head
X swimmer virtually on back
X vigorous, powerful leg thrust from wall into full body extension
X turn on to front during push off
X ready for transition into stroke

Back Crawl



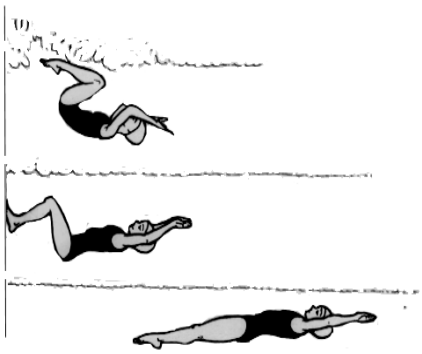
Approach

- on the back at normal swimming speed
- on the last full stroke before the turn recovering arm crosses body
- recovering arm enters the water in line with opposite shoulder
- swimmer rolls onto front
- non recovery arm remains at hip

Touch/Turn

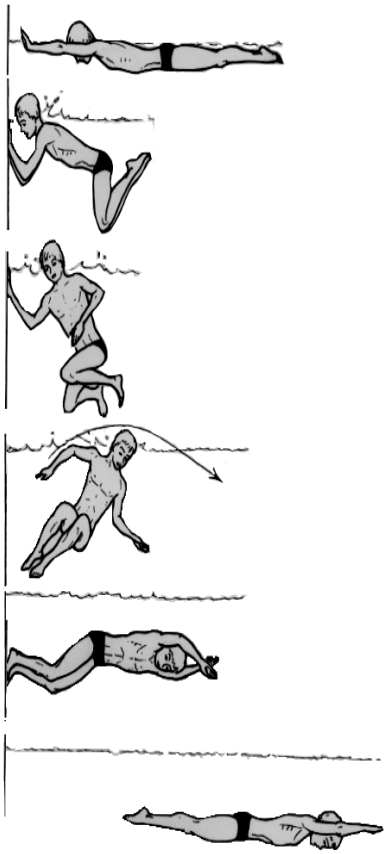
- on the front, head drops onto chest
- body pikes at hips into a front somersault
- leading hand assists front somersault by pulling backwards

Push Off



- feet firmly planted on the wall
- toes pointed upwards
- knees bend to approximately 90°
- leading arm extended in front of head
- trailing arm moves to join it
- powerful thrust against the wall
- body extended to streamlined position on back
- transition to stroke

Breaststroke/Butterfly



Approach

- normal swimming speed
- touch with arms almost fully stretched
- adjust arm stroke for above if necessary
- shoulders remain level

Touch/Turn

- both hands simultaneously
- firm contact to be made with wall
- elbows bend
- at same time - knees bend
  - hips continue forward
- one hand released from wall and elbow pulls backwards
- head turns towards hand which has been released
- hand is thrown over the water

Push Off

- feet planted firmly on wall
- toes pointing sideways and downwards
- body drops below water surface
- hands together and extended beyond head
- vigorous, powerful leg thrust from wall into full body extension
- ready for transition into stroke

Transition - All Strokes

General

- streamlined position maintained
- stroke commences as speed decreases
- timing of transition critical to competition starts

Front Crawl

- shortest of all transitions due to the fast swimming speed
- legs kick in Front Crawl or Butterfly action
- as swimmer nears the surface propulsive phase of arm action begins

Breaststroke

- body deeper than other strokes to allow underwater action
- as swimmers dive speed is about to decrease arms pull in a keyhole pattern to hips
- legs kick and arms move forward to streamlined position
- arm action commences as fingers near the surface

Butterfly

- leg action starts as dive speed decreases
- as hands approach the surface propulsive key hole phase of the arm action commences
- as head breaks surface recovery commences

Back Crawl

- leg action commences as start speed decreases
- Dolphin or Back Crawl leg action
- as swimmer nears the surface, propulsive phase of arm action begins
- transition completed as swimmer breaks surface with arm ready to recover

Constructing a Schedule

As swimmers progress through a learn to swim and development programme some will wish to enter the competitive area. In these instances there is a need for them to develop stamina and endurance along with the continued development of technique and skill. In the early stages it is essential to ensure that the development of stamina and endurance is not at the expense of good technique. If this does occur the teacher/coach should reduce the distance being swum in order to re-emphasise the correct technique.

The move to the early competition stage means session plans need to reflect the principles applied to training in addition to the teaching principles already utilised.

In essence the session plan becomes a basic training schedule.

A schedule is a training exercise or a series of training exercises which is sectionalised in a similar manner to a session plan. The words may vary but the general structure is the same. For example a schedule may include:

aim	- should be clearly stated at the top of the schedule
warm up	- the introductory activity of the session
main set	- the section that is based around the aim of the schedule
sectional work	- pulling, kicking or drills
sprints	- short swims of up to 25 metres duration
swim down	- the winding down swim at the end of a session

There are four main areas which need to be included when writing a schedule.

D	- Distance	- the distance to be covered on each swim
I	- Interval	- the interval of rest to be taken in between each swim
R	- Repetition	- the number of times a swim is repeated
T	- Time	- the time to be taken to complete each swim (this can be an indication of the amount of effort to be used for the swim)

Any or all of the areas above can be adjusted. By changing these areas this will make the training benefit lesser or greater.

Changing these variables also allows the teacher to include variety within the main set and still obtain the training benefit needed.

To develop aerobic endurance swimmers nee to swim sub maximal effort swims with only partial recovery in between each swim, e.g., 4x50 metres Front Crawl (80%-60% effort) with 20 seconds rest in between each 50 metres.

To develop speed, swimmers need to swim maximum (or near maximum) effort swims with a full recovery in between each swim . e.g., 4 x 50 metres Front Crawl (100% effort_ with a one minute rest between each 50 metre swim.

When writing up a schedule it is important to consider;

warm up - preparing the body for the activity to follow

main set - this may be primarily aerobic (endurance) or anaerobic (speed) or possibly a combination of the two

sectional work - activities/practices/drills which concentrate on sections of the stroke rather than the full stroke, e.g., arm action only, leg action only or other skills such as racing starts, turns etc. This section is likely to combine an element of both.

swim down - reducing the load to allow the body to return to a normal state

Example schedule

phase	stroke	distance/set	swim time	turn around time/rest	objective	total time
warm up	FR/BR/BKs	300 continuous 100 m each stroke	5 minutes	1 min rest	muscle warming technique	6 mins
main set	indv. medley	2 x 200 m	3.36 - 4.12 (80%-60%)	TT 4-4.5 mins	endurance	9 mins
	freestyle	8x100m	1.26 - 1.40 (80% - 60%)	TT 1.45 - 2.00	endurance	16 mins
sectional work	FR/BR/BK	2x50m each stroke kicking		10 sec rest between each 50	endurance/technique	6 mins
	1st choice stroke	drills - 300 m	6 mins	continuous	technique endurance	6 mins
	turn practice all strokes					6 mins
sprints	1st choice stroke	6x25m	8 mins	maximum speed	speed	6 mins
swim down	sculling	150m	5 mins	continuous	lower pulse rate/technique	5 mins

Using a pace clock

Most swimming pools have a pace clock on the wall and once swimmers are moved to a lane situation they should be shown how to make the best use of it. Once the swimmer can use the pace clock this helps to free the teacher/coach to concentrate on the pupils.

The main functions of the pace clock are:

- to time the swimmer
- to time rest periods
- to give time, and therefore space, between swimmers
- to provide a start time for swimmers

Time spent teaching pupils how to use a clock in the early stages will save considerable time later in the swimming programme. Simple Terminology is used in a Coaching Environment.

I would like the first swimmer to go on the 60 and then the others to follow at 10 second intervals.

This will often be used by the teacher/coach working with swimmers in lanes. The first part indicates that the lead swimmer in the lane should start when the second hand passes the top of the pace clock.

The second swimmer in the lane will start ten seconds later and so on.

- Swim 4 x 50 metres Front Crawl with 30 seconds rest in between swims.

Each swimmer in the lane is being asked by the teacher/coach to swim 50 metres Front Crawl followed by 30 seconds rest. This will be repeated 4 times. Swimming the same distance a number of times is referred to as repetition work. The statement is therefore, 4 repetitions of 50 metres with 30 seconds rest in between.

As with the first example the teacher/coach will set times between each swimmer.

- Swim 4 x 50 metres Front Crawl going every 75 seconds.

This again is repetition work but the total time from the swim and rest is specified. The first swimmer, for example, will probably start the second 50 metre swim 75 seconds later.

Again, other swimmers in the lane will follow at the pre-determined time interval. If, therefore the first 50 metres takes 55 seconds the swimmer will receive 20 seconds rest. This is sometimes referred to as a turn-around-time and in order to set a realistic turn-around time the teacher/coach will be required to have some knowledge of the time which the swimmer can achieve.