Quiz Policies

Eligibility
The NCSF online quizzes are open to any currently certified fitness professional, 18 years or older.

Deadlines
Course completion deadlines correspond with the NCSF Certified Professionals certification expiration date. Students can obtain their expiration dates by reviewing either their certification diploma or certification ID card.

Cancellation/Refund
All NCSF continued education course studies are non-refundable.

General Quiz Rules

- You may not have your quiz back after sending it in.
- Individuals can only take a specific quiz once for continued education units.
- Impersonation of another candidate will result in disqualification from the program without refund.

Disqualification
If disqualified for any of the above-mentioned reasons you may appeal the decision in writing within two weeks of the disqualification date.

Reporting Policy
You will receive your scores within 4 weeks following the quiz. If you do not receive the results after 4 weeks please contact the NCSF Certifying Agency.

Re-testing Procedure
Students who do not successfully pass an online quiz have the option of re-taking. The fees associated with this procedure total $15 (U.S) per request. There are no limits as to the number of times a student may re-test.

Special Needs
If special needs are required to take the quiz please contact the NCSF so that appropriate measures can be taken for your consideration.

Quiz Rules

What Do I Mail Back to the NCSF?
Students are required to submit the quiz answer form.

What do I Need to Score on the Quiz?
In order to gain the .5 NCSF continued education units students need to score 80% (8 out of 10) or greater on the CEU quiz.

Where Do I Mail My Quiz Answer Form?
You will mail your completed answer form to:

NCSF
Attn: Dept. of Continuing Education
5915 Ponce de Leon Blvd., Suite 60
Coral Gables, FL 33146

How Many CEUs Will I Gain?
Professionals who successfully complete the any continuing education quiz will gain .5 NCSF CEUs per quiz.

How Much does each quiz cost?
Each quiz costs the student $15.00.

What Will I Receive When The Course Is Completed?
Students who successfully pass any of the NCSF online quizzes will receive their exam scores, and a confirmation letter.

How Many Times Can I Take The Quizzes For CEUs?
Individuals can take each NCSF quiz once for continuing education credits.

Relationship between Percent HR Max and Percent VO2 Max

While aerobic exercise is an important fitness component for health and weight management it rarely gets the appropriate emphasis in a program aimed at cardiorespiratory improvements. Whereas most people recognize lifting light weights and performing inadequate volume limits strength gains and related benefits, when it comes to "cardio" people often climb onto a treadmill and start walking without taking into account the training zones in which they should be working. It is not uncommon to see exercisers reading the paper while riding the bike or intently watching a television program on the cardio theatre. As a result, the only physical response they can expect is the production of heat because the intensity is too low for cardiovascular benefits. On the other end of the spectrum is the former athlete who decides to get back in shape; recalling former training volumes they start out at too high an intensity and quit as a result of burnout or injury. Therefore, it stands to reason that to make the most of each bout of exercise, individuals should train in an appropriate and systematic manner. Unlike weight training where one simply performs repetitions to failure or lifts to a designated number based on a percentage of maximum force output capability for a given movement, aerobic exercise is based on percentage of maximal oxygen consumption. Therefore, an inherent limiting factor is measuring oxygen uptake at a given work rate. Since most people do not go running with a bag spirometer to gauge oxygen use, heart rates are commonly used to determine intensity. This is possible due to the linear relationship gain that occurs between heart rate and VO_2 at intensities above 50% VO_2max. To provide a metric for training intensity, heart rates and their associated feelings of exertion can be used as training zones to predict the relative intensity of the work (exercise VO_2). Luckily one does not need to always have a heart rate monitor to gauge intensity as there are multiple ways to determine these numbers.

Cardiovascular Rules of Thumb Table:

	Minimum Cardiovascular Benefit	Aerobic Limit (Level 1)	Anaerobic Threshold (Level 2)	Severe Exercise (Level 3)
Borg Scale RPE	11 (fairly light)	14 (between somewhat hard and hard)	17 (very hard)	18-20 (extremely hard to exhaustion)
% VO_2Max	50%	60-65%	80-85%	> 85%
% HRmax	70%	75-80%	90-92%	95-100%
"Expected" Lactate level (4 min. stages)	~1.0-2.0	~ 2.2	4.0	Usually >8-10
Ventilatory Responses	Ve/VO_2 proportional with work; unnoticeable change	1st increase in V_e per consumed O_2; Still barely noticeable	2nd increase in V_e per consumed O_2; Decrease in $PETCO_2$ and Increase in V_e/VO_2	Exercise hyperpnea; individual cannot speak

Pace of movement can be used to predict work rates as well. Generally, the amount of effort to maintain a given speed in a trained individual is consistent with relative heart rates. Running coaches often use the following table, which takes into account running speed and an equation developed in 1994 by David Swain (%HRmax = (0.64 x %VO_2max) + 37. This promotes more accurate training intensities particularly when used in conjunction with rate of perceived exertion (RPE).

% VO_2max	% HRmax	Speed
50%	70%	Very Slow (warm up, cool down, recovery)
60%	75%	Slow Running (early measure of a long run, recovery day)
70%	82%	Steady Running (off-season; maybe challenging for LIT runs)
80%	88%	Half Marathon Pace; Just above Marathon Pace
90%	95%	10K Speed
95%	98%	5k Speed
100%	100%	3K Speed
110%	100%	1500 Speed

For example, competitive 10k speed is about 90% of VO_2max, so according to the chart, an individual with a max heart rate of 200bpm would need to run at 95% of 200bpm (being 188bpm and a very hard RPE) to reach the 90% VO_2 equivalence. Because the two values, HR and VO_2 correlate well, one can go back and forth between them based on the need for the information. While heart rates predict the VO_2 work level, VO_2 can consequently predict heart rates. Obviously a direct measure is the most beneficial for valid training zones; therefore it is always best to attempt to determine one's true max heart rate. If this seems unwarranted for a particular client, predictive equations can be used, but validity may be reduced. Collecting data on clients can dramatically improve the predictive value of cardiovascular work. With this knowledge one can better predict the training VO_2 by simply re-engineering the Swain equation.
%VO_2max = (%HRmax – 37)/.64

Exercise heart rate/Max HR = %HRmax

Using the above example 188bpm/200bpm = 94%

When the HRmax percentage is placed into the re-engineered equation, the value reflects the actual percentage of VO_2max being used for work.

(94-37)/.64 = ~89-90% VO_2max

While this example is helpful to track intensities based on physical indices, it does not actually provide information as to a predicted VO_2max value. Since training is aimed at improving VO_2max it makes sense to track this metric to identify programmatic effectiveness and to make correct intensity adjustments when training, particularly for a scheduled event.
To determine VO_2max from performance measures one can use the running speed and percentage of heart rate max to identify the individual's predicted VO_2max. If the individual above runs at 94% of his heart rate max, at a speed of 8 mph his effort can be equated to his oxygen capacity. The first step is to determine the individual's exercise VO_2 (using his current running pace). To determine his running VO_2, miles per hour must be converted to meters per hour. This is accomplished by simply multiplying the running speed, in this case 8 mph by 26.8. To get outdoor running speed simply use a measured track to determine rate of movement, or perform the work on a treadmill. One issue with the treadmill is the results can be skewed because the runner does not have to work to overcome air resistance, which can

increase overall energy expenditure by 3-9% depending on conditions. To determine the predicted VO_2max follow the steps from the example. Again, keep in mind the example client ran at 94% HRmax, which was at a speed of 8 mph.

1) Convert MPH to Meters Per Hour

8 mph x 26.8 meters = 214.4 meters per hour

2) Next determine work (run) VO_2

Work VO_2 = [3.5 + (meters per minute x 0.2)]

Work VO_2 = [3.5 + (214.4 x 0.2)] = 46.38 ml/kg/min

3) Calculate VO_2max

VO_2max = (Work VO_2) ÷ %HRmax

VO_2max = 46.38 ÷ 0.94 = 49.3 ml/kg/min

When using equations, trainers must keep in mind that predictions are just that: predictive. And while useful, are not necessarily completely accurate. An elite runner who has been running for a long time will usually be more efficient, meaning they actually use less oxygen than predicted. On the other hand, an amateur runner is often inefficient, expending unnecessary energy and consuming more oxygen than predicted. Furthermore, to get the best results the conditions should be controlled for optimal validity. The heart rate response to oxygen consumption is affected by factors including environmental temperature, emotions, previous food intake, muscle fatigue, and the consistency of the activity. Therefore prior to an effort used for program calculations each of these factors should be taken into consideration. Once the values have been determined the training zones can be periodized to provide optimal results from the training.

Relationship between Percent HR Max and Percent VO_2 Max
CEU Quiz

1. Individuals who aerobically train at a low intensity _____.

   A. burn significant calories
   B. primarily generate heat but experience limited caloric expenditure
   C. successfully lose weight due to a lower perceived stress
   D. increase their VO_2max via improved fat oxidation

2. Proper programming for aerobic exercise should be based upon _____.

   A. a percentage of maximal oxygen uptake
   B. muscle mass
   C. flexibility
   D. age-predicted max heart rate

3. A linear relationship exists between heart rate and VO_2 at training intensities above _____.

   A. 25% VO_2max
   B. 50% VO_2max
   C. 90% 1RM
   D. 75% HRmax

4. Based on the chart from the article, a minimum cardiovascular benefit can be derived from aerobic training at 50% of VO_2max which corresponds with approximately _____ HRmax.

   A. 40%
   B. 50%
   C. 60%
   D. 70%

5. Based on the chart from the article, what would the RPE be for an individual who is training aerobically at an intensity so high they are unable to speak?

   A. 10-11 RPE
   B. 12-14 RPE
   C. 16-17 RPE
   D. 18-20 RPE

6. According to the Swain Equation, the amount of effort to accomplish a particular speed in a trained individual is consistent with _____.

   A. relative heart rates
   B. muscle mass
   C. respiration rate
   D. flexibility

7. According to the chart based on the Swain Equation, aerobic exercise at approximately 75% of HRmax should correspond with what percentage of VO_2max?

   A. 50%
   B. 60%
   C. 90%
   D. 110%

8. True or False? Using an estimate for maximum heart rate will provide the greatest amount of validity for these equations.

   A. True
   B. False

9. Properly programmed aerobic training for an event should lead to _____.

   A. increased resting heart rate
   B. increased muscle mass
   C. decreased VO_2
   D. increased VO_2max

10. Elite runners who have trained for a long period of time will usually be _____ efficient, which will result in the use of _____ oxygen.

    A. more; less
    B. more; more
    C. less; less
    D. less; more

Quiz Answer Form

FIRST NAME_____ **LAST NAME**_____ **M.I.**_____

TITLE_____

ADDRESS_____ **APT.**_____

ADDRESS _____

CITY_____ **STATE**_____ **ZIP**_____

COUNTRY_____ **POSTAL CODE**_____

CERTIFICATION NO. _____ **CERTIFICATION EXP.** ____/____/____

MEMBERSHIP NO. _____ **MEMBERSHIP EXP.** ____/____/____

Quiz Name	Member Price	Total
	$15	



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_____ _____ _____
Account No. Exp. Date Security Code

_____ _____
Signature Date

Quiz Answers

1. _____ 6. _____
2. _____ 7. _____
3. _____ 8. _____
4. _____ 9. _____
5. _____ 10. _____

Fill in each blank with the correct choice on the answer sheet. To receive 0.5 CEUs, you must answer 8 of the 10 questions correctly.

Please mail this Quiz answer form along with the proper enclosed payment to:

NCSF
5915 Ponce de Leon Blvd., Suite 60
Coral Gables, FL 33146

Questions? 800-772-NCSF