Translation and cultural adaptation of the Penn Shoulder Score to Portuguese language: PSS-Brazil

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ABSTRACT

Introduction/Objective: To produce the Brazilian version of Penn Shoulder Score (PSS) designated to measure pain, satisfaction, and function of patients with shoulder painful musculoskeletal conditions. **Patients and Methods:** The Brazilian version development of PSS questionnaire was based on the protocol proposed by the American Academy of Orthopaedic Surgeons (AAOS) and International Quality of Life Assessment (IQOLA). The process consists of translation, synthesis, back-translation, expert Committee review, pretest and evaluation of documents by the Committee and author of the PSS. This pre-final version was administered to a sample of 90 subjects with clinical diagnosis of painful musculoskeletal shoulder, male and females, aged over 18 years. In applications, the patients were inquired about their understanding of each item, and items not understood by 20% or more of patients were analyzed and modified by the Committee, requiring three questionnaire applications (n = 30). **Results**: The application of pre-final versions of the PSS revealed the difficulties encountered by patients, which were resolved by transforming the self-applied questionnaire in an instrument applied through interview. **Conclusion**: The translation and cultural adaptation resulted in the final Brazilian version of the PSS questionnaire.

Keywords: quality of life, questionnaires, translation, shoulder.

INTRODUCTION

The functional assessment instruments represent a primary outcome measure in assessing the condition and progress of patients, often used for studies aimed at examining the effectiveness of an intervention.[1-4] Traditionally, objective measures such as range of motion and muscle strength are used more often than subjective measures of questionnaires examining pain and disability.[5,6] However, it appears that the subjective data are as important as the objective data, ,[7] because they can assess the impact of disease and effectiveness of intervention on quality of life of the individual.[8]

The increasing number of multinational and multicultural research in the interest of measuring the quality of life and effectiveness of treatments led to the development and validation of several questionnaires in English,[9] which need to be translated and adapted for other languages, in order to allow comparison of results between studies with different populations[10] and prevent the development of several instruments with similar evaluation purposes, making it difficult to determine which instrument to use in clinical practice and research.

There are several tools in English to assess painful musculoskeletal conditions of the shoulder joint complex, such as the Penn Shoulder Score,[11] American Shoulder and Elbow Surgeons Evaluation Form (ASES),[12] Shoulder Pain and Disability Index (SPAD),[13] Disabilities of the Arm, Shoulder and Hand scale (DASH),[14] and Western Ontario Rotator Cuff Index (WORC),[15] among others. However, only DASH[16] and WORC[17] are translated and validated for the Portuguese of Brazil. This

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fact, combined with DASH non-specificity for shoulder and WORC specificity for a single shoulder dysfunction, justifies the need for translation of other questionnaires in order to evaluate different shoulder dysfunctions.

PSS was developed in 1999 to asses subjects with shoulder dysfunction, consisting of a 100-point scale that includes three domains: pain, satisfaction, and function. The pain and satisfaction subscales have, respectively, three items and one item assessed using a 10 Numeric Rating Scale (EN), where 0 corresponds to no pain and not satisfied, while 10 corresponds to the worst pain possible and very satisfied. The domain of function subscale contains twenty items, graded with a 4-point Likert scale, ranging from 0, which means "can not do at all" to 3 "without difficulty", with a maximum score of 60 points. The PSS score ranges from 0 to 100 points, with the maximum score indicating no pain, high satisfaction, and good function.[18]

Thus, considering the need to provide Brazil with other functional instruments, which are specific for the assessment of shoulder and its several dysfunctions, the purpose of this study is to produce a Brazilian version of the PSS questionnaire through translation and cultural adaptation of the original questionnaire.

PATIENTS AND METHODS

The PSS questionnaire was translated and adapted into Brazilian Portuguese based on the protocol proposed by Beaton *et al*.,[9] used by the American Academy of Orthopaedic Surgeons (AAOS) and the International Quality of Life Assessment (QOL). To this end, it was obtained permission from the author to translate PSS original version and the process of translation consisted of six stages: through translation, synthesis, back translation, review by Multidisciplinary Committee, pretesting, and evaluation of documents by a Committee and PSS author. The study was approved by the Research Ethics Committee, process No 5.615/2007; and all patients who agreed to participate in the study signed an informed consent.

The first stage consisted of translating the original questionnaire by two foreign language teachers who have Portuguese as their mother tongue and fluency in English. One of the translators knew the purpose of translation and the other was unaware of it, which resulted in versions T1 and T2. In the second stage, it was developed a common translation (T12) through the analysis of the original questionnaire and translations T1 and T2, during a meeting with the initial translators and researchers. The third stage consisted of back-translation; *i.e.*, translation of T12 Portuguese version into English by two native translators with fluency in Portuguese, generating RT1 and RT2 versions.

A review of all versions (original, T1, T2, T12, RT1 and RT2) was performed during the fourth stage by a multidisciplinary Committee, composed of an orthopedist specialist in upper limbs, five physiotherapists, three of which do research on physical therapy evaluating shoulder musculoskeletal disorders, and the translators involved in the process, which consolidated all versions of the questionnaire and developed the pre-final version of the PSS-Brazil.

The fifth stage involved three pretests of PSS-Brazil pre-final version, with each version applied to 30 patients, resulting in a sample of 90 male and female patients, aged above 18 years, with different painful musculoskeletal conditions of the shoulder. Patients were enrolled voluntarily in the Rehabilitation Center and Outpatient Clinic of Hand and Microsurgery of *Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto da Universidade de São Paulo (HCFMRP-USP)*. Consecutively, all patients who attended service were selected as long as they did not show involvement of neurological or rheumatic disease and, in the first and second pretests, illiterate persons and those unable to complete the self-applied questionnaire were also excluded, which did not happen with the third pretest that presented the questionnaire through an interview. After completing the pre-final version of PSS-Brazil, patients were interviewed by a researcher about their understanding of each item. The items that were not understood by 20% or more of patients were reformulated by the Committee, keeping the original concept of the instrument.[16,19]

In the sixth and final stage, all documentation of the Brazilian version of PSS questionnaire was submitted to the Committee and the authors of the original version for approval of the translation and cultural adaptation process.

This study used descriptive statistics performed by mean values and percentages for demographic and clinical characteristics of patients, for each questionnaire item and for response option "Did not do before injury".

RESULTS

The process of transcultural adaptation produced the Brazilian version of the PSS questionnaire (Appendix I). The clinical and demographic characteristics of patients who participated in all three pretests are presented in Table 1.

In the translation phase, the T12 version was obtained with some modifications made after the analysis of differences

between T1 and T2 (Table 2), giving priority to terms and expressions more usual to the Brazilian population.

The back translations RT1 and RT2 showed great similarity between them and equivalence with the original version of PSS, indicating that the common translation o fT12 was satisfactory for the pre-final version of PSS, requiring only minor changes (Table 3).

At this stage, the third item of the domain function "Perform necessary toileting activities" was the focus of further discussion by the Committee on the need for specificity of some activities, which was considered unnecessary by the author of the original version.

The cultural adaptation revealed the need to change only a few items and structural aspects of PSS-Brazil pre-final version (Table 4). The pre-test I indicated the need to reformulate only items 13, 16, and 20 and the response option X "Did not do before injury". For items 12-16, the Committee decided to highlight the elevation level required by the activity and add the words "big bag of rice" in items 13 and 16, in order to make the weight of 5 kg more noticeable to the individual. In relation to item 20, the words "full time" were changed to "whole time" in bold, and the response option "X" was placed in a column immediately after the items.

Table 1
Descriptive and demographic data of patients participating in the three pretests (N: 90)

Descriptive data	Pretest I	Pretest II	Pretest III
Mean age (min-max)	46.47 (18-75)	50.2 (25-72)	48.46 (19-66)
	N (%)	N (%)	N (%)
Sex			
Male	13 (43.3%)	12 (40%)	13 (43.3%)
Female	17 (56.7%)	18 (60%)	17 (56.7%)
Shoulder with pain			
Dominant shoulder	14 (46.7%)	20 (66.67%)	15 (50%)
Dominant shoulder	10 (33.3%)	9 (30%)	9 (30%)
Bilateral	6 (20%)	1 (3.33%)	6 (20%)
Education level			
Elementary school	12 (40%)	18 (60%)	14 (46.7%)
High school	12 (40%)	11 (36.67%)	8 (26.7%)
Higher education	6 (20%)	1 (3.33%)	8 (26.7%)
Clinical diagnosis			
RCT/SIS	14 (46.7%)	18 (60%)	15 (50%)
Shoulder dislocation/AC	6 (20%)	1 (3.3%)	6 (20%)
Fractured clavicle or shoulder	2 (6.7%)	5 (16.7%)	5 (16.7%)
Others	8 (26.7%)	6 (20%)	4 (13.3%)

RCT = rotator cuff tear; SIS = subacromial impingement syndrome, AC = acromioclavicular joint.

Some function items on the original version of PSS are not specific for the affected arm and allowed the subject to associate the activity with the affected arm, unaffected arm, or with both arms. Thus, the author's permission was asked to specify the items associated with activities done with the affected arm, considering the importance of performing, in the context of rehabilitation, the functional assessment of the affected arm, and not the overall assessment of the subject.

The Committee decided to modify some items that have not reached the level of misunderstanding to be

Table 2
Changes performed in translation stage

Item Modified expression	T1 and T2	T12 version
D3: Strenuous	T1 – Effort T2 – Strength	Strength
F1: Small of your back	T1 – Lumbar region T2 – Lower spine	Lower spine
F2: Middle of your back	T1 – Middle of the back T2 – Middle spine	Middle spine
F2: Hook bra	T1 – Button bra T2 – Fasten bra	Fasten bra
F3: Toileting activities	T1 – Hygiene activities T2 – Bathroom activities	Hygiene activities
F6: Elbow held straight out to the side	T1 – Elbow held straight out to the side T2 – Bent elbow pointing to the side	Elbow held straight out to the side
F7: Shirt	T1 – Shirt T2 – Shirt	Blouse
F8: On	T1 – Over T2 – Above	Above
F12 to F16: Without bending elbow	T1 Without bending the elbow T2 – Without flexing the elbow	With the arm outstretched
F13 and F16: Gallon container	T1 – Recipient T2 – Gallon	Jar
F17: Hobby	T1 – Habit T2 – Hobby	Leisure activities
F18: Household chores	T1 – Household chores T2 – Housework	Housework
F20: Full-time	T1 – Full time T2 – Whole time	Full time
F20: Regular job	T1 – Usual work T2 – Daily functions	Usual work

T1 = Portuguese version of the first translator; T2 = Portuguese version of the second translator; T12 = common version in Portuguese; D = pain subscale; F = function subscale.

modified, in order to ensure better understanding. Thus, the satisfaction subscale score was reversed, making it similar to the pain scale, where the higher score indicates a worse situation of the patient, with "0" and "10" now representing "very satisfied" and "not satisfied", respectively. Item 9, "Open the door with the affected arm", was also changed to "Open/push the door with the affected arm", as 73.33% of patients thought only about the activity of turning the knob, instead of thinking about the activity of pulling/pushing the door.

Table 3
Backtranslation stage

Original version Item – expression	RT1 and RT2	PSS pre-final version
D1: *Pain at rest with your arm by your side*	RT1 – *Pain with the arm resting beside the body* RT2 – *Pain when your arm is relaxed to your side*	Pain at rest with your arm by your side
S: *How satisfied are you with the current level of function of your shoulder*	RT1 – *What is your present satisfaction with the level of function of your shoulder* RT2 – *What is the overall level of satisfaction with the funcion of your shoulder*	How satisfied are you with the current level of function of your shoulder
F3: *Toileting activities*	RT1 – *To do necessary hygiene activities* RT2 – *Perform activities necessary for good hygiene*	Perform activities of personal hygiene
F12 to F16: *without bending (your) elbow*	RT1 – *arm extended* RT2 – *arm straight*	arm extended

RT1 = back-translator 1; RT2 = back-translator 2; D = pain subscale; S = satisfaction subscale; F = function Subscale.

Table 4
Items and structural aspects of the pre-final version of PSS misunderstood by patients, requiring reformulation during the cultural adaptation

Item not understood	Pretest 1 N (%)	Pretest 2 N (%)	Pretest 3 N (%)
S	4 (13.33%)	6 (20%)	0 (0%)
Item response "X"	13 (43.33%)	18 (60%)	0 (0%)
F12	4 (13.33%)	13 (43.33%)	0 (0%)
F13	7 (23.33%)	12 (40%)	0 (0%)
F16	6 (20%)	3 (10%)	0 (0%)
F20	9 (30%)	7 (23.33%)	0 (0%)

S = Satisfaction subscale; F = Function subscale. X = I could not perform even before injury.

The pretest II showed, in general, higher rates of misunderstanding for the subscale of satisfaction and did not solve the remaining problems identified in the first pretest. Thus, the subscale scores of satisfaction returned to the original format, with 0 and 10 indicating, respectively, not satisfied and very satisfied. As decided by the Committee, in order to solve the remaining problems transforming the self-applied questionnaire into an instrument applied by interview, a guidance material was prepared for the examiner on how to conduct the interview properly, paying attention to items that may not be understood.

As noted in the first pretest, it was necessary to change some items that have not reached the level of misunderstanding necessary for modification. Some patients scored item 10, "Carry a bag of groceries with the affected arm", with a greater degree of difficulty, while others felt that the item 11, "Carry a briefcase or small suitcase with the affected arm", more difficult. Thus, this confusion was resolved with the author's consent, and the items 10 and 11 changed to "Carry a book or briefcase, close to the body, with the affected arm" and "Carry a bag of groceries or briefcase with the affected arm".

The completion of pretest III showed to have solved all the problems described above, producing the final version of the PSS-Brazil.

DISCUSSION

The Brazilian version of PSS questionnaire (PSS-Brazil) was obtained by a careful cultural adaptation, comprising a wide age group and different educational levels, which probably favored the development of an easy understanding version. There was some difficulty for understanding the structure and items, which were solved by transforming the self-applied questionnaire into an instrument administered by interview, transferring to the examiner the responsibility for making the items understandable by the individual.

The process of transforming a self-applied questionnaire on application by interview was also recorded for other questionnaires translated into Brazilian Portuguese in Brazil.[20,23] Many Brazilian questionnaires are applied as an interview or provide some instructions for its completion, which is justified by Orfale *et al.*[16] by the patient's lack of habit to complete self-administered questionnaires or by insufficient education, while Oku *et al.*[24] justify the interview to avoid the exclusion of patients who can not read or have vision impairment.

The translation stages, back translation, and synthesis showed no problems, with changes being made to ensure

familiarity with the term and to achieve cultural equivalence with the Brazilian population. For example, we prefer the term *blusa* (blouse) instead of *camisa* (shirt) in Item 7, since in Portuguese the former is a unisex garment, while the latter is usually a male garment.

The Multidisciplinary Committee represented a key stage to prevent any liable aspect to misinterpretation by the individual during the pretest, since in that period the exchange of information with the author of the original version was constant.

The pretest stage showed major loss of data for the response option X "Did not do before injury", which may suggest that patients tend to consider that they performed all activities before the injury or that there is a need to quantify their disability. The latter explanation seems plausible when we observe that a modified application of the ASES used empty cells instead of numbers, preventing that a response option surpass the other.[25]

Pretest repetitions also revealed that sequences with small changes, such as items 12 to 16, which only differ in the arm elevation level and amount of weight lifted, are often not distinguished by the individual. It is therefore important that the questionnaires used by the examiner interview offer guidance on which items require further attention in order to avoid misinterpretations.

Regarding item 20, it was observed that individuals tend to report the adjustments made in the way they do the work, instead of indicating if they have the ability to keep working throughout the journey. Although the disease impact at work can be reviewed by changing duties and reducing the working hours, as mentioned by the author of the original version, the PSS has the function of assessing only the ability to remain active throughout the day. Although the impact of illness at work can be assessed by change of duties and reduction of working hours, as mentioned by the author of the original version, PSS has the function of assessing only the ability to remain active throughout the workday.

The authors should be aware of possible factors contributing to inadequate interpretation of an item, even if this item does not reach the level of misunderstanding required to be changed, as observed in this study about the need to specify the assessment for the affected arm. This change was authorized by the author of the original version that agreed with the use of PSS to evaluate the functionality presented by the individual with the affected arm, which is fundamental to follow the progress of patients undergoing intervention.

CONCLUSION

The process of translation and cultural adaptation of PSS to Portuguese was performed properly and resulted in the Brazilian version of PSS. Despite the conclusion of its adapted translation, an analysis of the questionnaire psychometric properties is recommended in order to make it a reliable and valid instrument in Brazil.

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APPENDIX I – Brazilian version of the Penn Shoulder Score (PSS-Brazil)

DIRECTIONS TO THE EXAMINER

The PSS-Brazil questionnaire is intended to evaluate shoulder pain in your patients, their satisfaction, and their ability to perform daily life activities (DLAs).

We recommend the application of PSS-Brazil questionnaire by INTERVIEW

To ensure questionnaire maximum understanding by the patient, we asked each examiner to CAREFULLY read the following guidelines:

1) Guidelines for the environment:

Before starting the interview, try to find a quiet place, with a table and chairs for you and your patient. Make sure that the patient is not anxious or in a hurry.

2) Guidelines for questionnaire application:

a) During the interview, it is important that the patient look directly into the questionnaire to answer the Numeric Rating Scale (EN) and the Likert scale (used in function domain).

b) It is advisable to make sure that the patient understands the meaning of numbers used in the numerical and Likert scales. Whenever necessary, repeat to patient the meaning of the numbers "0" and "10" for pain and satisfaction domains. For function domain, prior to reading the items, it is recommended that you clearly explain to the patient which answers he can provide. For each item read, it is suggested to repeat the words "without difficulty", "some difficulty", "very difficult", and "can not perform in any way", whenever deemed necessary.

c) If the patient has bilateral involvement, instruct him to answer based on his observation regarding the arm presenting more pain or dysfunction.

d) Each item of the domain function on questionnaire has five possible answers: the first column "Did not do before injury" and the Likert scale of 4 points represented by the four remaining columns. For each item, only one answer can be checked. It is important to pay attention to first column completion, which should be checked when the activity was no longer part of patient's everyday life before the injury, which may occur more frequently for items 13, 16, 18 and, 19. It is recommended that you be sure on that for these items.

e) Before scoring each item, make sure that the patient understood the question and indicated the best response. If it is not clear to you that the patient thought about the correct activity, please clarify or demonstrate the activity to the patient, redo the question and take the appropriate response to score the item. Items 6 and 12-16 often need to be demonstrated, because the patient does not raise his arm at the correct height.

On the following chart, you may consult information about some items of PSS-Brazil and its scoring.

INFORMATION ON SOME ITEMS OF THE PSS-BRAZIL QUESTIONNAIRE

Satisfaction domain

Make it clear to the patient that the question refers to the level of satisfaction with the shoulder function, not mentioning the therapist or the quality of care provided. The significance of the EN score of satisfaction domain is opposite to the pain domain. So, tell the patient that now the number "0" indicates "not satisfied" and the number "10" indicates "very satisfied".

Function domain

a) In item 3, the patient can think of any activity performed in the bathroom, such as cleaning up after using the toilet, brushing teeth, washing/combing hair, cutting nails, waxing, shaving etc.

b) In item 10, the object must be carried close to the body (supported against the trunk), without requiring the movement of the patient's arm elevation. The book or briefcase can be replaced by a phone book, Bible, or other object of similar weight.

c) More attention should be focused on items 12-16, which show differences between heights and weights. The patient usually thinks of activity of item 12 with the arm stretched above shoulder height, but the report should be made to a shelf at shoulder height. For items 14-16, patients tend not to notice the progression of the object weight. Please make sure that the patient saw the correct height and weight.

d) Item 19 refers only to sports activities.

e) Item 20 emphasizes the difficulty that the patient has to keep working during normal working hours. Therefore, it does not tell how many hours the patient is working and does not refer to reported changes that may have occurred in the way work is done by the patient. If the patient's current activity is not the same as before the injury, describe the difficulty to keep working on the current activity.
Ask the patient to consider the household chores, if these are his/her main tasks.

SCORING OF PSS-BRAZIL

a) The maximum score of pain and satisfaction domains are, respectively, 30 points and 10 points, with a score of 30 indicating complete absence of pain and a score of 10 indicating that the patient is very satisfied, respectively.

b) The function domain has a maximum score of 60 points, which indicates high function. However, if the item is marked with X "Did not do before injury", the maximum score should be reduced by 3 points. If the sum of 20 items results in 27 points and the individual has marked X for two items, the maximum possible score will no longer be 60 but 54 (60-2 x 3). The final score of function domain will be 27/54 x 60, i.e., 30 points.

c) The questionnaire final score can range from 0 to 100, with the score of 100 indicating the best condition of the patient.

PATIENT'S IDENTIFICATION

Full name: . . . . . Registration: . . . . . .
Birth date: . . . . / . . . . / . . . . Age: . . . . . Sex: ( ) F ( ) M
Occupation: . . . . . Phone: . . . . . Dominance: ( ) R ( ) L
Diagnostic hypothesis: . . . . . .
Surgery: Which: . . . . . When:. . . . / . . . . / . . . . . .
Arm with pain or dysfunction: ( ) R ( ) L ( ) Both Worst arm: ( ) R ( ) L
How long do you have pain or dysfunction in this arm: . . . . . .

Penn Shoulder Score (PSS-Brazil)

Name: . . . . . Arm assessed: . . . . . Date: . . . . . / . . . . . / . . . . .

PSS-BRAZIL SHOLDER SCORE

Part I: Pain and Satisfaction: Please indicate the number closest to your level of pain or satisfaction

											Exclusive Use
Pain at rest with your arm by your side:											
0	1	2	3	4	5	6	7	8	9	10	. . . . .
No pain										Worst pain possible	(10 – Nº circled)
Pain during normal activities (eating, dressing, bathing):											
0	1	2	3	4	5	6	7	8	9	10	. . . . .
No pain										Worst pain possible	(10 – Nº circled) (Score 0 if not applicable)
Pain during strenuous activities (reaching, lifting, pushing, pulling, throwing):											
0	1	2	3	4	5	6	7	8	9	10	. . . . .
No pain										Worst pain possible	(10 – Nº circulado) (Score 0 if not applicable)
										Pain score =	. . . . . / 30
How satisfied are you with the current level of function of your shoulder?											
0	1	2	3	4	5	6	7	8	9	10	. . . . . / 10
Not satisfied										Very satisfied	(Nº circled)

PSS-BRASIL SCORE

Part II: Function: Please indicate the level of difficulty you might have to perform each activity.

		Did not do before injury	No difficulty	Some difficulty	Much difficulty	Can't do at all
1	Reach the small of your back with the hand of affected arm to tuck in your shirt.	X	3	2	1	0
2	Wash the middle of your back or fasten bra in the back with the affected arm.	X	3	2	1	0
3	Perform personal hygiene activities with the affected arm.	X	3	2	1	0
4	Wash the back of opposite shoulder with the affected arm.	X	3	2	1	0
5	Comb hair with affected arm.	X	3	2	1	0
6	Place hand of affected arm behind the head with elbow held straight out to the side.	X	3	2	1	0
7	Dressing (including put on coat and take shirt off overhead).	X	3	2	1	0
8	Sleeping on affected side.	X	3	2	1	0
9	Open/push door with the affected arm.	X	3	2	1	0
10	Carry a book or briefcase close to the body with the affected arm.	X	3	2	1	0
11	Carry a bag of groceries or small suitcase with affected arm.	X	3	2	1	0
12	Place a can (500 g to 1 kg) on a shelf at shoulder level with the affected arm stretched out.	X	3	2	1	0
13	Place a jar of about 5 kg (big bag of rice) on a shelf at shoulder level with the affected arm stretched out.	X	3	2	1	0
14	Reach a shelf above your head with the affected arm stretched out.	X	3	2	1	0
15	Place a can (500 g to 1 kg) on a shelf overhead with the affected arm stretched out.	X	3	2	1	0
16	Place a jar of about 5 kg (big bag of rice) on a shelf overhead with the affected arm stretched out.	X	3	2	1	0
17	Perform regular leisure activities or sports.	X	3	2	1	0
18	Perform housework (cleaning, laundry, cooking).	X	3	2	1	0
19	Throw overhand/swim/overhead racquet sports (Circle all that apply to patient).	X	3	2	1	0
20	Work full-time at your job or regular function.	X	3	2	1	0

FUNCTION SCORE

Total of columns = ... (a)

Number of "X" x 3 = ... (b), 60 - . . . . . (b) = ... (c)

(if no Xs are circled, function score = total of columns)

Function Score = ... (a) ÷ . . . . . (c) = ... x 60 . . . . . /60

Total Score (Part I and II) =

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