

Recommendation of Physical activity

Preporuka fizičke aktivnosti

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Category **BMI** Body weight in kg /
/(height in meters to the power of 2)

<18 under the weight

20-25 **normal**

25-30 overweight

30-40 obesity

>40 pathology

Category **BMI** Body weight in kg /
/(height in meters to the power of 2)

<18 ispod težine

20-25 prihvatljivo

25-30 bucmast

30-40 debeo

>40 patologija

Prvo da vidimo kakva je situacija: BMI, FITNES index

	B	C	D	E	F	G	H	I	K	L	M	N	O	R	S	T	U	W
May 2012 - Students years II PES																		
FEMALE	gender	AGE	High	weight	walking 2 km in min	sec	HR	% HR	Walking in km	BMI	FITNES female	VO2max žene	BM female kcal/cas	ml/02/24h	iMett ml02/kg/min	Max HR	%H2O	
Hoitan Camelia (aerobics)	z	33	1.65	60.0	16	48	132	70.03	7.14	22.04	108.00	38.40	1285.22	257044.40	2.98	188.50	42.3	
Nicolau Daniela (handball)	z	25	1.70	63.0	15	20	112	58.18	7.83	21.80	123.88	46.19	1375.57	275113.80	3.03	192.50	46.7	
Ciurea Laura (voley)	z	30	1.74	58.0	18	32	142	74.74	6.47	19.16	92.01	33.68	1323.77	264754.80	3.17	190.00	46.7	
Anghel Rodica	z	29	1.65	55.0	18	35	112	58.79	6.46	20.20	99.64	36.56	1256.11	251222.20	3.17	190.50	46.7	
Farcas Andrada (athlete)	z	21	1.70	66.0	16	10	124	63.75	7.42	22.84	110.20	42.54	1422.96	284592.40	2.99	194.50	41.5	
Karkas Szende (basket)	z	23	1.70	58.0	15	16	134	69.25	7.86	20.07	118.50	44.92	1337.11	267421.20	3.20	193.50	56.3	
Engy Eniko (wushu)	z	26	1.72	60.0	15	24	152	79.17	7.79	20.28	112.59	42.04	1351.90	270380.80	3.13	192.00	51.8	
Gabot Monica (swimming)	z	21	1.76	72.0	15	48	138	70.95	7.60	23.24	108.45	41.93	1509.44	301888.00	2.91	194.50	40.3	
Urs Daciana (dance)	z	22	1.71	58.0	16	31	128	65.98	7.27	19.84	109.68	42.09	1346.63	269326.40	3.22	194.00	53.8	
Lavric Paula (athlete)	z	23	1.69	60.0	15	54	124	64.08	7.55	21.01	115.35	43.77	1351.38	270276.40	3.13	193.50	53.0	
Deac Raluca (basket)	z	22	1.78	70.5	16	52	116	59.79	7.11	22.25	107.92	41.42	1500.12	300023.90	2.96	194.00	53.5	
Borbath Kinga (Handball)	z	21	1.75	67.0	16	14	132	67.87	7.39	21.88	108.13	41.83	1456.78	291355.00	3.02	194.50	43.0	
Rada Sabina (swimming)	z	22	1.73	70.0	17	21	132	68.04	6.92	23.39	97.39	37.78	1471.09	294217.60	2.92	194.00		
Flangea Rada (voley)	z	23	1.82	71.0	16	28	132	68.22	7.29	21.43	107.46	41.03	1519.63	303925.00	2.97	193.50	42.9	
Szabo Matilda	z	21	1.69	60.0	17	54	144	74.04	6.70	21.01	91.15	35.89	1360.73	272146.80	3.15	194.50	46.3	
Gulay Marta	z	22	1.65	55.0	18	32	136	70.10	6.47	20.20	89.58	35.05	1288.84	257768.60	3.25	194.00	47.8	
Rogdan Ramona (tenis)	z	22	1.70	62.0	17	55	132	68.04	6.70	21.45	94.76	36.84	1380.03	276006.80	3.00	194.00	43.5	



FITNESS INDEX

< 70	well below average
70 - 89	under the average
90 - 110	average
110 - 130	above average
> 130	well above average

< 70	znatno ispod proseka
70 - 89	nešto ispod proseka
90 - 110	prosek
110 - 130	nešto iznad proseka
> 130	znatno iznad proseka



Razvoj kondicije

|||

Održavanje kondicije



Razvoj aerobne sposobnosti

8 - 16

nedelja

Program dovodenja u kondiciju hodanjem

kategorija			prema Kuperu 1969			
I	II	III	dužina staze u metrima	vreme u minutima	broj vežbanja nedeljno	ukupno poena
nedelja	vežbanja		distance	minuts	per week	points
1	1	-	1600	15:00	5	5
2	-	-	1600	14:00	5	10
3	2	1	1600	13:45	5	10
4	3	-	2400	21:30	5	15
5	4	2	2400	21:00	5	15
6	5	3	2400	20:30	5	15
7	6	-	3200	28:00:00	5	20
8	-	4	3200	27:45:00	5	20
9	7	5	3200	27:30:00	5	20
10	8	-	3200	27:30:00	3	
			4000	33:45:00	2	22
11	9	6	3200	27:30:00	3	
			4000	33:30:00	2	22
12	-	7	4000	33:15:00	4	
			4800	41:30:00	1	26
13	10	-	4000	33:15:00	3	
			4800	41:15:00	2	27
14	11	8	4000	33:00:00	3	
			4800	40:00:00	2	27
15	12	9	4800	41:00:00	5	30
16	13	10	6400	55:00:00	4	32

walking

Kenneth Cooper

Development Conditions - running

Kenneth Cooper

Razvoj aerobne sposobnosti - trčanje

Kenneth Cooper

<i>Week and category</i> Nedelja i kategorija			<i>Track length in meters</i> Dužina staze u metrima	<i>Running time in min.</i> Vreme trčanja u min.	<i>Number of running per week</i> Broj trčanja nedeljno	<i>Total points per week</i> Ukupno bodova nedeljno
I	II	III				
1.	1.	-	1600	13:30	5	10
2.	-	-	1600	13:00	5	10
3.	2.	1.	1600	12:45	5	10
4.	3.	-	1600	11:45	5	10
5.	4.	2.	1600	11:00	5	15
6.	5.	3.	1600	10:30	5	15
7.	6.	-	1600	9:45	5	20
8.	-	4.	1600	9:30	5	20
9.	7.	5.	1600	9:15	5	20
10.	8.	-	1600 2400	9:00 16:00	3 2	21

Procenat masti u telesnoj kompoziciji – BIM metod

What is Body Fat Percentage?

Body fat percentage is the percentage of fat in your body. Too much body fat has been linked to conditions such as high blood pressure, heart disease, diabetes, cancer, and other disabling conditions.



¹ Based on NIH/WHO BMI Guidelines.

² As reported by Gallagher, et al, at NY Obesity Research Center.

To determine the percentage of body fat that is appropriate for your body, consult your physician.

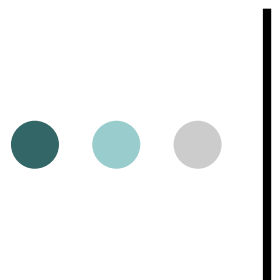


Recommendation

- Target Heart rate zone
- Speed
- Distance
- Energetic balance

Preporuka

- Ciljna zona pulsa
- Brzina kretanja
- Dužina staze
- Energetski balans



Target HR generally

$220 - \text{Age} = \text{biologic maximum (per female 5-10 more)}$

or

$205 - \frac{1}{2} \text{Age}$

- 55 – 65% fat burning zone
- 60 – 80% is aerobic zone

Ciljna zona pulsa – najopštija formula

$220 - \text{godine starosti} = \text{Biološki maksimum (za žene 5-10 više)}$

ili

$205 - \frac{1}{2} \text{godine}$

- 55 – 65% zona sagorevanja masti
- 60 – 80% aerobna zona inteziteta



Cilna zona pulsa preko srčane rezerve (Karvonen 1956)

205 – $\frac{1}{2}$ godine = Biološki maksimum

- HR u miru (HRB)= Srčana rezerva (HRR)

HRB + 0.5 * HRR = početak aerobne zone

HRB + 0.7 * HRR = kraj aerobne zone

Primer

muškarac 40 godina, HRB 50

$$205 - \frac{1}{2} * 40 = 185$$

$$185 - 50 = 135$$

$$50 + 0.5 * 135 = 50 + 68 = 118$$

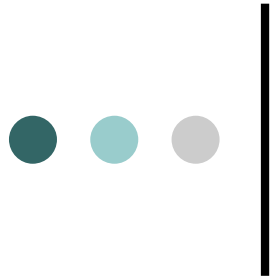
$$50 + 0.7 * 135 = 50 + 94 = 144$$



Brzina kretanja zavisi od rezultata na testu

	B	C	D	E	F	G	H	I	K	L	M	N	O	R	S	T	U	W
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Distancu određujemo na
osnovu BMI indeksa

Intezitet aktivnosti određujemo
na osnovu FITNESS Indeksa



Example

UKK 2km Walking test																				24 decembar 2012.	
rb	MALE	gender	AGE	High	weigh	walking 2 km in min	sec	HR	step	% HR	Walking in km	BMI	FITNES male	VO2max male	frek. koraka	time for VO ₂ max	BM female kcal/cas	ml/02/24h	iMett ml02/kg/m in	Max HR	
1	Dopun Nikolić Ljubiša		42	1.72	69	17	40	120	2010	62.22	6.79	23.32	95.36	40.94	113.77	17.67	1591	318260	3.20	184	
2	Dopun Jevtić Miodrag		48	1.75	98	18	30	144	2393	79.56	6.49	32.00	50.96	21.12	129.35	18.50	1964	392898	2.78	181	
3	YU fes Radojičić Ninoslav	m	46	1.83	87	18	26	112	2343	61.54	6.61	25.98	84.94	35.31	127.11	18.43	1867	373352	2.98	182	
4	YU fes Miščević Mirko	m	44	1.78	81	20	25	123	2284	67.21	5.88	25.56	56.45	24.62	111.87	20.42	1773	354556	3.04	183	
5	YU fes Borić Đuro	m	39	1.79	94	20	25	120	2200	64.69	5.88	29.34	47.32	22.62	107.76	20.42	1990	398066	2.94	185.5	
6	YU fes Andreev Tome	m	48	1.82	92	15	55	99	2093	54.70	7.54	27.77	116.95	47.47	131.50	15.92	1917	383398	2.89	181	
7	vss pri Tadić Vladimir	m	23	1.93	102	19	37	157	2268	81.14	6.12	27.38	37.68	24.41	115.62	19.62	2278	455698	3.10	193.5	
8	vss pri Ivić Renato	m	21	1.80	75	18	18	130	2270	66.84	6.56	23.15	78.81	41.44	124.04	18.30	1856	371152	3.44	194.5	
9	BEČIĆ Madžgalj Edin	m	38	1.65	87	17	37	157	2542	84.41	6.81	31.96	51.99	25.01	144.30	17.62	1831	366168	2.92	186	
10	BEČIĆ Anđelković Zoran	m	48	1.70	85	19	40	112	1968	61.88	6.10	29.41	62.01	25.45	100.07	19.67	1761	352148	2.88	181	
	FEMALE	gender	AGE	High	weigh	walking 2 km in min	sec	HR	step	% HR	Walking in km	BMI	FITNES female	VO2max female	frek. koraka	time for VO ₂ max	BM female kcal/cas	ml/02/24h	iMett ml02/kg/m in	Max HR	
11	97 Ratkovic Zorica	ž	40	1.70	70	19	3	153		82.70	6.30	24.22	82.48	27.55		19.05	1372.37	274474.00	2.72	185.00	
12	97 Trnić Zorica	ž	53	1.59	64	23	49	143		80.11	5.04	25.32	49.23	12.20		23.82	1200.85	240170.80	2.61	178.50	
13	97 Tadić Vesna	ž	39	1.73	77	20	20	141		76.01	5.90	25.73	73.38	24.60		20.33	1458.54	291707.40	2.63	185.50	
14	97 Jovanović Mirjana	ž	41	1.67	65	22	12	130		70.46	5.41	23.31	64.48	20.91		22.20	1305.33	261065.80	2.79	184.50	
15	97 Ristić Zorica	ž	46	1.62	56	16	57	162	2460	89.01	7.08	21.34	103.11	33.11	145.13	16.95	1171.63	234326.40	2.91	182.00	



Energetske potrebe

- Bazalni metabolizam u tabeli
- Dnevne aktivnosti 150 (žene) to 200 (muškarci) Kcal
- Energetska cena koštanja fizičke aktivnosti kcal/km/kg
- umanjujemo oko 10% ako je u pitanju gojaznost



Primer - Borić Djuro

- Uzrast 39
- Telesna visina 1.79m
- Telesna masa 94kg
- BMI 29.34
- Vreme za UKK2km 20 min 20sec
- HR 120 (65%)
- FITNESS index 47.32
- VO2max 22.62
- Bazalni metabolizam 1990 Kcal

● ● ● | Preporuka za Djuru Borić

- **Cilj je da se poveća aerobna sposobnost kroz aktivnost u zoni sagorevanja masti**
 - Započeti sa programom od 16 nedelja hodanja po Kuperovom programu
- ili**
- 2 km za 20:30 min, 5 puta nedeljno (HR 115)
 - $(1990+200+190) - 10\% = 2240$ kcal

Skica trase za UKK-2km test hodanja na TRIM STAZI U Košutnjaku



TEST HODANJA NA 2 KM

Test hodanja na 2 km nam daje mogućnost određivanja FITNES INDEKSA (sporednosti) i procjene maksimalne potrošnje kisika (VO₂max).

Učinci na organizam človeka

1. Temperaturna ispodizbava (sporednost) od 1-2°C.
2. Učestvovanje u hodanju u parku daje pozitivno utjecaj na zdravlje.
3. Kometna hodanja 30 minuta 3-4 puta tjedno povećava otpornost na stres.
4. Agresivnost od 1,2-2,0 minuta, smanjuje mišićnu aktivnost i snagu i brzo hodanje oko 20%.
Smanjuje krvni tlak i snagu i brzo hodanje oko 20%.
5. Nakon 10 minuta hodanja, snaga i brzina hodanja se smanjuju za 20%.
6. Nakon 20 minuta hodanja, snaga i brzina hodanja se smanjuju za 40%.
7. Nakon 30 minuta hodanja, snaga i brzina hodanja se smanjuju za 60%.
8. Nakon 40 minuta hodanja, snaga i brzina hodanja se smanjuju za 80%.
9. Nakon 50 minuta hodanja, snaga i brzina hodanja se smanjuju za 100%.

Formule za izračunavanje FITNES INDEKSA za osobe od 18 do 65 god.

muškarci
 $420 - (11,6 \cdot \text{min} + 0,2 \cdot \text{sec} + 0,56 \cdot \text{HR} + 2,6 \cdot \text{BMI}) + 0,2 \cdot \text{godine}$

Prilagodite vreme u min i sec (npr. 17:30 na hodanje na 2 km) u formulu
 HR - broj srca (broj u toku hodanja)
 BMI - težina (kg) / visina (m) na kvadrat

žene
 $304 - (8,5 \cdot \text{min} + 0,14 \cdot \text{sec} + 0,32 \cdot \text{HR} + 1,1 \cdot \text{BMI}) + 0,4 \cdot \text{godine}$

odgovarajući FITNES INDEKS u svim kategorijama

odgovarajući FITNES INDEKS	svakodnevna aktivnost	svakodnevna aktivnost
> 90	vrlo visoka	vrlo visoka
70-89	visoka	visoka
50-69	prosječna	prosječna
30-49	niska	niska
< 29	vrlo niska	vrlo niska

PROCJENA MAKSIMALNE POTROŠNJE KISIKOVIKA (VO₂max ml/kg/min)

muškarci
 $184,9 - 4,65 \cdot \text{vreme} - 0,22 \cdot \text{HR} - 0,26 \cdot \text{godine} - 1,85 \cdot \text{BMI}$

žene
 $116,2 - 2,98 \cdot \text{vreme} - 0,11 \cdot \text{HR} - 0,14 \cdot \text{godine} - 0,39 \cdot \text{BMI}$

- 1-2 puta nedeljno
- u trajanju od 40 do 60 minuta
- na intenzitetu od 60-80% od maksimalnog vrednosti (120-150 godina hodanja)
- 30 sekundi 110 koraka u minuti, na putu od 110 sekundi u minuti

Ukupni rezultat po proceduri testa i izračunajte u formuli. Rezultat je 3-4 puta manji u formuli od stvarne vrednosti VO₂max. Za procenu stvarne vrednosti VO₂max treba koristiti formulu koja uzima u obzir i faktore kao što su: starost, spol, visina, težina, itd.

FITNESS INDEX AND MAXIMAL OXYGEN UPTAKE AMONG PEOPLE WITH ACTIVE LIFE-STYLE IN SERBIA

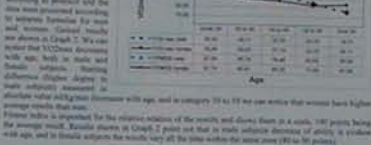
Author: Miro, and Jovan, Faculty of Sport and Physical Education, Belgrade, Serbia and Montenegro

Introduction: Physical work ability is based on the ability of the body to take and transport oxygen. Ability of the following factors are also essential for the estimation of oxygen uptake: sex, age, body mass, body height and heart frequency at the end of the test. Aired from different studies there is a decrease in the ability of the body to take and transport oxygen with age.

Method: UKK test walking test was conducted by the sample of 300 subjects: 122 female and 178 male. The test was conducted in the year 2005. During the period from 1997 to 2005, authors of this study conducted the test of the test. Aired from different studies there is a decrease in the ability of the body to take and transport oxygen with age.

Table 1. Age and sex structure of the sample.

Age	Sex	n
18-29	Male	100
18-29	Female	100
30-39	Male	100
30-39	Female	100
40-49	Male	100
40-49	Female	100
50-59	Male	100
50-59	Female	100
60-69	Male	100
60-69	Female	100



Graph 1. Fitness Index and VO₂max female and male in Serbia.

Conclusion:
 1. In younger categories, there is a significant difference in maximal oxygen uptake related to sex, which decreases in time, and is completely gone around the age of 20.
 2. In 70-year-olds, there is a significant difference in value (can be noticed, whereas in female subjects it has a higher value than in male subjects).
 3. Difference between absolute values of VO₂max and Relative value, shows through Fitness Index, indicate the need for further research of working ability in relation to sex.

References:
 1. Patek, Miro, and Jovan, Faculty of Sport and Physical Education, Belgrade, Serbia, 2005.
 2. Miro, and Jovan, Faculty of Sport and Physical Education, Belgrade, Serbia, 2005.

Program dovođenja u kondiciju hodanjem

Program dovođenja u kondiciju hodanjem

Kategorija	I	II	III	dužina staze u metrima	vreme u minutama	broj vežbanja	ukupno poena
1	1	1	1	1000	15:00	5	5
2	1	1	1	1500	14:00	5	15
3	2	1	1	1500	13:45	5	18
4	2	1	1	2400	21:30	5	18
5	4	2	1	2400	21:00	5	18
6	5	3	2	2400	20:30	5	18
7	6	3	2	3200	28:00:00	5	20
8	7	4	2	3200	27:45:00	5	20
9	7	5	2	3200	27:30:00	5	20
10	8	5	2	3200	27:30:00	5	20
11	8	6	2	4000	33:45:00	2	23
12	8	6	2	4000	33:30:00	2	23
13	10	7	2	4000	41:30:00	1	26
14	11	8	2	4000	41:15:00	2	27
15	12	9	2	4800	47:00:00	1	29
16	13	10	2	4800	46:45:00	1	29

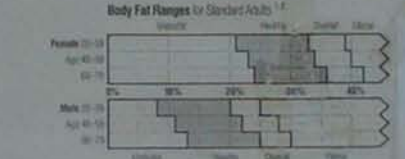
Program dovođenja u kondiciju trčanjem

Program dovođenja u kondiciju trčanjem

Kategorija	I	II	III	dužina staze u metrima	vreme u minutama	broj vežbanja	ukupno poena
1	1	1	1	1000	13:30	5	5
2	1	1	1	1000	13:00	5	5
3	2	1	1	1000	12:45	5	5
4	2	1	1	1500	17:45	5	5
5	4	2	1	1500	17:00	5	5
6	5	3	2	1500	16:30	5	5
7	6	3	2	1500	16:45	5	5
8	7	4	2	1500	16:30	5	5
9	7	5	2	1500	16:15	5	5
10	8	5	2	1200	16:00	5	5
11	8	6	2	1500	16:20	5	5
12	8	6	2	1500	15:50	5	5
13	10	7	2	1500	16:30	5	5
14	11	8	2	1500	17:00	5	5
15	12	9	2	2400	12:30	5	5
16	13	10	2	2400	11:50	5	5

What is Body Fat Percentage?

Body fat percentage is the percentage of fat in your body. For much body fat has been linked to conditions such as high blood pressure, heart disease, diabetes, cancer, and other disabling conditions.



Kategorija: muškarci

- vrlo niska: 14,00-17,00%
- niska: 17,00-19,00%
- prosječna: 19,00-24,00%
- visoka: 24,00-27,00%
- vrlo visoka: 27,00-32,00%

Kategorija: žene

- vrlo niska: 16,00-19,00%
- niska: 19,00-22,00%
- prosječna: 22,00-27,00%
- visoka: 27,00-32,00%
- vrlo visoka: 32,00-37,00%

Većina aktivnosti	u 1000 koraka (min)	u 1000 koraka (max)
Vožnja bicikla 11,3 km/h	320	1344
Vožnja bicikla 20 km/h	540	2160
Aerobni plus hodanje (intenzivno)	210	840
Aerobni plus hodanje (umjereno)	480	1920
Godišnja težina	180	720
Kuljenje	180	720
Trčanje	450	1800
Kukanje	480	1920
Održavanje	330	1320
Kupanje	180	720
Trčanje hodanje	210	840
Trčanje hodanje	210	840
Hodanje 4 km/h	150	600
Hodanje 6 km/h	150	600
Trčanje 11,3 km/h	480	1920
Trčanje 16 km/h	780	3120
Trčanje 20 km/h	1080	4320
Trčanje 24 km/h	1380	5520
Trčanje 28 km/h	1680	6720
Trčanje 32 km/h	1980	7920
Trčanje 36 km/h	2280	9120
Trčanje 40 km/h	2580	10320
Trčanje 44 km/h	2880	11520
Trčanje 48 km/h	3180	12720
Trčanje 52 km/h	3480	13920
Trčanje 56 km/h	3780	15120
Trčanje 60 km/h	4080	16320
Trčanje 64 km/h	4380	17520
Trčanje 68 km/h	4680	18720
Trčanje 72 km/h	4980	19920
Trčanje 76 km/h	5280	21120
Trčanje 80 km/h	5580	22320
Trčanje 84 km/h	5880	23520
Trčanje 88 km/h	6180	24720
Trčanje 92 km/h	6480	25920
Trčanje 96 km/h	6780	27120
Trčanje 100 km/h	7080	28320

Tablica 11. Učinkovitost hodanja u raznim kategorijama (1000 koraka u 1000 koraka).