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Proposed Revisions to the Navy Physical Readiness Test

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2015

Proposed Revision to the Navy Physical Readiness Test

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MSC, USN

Need for Combat Fitness Tests

- In May 2004, an Army HHC operating in Northern Iraq was hit multiple times by enemy mortar fire.
 - After the attack, the onsite commander found one of his soldiers attempting to move a bleeding and unresponsive casualty; however, lacked the physical strength to do so.
 - Ironically, this soldier consistently passed the APFT.
- Batchelor (2008)

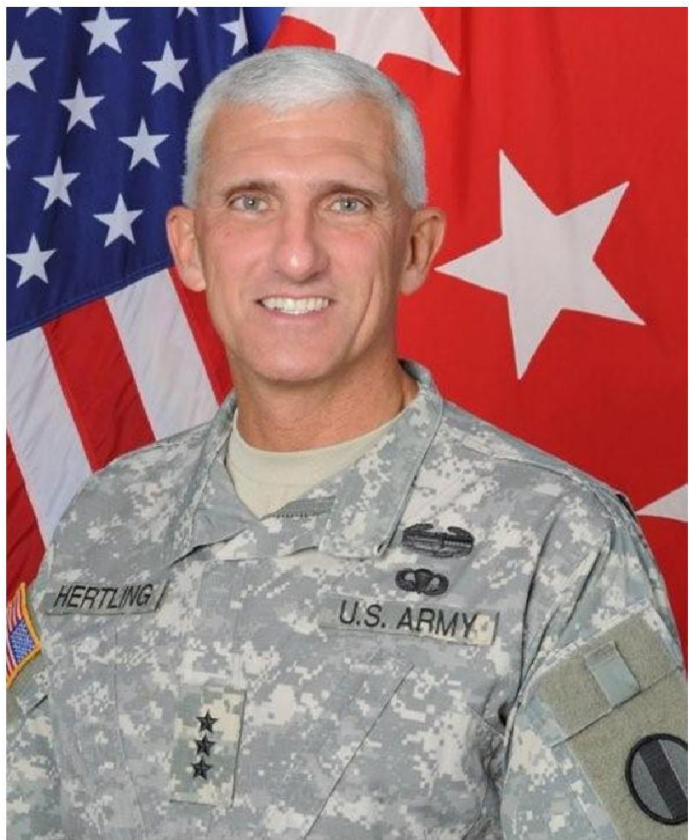
Need for Combat Fitness Tests

- **Lessons learned:**

- Service members need to be better prepared for the rigors of war
- Military services cannot rely on current physical training programs to prepare service members to meet these demands

- Batchelor (2008)

Need for Combat Fitness Tests



LTG Mark Hertling
TRADOC Deputy CG

"Today's PT test does not adequately measure components of strength, endurance, or mobility. The events have a low correlation to the performance of warrior tasks and battle drills and are not strong predictors of successful physical performance on the battlefield or in full spectrum operations."

Need for Combat Fitness Tests

- In January 2013, SecDef lifted the ban on women serving in combat roles



Need for Combat Fitness Tests

- Today's service members are “**tactical athletes**”
 - Job requirements include the ability to jump, crawl, roll, bound, climb, push, pull, sprint, and carry heavy loads long distances
- Doyle & McDaniel (2006), Heinrich et. al (2012), Roy et. (2010)

Need for Combat Fitness Tests

Operationally relevant PT tests provide military commanders with the following information:

- Physical capabilities/limitations of assigned personnel
- Information for task force selection
- Identify essential fitness components
- Means of evaluating PT programs

- Harman et. al (2008), Knapik & East (2014)

Fitness Testing 101

Fitness Testing Definition

- A series of exercises designed to assess fitness (e.g., cardiovascular endurance, muscular strength, agility, etc.). [WHAT]
- Typically performed before starting an exercise program *and/or* periodically to monitor progress. [WHEN]

Fitness Testing Purpose

- Identify physiological strengths & weaknesses
- Ranking individuals for selection purposes
- Predicting future performances
- Evaluating effectiveness of training program
- Track performance over time
- Assign training parameters
 - load (e.g., based of 1RM)

[WHY]

Field Test Definition

A test used to assess ability that is performed away from the laboratory and does not require extensive training or expensive equipment to administer.



Field Tests Should...

- Be Valid
- Be Reliable
- Be Feasible
- Be Objective
- Be Operationally Relevant
- Incorporate as many components of physical fitness as possible

Physical Fitness Components

Health Related:

- Cardiovascular Fitness
- Muscular Endurance
- Muscular Strength
- Flexibility
- Body Composition

Skill Related:

- Speed
- Agility
- Power
- Coordination
- Balance
- Reaction Time

Potential Field Tests

	Upper Body	Lower Body	Core
Body Composition	Body Circumference (2-site for Males; 3-site for Females) / 3-Site Skinfold		
Flexibility	Shoulder Flexibility Test	Sit-Reach	-
Balance	-	Stork Stand Test Modified Bass	-
Agility	-	3-Cone Drill Pro-Agility NSCA T-Test	-
Anaerobic Power	Overhead Medicine Ball Throw Underhand Medicine Ball Throw	Standing Long Jump Vertical Jump	-
Speed	-	40-yd Sprint ¾ Court Sprint	-
Muscular Strength	Push-Pull Dynamometer Test	Leg-Hip Dynamometer	-
Muscular Endurance	Pull-Ups Modified Cadence Push-Ups	Wall Squat Quad	Plank V-Sit
Anaerobic Capacity	-	60-yd Shuttle 300-yd Shuttle 400-m Sprint	-
Aerobic Endurance	-	12-min Run 1.5-mi. Run	-

Field Test Order

- Non-fatiguing tests
- Agility tests
- Maximum power / strength
- Sprint tests
- Muscular endurance
- Anaerobic capacity
- Aerobic capacity

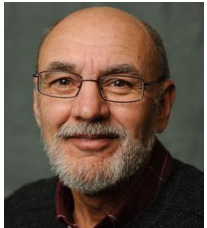


Developing a Fitness Test

Developing a Test

- Define what you want to measure [Needs Analysis]
- Research to see if similar tests already exist
- Modify / develop official testing procedures
- Determine appropriate scoring system
- Pilot the test, scoring system, and procedures
- Evaluate, modify, and retest
- Develop norms

- Bishop, P. (2008). *Measurement and Evaluation in physical activity applications*.



Criterion vs. Norm Standards

Criterion Standards Example:

US Army Airborne School APFT Requirements		
Event	Male (17-21 y/o)	Female (17-21 y/o)
Push-Ups	42	19
Sit-Ups	53	53
2-Mile Run	15:54	18:54

US Army Ranger Physical Fitness Test			
Push-Ups	Sit-Ups	Chin-Ups	5-Mile Run
49+	59+	6+	≤40:00

Criterion vs. Norm Standards

Performance Norms Example: OPNAVINST 6110.1H

Standards are based on a sample of PRT results from over 200,000 members in the Fleet during PRTs from 1997 and 1998. Separate standards were developed for each gender and age group. Standards for each performance category are as follows:

- (1) **OUTSTANDING** - Performance above or equal to top 10 percent.
- (2) **EXCELLENT** - Performance in top 25 percent, but less than OUTSTANDING.
- (3) **GOOD** - Performance better than or equal to lowest 25 percent, but less than EXCELLENT.
- (4) **SATISFACTORY/PROBATIONARY** - Performance in bottom 25 percent, but above lowest 10 percent.
- (5) **UNSATISFACTORY** - Performance in lowest 10 percent.

Sample Field Tests used by Industry

NFL Combine

- 40-yd Dash
- Bench Press
- Vertical Leap
- Broad Jump
- 20-yd Shuttle
- 3 Cone Drill
- 60-yd Shuttle



Nike SPARQ

- 40-yd Dash
- Pro-Agility
- Kneeling Powerball Toss
- Vertical Jump



Kneeling Powerball Toss



Fitness Tests used by the Military

DoD Instruction 1308.3

- Military Services shall develop and use physical fitness tests (PFTs) that evaluate aerobic capacity, muscular strength, and muscular endurance.
- PFTs shall assess baseline **generalized fitness** and not represent mission specific fitness demands.

Army Physical Fitness Test

- **Primary Components:**
 - Push-Up
 - Sit-Up
 - 2.0-Mile Run
- **Alternate Cardio Options:**
 - 800-yd Swim
 - 6.2-Mile Stationary Bike
 - 2.5-Mile Walk Test



Air Force Physical Fitness Test

- **Primary Components:**

- Curl-Ups (1-min)
- Push-Ups (1-min)
- 1.5-Mile Run



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- **Alternate Cardio Options:**

- 1.0-Mile Rockport Walk Test

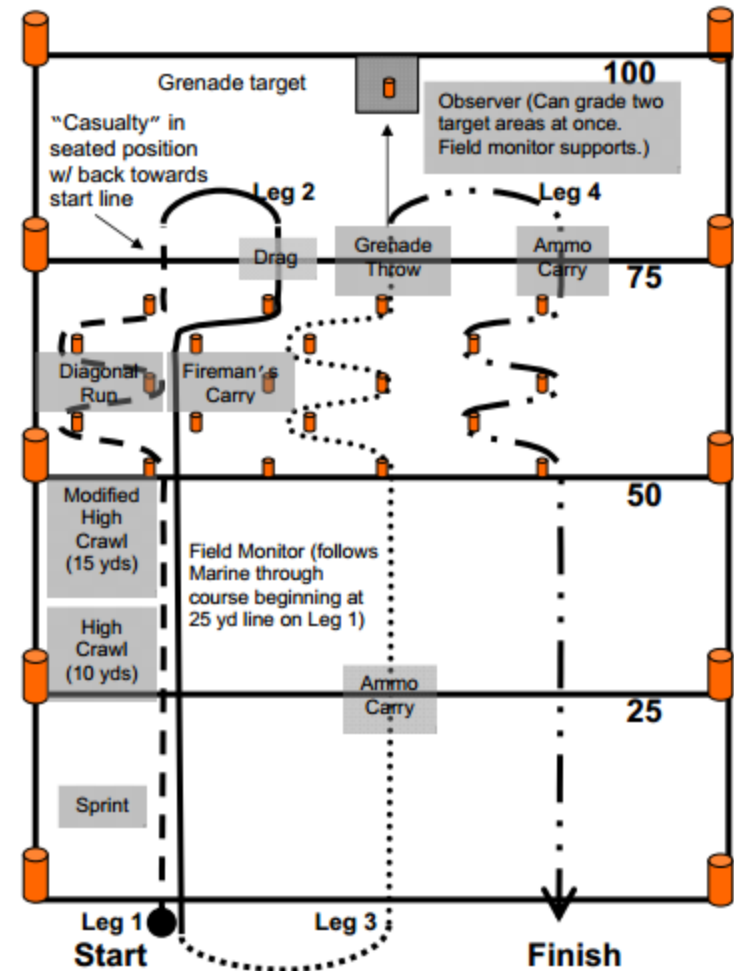
USMC Physical Fitness Test

- Pull-ups (Males) / Flexed Arm Hang (Females)
- Crunches
- 3.0-Mile Run



USMC Combat Fitness Test

- 880-yd run
- 2-min overhead press
- Obstacle Course



Navy Physical Readiness Test

- **Primary Components:**
 - Curl-Ups
 - Push-Ups
 - 1.5-Mile Run
- **Alternate Cardio Options:**
 - 450-m / 500-yd Swim
 - 12-min Elliptical
 - 12-min Stationary Bike



Where have all the runners gone?



Navy Physical Readiness Test

Event	Valid	Reliable	Feasible	Objective	Operationally Relevant
Curl-Ups	X	X	X	X	-
Push-Ups	-	X	X	-	-
1.5-Mile Run	X	X	X	X	-
500-yd / 450-m Swim	-	X	-	X	-
12-min Elliptical Trainer	-	-	-	X	-
12-min Stationary Bike	-	-	-	X	-

ACSM's Guidelines for Exercise Testing & Prescription (9th Ed.)

- **Chapter 4, page 77:** “Some electronic fitness equipment [bike] cannot be calibrated and **should not** be used for testing.”

PRT Approved Ellipticals and Bikes

Elliptical trainers approved for official PFA testing:

- LifeFitness 95X Engage
- LifeFitness 95X Inspire
- Precor EFX556I
- Precor EFX576I
- Technogym Excite Synchro 700 VisioWeb+WS+iPod+USB
- Technogym Excite Synchro 700 VisioWeb+iPod+USB
- Technogym Excite Synchro 700 VisioWeb+WS
- Technogym Excite Synchro 700 VisioWeb
- Technogym Excite Synchro 700sp LED+WS
- Technogym Excite Synchro 700sp LED
- LifeFitness CT9500
- LifeFitness CT9500HR
- LifeFitness 95XI (Quiet Drive Only)
- LifeFitness 91XI
- LifeFitness 91X / Classic Series (CL8X)
- LifeFitness 95X Engage
- LifeFitness 95X Inspire
- Precor EFX556 NAVY
- Precor EFX556I NAVY
- Precor EFX556I
- Precor EFX576I
- Nautilus E916
- Technogym Excite Synchro 700 VisioWeb+WS+iPod+USB
- Technogym Excite Synchro 700 VisioWeb+iPod+USB
- Technogym Excite Synchro 700 VisioWeb+WS
- Technogym Excite Synchro 700 VisioWeb
- Technogym Excite Synchro 700sp LED+WS
- Technogym Excite Synchro 700sp LED
- Technogym Synchro 700
- Cybex Arc Trainer 770AT
- Cybex Arc Trainer 750AT
- Cybex Arc Trainer 625AT
- Cybex Arc Trainer 771AT
- Octane Pro 370/3700
- Octane Pro 4700

Stationary bikes approved for official PFA testing:

- LifeFitness 95Ci / Classic Series (CL8C)
- LifeFitness 95Ci XXL
- LifeFitness 95C Inspire
- Cybex 750C
- Cybex 770C
- Cybex 625C
- Matrix U5X

5K Bike vs. 500-yd Swim

Correlation between VO_2max , 1.5 Mile Run, and 500-yd Swim

	VO_2max	1.5 Mile Run	500-yd Swim
VO_2max	-	-0.84 *	-0.32
1.5 Mile Run	-	-	0.44 *
500-yd Swim	-	-	-

Correlation between VO_2max , % BF, Swim Skill, and Swim Time

	Swim Time	VO_2max	Swim Skill	% BF
Swim Time	-	-0.32	-0.83 *	0.20
VO_2max	-	-	0.28	-0.74 *
Swim Skill	-	-	-	0.24
% BF	-	-	-	-

* $p < 0.01$, N = 60

Possible New Physical Fitness Tests

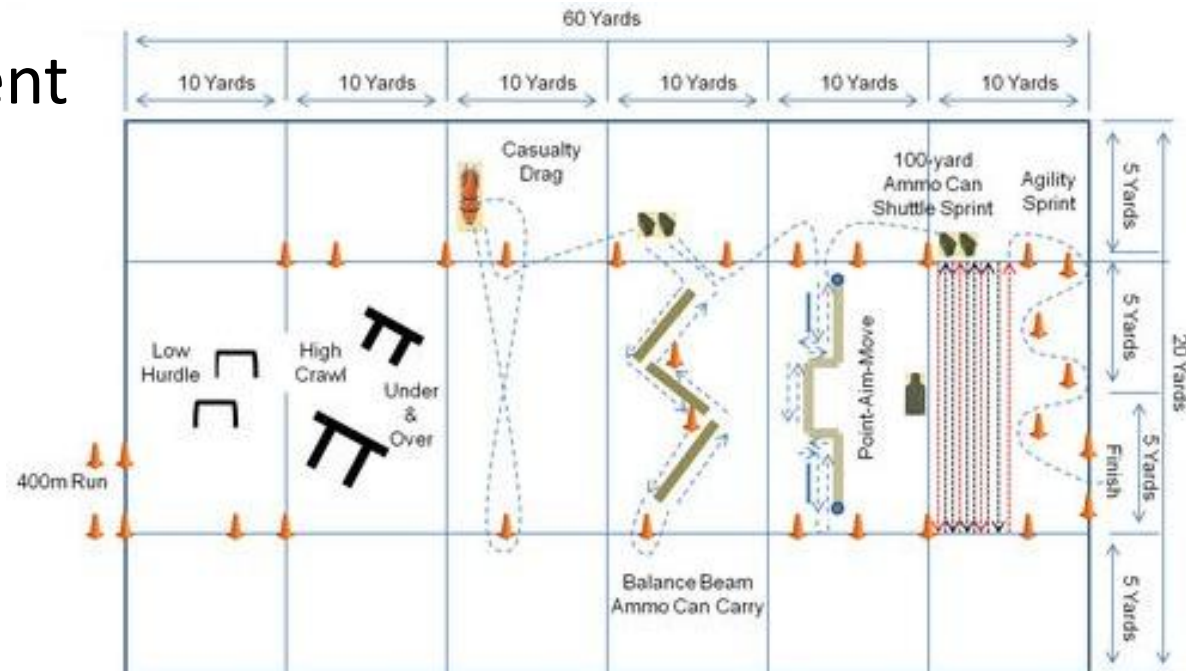
Army Physical Readiness Test



- 60-yd Shuttle
- 1-Minute Rower
- Standing Long Jump
- 1-Minute Push-Up
- 1.5-Mile Run

Army Combat Readiness Test

- 400-m Run w/Weapon
- Individual Movement Techniques
- Ammo Can Shuttle Sprint
- Casualty Drag
- Agility Sprint



TRADOC Soldier 2020

- **Transition to a standards-based Army**
 - Match Soldiers to jobs that best correspond to their physical ability
- **Apply standards uniformly to every Soldier**
 - No age or gender exceptions to these standards



TRADOC Soldier 2020

- **Specific job tasks determined to be essential for Combat Engineers**
 - Maximal lift
 - Drag
 - Repetitive lift & carry
 - Load carriage



Soldier 2020 Predictor Tests

Muscular Strength:

- Handgrip
- Upright pull
- Biceps curl
- Squat lift

Power:

- Standing long Jump
- Medicine-ball put
- Overhead powerball throw
- Resistance pull

Muscular Endurance:

- Sit-ups
- Push-ups
- Arm ergometer

Cardiovascular Endurance:

- Beep test
- Step test

Speed & Agility:

- Illinois agility test
- 300-m run

Air Force Combat Fitness Test?

- **Worden and White III (2012):**

- ½ mile run
- 2-min repetitive dumbbell lift
- 1-min push-ups

- **Mitchell et al. (2014):**

- 1.5-mile run
- 2-min repetitive dumbbell lift



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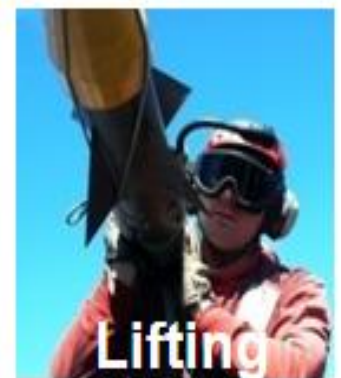
2011 PRT Beta Test



- Single-Leg Plank
- Single-Leg Wall Squat
- Cadence Push-Ups
- Standing Long Jump
- Leg/Hip Dynamometer
- Pro Agility Test
- 300-yd Shuttle
- 2-Km Rower
- 5-Km Bike Test

1985 Robertson & Trent Study

- Numerous shipboard and other Naval tasks require great physical strength. However, few field batteries exist to adequately assess muscular strength.
- ~ 84% of Navy shipboard tasks can be categorized into three basic movement patterns
 - Lifting
 - Carrying
 - Pulling



Proposed Fitness Tests for the U.S. Navy

Navy General Fitness Test

- **Primary Components:**
 - Abdominal Circumference
 - Umbilicus
 - Plank
 - 1.5-mile Run
- **Alternate Cardio Options:**
 - 2-Km Rower



Navy General Fitness Test

Event	Valid	Reliable	Feasible	Objective	Operationally Relevant
Abdominal Circumference	X	X	X	X	X
Plank	X	-	X	-	X
1.5-mile Run	X	X	X	X	-
2-Km Rower	X	X	-	X	-

Navy General Fitness Test

Male				Points	Female			
A/C (in.)	Plank	1.5-mile Run	2K Rower		A/C (in.)	Plank	1.5-mile Run	2K Rower
≤ 35	4:00	09:30	07:00	100	≤ 30	4:00	11:00	08:00
-	3:58	09:35	07:06	99	-	3:58	11:15	08:06
35.25	3:56	09:40	07:12	98	30.25	3:56	11:25	08:12
-	3:54	09:50	07:18	97	-	3:54	11:35	08:18
35.5	3:52	10:00	07:24	96	30.5	3:52	11:45	08:24
-	3:50	10:10	07:30	95	-	3:50	11:55	08:30
35.75	3:48	10:15	07:36	94	30.75	3:48	12:05	08:36
-	3:46	10:20	07:42	93	-	3:46	12:20	08:42
36	3:44	10:30	07:48	92	31	3:44	12:30	08:48
-	3:42	10:40	07:54	91	-	3:42	12:40	08:54
36.25	3:40	10:50	08:00	90	31.25	3:40	12:50	09:00
-	3:38	10:55	08:06	89	-	3:38	12:55	09:06
36.5	3:36	11:00	08:12	88	31.5	3:36	13:00	09:12
-	3:34	11:10	08:18	87	-	3:34	13:10	09:18
36.75	3:32	11:20	08:24	86	31.75	3:32	13:20	09:24
-	3:30	11:25	08:30	85	-	3:30	13:30	09:30
37	3:28	11:30	08:33	84	32	3:28	13:45	09:33
-	3:26	11:35	08:36	83	-	3:26	14:00	09:36
37.25	3:24	11:40	08:39	82	32.25	3:24	14:30	09:39
-	3:22	11:50	08:42	81	-	3:22	14:45	09:42
37.5	3:20	12:00	08:45	80	32.5	3:20	15:15	09:45
-	3:18	12:10	08:48	79	-	3:18	15:30	09:48
37.75	3:16	12:15	08:51	78	32.75	3:16	15:40	09:51
-	3:14	12:20	08:54	77	-	3:14	15:50	09:54
38	3:12	12:25	08:57	76	33	3:12	16:00	09:57
-	3:10	12:30	09:00	75	-	3:10	16:10	10:00
38.25	3:08	12:35	09:15	74	33.25	3:08	16:20	10:15
-	3:05	12:40	09:30	73	-	3:05	16:30	10:30
38.5	3:00	12:45	09:30	72	33.5	3:00	16:40	10:30
-	2:55	12:50	09:45	71	-	2:55	16:50	10:45
38.75	2:50	13:00	10:00	70	33.75	2:50	17:00	11:00
-	2:45	13:15	10:02	69	-	2:45	17:10	11:02
39	2:40	13:30	10:05	68	34	2:40	17:15	11:05
-	2:35	13:45	10:07	67	34.25	2:35	17:20	11:07
39.25	2:30	14:00	10:10	66	34.5	2:30	17:25	11:10
-	2:25	14:15	10:12	65	34.75	2:25	17:30	11:12
39.5	2:20	14:30	10:15	64	35	2:20	17:40	11:15
-	2:15	14:45	10:17	63	35.25	2:15	17:45	11:17
39.75	2:10	15:00	10:20	62	35.5	2:10	17:50	11:20
-	2:05	15:15	10:25	61	35.75	2:05	17:55	11:25
40	2:00	15:30	10:30	60	36	2:00	18:00	11:30

	≤ 34 years	35-44 years	45-54 years	55+ years
Maximum	300	285	260	240
Outstanding	275	260	235	220
Excellent	250	235	215	200
Good	225	215	195	190
Satisfactory	180	180	180	180

Navy Operational Fitness Test

- **Components:**
 - Kneeling Powerball Toss
 - 2-kg powerball - Females
 - 3-kg powerball - Males
 - Standing Long Jump
 - 40-yd Dash
 - 50-yd Loaded Carry
 - (2) 24-kg kettlebells - Females
 - (2) 32-kg kettlebells - Males
 - 300-yd Shuttle



Navy Operational Fitness Test

Event	Valid	Reliable	Feasible	Objective	Operationally Relevant
Kneeling Powerball Toss	X	X	-	X	X
Standing Long Jump	X	X	X	X	X
40-yd Dash	X	X	X	X	X
50-yd Loaded Carry	X	X	-	X	X
300-yd Shuttle	X	X	X	X	X

Navy Operational Fitness Test

Male					Points	Female				
KPB Toss (ft)	SLJ (cm)	40-yd Sprint (sec)	Loaded Carry (sec)	300-yd Shuttle		KPB Toss (ft)	SLJ (cm)	40-yd Sprint (sec)	Loaded Carry (sec)	300-yd Shuttle
38	275	4.9	12	00:55	100	28	225	5.3	15	01:00
37.5	272	-	-	-	99	-	222	-	-	01:01
37	270	-	-	00:56	98	27.5	220	5.4	-	01:02
36.5	267	5.0	-	-	97	-	217	-	16	01:02
36	265	-	13	00:57	96	27	215	5.5	-	01:03
35.5	262	-	-	-	95	-	212	-	-	01:04
35	260	5.1	-	00:58	94	26.5	210	5.6	17	01:05
34.5	257	-	-	-	93	-	207	-	-	01:06
34	255	-	14	00:59	92	26	205	5.7	-	01:07
33.5	252	5.2	-	01:00	91	-	202	-	18	01:08
33	250	-	-	01:01	90	25.5	200	5.8	-	01:09
32.5	247	-	-	01:02	89	-	197	-	-	01:10
32	245	5.3	15	01:02	88	25	195	5.9	19	01:11
31.5	240	-	-	01:03	87	-	190	-	-	01:12
31	235	-	-	01:04	86	24.5	185	6.0	-	01:13
30.5	230	5.4	-	01:05	85	-	180	-	20	01:14
30	229	-	16	01:06	84	24	179	6.1	-	01:15
29.5	228	-	-	01:07	83	-	178	-	-	01:16
29	227	5.5	-	01:08	82	23.5	177	6.2	21	01:17
28.5	226	-	-	01:09	81	-	176	-	-	01:18
28	225	-	17	01:10	80	23	175	6.3	-	01:19
27.5	224	5.6	-	01:11	79	-	174	-	22	01:20
27	223	-	-	01:12	78	22.5	173	6.4	-	01:21
26.5	222	-	-	01:13	77	22	172	-	-	01:22
26	221	5.7	18	01:14	76	21.5	171	-	23	01:23
25.5	220	-	-	01:15	75	21	170	6.5	-	01:24
25	219	-	-	01:16	74	20.5	169	-	-	01:25
24.5	218	5.8	-	01:17	73	20	168	-	24	01:26
24	217	-	19	01:18	72	19.5	167	6.6	-	01:27
23.5	216	-	-	01:19	71	19	166	-	-	01:28
23	215	5.9	-	01:20	70	18.5	165	-	25	01:29
22.5	210	-	-	01:21	69	18	164	6.7	-	01:30
22	205	-	20	01:22	68	17.5	163	-	-	01:30
21.5	200	6.0	-	01:23	67	17	162	-	26	01:31
21	195	-	-	01:24	66	16.5	161	6.8	-	01:32
20.5	190	-	-	01:25	65	16	160	-	-	01:33
20	185	6.1	21	01:26	64	15.5	158	-	28	01:34
19.5	180	-	-	01:27	63	15	156	6.9	-	01:35
19	175	6.2	-	01:28	62	14.5	154	-	29	01:36
18.5	170	-	-	01:29	61	14	152	-	-	01:37
18	165	6.3	22	01:30	60	13.5	150	7.0	30	01:38

	≤ 34 years	35-44 years	45-54 years	55+ years
Maximum	500	475	430	400
Outstanding	455	430	390	365
Excellent	415	395	355	330
Good	375	355	320	310
Satisfactory	300	300	300	300

Questions?



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