

# Sciencetific Invention



Kanchanapisek Wittayalai Nakhonpathom School  
(Pratumnak Suankularb Mattayom)

## Created by

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## Physical fitness

Physical fitness means physical condition that can carry out activities Effectively And include all the features of health and well-being.



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## Physical fitness related to health

Good condition of the body makes it possible to carry out daily tasks actively. Reduce the risk of health problems due to lack of exercise.



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## Physical fitness related to health

1. Muscular Strength



2. Muscular Endurance

3. Cardiorespiratory Endurance

4. Flexibility



5. Body Composition



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## Physical fitness related to skills

The physical fitness required for sport.  
This will make sport the most effective.



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## Physical fitness related to skills.

1.Speed



2. Muscle Power



3. Agility



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## Physical fitness related to skills.

4.Balance



5. Reaction Time



6. Coordination



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## Physical Fitness Tests

BMI



Skin fold



Push up



Sit-up

Sit and reach

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## Physical Fitness Tests



Zig-zag run



Run

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## Speed

Speed is the ability to move to the desired goal in the shortest possible time. The muscles must exert and shrink with maximum speed



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## Steps of short run speed.

In the first 15 meters the corners of body are still low and very forward and that is speed of the acceleration. Until the distance of 30 meters



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## Steps of short run speed.

The range of 30 – 50 meters speed will gradually increase to the peak.



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## Speed test equipment



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## Swift SpeedLight timing training systems

Swift SpeedLight timing training systems are similar to SPEED analyzers developed by the research team. The price is. £ 446.40 – £ 15,192.00 (approximately 22,320 - 759,600 baht), which is a very high price.



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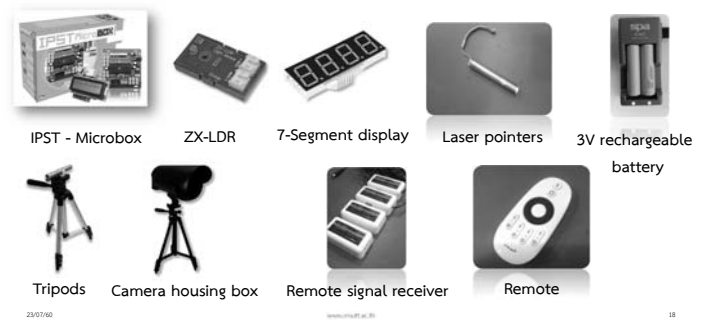
## Layout of equipment of “SPEED ANALYSER”



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## Material used in speed analyser



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## Research Objectives

1. To design and create Speed Analyser.
2. To study performance of Speed Analyser.

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## Scope of research

The samples are male students in grade 10 - 12.  
Number of 10 people between 16-18 years of academic year 2016

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(Specific random sampling)

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## Hypothesis

Speed Analyser can work effectively to know the running speed of 50 meters in 4 distance of 0 - 15, 0 - 30, 0 - 40 and 0 - 50 meters, respectively.

The test results can be used to develop a physical fitness program that is related to 50-meter runner speed.

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## Variable studied

### Independent Variable

Speed Analyser

### Dependent Variable

1. Efficiency of speed analyser
2. Results recorded from speed analyser

### Control Variable

1. Distance to run
2. The age of samples

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## Design and build process

1. Study related document.
2. Study information about process of speed analyser.
3. Study information about materials that used to build speed analyser.

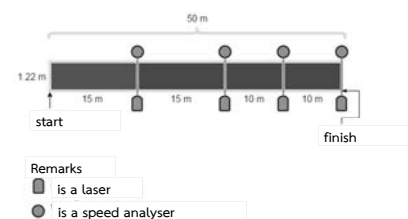
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## Design and build process

4. Study information about how to position speed analyser in testing.



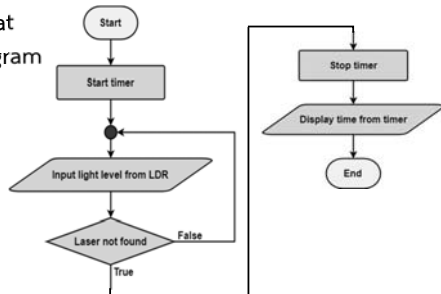
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## Design and build process

5. Create flowchart that show process of program in IPST-Microbox.



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## Design and build process

6. Program IPST-Microbox by following this step.

- 6.1 Write program according to flowchart that created in step 5.

```

#include <ipst.h>
void setup() {
  Serial.begin(9600);
  pinMode(LED_PIN, OUTPUT);
  pinMode(LDR_PIN, INPUT);
  pinMode(BUZZER_PIN, OUTPUT);
  pinMode(TIMER_PIN, OUTPUT);
}

void loop() {
  if (digitalRead(LDR_PIN) == HIGH) {
    digitalWrite(LED_PIN, HIGH);
    digitalWrite(BUZZER_PIN, HIGH);
    digitalWrite(TIMER_PIN, HIGH);
    delay(1000);
    digitalWrite(LED_PIN, LOW);
    digitalWrite(BUZZER_PIN, LOW);
    digitalWrite(TIMER_PIN, LOW);
    delay(1000);
  }
}

```

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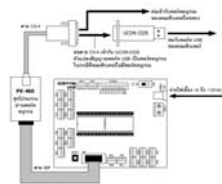
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## Design and build process

- 6.2 Compile written program.

- 6.3 Connect IPST - Microbox to computer and program IPST - Microbox.



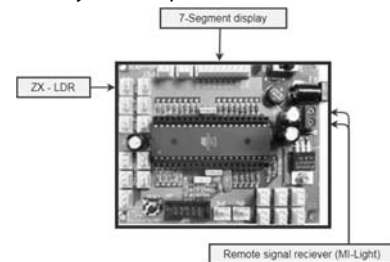
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## Design and build process

7. Install speed analyser components.



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## Design and build process

8. Test speed analyser in simulating room.

9. Test speed analyser in real place.



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## Evaluation and testing process

1. Order 4 timekeepers to stand in 15, 30, 40, 50 meters distance and order speed analyser starter to stand in 50 meters distance.
2. Order a participant to move to starting point.
3. Signal the participant to start running. When the timekeepers and the speed analyser starter hear the signal, the speed analyser starter will start speed analyser and the timekeepers will start their stopwatches.

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## Evaluation and testing process

- When the participant move through each defined distances that are 15, 30, 40 and 50 meter, timekeeper in each distance must stop her stopwatches.
- Record times that the speed analysers show and times of each timekeeper.
- Repeat step 2 to 5 for each participant until all participants are tested. When all participant are tested, test all participants again.

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## Evaluation and testing process

- Calculate error between times recorded from each timekeeper and speed analysers.
- Use recorded times to calculate running speed of each participant and then use calculated running speed to create fitness training program for each participant.

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## Digital timers evaluation result

Time from digital timer using 3 timer at 0-15 meters

Timekeeper	Time in the range of 0 - 15 meters (sec)		
	First	Second	Third
1.	3.02	3.06	2.87
2.	2.91	2.39	3.05
3.	3.19	2.84	2.94
Average	3.04	2.76	2.95

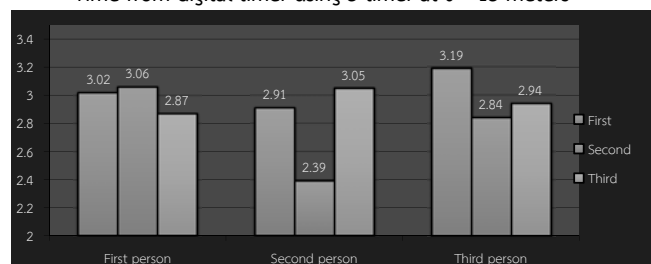
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## Digital timers evaluation result

Time from digital timer using 3 timer at 0 – 15 meters



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## Digital timers evaluation result

Time from digital timer using 3 timer at 0 - 30 meters

Timekeeper	Time in the range of 0 - 30 meters (sec)		
	First	Second	ครั้งที่ 3
1.	4.89	4.99	5.20
2.	4.93	4.93	6.20
3.	5.11	5.23	5.23
ค่าเฉลี่ย	4.98	5.05	5.54

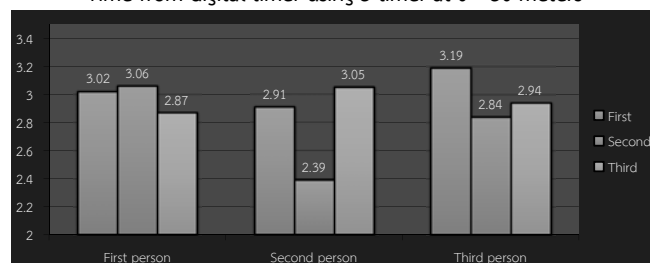
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## Digital timers evaluation result

Time from digital timer using 3 timer at 0 – 30 meters



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## Digital timers evaluation result

Time from digital timer using 3 timer at 0 - 40 meters

Timekeeper	Time in the range from 0 - 40 meters (sec)		
	First	Second	Third
1.	6.88	6.16	6.37
2.	6.01	6.24	6.47
3.	6.11	6.28	6.32
Average	6.33	6.23	6.39

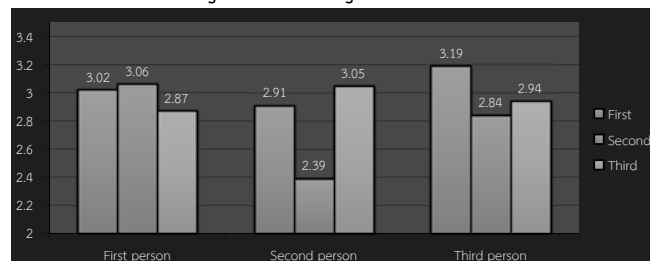
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## Digital timers evaluation result

Time from digital timer using 3 timer at 0 - 40 meters



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## Digital timers evaluation result

Time from digital timer using 3 timer at 0 - 50 meters

Timekeeper	Time in the range from 0 - 50 meters (sec)		
	First	Second	Third
1.	7.70	8.40	8.12
2.	7.61	8.50	8.10
3.	7.76	8.50	8.27
Average	7.69	8.47	8.16

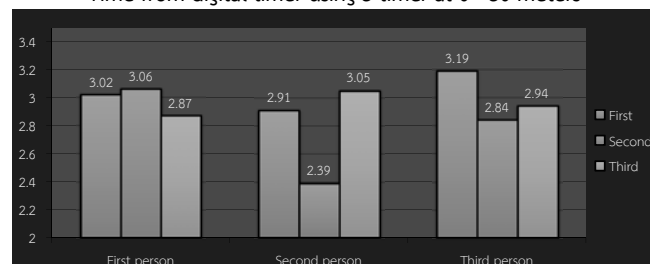
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## Digital timers evaluation result

Time from digital timer using 3 timer at 0 - 50 meters



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## Test result (0 - 15 meters)

Time and speed of running range form 0 to 15 meters.

The test taker	Digital tmer		Speed Analyser	
	Time (s)	Speed (m/s)	Time (s)	Speed (m/s)
1.	2.77	5.42	2.53	5.93
2.	2.90	5.17	2.86	5.24
3.	2.43	6.17	2.31	6.49
4.	2.33	6.44	2.29	6.55
5.	2.38	6.30	2.64	5.68
6.	2.53	5.93	2.76	5.43
7.	2.79	5.38	2.81	5.34
8.	2.55	5.88	2.67	5.62
9.	2.58	5.81	2.75	5.45
10.	2.51	5.98	2.34	6.41
Average	2.58	5.85	2.60	5.82

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## Test result (0 - 30 meters)

Time and speed of running range form 0 to 30 meters.

The test taker	Digital timer		Speed Analyser	
	Time (s)	Speed (m/s)	Time (s)	Speed (m/s)
1.	4.08	7.35	4.33	6.93
2.	4.94	6.07	4.86	6.17
3.	4.30	6.98	4.31	6.96
4.	4.36	6.88	4.19	7.16
5.	4.59	6.54	4.57	6.56
6.	4.84	6.20	4.64	6.47
7.	4.90	6.12	4.85	6.19
8.	4.77	6.29	4.49	6.68
9.	4.61	6.51	4.50	6.67
10.	4.41	6.80	4.37	6.86
Average	4.58	6.57	4.51	6.67

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## Test result (0 – 40 meters)

Time and speed of running range form 0 to 40 meters.

The test taker	Digital timer		Speed Analyser	
	Time (s)	Speed (m/s)	Time (s)	Speed (m/s)
1.	5.37	7.45	5.49	7.29
2.	5.94	6.73	6.17	6.48
3.	5.53	7.23	5.47	7.31
4.	5.43	7.37	5.29	7.56
5.	6.24	6.41	5.91	6.77
6.	6.31	6.34	6.01	6.66
7.	6.23	6.42	6.15	6.50
8.	5.99	6.68	5.71	7.01
9.	5.94	6.73	5.71	7.01
10.	5.33	7.50	5.53	7.23
Average	5.83	6.89	5.74	6.98

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## Test result (0 – 50 meters)

Time and speed of running range form 0 to 50 meters.

The test taker	Digital timer		Speed Analyser	
	Time (s)	Speed (m/s)	Time (s)	Speed (m/s)
1.	6.71	7.45	7.08	7.06
2.	7.09	7.05	7.38	6.78
3.	6.55	7.63	6.63	7.54
4.	6.94	7.20	6.62	7.55
5.	7.41	6.75	7.27	6.88
6.	7.31	6.84	7.24	6.91
7.	7.37	6.78	7.48	6.68
8.	6.88	7.27	6.93	7.22
9.	7.12	7.02	6.95	7.19
10.	7.45	6.71	6.69	7.47
Average	7.08	7.07	7.03	7.13

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## Test result (Overall)

Time and speed to run all distance

The test taker	Speed in each distance			
	0 – 15	0 – 30	0 – 40	0 – 50
1.	5.93	6.93	7.29	7.06
2.	5.24	6.17	6.48	6.78
3.	6.49	6.96	7.31	7.54
4.	6.55	7.16	7.56	7.55
5.	5.68	6.56	6.77	6.88
6.	5.43	6.47	6.66	6.91
7.	5.34	6.19	6.50	6.68
8.	5.62	6.68	7.01	7.22
9.	5.45	6.67	7.01	7.19
10.	6.41	6.86	7.23	7.47
Average	5.82	6.67	6.98	7.13

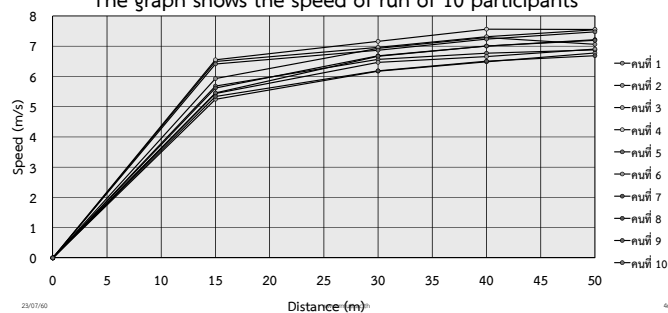
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## Test result (Overall)

The graph shows the speed of run of 10 participants

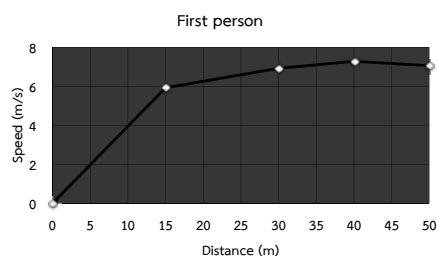


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## Test result (first person)

Speed chart of each distance of first person



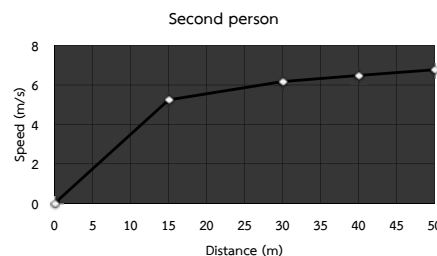
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## Test result (second person)

Speed chart of each distance of second person



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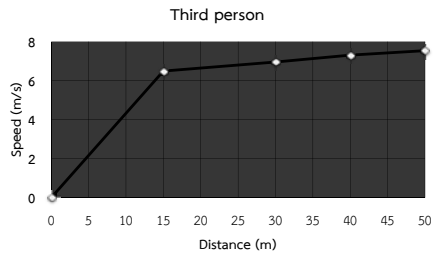
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### Test result (third person)

Speed chart of each distance of third person



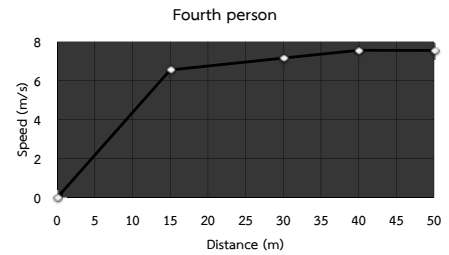
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### Test result (fourth person)

Speed chart of each distance of fourth person



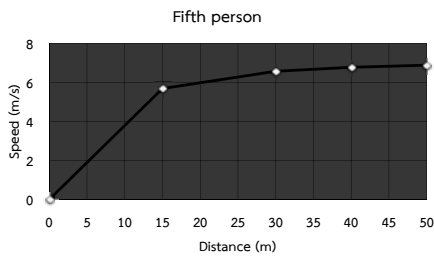
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### Test result (fifth person)

Speed chart of each distance of fifth person



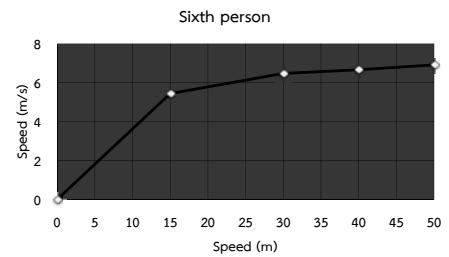
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### Test result (sixth person)

Speed chart of each distance of sixth person



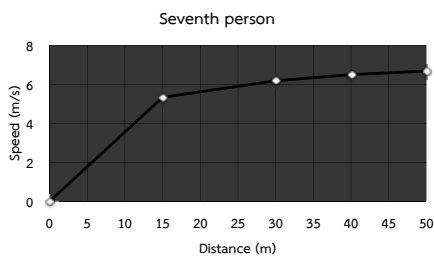
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### Test result (seventh person)

Speed chart of each distance of seventh person



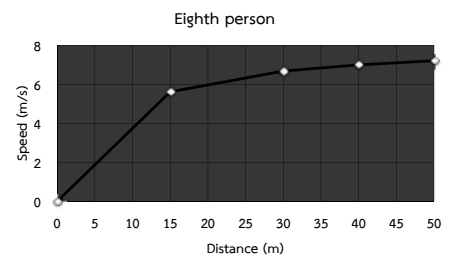
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### Test result (eighth person)

Speed chart of each distance of eighth person



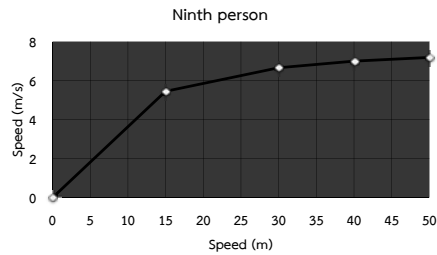
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## Test result (ninth person)

Speed chart of each distance of ninth person



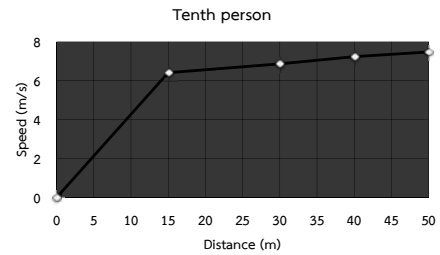
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## Test result (tenth person)

Speed chart of each distance of tenth person



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## Conclusion

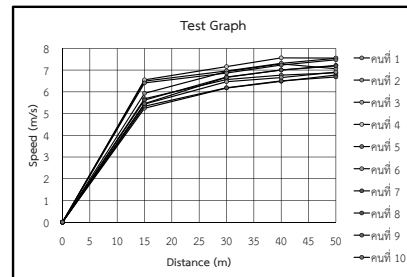
1. Can design and create Speed Analyser have succeeded
2. Speed Analyser has high accuracy
3. The test takers had a distinct performance relative to their speed skills, with the average speed of 5.82 m / s in the range of 15 to 30 m in the 0 to 15 m range, with an average speed of 6.67 m / s. The range of 30-40 meters has an average speed of 6.98 m / s in the range of 40 to 50 m with an average speed of 7.13 m / s.

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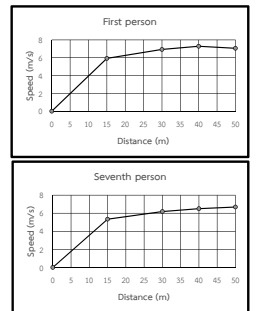
## Conclusion



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## Conclusion

4. The average running speed can be used to develop physical fitness programs that relate to speeding skills. The distance of 50 meters is as follows.

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## Applying results

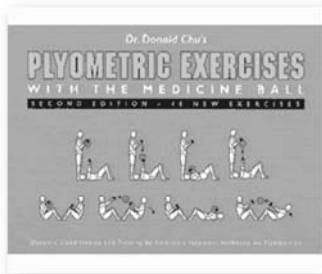
Training and training programs Plyometric Training (Plyometric Training) It is a pattern and muscle training program that connects muscle strength with muscle contraction speed, resulting in muscle strength, plyometric training. Use jumping activities. Jumping with the lower body and spinning Throwing and shoving the ball with the ball using the upper body.

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## Applying results



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## Applying results

### ANAEROBIC TRAINING PROGRAM

Use a training style with a full sprint of 70 – 90% of the maximum heart rate (according to individual student's ability to run at full speed)



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Thanks for your attention  
If there are some mistake  
please apologize

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