

1st Annual West County Robotics Vex Decathlon

Thanks for your interest in our first West County Robotics Vex Decathlon! We at West Country Robotics hope you will enjoy both the journey towards the competition, as well as the competition itself.

Non-refundable registration is \$50. Make your check out to Contra Costa College for the Vex Robotics Decathlon. Each team you team

Remember you can order necessary parts from RadioShack at a 10% discount, if you use the method outlined below.

Please feel free to contact us with your questions, comments, and concerns regarding information presented in this packet

(http://contracosta.edu/robotics/Vex_Decathlon.pdf).

Great things are in store for us in this very first Vex Robotics Decathlon!

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WCR-Vex Decathlon Packet Contents

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When/Where is the Decathlon?

When

- December 10, 2005
- 9 - 5pm

Where

- De Anza High School
5000 Valley View Road
Richmond, CA 94803

What do I bring

- Team members
- Robot
- Spare batteries and chargers
- Spare parts
- Tools
- Enthusiasm
- Snacks, beverages, and lunch for your team.
The de Anza PTA will be there to sell food as well.

Sources and Discounts for Vex Parts

Radio Shack

| • Description | • Part Number | • Base Price |
|---------------------------------|-----------------|--------------|
| • Vex™ Robotics Starter Kit | • part 276-2151 | • \$300 |
| • Vex™ Metal and Hardware Kit | • part 276-2161 | • \$80 |
| • Vex™ Robotics Programming Kit | • part 276-2152 | • \$100 |
| • Vex™ Tank Tread Kit | • part 276-2168 | • \$30 |
| • Vex™ Sprocket and Chain Kit | • part 276-2166 | • \$30 |

Extra Parts you can use

| • Description |
|---|
| • Extra long PWM cables – you can use what ever length PWM cable you would like. They can only be used to connect from the controller to a sensor, servo or motor. For instance, the bot can't swing from a PWM cable or use it to hold the bot together. |
| • 5 rubber bands no more than ½ inch wide and 4 inches long (8 inches in circumference) |

RadioShack Discount for both schools and individuals

- You can get a **10% discount and free shipping**, if you cite “**West County Robotics RoboEducators**” using the contact below.

Al Singleton

Direct Voice: 817-415-6421

Direct Fax: 817-415-0315

Email: Allan.Singleton@radioshack.com

You can get an even Larger Discount

- If, at one time, a purchase is made of **10-49** of any one of the four kits, then the discount changes to **15%** for just those kits
- Similarly, the discount becomes **20%**, if **50** or more are purchased at one time

Possible Sources for other useful stuff

I purchased the following Decathlon implements at the Concord SportMart. I presume they will be available at the Emeryville SportMart (and other stores):

| | | |
|--|--------------|--------|
| Original Frisbee Disc Pro Classic 130g | SKU 13748854 | \$5.99 |
| Twelve 5" Easton Training Balls (golf ball size) | SKU 13403555 | \$4.99 |
| Puck (Official made in Slovakia) | SKU 6096720 | \$0.99 |
| Jakks Pacific Original Poolnoodle | SKU 4655422 | \$2.49 |

These are great tools to order from McMaster Carr. They help prevent stripping screws. The list is from: <http://www.chiefdelphi.com/forums/showthread.php?t=37031>

- **Nut Driver for 8-32 Nuts:**
Hollow-Shaft Inch Nutdriver Standard, 11/32" Size, 3" Shaft Depth, Green (8358A26)
This tool makes it easier to tighten a nut in close quarters.
- **Hex Driver for 8-32 Screws:**
Comfort Grip Ball Driver Long Length, 5/64" Hex, 4-21/64" Blade Length (5497A68)
Hex Driver for 6-32 Motor Screws and Shaft Collar Set Screws:
Comfort Grip Ball Driver Long Length, 3/32" Hex, 4-51/64" Blade Length (5497A69)
These two tools save TONS of time when building, repairing, etc. Saving time means you will reduce the general stress level. **HIGHLY RECOMMENDED.**
- **Hi Torque Hex L-keys:**
Hi-Torque L-Key 5/64" Hex, 4" Length (71285A151)
Hi-Torque L-Key 3/32" Hex, 4-13/32" Length (71285A152)
These L-keys do a much better job of keeping the hex from stripping. These things are cheap. Buy 10 of each of them. Use them until they start to show wear and **THROW THEM OUT**
- **If you are going to replace motor screws:**
Torx Button Head Socket Cap Screw Alloy Steel, 6-32 Thread, 1/4" Length (96452A144)
Torx Button Head Socket Cap Screw Alloy Steel, 6-32 Thread, 1/2" Length (96452A148)
- **Torx Driver for Above Screws:**
Torx Driver Size T10, 3-1/4" Blade Length, 5-5/8" O'all Length (5756A14)
- **Torx L-key for Above Screws:**
Torx L-Key Long Arm, Size T10, 3-3/8" Length (6959A41)
This tool is another one that I would buy several of. Torx tools are nowhere near as likely to round out or strip, so I would perhaps only buy 5 of these where I might buy 10 of the similar hex tool.
- **Tools for Torx Motor Screws:**
Comfort Grip Torx Ball-Point Driver T10 Torx, 2-23/32" Blade Length, 5-3/16" L O'all (37455A22)
This is a nice tool, more expensive, but the ball end feature makes it possible to tighten some screws at "off angles"

Rules of the Robotics Decathlon

General Rules

1. More than one Vex team can compete per school, if registered by Nov 10th.
2. A Vex team can have as many members as desired.
3. You can construct a bot only from parts in the table below. The group judge or their designee will check the team supplied inventory list before allowing the bot to compete. The inventory must include any spare parts the team mechanics bring with them. A non-compliant bot cannot compete. Note: this means 5 inspections.

| | |
|------|---|
| One | Vex™ Robotics Starter Kit |
| One | Vex™ Metal and Hardware Kit |
| One | Vex™ Robotics Programming Kit |
| One | Vex™ Tank Tread Kit |
| One | Vex™ Sprocket and Chain Kit |
| Four | Extra long PWM cables used only to connect a servo or motor to the controller, e.g. the bot cannot also swing from a PWM cable. |
| Five | rubber bands no more than ½" wide, 1/8" thick, and 8" in circumference |

4. The bot and its kit of parts can be reconfigured and pre-assembled as much as desired within the constraints of assigned competition times
5. Teams may purchase extra parts, but only for spares.
6. Spare parts cannot be pre-assembled. In other words, you can freely replace lost screws and broken rubber ands. You could even take a robot assembly out of competition, but the parts used to replace the assembly cannot be pre-assembled; they must be loose parts.

Common Event Rules

7. We will close the pits during the lunchtime break. You can not do any work using kit parts during the lunch break.
8. The ten decathlon events are broken into five groups of two.
9. On Dec 10th, pick up the event schedule at the check in desk.
10. A team will have at least a 40-minute reconfiguration time between event groups.
11. Only one bot competes in an event at a time. A field team of up to four members may accompany the bot to a particular group of events: a coach (preferably a student), a driver, and two mechanics. The coach can only speak words of direction and encouragement. The driver can only drive. The mechanics can only repair.

Rules of the Robotics Decathlon

Decathlon Events

- 12. Bot must be completely behind the front limit line at the start of the event.
- 13. Judges record the shortest distance from the game objective to the front limit line.
- 14. There are six time slots for each group. The first three slots are the times for the first event of the group; the last three time slots are for the second event of the group. A bot not ready to compete at the beginning of a time slot forfeits their time slot and is given a score of 0 for that time slot.

The judge will alternate between judging the two events. The judge will be judging one event while a bot clears from the preceding event and a bot sets-up for the next event.

- 15. The table below shows the playing mode (player or autonomous program controlled), scoring metric and penalties for each of the ten events.

| Event | Mode | Scoring Metric | Scoring Penalty |
|------------|---------|--|--|
| 100 meter | Program | Time | |
| 400 meter | Program | Time | |
| 1500 meter | Driver | Time | |
| Hurdles | Driver | Time | One second penalty per moved cups Four second penalty per skipped cup |
| Long Jump | Program | Distance to side wall touch or front of bot | Four foot penalty if far line is crossed |
| Shot Put | Driver | Distance to where puck stops or leaves side | Five foot penalty, if far line is crossed |
| High Jump | Driver | Distance to back of bot | |
| Javelin | Program | Distance to first touch or where leaves side | Five foot penalty, if far line is crossed |
| Pole Vault | Program | Value of ball's scoring bin | |
| Discus | Program | Distance to first touch or where left side | Five foot penalty, if far line is crossed |

Group One – Autonomous Circuit

100 meter dash

16. One lap around oval track

400 meter dash

17. Four laps around oval track

Group Two – Player Speed Challenge

1500 meter race

18. Eight laps around oval track

Hurdles

19. Bot weaves through 10 cups in a line

Group Three – How Straight Can it Go?

Long Jump

20. Bot goes as far as possible without touching side wall or back line

High Jump

21. Bot advances as far as possible up a ramp with increasing slope.

Group Four – Power Grab

Shot Put

22. Bot revolves in the center of a bounding circle, releasing hockey puck within the wedge track as close as possible to back limit line,

Javelin

23. Bot throws a Jakks Pacific Original Poolnoodle down the wedge track, with its first touch as close as possible to back limit line.

Group Five – Accuracy Counts

Pole Vault

24. Bot tosses a softball size 5" Easton Training ball (golf ball size) through upright poles (the height reached is scored). The score is the sum of three tosses

Discus

25. Robot throws a Wham-O Original Frisbee Disc Pro Classic 130g down the wedge track, with its first touch as close as possible to back limit line.

Rules of the Robotics Decathlon

Scoring and Awards

Scoring

26. The recorded score of an event is the highest score of the three qualifying scores.
27. A time or event fault will yield a qualifying score of 0 for that run. See the judging section below for the definition of faults relative to each event.
28. A no-show in an event will be given a score of 0 in each of the three qualifying runs for that event, as the time fault occurs.
29. The scoring program will convert the recorded time or distance at each event to a score in the range 1 to 1000.
30. The best time or distance for an event will be given a score of 1000
31. Since all our teams are above average, the lowest score in an event will be given a score of 500.
32. Judges assistants will measure distances via a string with a pole at one end. They will place the pole on the field marking what the bot achieved. The other end touches the outside edge of tape at the front limit line. The distance of record is the shortest possible distance.
33. The scoring program will total the scores from all ten events to rank teams for the overall Decathlon awards.

Awards

34. Up to ten participation medals will be given to each team.
35. A plaque will be given to the winning team of each event.
36. There will also be overall Decathlon awards: Gold, Silver, and Bronze.
37. There will also be additional awards recognizing teamwork, team spirit, programming, bot creativity, etc
38. Judges' rulings are final
39. Judges may use information from official assistants to make their final decision.
40. If a bot taking too long completing an event will cause a delay of game fault

Rules of the Robotics Decathlon

Judging

41. The fault criteria for each event is shown in the table below. A fault that qualifying attempt is over.

| Event | Time fault | Other fault |
|------------|------------|---|
| 100 meter | 15 seconds | |
| 400 meter | 1 minute | |
| 1500 meter | 2 minutes | |
| Hurdles | 30 seconds | |
| Long Jump | 15 seconds | |
| Shot Put | | Bot leaves bounding circle or puck never enters field |
| High Jump | 15 seconds | |
| Javelin | | Javelin never enters field |
| Pole Vault | | |
| Discus | | Discus never enters field |

42. A judge, in collaboration with the event facilitator, in unlikely and improbable situations, can elect to rerun an event.

Field Construction

Description of Field Elements

Oval Track - 100 meter, 400 meter, 1500 meter

An oval track (4' x 8'), with inside and outside walls so bot can touch/collide with wall while remaining on the track.

Hurdles Track - Hurdles

Track is 23 feet long and 5 feet wide with ten inverted paper cups equidistant down the center of the track. The sides of the track are marked with masking tape. The cups are centered on a circle the same diameter as the lip of the cup.

Long Jump Track - Long Jump

Track is 16 feet long and 2 feet wide, marked with masking tape forming the sides of the track and the two limit lines

Wedge Track - Shot Put, Javelin, Discus

Wedge is a 20 foot radius 90 degree arc with a 1 foot radius bounding circle using the same center as the wedge. The limit line is the portion of the bounding circle between the edges of the arc. The track is defined by masking tape. The full circle is only used with the shot put event

High Jump Track - High Jump

Ramp is a 15 foot sheet of wood made to start with no pitch (0 degree ramp) all the way to a 90 degree pitch. Bot tries to advance as far as possible up ramp with increasing pitch.

Pole Vault Track - Pole Vault

The scoring mechanism for this event is resonant with skee-ball. The poles are formed from a ladder. The ball must go between rungs to score. It is channeled to a scoring bin corresponding to the height of the enclosing highest rung.

Field Construction

Bill of Materials

This section reluctantly left blank.

We want to build it ourselves first before we add this section.

Multicolored removable masking tape will be appearing.

Field Construction Assembly Hints

High Jump Ramp is closely approximated by this table

| | |
|---------|---------|
| 0 | 0 |
| 11.125 | 0.3125 |
| 18.3125 | 1.5 |
| 24.4375 | 3.625 |
| 29.6875 | 6.625 |
| 34.375 | 10.625 |
| 38.5 | 15.5625 |
| 42 | 21.4375 |
| 44.75 | 28.0625 |
| 46.75 | 35.5 |
| 47.875 | 44.0625 |
| 47.9375 | 45.1875 |
| 48 | 48 |