FIRST WASHINGTON

"The sport of science, technology and teamwork."

STEM Education Tools for Rural and Underserved Communities

WEDA Summer Conference

August 23, 2018

Vision

Bring *FIRST* Programs to every community and school in Washington State.

FIRST® is...

Inspiring youth to become science & technology leaders & innovators,
by engaging them in exciting, experiential, Mentor and project-based programs that teach science, technology, engineering, and math (STEM) skills, inspire innovation, and foster well-rounded life capabilities.

FIRST LEGO LEAGUE JR.

FIRST LEGO LEAGUE

FIRST TECH CHALLENGE

FIRST ROBOTICS COMPETITION

FIRST WASHINGTON
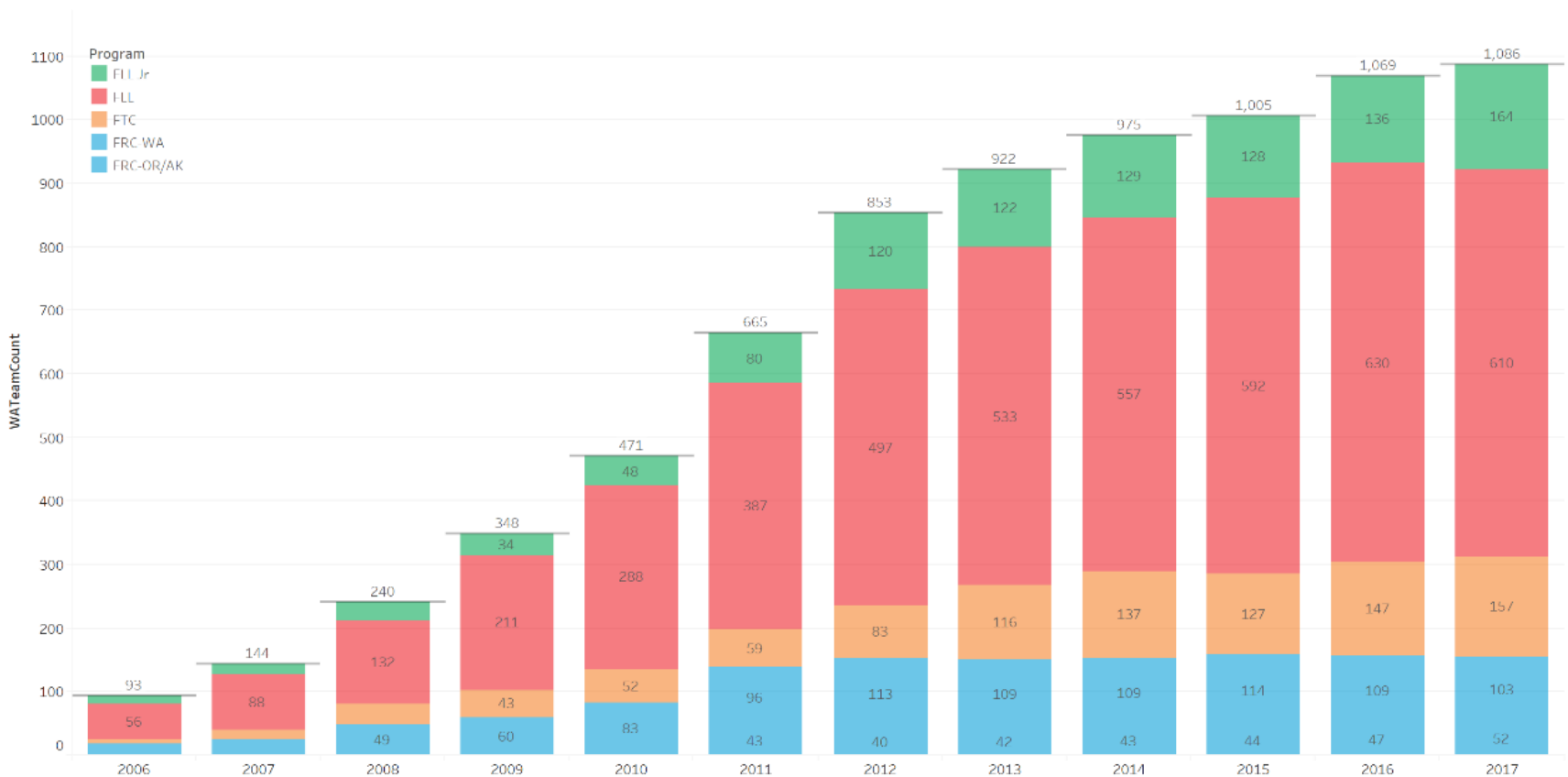*"The sport of science, technology and teamwork."*

FIRST® Washington

- **Four** programs that compliment K-12
- **11,489** students who…
- Make up **1140** teams that are…
- Supported by **5500** adult mentors, coaches and event volunteers at…
- More than **150** events and competitions every year!

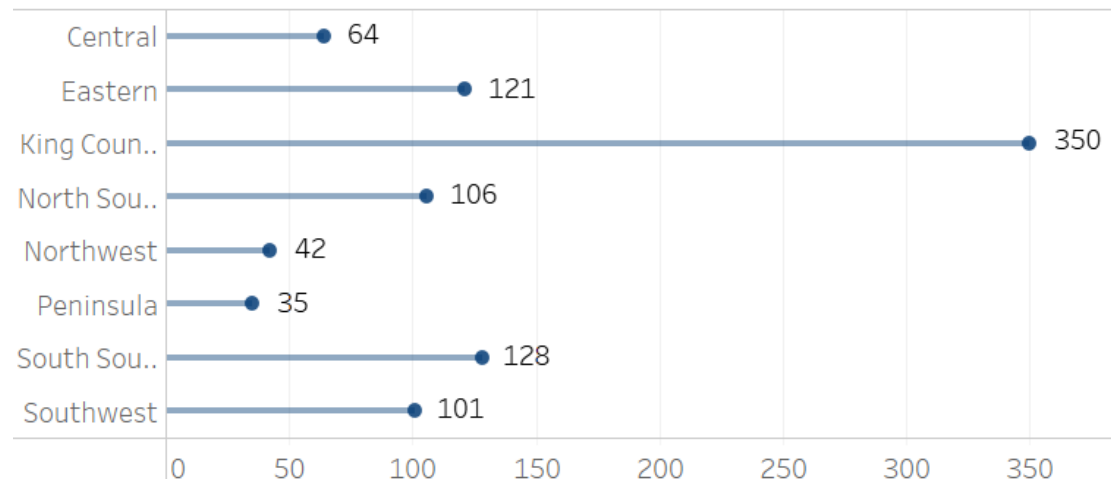# Incredibly Popular with Kids!

FIRST Growth in Washington

FIRST® Washington's Footprint

FIRST® Washington Teams

- **102 FIRST Robotics Competition (9th-12th)**
- **165 FIRST Tech Challenge (7th-12th)**
- **628 FIRST LEGO League (4th-8th)**
- **193 FIRST LEGO League Jr.**

FIRST® Washington Teams by Region

Region	Teams
Central	64
Eastern	121
King Coun..	350
North Sou..	106
Northwest	42
Peninsula	35
South Sou..	128
Southwest	101

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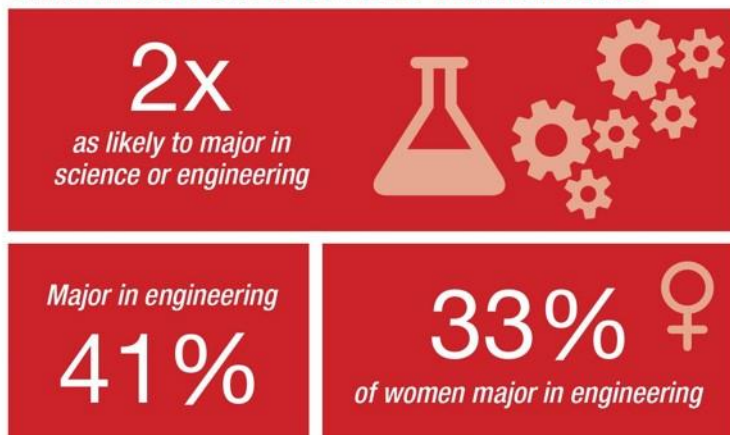*"The sport of science, technology and teamwork."*

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FIRST® IMPACT
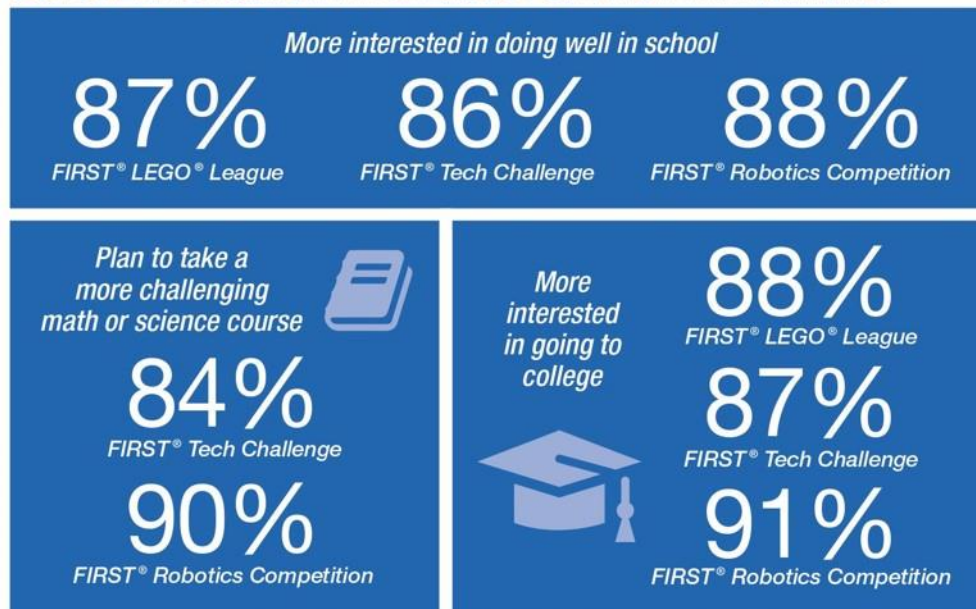
10 years of evaluation data indicates that with participation in **FIRST,**® team members are:

STEM MAJOR CITED BY *FIRST* PARTICIPANTS

2x
as likely to major in science or engineering

Major in engineering
41%

33% ♀
of women major in engineering

Source: Brandeis University, 2005 Evaluation of *FIRST*® Robotics Competition Alumni

SCHOOL ENGAGEMENT INCREASES FOR *FIRST* PARTICIPANTS

More interested in doing well in school

87%	86%	88%
FIRST® LEGO® League	*FIRST*® Tech Challenge	*FIRST*® Robotics Competition

Plan to take a more challenging math or science course
84%
FIRST® Tech Challenge
90%
FIRST® Robotics Competition

More interested in going to college
88%
FIRST® LEGO® League
87%
FIRST® Tech Challenge
91%
*FIRST*® Robotics Competition

Source: Brandeis University, 2011 *FIRST*® Tech Challenge – *FIRST*® Robotics Competition Evaluation and 2013 *FIRST*® LEGO® League Evaluation

21ST CENTURY WORK-LIFE SKILLS GAINED BY *FIRST* PARTICIPANTS

Improved problem solving skills	Increased time management skills	Increased conflict resolution skills	Strengthened communication skills
98%	95%	93%	OVER 76%

Source: Brandeis University, 2011 *FIRST*® Tech Challenge – *FIRST*® Robotics Competition Evaluation and 2013 *FIRST*® LEGO® League Evaluation

FIRST ALUMNI IN STEM CAREERS

89.6%
of Alumni are in a STEM field as a student or professional
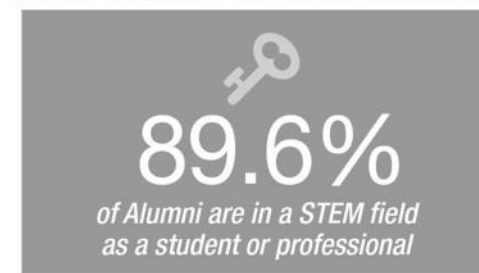
FIRST®, 2011, Survey of *FIRST*® Alumni

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Building the pipeline for our communities economies

- Local employers want local talent to hire.

- *FIRST* teams are local, pooling talent from educators and industry.

- Career Connected/Project Based learning for <u>every</u> kid across <u>every</u> community.
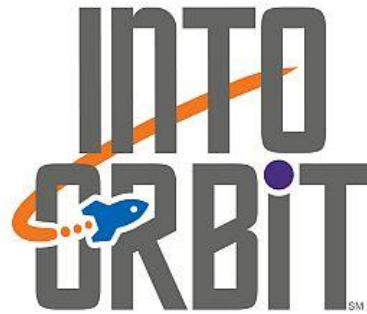
- Foundational commitment to equity and access.

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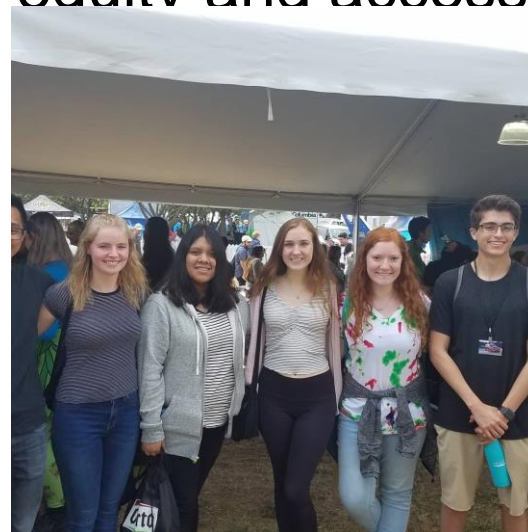
FIRST® Progression of Programs

2018-2019 Challenges

FIRST LEGO League Jr.

FIRST LEGO League

FIRST Tech Challenge

FIRST Robotics Competition

FIRST LEGO LEAGUE JR.

Ages 6-10 (Grades K-4)

Teams of up to 6 kids build interest in science with a real-world scientific challenge solved by guided research and imagination.

AQUA ADVENTURE℠

2017/2018 Season

- Introduction to science and technology
- Design and build Challenge-related model using LEGO® elements, WeDo 2.0
- Create a *Show Me* poster and practice presentation skills
- Explore challenges facing today's scientists
- Discover real-world math and science
- Engage in team activities guided by *FIRST*® LEGO® League Jr. Core Values

Ages 9-16* (Grades 4-8)
*Ages vary by country

Teams of up to 10 kids build LEGO$^®$–based robots and develop research projects based on real-world scientific challenges.

2017/2018 Season

- Create innovative solutions to challenges facing today's scientists

- Strategize, design, build, program and test an autonomous robot using Challenge-related model using LEGO® MINDSTORMS® technology

- Apply real-world math and science concepts

- Develop career and life skills

- Become involved in their local and global community

FIRST LEGO League

https://www.youtube.com/watch?v=Q6Cy3z5QunI&t=86s

Average Team Cost for 5 Months

In Class = 28 Students and 2 after school teams = 20 Students

Costs for providing *FIRST* LEGO League program in-school as part of STEM Robotics 101	Rookie (2 teams/classroom)	Veteran (2 teams/classroom)
Classroom Robotics Education		
STEM Robotics 101 Classroom Kits -12/classroom (*FIRST* in Class Program)**	$ 5,000	$ 500
Teacher Professional Development (2-Day Intro, 1-Day Adv, Take-Home Robotics Kit)	$ 1,350	$ -
Classroom Total	$ 6,350	$ 500
***FIRST* LEGO League Program (ages 9-14)**		
FIRST LEGO League Registration *(game design, youth protection, Challenge Kit)*	$ 650	$ 650
Competition Robotics Kit and Table	$ 1,200	$ -
Teacher/Coach Stipend	$ 1,000	$ 1,000
***FIRST* LEGO League Total**	$ 2,850	$ 650
State Competiton		
FIRST Washington Registration *(competitions, mentor/coach training, team recruitment)*	$ 650	$ 650
Misc Expenses: Project Presentation, Shirts, etc	$ 500	$ 500
***State Competition* Total**	$ 1,150	$ 1,150
Grand Total	$ 10,350	$ 2,300
Cost/Student	$ 431	$ 96

After school: 10 Students

Budget Item for Yearly Challenge	Rookie Team Cost	Veteran Team Cost
FIRST		
FIRSTLEGO League Registration (game design, youth protection)	$ 225	$ 225
FLL Challenge Kit (Mat & Missions)	$ 90	$ 90
Robotic Kit: EV3 Robot Kit, Expansion Set, Software, rechargeable battery and charger (1 time expense)	$ 507	$ -
FIRST Washington FIRST LEGO League Registration (competitions, mentor/coach training, team recruitment)	$ 325	$ 325
Additional Team Expense		
FLL Table (1 time expense)	$ 85	$ -
Misc Expenses: Project Presentation, Shirts, etc	$ 200	$ 200
School Expense (suggested)		
Teacher Stipend	$ 250	$ 250
Transportation	$ 250	$ 250
STEM Robotics 101 Cirriculm	$ -	$ -
Grand Total	$ 1,932	$ 1,340
Avg.Cost Per Team Member (10/team) for 5 mo.	$ 193	$ 134

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FIRST TECH CHALLENGE

Ages 12-18 (Grades 7-12)

Teams of 10 (avg.) or more students develop strategy, design and build sophisticated robots using a modular kit-of-parts, then compete head to head.

FIRST RELIC RECOVERY

2017/2018 Season

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- Head-to-head competition using a sports model

- Teams design, build, and program robots based on sound engineering principles

- Reusable platform, powered by Android technology, programmed using Scratch or Java

- Develop strategic problem-solving, organization, team-building skills

- Awards for competition, community outreach, design

- Qualify for >$30 million in scholarships

Average Team Cost for 5 Months

In class and after school competitive team

Budget Item	Rookie Team Cost	Veteran Team Cost
Classroom Robotics Education (optional)		
Teacher Professional Development	$750	$750
FIRST		
FIRST National FTC Registration (game design, youth protection)	$ 275	$ 275
FIRST Washington		
FIRST Washington FTC Registration (competitions, mentor/coach training, team recruitment)	$ 882	$ 882
Kit of Parts (1 time cost)		
Control System Kit (2 cell phones, charge. cable)	$ 300	$ 300
Electronic Modules Sensor Kit	$ 391	$ 127
Matrix or Tetrix (choose 1, your choice)	$ 500	
Additional Team Expense (will vary by school, team members, mentors/coaches)		
Misc Expenses: project presentation, team uniforms, additional robot parts	$ 400	$ 400
Travel, Meals (8 meals and snacks per student, and snacks per competition)	$ 1,000	$ 1,000
Teacher Stipend	$ 1,000	$ 1,000
Grand Total	$ 5,498	$ 3,984
Avg.Cost Per Team Member (15/team) for 5 mo.	$367	$266

FIRST ROBOTICS COMPETITION

Ages 14-18 (Grades 9-12)

Teams of 28 (average) or more students compete with 120-pound robots in this Varsity *Sport for the Mind*,™ combining the excitement of sports with the rigors of science and technology.
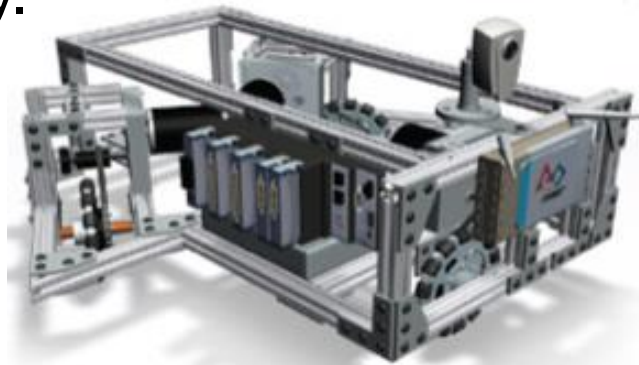
FIRST POWER UP℠

2017-2018 Season

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FIRST Robotics Competition

- Strict rules, limited resources, time limits

- Students mentored by professional engineers

- Learn and use sophisticated hardware and software

- Build and compete with robots of their own design

- Develop design, project management, programming, teamwork, strategic thinking, and *Coopertition*® skills

- Qualify for >$50 million in scholarships

- Build and compete with robots of their own design

- Develop design, project management, programming, teamwork, strategic thinking, and *Coopertition*® skills

- Qualify for >$50 million in scholarships

Average Team Cost for 4-12 Months

After school program:28-100 students.

Cost: Between $23K-$71K.

Budget Item	Rookie Team Cost	Veteran Team Cost
FIRST Washington Registration (Global and PNW District Competitions for game design, robot kit of parts, minimum of 2 competitions, mentor/coach training, team leadership workshops)	$10,866	$10,866
Additional Team Expense (*will vary by school, team members, mentors/coaches*)		
Additional Robot Parts (optional)	$1,500	$1,500
Teacher Stipend	$3,000	$3,000
Team Uniforms	$500	$400
Travel, Hotel (2 nights, 4 students per room, per competition)	$4,000	$4,000
Travel, Meals (8 meals and snacks per student, and snacks per competition)	$2,000	$2,000
Travel, Transporation	$1,500	$1,500
Total for minimum of 2 PNW District Competitions	**$23,366**	**$23,266**
PNW District Championships (*64 teams advance/avg. 30 people team*)		
Travel, Hotel (2 nights, 4 students per room, per competition)	$4,500	$4,500
Travel, Meals (8 meals and snacks per student, and snacks per competition)	$1,500	$1,500
Travel, Transporation	$2,000	$2,000
Total PNW District Championship Expenses	**$8,000**	**$8,000**
World Championships (*41 teams advance/avg. 30 people/team*)		
FIRST Registration Fee	$5,000	$5,000
Travel (airline tickets)	$18,000	$18,000
Travel, Hotel (6 nights, 4 students per room, per competition)	$10,000	$10,000
Travel, Meals (8 meals and snacks per student, and snacks per competition)	$3,000	$3,000
Travel at World Championship	$600	$600
Travel Insurance for mentor/coach/teacher	$1,000	$1,000
Substitute Teachers (2)	$2,000	$2,000
Total World Championship Expenses, approx.$1,200/person	**$39,600**	**$39,600**
AVERAGE TEAM BUDGET IF TEAM ADVANCES TO WORLD CHAMPIONSHIP	**$70,966**	**$70,866**

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Industry Volunteers

Volunteer share their professional skills:

- Programming and coding

- Building

- Project / team management

- Community outreach

- Budgeting and forecasting

- Presentation coaching

- Marketing

- Etc.

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Mentor Time Commitment

Volunteer mentors work is focused on the beginning of the season and pre-season and tapers off as competitions begin.

- *FIRST* LEGO League Competitions begin December 1
- *FIRST* Tech Challenge Competitions begin November 2
- *FIRST* Robotics Competitions begin March 2

Competitions take place on Saturdays and Sundays and the 2018-19 schedule will be available very soon. Not all team volunteer mentors attend every competition but it is encouraged to show support for the students AND it is a blast to see them compete

Please join us in building a pipeline of youth who can go Pro!

Erin McCallum, President : erin@firstwa.org

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