

2018 MICHIGAN SCIENCE OLYMPIAD

REGIONAL TOURNAMENT

MARCH 17, 2018



GRAND VALLEY
STATE UNIVERSITY
REGIONAL MATH AND
SCIENCE CENTER

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REGION 12 TOURNAMENT SPONSORS



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SCIENCE OLYMPIAD CODE OF ETHICS

Student participants are expected to compete in tournament events with an honest effort to follow the rules and the spirit of the competition. The goal of the competition is to give one's best effort while displaying honesty, integrity, and sportsmanship.

Students, coaches, parents, and guests are expected to display courtesy and respect toward Olympiad officials, other teams, and guests of the Olympiad.

Failure to show honesty and/or courtesy by a participant, coach, or guest of a team may result in the disqualification of a team from that event, the entire tournament, or future tournaments.

Excitement in learning through competition.

This is your tournament. ENJOY!



Aiming High – Collaboration and Communication Connects LIGO To Gravitational Wave Observations

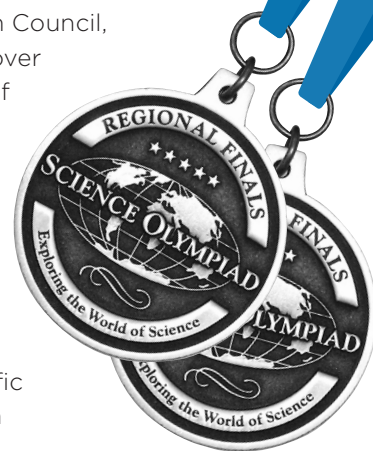
On February 11, 2016, Caltech, Massachusetts Institute of Technology, and the National Science Foundation held a joint press conference to announce a breakthrough. The collision of two black holes, predicted but never observed, was measured by the twin apparatuses in Livingston, Louisiana and Hanford, Washington. By bouncing light in pathways nearly 3 miles in length, the Laser Interferometer Gravitational-Wave Observatory (LIGO) recorded tiny oscillations in the motion of the lasers, indicating a disturbance from passing gravitational waves.

The image on the front cover depicts such an event. As merging black holes approach each other, energy is lost through the generation of gravitational waves. These waves have long been too low in energy to detect, but the final burst, right before the black holes merge, has peak output large enough for a modern and very sensitive Earth-based detector to measure. These waves were first predicted by Albert Einstein in his 1915 General Theory of Relativity, then shown to be viable in the 1970s and 1980s by Joseph Taylor Jr., Russell Hulse, and Joel M. Weisburg with the observation of two orbiting stars losing energy as they moved closer to each other, losing energy to gravitational waves.

The work of LIGO was awarded the 2017 Nobel Prize in Physics, following nearly five decades of work to observe these gravitational waves. The work could not have been possible without a cadre of support from such international partners as the Max Planck Society (Germany), the Science and Technology Facilities Council (United Kingdom), and the Australian Research Council, as well as U.S.-based supports from AEI Hannover Atlas, Syracuse University, and the University of Wisconsin-Milwaukee.

Work like this highlights the importance of multilateral cooperation and communication of scientific knowledge and literacy. Each individual participant contributed one small part of the project, but together, the group achieved a much larger goal. This synergistic collaborative environment is one key to scientific success: that the whole is greater than the sum of the individual parts.

This aspect is also key to Science Olympiad. The most successful teams create collaborative webs of knowledge and function and are greater than the sum of the individual teammates. As students move through the new Michigan Science Standards, continued engagement with scientific practices will prepare them for their future career or college goals. We celebrate teamwork and encourage students to look for ways to work together toward problems and solutions bigger than themselves. Look around and see — maybe the next Nobel laureate is sitting right next to you today.



Tournament Day Activities

ACTIVITY	TIME	LOCATION
Registration	8–8:30 a.m.	Upper Lobby in the Fieldhouse Arena
Welcome and Orientation	8:30–9 a.m.	Fieldhouse Arena
Competition	9:15 a.m.–3:05 p.m.	See tournament schedule on pages 5 and 6 and campus map on back cover for activities and event locations.
Meals or Snacks	7:30 a.m.–4:30 p.m.	Laker Concessions in the Fieldhouse
	8:30 a.m.–12:30 p.m. (breakfast)	Fresh Food Company in The Commons
	11 a.m.–4 p.m. (lunch)	Fresh Food Company in The Commons
	8 a.m.–1 p.m.	Provisions on Demand (POD) Express in Mackinac Hall
	11 a.m.–9 p.m.	Subway in the Kirkhof Center
	7:30 a.m.–9 p.m.	Lobby Shop in the Kirkhof Center
	11 a.m.–2 a.m.	Papa John's Pizza in The Connection
	8 a.m.–12 midnight	Provisions on Demand (POD) in The Connection
	11 a.m.–9 p.m.	Engrained in The Connection
	11 a.m.–12 midnight	A. Robert Kleiner Commons
	8 a.m.–4 p.m.	Starbucks in The Marketplace
	10:30 a.m.–4 p.m.	Which Wich? in The Marketplace
Geology and Physics Tables	9 a.m.–3 p.m.	Padnos Hall of Science
Swimming	11 a.m.–4 p.m.	Pool in the Fieldhouse, \$5.00
Basketball	2:30–4 p.m.	Fieldhouse Recreation Center
Climbing Wall	11 a.m.–4 p.m.	Climbing Center in the Fieldhouse, \$5.00
Laker Store	10 a.m.–5 p.m.	The Marketplace
The Coaches' Turn	3:15–4:15 p.m.	Fieldhouse Arena
Awards Ceremony	4:30–6 p.m.	Fieldhouse Arena

Information Sites

INFORMATION SITE	TIME	LOCATION
Headquarters	8 a.m.–4 p.m.	192 Fieldhouse
Arbitration Board	10:30 a.m.–4 p.m.	192 Fieldhouse
First Aid	8:30 a.m.–4 p.m.	Recreation Center Welcome Desk B
Message Board	9 a.m.–4 p.m.	Main Lobby in the Fieldhouse and 308 Padnos Hall
Volunteer Check-in	8 a.m.–4 p.m.	Main Lobby in the Fieldhouse and 308 Padnos Hall
Volunteer Hospitality	8 a.m.–4 p.m.	18 Fieldhouse, 308 Padnos Hall, C-1-130 Mackinac Hall, 1179 Kindschi Hall of Science

2018 Regional Tournament Schedule

DIVISION B (GRADES 6-9)

Registration

8-8:30 a.m.
Upper Lobby
Fieldhouse Arena

Impound

8-8:30 a.m.
At event sites:
Battery Buggy,
Hovercraft,
Roller Coaster,
Thermodynamics

Welcome and Orientation

8:30-9 a.m.
Fieldhouse Arena

The Coaches' Turn

3:15-4:15 p.m.
Fieldhouse Arena

Parade of Schools Lineup

4:15 p.m.
Lower Lobby
Fieldhouse Arena

Awards Ceremony

4:30-6 p.m.
Fieldhouse Arena

EVENT	SITE	8:30-9 a.m.	9:15-10:05 a.m.	10:15-11:05 a.m.	11:15 a.m.-12:05 p.m.	12:15-1:05 p.m.	1:15-2:05 p.m.	2:15-3:05 p.m.
Anatomy and Physiology	250 Padnos Hall	MSO Welcome and Orientation				23-45	1-22	
Crime Busters	328 Padnos Hall		1-15	16-30	31-45			
Dynamic Planet	1121 Kindschi Hall					23-45	1-22	
Ecology	2213 Kindschi Hall					1-22	23-45	
Experimental Design	2270 Kindschi Hall		1-15	16-30	31-45			
Fast Facts	BLL-110 Mackinac Hall		31-45	1-15	16-30			
Herpetology	1113 Kindschi Hall		31-45	1-15	16-30			
Meteorology	D-2-227 Mackinac Hall		16-30	31-45	1-15			
Microbe Mission	2216 Kindschi Hall					1-22	23-45	
Optics	103 Loutit		31-45	1-15	16-30			
Road Scholar	B-2-110 Mackinac Hall					1-22	23-45	
Rocks and Minerals	107 Padnos Hall					23-45	1-22	
Solar System	168 Padnos Hall					1-22	23-45	
Thermodynamics	205 Padnos Hall		16-30	31-45	1-15			
Write It, Do It	A-2-155 Mackinac Hall		16-30	31-45	1-15			
SELF-SCHEDULE								
Battery Buggy ○	Fieldhouse Arena			9:30 a.m.- 1:20 p.m.				
Disease Detectives	261 Padnos Hall		9:15 a.m.- 12:05 p.m.					
Mystery Architecture	4402 Kindschi Hall			10:15 a.m.- 1:05 p.m.				
Roller Coaster ○	Rec Center South Gym		9:15 a.m.- 1:05 p.m.					
Hovercraft	1108 Kindschi Hall		9:15 a.m.- 12:05 p.m.					
Potions and Poisons	142 Padnos Hall		9:15 a.m.- 12:05 p.m.					
Towers ○	Cook-DeWitt Center			9:45 a.m.- 2:05 p.m.				
Wright Stuff ○	Rec Center Courts		9:15 a.m.- 2:05 p.m.					
TRIAL EVENTS								
Pentathlon ○	Fieldhouse Arena			Walk-in				
Source Code	2207 Kindschi Hall		Self-Schedule					

○ = Open for viewing

DIVISION C (GRADES 9-12)

Registration

8-8:30 a.m.
Upper Lobby
Fieldhouse Arena

Impound

8-8:30 a.m.
At event sites:
Hovercraft,
Mousetrap Vehicle,
Thermodynamics
Mission Possible (optional)

Welcome and Orientation

8:30-9 a.m.
Fieldhouse Arena

The Coaches' Turn

3:15-4:15 p.m.
Fieldhouse Arena

Parade of Schools Lineup

4:15 p.m.
Lower Lobby
Fieldhouse Arena

Awards Ceremony

4:30-6 p.m.
Fieldhouse Arena

EVENT	SITE	8:30-9 a.m.	9:15-10:05 a.m.	10:15-11:05 a.m.	11:15 a.m.-12:05 p.m.	12:15-1:05 p.m.	1:15-2:05 p.m.	2:15-3:05 p.m.
Anatomy and Physiology	1101 Kindschi Hall	MSO Welcome and Orientation			All Teams			
Astronomy	155 Padnos Hall		15-28	1-14				
Chemistry Lab	376 Padnos Hall					1-14	15-28	
Dynamic Planet	101 Loutit				All Teams			
Ecology	2219 Kindschi Hall					1-14	15-28	
Experimental Design	2252 Kindschi Hall		1-14	15-28				
Fermi Questions	102 Loutit				All Teams			
Forensics	377 Padnos Hall		1-14	15-28				
Game On	2nd Floor Manitou Hall		15-28	1-14				
Herpetology	1102 Kindschi Hall					15-28	1-14	
Material Science	255 Padnos Hall		15-28	1-14				
Microbe Mission	2202 Kindschi Hall		15-28	1-14				
Optics	103 Loutit					15-28	1-14	
Remote Sensing	116 Henry Hall					1-14	15-28	
Rocks and Minerals	110 Padnos Hall					15-28	1-14	
Write It, Do It	BLL-126 Mackinac	1-14	15-28					
SELF-SCHEDULE								
Disease Detectives	262 Padnos Hall		9:15- 11:05 a.m.					
Helicopters ○	Racquetball Courts - Fieldhouse Lower Level			9:40 a.m.- 1:05 p.m.				
Hovercraft	1152 Kindschi Hall					12:15- 2:05 p.m.		
Mission Possible ○	Rec Center South Gym		9:15 a.m.- 1:30 p.m.					
Mousetrap Vehicle ○	B160 Fieldhouse Arena		9:15 a.m.- 2:05 p.m.					
Thermodynamics	259 Padnos Hall			10:15 a.m.- 12:05 p.m.				
Towers ○	Cook-DeWitt Center		9:15 a.m.- 2 p.m.					
TRIAL EVENTS								
Pentathlon ○	Fieldhouse Arena			Walk-in				
Source Code	2207 Kindschi Hall		Self-Schedule					

○ = Open for viewing

2018 Registered Schools

DIVISION B

TEAM #	SCHOOL NAME	COUNTY	HEAD COACH
14	Allendale Middle School	Ottawa	David Erdmans
13	Assumption of the Blessed Virgin Mary	Kent	Brenda Sack
2	Byron Center Christian Middle School	Kent	Clayton Lubbers
1	Chandler Woods Charter Academy	Kent	Jerry Anderson
32	Corpus Christi Catholic School	Ottawa	Chelsea McWain
21	Cross Creek Charter Academy	Kent	Melinda McWilliams
3	Duncan Lake Middle School	Kent	Elizabeth Alexander
27	Dutton Christian Middle School	Kent	Reuben Sportel
43	Eagle Crest Charter Academy	Ottawa	Dena Merrill
40	East Grand Rapids Middle School	Kent	Kevin Vance
42	Excel Charter Academy	Kent	Albert Smith
9	Forest Hills Central Middle School	Kent	Julianne Smith
28	Forest Hills Eastern Middle School	Kent	Jill McCullough
30	Grand Rapids Christian Middle School	Kent	Paige Stephens
24	Grand Rapids University Preparatory Academy	Kent	Tiffany Young
33	Grandville Middle School	Kent	Bruce Marvel
41	Harbor Lights Middle School	Ottawa	Debra Taylor
25	Holy Trinity Catholic School	Kent	Jill Teegardin
35	Immaculate Heart Of Mary Catholic School	Kent	Erin Weaver
6	Jenison Junior High School	Ottawa	Nick Brouwer
36	Kenowa Hills Middle School	Kent	Chip Heyboer
18	Kraft Meadows Middle School	Kent	Meredith Zeitler
34	Lakeshore Middle School	Ottawa	Nathan Mihalek
31	Lee Middle School	Kent	Vlad Borza
19	Lowell Middle School	Kent	James Grulke
23	Macatawa Bay Middle School	Ottawa	Debra Taylor
11	Northern Hills Middle School	Kent	David Vermullen
10	Our Lady Of Consolation School	Kent	Katherine Schoenborn
17	Plymouth Christian Middle School	Kent	Katelyn Kamp
7	Reeths-Puffer Middle School	Muskegon	Kelly Kramer
5	Riley Street Middle School	Ottawa	Brad Sall
15	Saint Anthony Of Padua Catholic School	Kent	Michael Hoch
39	Saint Patrick Middle School	Kent	Lynette Gasper
37	Saint Paul The Apostle School	Kent	Kevin Maitner
38	Sparta Middle School	Kent	Richard Toole
26	West Michigan Academy of Environmental Science Middle School	Kent	Robert Barrett
4	West Side Christian School	Kent	Jonathan Oosterman
20	White Pines Intermediate School	Ottawa	Rhonda Bird
8	Wyoming Junior High School	Kent	David Rader
12	Zion Christian Middle School	Kent	Bruce Smith

TEAM #	SCHOOL NAME	COUNTY	HEAD COACH
28	Allendale High School	Ottawa	Brian Brethauer
2	Byron Center High School	Kent	Katherine Parrish
4	Caledonia High School	Kent	Michael Niemann
11	East Grand Rapids High School	Kent	Elizabeth Neubig
15	Forest Hills Central High School	Kent	Patti Richardson
27	Forest Hills Eastern High School	Kent	Ronda Geers
9	Forest Hills Northern High School	Kent	Elbert Yeh
24	Grand Haven High School	Ottawa	Michael Reed
26	Grand Rapids Christian High School	Kent	John Christians
18	Grandville High School	Kent	Shelly Zokoe
17	Hudsonville High School	Ottawa	Doug Ragan
13	Jenison High School	Ottawa	Gary Kunzi
10	Lee High School	Kent	Brian McKanna
7	Lowell Senior High School	Kent	Heather DeJonge
19	NorthPointe Christian High School	Kent	Sharene Fleetham
16	Northview High School	Kent	Brian Hendricks
14	Plymouth Christian High School	Kent	Phillip Bleeker
3	Ravenna High School	Muskegon	Scott McFarren
23	Reeths-Puffer High School	Muskegon	Dee Richardson
1	Sparta Senior High School	Kent	Paul Groh
21	Unity Christian High School	Ottawa	Brian Mast
20	West Michigan Academy of Environmental Science High School	Kent	Robert Barrett
25	West Michigan Aviation Academy	Kent	Robert Battey
6	West Ottawa High School	Ottawa	Robert Myers
5	Western Michigan Christian High School	Muskegon	Kelly Wierenga
12	Wyoming High School	Kent	David Rader

Event Supervisors

EVENT	DIVISION	SUPERVISOR
Anatomy and Physiology	B	John Capodilupo, Biomedical Sciences Department Dawn Richiert, Biomedical Sciences Department Ted Towse, Biomedical Sciences Department
	C	Cynthia Thompson, Biomedical Sciences Department
Arbitration		Debbie Lown, Biomedical Sciences Department Karen Meyers, (retired), Regional Math and Science Center Paul Stephenson, Statistics Department
Astronomy	C	Geoff Lenters, Physics Department
Battery Buggy	B	Chris Lawrence, Chemistry Department Felix Ngassa, Chemistry Department
Chemistry Lab	C	Richard Lord, Chemistry Department Scott Thorgaard, Chemistry Department
Crime Busters	B	Blair Miller, Chemistry Department Dan Groh, Grand Rapids Community College
Disease Detectives	B	M. Aaron Baxter, Biomedical Sciences Department Douglas Graham, Biomedical Sciences Department Sue Leonard, Biomedical Sciences Department Tony Nieuwkoop, Biomedical Sciences Department
	C	Derek Thomas, Biomedical Sciences Department
Dynamic Planet	B	Caitlin Callahan, Geology Department Tara Kneeshaw, Geology Department
	C	Virginia Peterson, Geology Department
Ecology	B/C	Sarah Lamar, AWRI
Experimental Design	B	Rachel Driscoll, Chemistry Department Julie Henderleiter, Chemistry Department
	C	Jerry Kenney, Chemistry Department Jill Morris, Chemistry Department Jessica VandenPlas, Chemistry Department
Fast Facts	B	Shannon Biros, Chemistry Department Laurie Witucki, Chemistry Department
Fermi Questions	C	Doug Furton, Physics Department
Forensics	C	Laura Hawk, Chemistry Department Andrew Korich, Chemistry Department Randy Winchester, Chemistry Department

EVENT	DIVISION	SUPERVISOR
Game On	C	Jayne Dissette, School of Computing and Information Systems Theresa Peterman, School of Computing and Information Systems Ana Posada, School of Computing and Information Systems
Helicopters	C	Dave Leonard, Chemistry Department Ross Reynolds, Chemistry Department
Herpetology	B/C	Jennifer Moore, Biology Department
Hovercraft	B	Brennan Kulfan, Physics Department Aaron Perry, College of Liberal Arts and Sciences Mallory Traxler, Physics Department
	C	Tim Evans, Physics Department Dirk Pandel, Physics Department Joshua Veazey, Physics Department
Material Science	C	John Bender, Chemistry Department Harvey Nikkel, Chemistry Department Richard Vallery, Physics Department
Meteorology	B	Bill Steffen, WOOD TV8 Kevin Strychar, AWRI
Microbe Mission	B/C	Ian Cleary, Biomedical Sciences Department Kathryn Haley, Biomedical Sciences Department Bruce Ostrow, Biology Department
Mission Possible	C	Brett Bolen, Physics Department Benjamin Holder, Physics Department Shelly Smith, Mathematics Department
Mouse Trap Vehicle	C	Greg Bosch, Brooks Capital Management Gary Slykhouse, Grand Rapids City Engineers
Mystery Architecture	B	Ashley Campanali, Grand Rapids Community College Hans Dulimarta, School of Computing and Information Systems Sean Kuczmarski, GE Aviation
Optics	B	Thomas Killeen, Physics Department Kingshuk Majumdar, Physics Department
	C	Keith Oliver, Physics Department
Pentathlon*	B/C	Paul Cook, Chemistry Department Rachel Powers, Chemistry Department Brad Wallar, Chemistry Department
Potions and Poisons	B	Sarah Clark, Chemistry Department Brittland DeKorver, Chemistry Department
Remote Sensing	C	Kevin Thaisen, Geology Department Peter Wampler, Geology Department
Road Scholar	B	Kevin Cole, Geology Department Susan Jansen, Geology Department Greg Wilson, Geology Department

* Trial event

EVENT	DIVISION	SUPERVISOR
Rocks and Minerals	B	Figen Mekik, Geology Department
	C	Stephen Mattox, Geology Department
Roller Coaster	B	Lindsay Corneal, School of Engineering Wendy Reffeor, School of Engineering
Score Keeping		Kirk Anderson, Statistics Department
Score Verification		Stephen Rybczynski, Biology Department
Solar System	B	Javier Estrada, Physics Department
Source Code*	B/C	Nicholas Nelson, Information Technology Brandon Ridge, Information Technology
Thermodynamics	B	Brad Ambrose, Physics Department Karen Gipson, Physics Department
	C	Milun Rakovic, Physics Department
Towers	B/C	Eric Dykstra, Newkirk Electric Dan Tlachac, Shape Corporation
Wright Stuff	B	Brian Krug, School of Engineering Scott Zuidema, School of Engineering
Write It, Do It	B	Todd Carlson, Chemistry Department George McBane, Chemistry Department Sheila Ryan, Chemistry Department
	C	Ryan Hoekstra, Chemistry Department Mary Karpen, Chemistry Department Chen Hsiao-ping, Chemistry Department

* Trial event



MICHIGAN SCIENCE OLYMPIAD, REGION 12 EVENT SUPERVISOR APPRECIATION AWARDS 2017-2018

We would like to thank the following people at Grand Valley State University's Michigan Science Olympiad (MSO) Regional Tournament for their leadership and continuing service:

AWARD RECIPIENTS

Ashley Campanali	Stephen Rybczynski
Sarah Clark	Paul Stephenson
Eric Dykstra	Scott Thorgaard
Sue Leonard	Dan Tlachac
Teresa Peterman	Joshua Veazey
Ana Posada	Larry West
Brandon Ridge	Sue West

EXCEPTIONAL COMMITMENT AWARD RECIPIENTS

Brad Ambrose	Blair Miller*
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Aaron Baxter	Tony Nieuwkoop*
John Bender	Harvey Nikkel*
Greg Bosch*	Keith Oliver
John Capodilupo	Bruce Ostrow
Douglas Furton	Virginia Peterson
Karen Gipson	Rachel Powers
Douglas Graham	Milun Rakovic
Julie Henderleiter	Sheila Ryan
Mary Karpen	Shelly Smith
Christopher Lawrence	Richard Vallery
Geoff Lenters	Brad Wallar
Dave Leonard	Peter Wampler
Kingshuk Majumdar	Greg Wilson*
Stephen Mattox	Randy Winchester
George McBane	Laurie Witucki
Figen Mekik	

* Denotes over 20 years of service



ALLENDALE CAMPUS



Building Key

7	The Commons (COM)	E4
88	The Connection (CON)	D7
35	Cook-DeWitt Center (CDC)	D5
11	Fieldhouse (FH)	D3
	Arena	
	Pool	
	Recreation Center (RC)	
42	Henry Hall (HRY)	D4
16	Russel H. Kirkhof Center (KC)	D5
33	Robert Kleiner Commons (KLC)	E2
96	P. Douglas Kindschi	D4
	Hall of Science (KHS)	
9	Mackinac Hall (MAK)	E3
10	Manitou Hall (MAN)	E4
95	The Marketplace (LMP)	D4
43	Seymour & Esther Padnos	E4
	Hall of Science (PAD)	

Map Legend

- Science Olympiad
- 1 University Buildings
- Lot A Parking Lots
- State Highway
- Main Roads
- Minor Campus Roads
- Pathways/Sidewalks
- Science Olympiad Parking
- H Handicap Parking
- P Visitor Parking (pay-to-park)

MEALS OR SNACKS

7:30 a.m.-4:30 p.m.	Laker Concessions in the Fieldhouse
8 a.m.-4 p.m.	Starbucks in The Marketplace
8:30 a.m.-12:30 p.m. (breakfast)	Fresh Food Company in The Commons
11 a.m.-4 p.m. (lunch)	Fresh Food Company in The Commons
8 a.m.-1 p.m.	Provisions on Demand (POD) Express in Mackinac Hall
10:30 a.m.-4 p.m.	Which Wich? in The Marketplace
11 a.m.-9 p.m.	Subway in the Kirkhof Center
7:30 a.m.-9 p.m.	Lobby Shop in the Kirkhof Center
11 a.m.-2 a.m.	Papa John's Pizza in The Connection
8 a.m.-12 midnight	Provisions on Demand (POD) in The Connection
11 a.m.-9 p.m.	Engrained in The Connection (credit card only)
11 a.m.-12 midnight	A. Robert Kleiner Commons (credit card only)



In support of GVSU's sustainability values, this paper contains fiber from certified, responsibly managed forests, was produced using certified renewable energy, includes a minimum of 10% postconsumer waste, and was printed locally.

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