

FORMULA
STUDENT EAST

ANSWER KEY OF
QUIZ
2020 FS EAST
FOR ELECTRIC
VEHICLE TEAMS



#FSEASTAUG4<>9

RELEASE

VERSION 1.0

RELEASE DATE: 31ST OF JANUARY 2020

FURTHER DETAILS AT [FSEAST.EU](https://fseast.eu)

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Which of the following events did NOT happen on this day (Jan 31st)?

- ☐ Launch of the Apollo 14 Mission
- ☐ The Soviet Union launches the unmanned Luna 9 spacecraft
- ☒ Launch of the Vostok 6 (first spaceflight for a woman)
- ☐ Launch of the first successful American satellite (Explorer 1)

Concerning a given vector field v , which statement is correct?

- ☒ $\text{div}(\text{rot}(V))=0$
- ☐ $\text{rot}(\text{grad}(V))=0$
- ☐ $\text{div}(\text{grad}(V))=0$
- ☐ $\text{rot}(\text{rot}(V))=0$

$\nabla \cdot \nabla \times v = 0$	<i>true</i>
$\nabla \times \nabla v = 0$	<i>false</i>
$\nabla \cdot \nabla v = 0$	<i>false</i>
$\nabla \times \nabla \times v = 0$	<i>false</i>

Which of the following dimensionless quantities is independent of the flow parameters and depend only on the fluid and the fluid state?

- ☐ Re number
- ☒ Pr number
- ☐ Nu number
- ☐ Gr number

Which statement is true for the Cost and Manufacturing Event?

- ☐ Vehicles must be presented for cost and manufacturing judging in finished condition, fully assembled, complete, ready-to-race condition, with its dry or wet tires mounted
- ☐ Covers and/or parts must be removed before the judging to facilitate access and presentation of components or concepts.
- ☐ The teams may present their vehicle at the designated time to the judges.
Teams that miss their time slot can present their vehicle at the end of the day to the judges.
- ☒ Teams are allowed to bring laptops and tablets beside the handwritten, or printed handouts to the event.

Which of the following expressions is part of the 5S methodology?

- ☒ seiketsu
- ☐ sayori
- ☐ shikishima
- ☐ shinchaku

What is not the main objectives of the TPS?

- ☐ Design out overburden
- ☐ Inconsistency
- ☐ Eliminate waste
- ☒ Transportation cost cut

The length of the acceleration track is 75 metres. Hypothetically the acceleration of the cars is constant, and linear, without slip. The vehicle starts from the starting line of the Acceleration track and then covers 75 metres. At the finish line, the speed of the racecar is 108 km/h. How much time it is needed for the car complete the Acceleration Event and what was the acceleration of the car?

- ☒ Time = 5 sec Acceleration = 6 m / sec ²
- ☐ Time = 4 sec Acceleration = 7 m / sec ²
- ☐ Time = 5 min Acceleration = 6 km / h ²
- ☐ Time = 5,65 sec Acceleration = 5,84 m / sec ²

The weather Condition during Endurance changes from wet to damp. Which statement is true?

- The tire change during driver change is allowed and the time used is added to the team's total time.
- **The tire change during driver change is not allowed and the time used for dry tyre change is added to the team's total time.**
- The tire change during driver change is allowed and does not count as time penalty.
- The tire change during driver change is not allowed and does not count as time penalty.

Imagine that there is a Skidpad session. One of the drivers runs a full - skidpad scene, but at the end, the driver forgets to end the session and runs a 3rd left circle instead of the normally 2 circles. What will be the result of this full - skidpad run?

- **The result of the run is a DNF.**
- 0.2 second time penalty will be added to the measured skidpad time.
- There is no problem, every second lap will be measured, like a normal skidpad session.
- If this 3rd left circle is faster than the second left circle, the 3rd circle time will be counted.

Which type of emergency stop button is allowed to be used in the cockpit?



- A
- **B**
- C
- D: It is not allowed to use an emergency stop button in the cockpit.

You would like to monitor the voltage of a LiPo cell by a microcontroller. The voltage of the cell is always kept in the range of 3000...4000 mV. The microcontroller is supplied by 3.3V, the reference voltage of the 12 bit resolution ADC converter is 3V and the ground level for the ADC is the same as the cell's ground.

The schematic of the system can be found below. Which one is the possible range of the ADC values?

- 2577...3436
- 1260...1680
- 1145...1527
- **2835...3780**

Where do you need to mount the LVMS?

- In the middle of a completely red circular area of ≥ 45 mm diameter.
- **In the middle of a completely red circular area of ≥ 50 mm diameter.**
- In the middle of a completely orange circular area of ≥ 45 mm diameter.
- In the middle of a completely orange circular area of ≥ 50 mm diameter.

Which brake light cannot be used, assuming that the whole area is illuminated with even luminous intensity?

- A 6 cm wide and 3 cm high rectangle.
- A near round shape with the diameter of 5 cm.
- **A triangle with 6 cm base and 4.5 cm height.**
- A 20 cm long LED strip.

Your team use a LiFePO4 TS battery with 120S1P layout. The minimal, nominal and maximal cell voltage is 2.8, 3.3 and 3.65V, the cell capacity is 7.2Ah. Only the rear wheels are driven by independent motors and inverters. The custom designed inverters have 900uF capacitance each. For the discharge circuitry, only a relay and a resistor is used. What is the minimal switching power (contact rating) that the relay must be rated for?

- ☐ 69.1 W
- ☐ 68.6 W
- ☐ 106.5 W
- ☒ 137.3 W
- ☐ 159.0 W

During a test drive at FS East 2020 your precharge relay got stuck, because its contacts were overloaded. The team restarts the vehicle and tries to activate the Tractive System. What will the team see on the TSAL, when they switch on the LVMS?

- ☒ Red flashing
- ☐ Red light
- ☐ No illumination
- ☐ Green flashing
- ☐ Green light

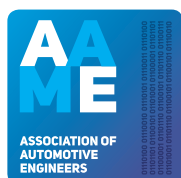
**AUG
4<>9
2020**

**SEE YOU AT FS
EAST 2020,
WE WILL BE
THERE!**

#FSEASTAUG4<>9

CHANGELOG

Version	Date	Modification	Page
1.0.0	31st of January 2020	Initial release	-



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