

FORMULA  
STUDENT **EAST**

ANSWER KEY OF  
**QUIZ**  
**2020 FS EAST**  
FOR COMBUSTION  
VEHICLE TEAMS



**#FSEASTAUG4<>9**

RELEASE

**VERSION 1.0**

RELEASE DATE: 31ST OF JANUARY 2020

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

**#FSEAST #FSEASTAUG4<>9**

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

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,


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

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

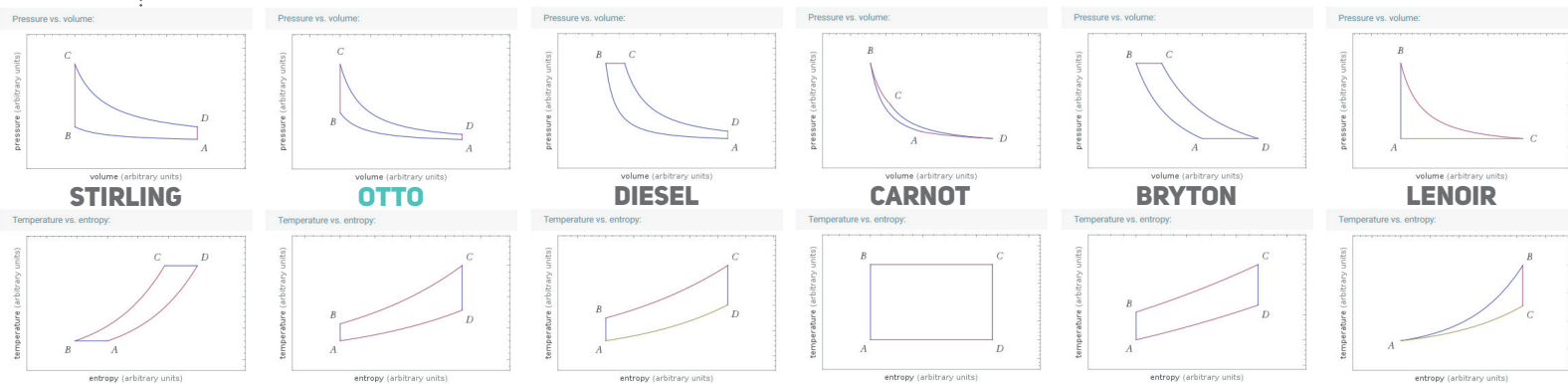
- A 6 cm wide and 3 cm high rectangle.
- A near round shape with the diameter of 5 cm.
- **A triangle with 6 cm base and 4.5 cm height.**
- A 20 cm long LED strip.

A team is choosing an engine for their current FS season.

Which of the following is allowed by the rules?

- A 1750 cc turbocharged and supercharged engine with an intercooler.
- A 600 cc four cylinder engine with a flexible restrictor in the intake system.
- A 500 cc two-cylinder engine with two-stage turbocharging and an intercooler between the stages
- **A 690 cc turbocharged single-cylinder engine with a plenum downstream of the throttle body.**

Which of the following p-V and T-S diagram pair belongs to the Otto cycle?



Calculate: You are using a 2007 Kawasaki zx6r engine for your FS car. This engine comes with a engine displacement of 599 cc, a bore of 67mm, a stroke of 42,5mm and a compression ratio of 12,0.

You make the following modifications on this engine:

- 1) machining crankcase - 0,35mm,      2) piston head offset +0,15mm,      3) cylinder head gasket -0,10mm.

**What will be the new compression ratio after the modifications?**

(round all numbers on two decimal points)

- ☐ 13,05
- ☒ 14,03
- ☐ 15,04
- ☐ 15,67

Calculate: During an impact the front section of your chassis has to absorb an energy of 13.690J.

The over all weight of your car is 268kg, the lenght of the impact attenuator is 250mm, height, 100mm and a with of 200mm.

**Calculate the impact speed (kph).**

- ☒ v= 35,21 kph
- ☐ v= 31,46 kph
- ☐ v= 29,02 kph

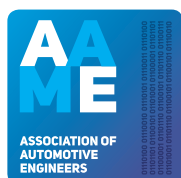
AUG  
4<>9  
2020

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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