<table>
<thead>
<tr>
<th>Design</th>
<th>Digital</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXPLORE</strong></td>
<td><strong>EXPLORE</strong></td>
</tr>
<tr>
<td>5-6 <strong>explanation</strong> of how the features of technologies impact on designed solutions for each of the prescribed technologies contexts</td>
<td>5-6 <strong>definition</strong> of problems in terms of data and functional requirements</td>
</tr>
<tr>
<td>7-8 <strong>explanation</strong> of how the features of technologies impact on designed solutions and influence design decisions for each of the prescribed technologies contexts</td>
<td>7-8 <strong>definition and decomposition</strong> of problems in terms of functional requirements and constraints</td>
</tr>
<tr>
<td><strong>GENERATE</strong></td>
<td><strong>GENERATE</strong></td>
</tr>
<tr>
<td>5-6 <strong>production</strong> of designed solutions by <strong>selecting</strong> and <strong>using</strong> appropriate technologies and techniques correctly and safely</td>
<td>5-6 <strong>implementation</strong> of digital solutions, including a visual program</td>
</tr>
<tr>
<td>7-8 <strong>production</strong> of effective designed solutions for the intended purpose independently and safely</td>
<td>7-8 <strong>testing, modification and implementation</strong> of digital solutions</td>
</tr>
<tr>
<td><strong>DEVELOP</strong></td>
<td><strong>DEVELOP</strong></td>
</tr>
<tr>
<td>5-6 <strong>communication</strong> of design ideas to audiences using:  • graphical representation techniques  • technical terms</td>
<td>5-6 <strong>design</strong> of solutions by:  • developing algorithms to address defined problems  • incorporating decision making, repetition (iteration) and user interface design</td>
</tr>
<tr>
<td>7-8 <strong>communication</strong> to different audiences using:  • appropriate technical terms  • a range of technologies and graphical representation techniques</td>
<td>7-8 <strong>design</strong> of user experiences and algorithms incorporating branching and iterations</td>
</tr>
<tr>
<td><strong>EVALUATE &amp; RENEW</strong></td>
<td><strong>EVALUATE &amp; RENEW</strong></td>
</tr>
<tr>
<td>5-6 <strong>evaluation</strong> of their ideas and designed solutions using their suggested criteria for success, including sustainability considerations</td>
<td>5-6 <strong>explanation</strong> of how information systems and their solutions meet needs  • consideration of sustainability</td>
</tr>
<tr>
<td>7-8 <strong>use</strong> of developed criteria for success (including sustainability considerations) to judge the suitability of:  • their ideas  • designed solutions and processes</td>
<td>7-8 <strong>evaluation</strong> of information systems and their solutions in terms of meeting needs, innovation and sustainability</td>
</tr>
</tbody>
</table>

**Reference**

https://makecode.mindstorms.com/reference/sensors/gyro
https://lwww-ww-s.legocdn.com/sc/media/files/user-guides/ev3/ev3_user_guide_engb-f24950e6482a3c16e56af0fd72a756fe.pdf pg 15

MakeCode EV3 / Moving straight with the Gyro <https://www.youtube.com/watch?v=ufiOPwW37xc>
The Gyro Sensor is a digital sensor that detects rotational motion on a single axis. If you rotate the Gyro Sensor in the direction of the arrows on the case of the sensor, the sensor can detect the rate of rotation in degrees per second. (The sensor can measure a maximum rate of spin of 440 degrees per second.) You can then use the rotation rate to detect, for example, when a part of your robot is turning, or when your robot is falling over. In addition, the Gyro Sensor keeps track of the total rotation angle in degrees. You can use this rotation angle to detect, for example, how far your robot has turned. This feature means you are able to program turns (on the axis the Gyro Sensor is measuring) with an accuracy of +/- 3 degrees for a 90-degree turn.

Calibrate
The gyroscope is a very useful sensor in the EV3 system. It detects the rotation rate which can be very useful to correct the trajectory of the robot and do precise turns. However, the sensor can be imprecise and subject to drifting. It is recommend to calibrate your sensor at least once after starting your brick. You don’t have to recalibrate on every run.

Instructions
[Add this to your Report]
Turn 90 degrees

Algorithm

On start
Calibrate gyro
Steer motors 200 speed 50
Pause until rotated 90 degrees

Did it turn exactly 90 degrees?
Refine it so that it moves forwards one rotation after turning and then turns back in 90 degrees in the opposite direction

Move Straight

Rotating using a wheel is not precise. The wheel can slip or the motors can be slightly different. With the help of the gyro you can detect and correct deviations in your trajectory.

To do this, we will use the gyro rate block to get the current rotation rate from the gyro.

When the brick is in motion, it moves in the direction of one of axes used to measure three-dimensional space. Depending on where the gyro sensor is attached, it can measure the difference in angle from where it was before the last motion occurred. While the brick is moving the angle differences are measured continuously. This gives a rate of change in angle from one point in time to the next. This rate of change is measured as how many degrees of angle change in one second (degrees per second). This also known as roll rate or angular velocity.

Returns
- a number that is the current rate of rotation in degrees per second.
To correct our movement so that we are always driving straight, we make a new `error` variable and set it to `gyro rate` multiplied by -1. The reason we multiply by -1 is to steer in the opposite direction. Then we pass this error value into the turn ratio section of the steer motors block. Then, if the robot is turning right, the gyro will report a positive rotation rate and the turn ratio will be negative which will turn the robot left!

**Algorithm**

On start
- Calibrate gyro
  - While true
    - Do
      - Set `error` to `gyro rate` x -1
      - Steer motors `error` speed 50

**OR**

On start
- Calibrate gyro 2

**Evaluate & Refine**

Did it drive straight?

Refine it so that you drive straight for 2 seconds, turn 90 degrees and drive straight for 2 seconds
Hint

- on start
  - reset gyro 2
  - calibrate gyro 2
- run large motor A at 50% if gyro 2 angle ~ 45 then
- stop large motor A
- tank motors B+C 50% 50% for 1 rotations