A screenshot of a computer

Description automatically generated with low confidence

Graphical user interface, text, application

Description automatically generated

A screenshot of a computer

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Graphical user interface, text

Description automatically generated

Text

Description automatically generated

The surface of the Earth is **not**, rigorously speaking, an inertial frame of reference. Objects at rest relative to Earth's surface are actually subject to a series of inertial effects, like the ficticious forces (Coriolis, centrifugal etc.) because of Earth's rotation, precession and other kinds of acceleration.

When solving physics problems, however, we usually take the Earth frame as being inertial. This is because the inertial effects are **minuscule** for most of our day-to-day experiences and experiments. For example, objects in the Equator are the ones subject to the strongest centrifugal force and it is only about 3×10−33×10−3 or 0.3%0.3% of their weight.

So for the most part, if an experiment is short enough and happens in a small enough region, the surface of Earth can indeed be approximated to an inertial frame of reference since the effects on the experiment's results are very, very tiny.

This of course has exceptions, as cited in njspeer's answer.

If however by "Earth" you mean the reference frame in Earth's center, it is an inertial frame according to General Relativity (GR), since observers in free fall are inertial in GR. The Earth actually does have some proper acceleration due to external forces such as radiation pressure, but these are also minuscule effects.

Because the earth is rotating, it is never strictly an inertial reference frame. However, because the effects are small in many situations, it can often be approximated as one.

Graphical user interface, text, application

Description automatically generated

When ship will be far from all other objects, no external or resultant force will be acting on it. And according to Newton’s First Law, a body at rest will remain at rest and body in motion will continue its motion with constant velocity. Hence, space ship will move on with the constant speed of 1x104 m/s

Graphical user interface

Description automatically generated