Gravity and space

1 Calculate the weight of these objects on the Earth (gravitational field strength = 10 N/kg):
   a  a 5 kg bag of potatoes
   b a 70 kg man
   c an 80 g orange.

2 Fill in the gaps with the correct word, mass or weight, in each of these statements.
   a ................................ stays the same everywhere in the solar system.
   b ................................ is less on the Moon than on the Earth.
   c ................................ is measured in kilograms and ................................ is measured in newtons.
   d ................................ is a force.
   e ................................ acts towards the centre of the Earth.

3 The gravitational field strength at the surface of Mars is 3.7 N/kg.
   a How much would a 1 kg bag of sugar weigh on Mars?
   b How much would a 65 kg person weigh on Mars?
   c If a person weighs 560 N on Earth, how much would they weigh on Mars?

4 The diagram shows the Sun and the Earth.
   a What is the almost circular path of the Earth called?
   b What force keeps the Earth moving in this path?
   c On the diagram draw an arrow showing the force. Label it F.
   d Imagine that the force is suddenly switched off. What will happen to the Earth?
   e Draw this new path on the diagram.
5 The diagrams show two very large objects with the same mass. In which diagram, A or B, is the gravitational force between the objects larger? 

A B

6 The diagrams show two planets and their moons. In which diagram, A or B, is the gravitational force between the objects larger? 

A B

7 The diagram shows the journey of a rocket from the Earth to the Moon.

a Why does a rocket need a large thrust on take-off from the Earth?

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b What happens to the force of gravity as the distance between the rocket and the Earth increases?

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c What would happen if the thrust of the rocket at take-off was not enough to put the rocket in orbit around the Earth?

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8 Complete the sentence.
The Moon is a natural ________________ of the Earth.

9 Fill in the gaps to complete these sentences about satellites.
   a If a satellite is in a ______________________ orbit, it stays at the same
     point above the Earth’s surface. It takes 24 hours to complete an orbit –
     the time the Earth takes to rotate once. This is very useful for satellites
     which are used for ________________.
   b If a satellite is in a ______________________ orbit, it passes over
     the poles of the Earth. This is very useful for satellites which are
     used for ________________.

10 Draw lines to match the scientist with his work on the solar system.

   Newton  •  a geocentric model of the universe
   Copernicus  •  very accurate star charts and planet positions
   Galileo  •  calculation to show that planets move in elliptical
               orbits round the Sun
   Kepler  •  observation of Jupiter’s moons using a telescope
   Brahe  •  explanation of elliptical orbits
   Aristotle  •  a heliocentric model of the universe