1   Exoplanets are planets orbiting stars other than our own Sun. Most exoplanets
    discovered so far are giant planets similar to the planet Jupiter. The exoplanet Kepler-7b
    has a mass about 0.43 times the mass of Jupiter, and a radius about 1.6 times the radius
    of Jupiter.

    Take the gravitational field strength at the surface of Kepler-7b to be g_K, and the
    gravitational field strength at the surface of Jupiter to be g_J.

    The ratio $\dfrac{g_K}{g_J}$ is

    ☒ **A** 0.17

    ☒ **B** 0.27

    ☒ **C** 0.69

    ☒ **D** 1.1

    (Total for Question = 1 mark)

2   The force between two masses and the force between two charges can be modelled in a
    similar way, using gravitational and electric fields. A difference between these models is that

    ☒ **A** an electric field is always a radial field.

    ☒ **B** an electric field is always the stronger field.

    ☒ **C** a gravitational field cannot be shielded.

    ☒ **D** a gravitational field extends over an infinite range.
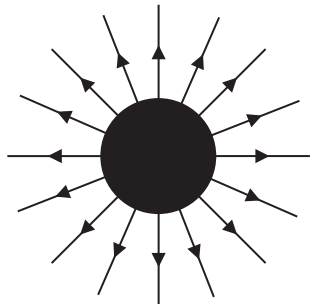
    (Total for Question = 1 mark)

3 The electrostatic interaction between two charges and the gravitational interaction between two masses can be represented by similar equations.
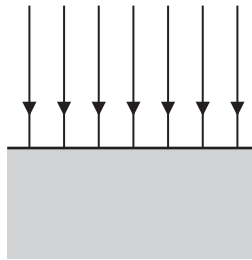
Which of the following is correct?

☒ **A** The force variation in both fields obeys an inverse square law.

☒ **B** Both fields are examples of strong interactions.

☒ **C** Both have a field strength variation that is inversely proportional to distance.

☒ **D** Electric charge is exactly analogous to mass.
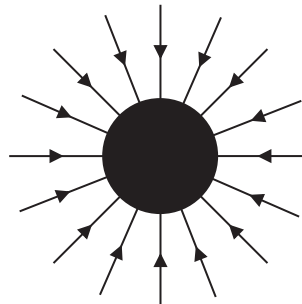
(Total for Question   1 mark)

4 Electric and gravitational fields can be represented in similar ways. Which of the diagrams below **cannot** be used for a gravitational field?

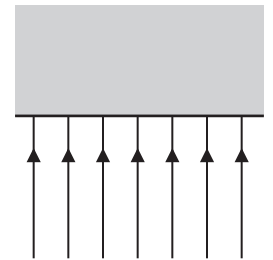
A   **B**   **C**   **D**

☒ **A**

☒ **B**

☒ **C**

☒ **D**

(Total for Question = 1 mark)

5 Newton's law of gravitation can be applied to the Earth-Moon system. Which of the following statements is **not** correct?

☐ **A** The value of *G* at the surface of the Moon is the same as that at the surface of the Earth.

☐ **B** The gravitational force between the Earth and the Moon is proportional to the square of the separation of the Earth and the Moon.

☐ **C** The gravitational force between the Earth and the Moon is proportional to the mass of the Moon.

☐ **D** The orbital time of the Moon about the Earth is independent of the mass of the Moon.

(Total for Question = 1 mark)

6 A small satellite has a weight of 1200 N at the Earth's surface. It is launched into a circular orbit with radius equal to twice the radius of the Earth. The weight of the satellite in this orbit is

☒ **A** 0 N

☒ **B** 300 N

☒ **C** 600 N

☒ **D** 1200 N

(Total for Question   1 mark)

7 In many ways electrical and gravitational forces are similar.

One key difference is that only

☒ **A** electrical forces can be attractive and repulsive.

☒ **B** electrical forces have an infinite range.

☒ **C** gravitational forces can be attractive and repulsive.

☒ **D** gravitational forces have an infinite range.

(Total for Question   1 mark)

8   Which of the following statements is correct?

☒   **A** Electrostatic forces have a much longer range than gravitational forces.

☒   **B** Gravitational forces have a much longer range than electrostatic forces.

☒   **C** Gravitational and electrostatic forces both obey an inverse square law.

☒   **D** Gravitational and electrostatic field strength are both scalar quantities.

(Total for Question   1 mark)

9   Mars has twice the mass of Mercury and is 4 times further away from the Sun.

The ratio of the gravitational force from the Sun on Mercury to the gravitational force from the Sun on Mars is

☒   **A**   0.5

☒   **B**   2.0

☒   **C**   8.0

☒   **D**   32

(Total for Question = 1 mark)

10   The gravitational field strength at the surface of the Earth is 9.8 N kg^{-1}. A satellite is orbiting at a height above the ground equal to the radius of the Earth.

The gravitational field strength, in N kg^{-1}, at this height is

☒   **A**   0.0

☒   **B**   2.5

☒   **C**   4.9

☒   **D**   9.8

(Total for Question = 1 mark)