1 The gravitational constant, G, is a constant of proportionality in Newton's law of gravitation. The permittivity of free space, ε_0, is a constant of proportionality in Coulomb's law.

When comparing the electrostatic force acting on a pair of charged particles to the gravitational force between them, the product $\varepsilon_0 G$ can appear in the calculation.

Which is a unit for $\varepsilon_0 G$?

A $C^2\ kg^{-2}$

B $C^2\ m^{-2}$

C $F\ kg^2\ N^{-1}\ m^{-2}$

D it has no unit

(Total 1 mark)

2 Which of the following gives a correct unit for $\left(\frac{g^2}{G}\right)$?

A N ☐

B $N\ kg^{-1}$ ☐

C N m ☐

D $N\ m^{-2}$ ☐

(Total 1 mark)

3 Which of the following is **not** a unit of power?

A $N\ m\ s^{-1}$ ☐

B $kg\ m^2\ s^{-3}$ ☐

C $J\ s^{-1}$ ☐

D $kg\ m^{-1}\ s^{-1}$ ☐

(Total 1 mark)

4 Which is equivalent to the ohm?

A $J\ C^{-2}\ s^{-1}$ ⬭

B $J\ C^{-2}\ s$ ⬭

C $J\ s$ ⬭

D $J\ s^{-1}$ ⬭

(Total 1 mark)

5 What is a correct unit for the area under a force−time graph?

A $N\ m$ ⬭

B $kg\ m\ s^{-1}$ ⬭

C $kg\ m\ s^{-2}$ ⬭

D $N\ s^{-1}$ ⬭

(Total 1 mark)

6 What **cannot** be used as a unit for the Young modulus?

A $N\ m^{-2}$ ⬭

B Pa ⬭

C $kg\ m^{-2}\ s^{-2}$ ⬭

D $kg\ m^{-1}\ s^{-2}$ ⬭

(Total 1 mark)

7 In which of the following do both quantities have the same unit?

A Electrical resistivity and electrical resistance. ⬭

B Work function Planck constant ⬭

C Pressure and the Young modulus. ⬭

D Acceleration and rate of change of momentum. ⬭

(Total 1 mark)

8 A mobile phone operates at a constant power of 200 mW
It has a 3.7 V lithium-ion battery that has a charge capacity of 9400 C

What is the time taken for the battery to discharge completely?

A 2 hours ⬭

B 48 hours ⬭

C 120 hours ⬭

D 140 hours ⬭

(Total 1 mark)

Mark schemes

1	**A**	**[1]**
2	D	**[1]**
3	D	**[1]**
4	**B**	**[1]**
5	**B**	**[1]**
6	**C**	**[1]**
7	C	**[1]**
8	**B**	**[1]**