



$$F_g = \frac{Gm_1m_2}{d^2}$$

$$G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$$

$$F_g = mg$$

Part One: Training

Reggie the Rooster is sent on a special mission by NASA to see which planets in the Universe would be suitable for the Poultry in Outer Orbits Project, P.O.O.P. Before the mission, Reggie must review his knowledge of the force of gravity. Reggie has a mass of 4 kg.

1) What is Reggie's weight on Earth?

weight
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2) If Reggie lands on a planet that has twice the mass of Earth, what is Reggie's weight on this planet?

factor changed
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new weight
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3) If Reggie lands on a planet that has half the mass of Earth, what is Reggie's weight on this planet?

factor changed
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new weight
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4) If Reggie lands on a planet that has twice the radius of Earth, what is Reggie's weight on this planet?

factor changed
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new weight
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5) If Reggie lands on a planet that has half the radius of Earth, what is Reggie's weight on this planet?

factor changed
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new weight
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6) If Reggie lands on a planet that has twice the mass of Earth and three times the radius, what is Reggie's weight on this planet?

factor changed
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new weight
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7) If Reggie lands on a planet that has half the mass of Earth and one fourth the radius, what is Reggie's weight on this planet?

factor changed
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new weight
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8) If Reggie lands on a planet that has ten times the mass of Earth and one fifth the radius, what is Reggie's weight on this planet?

factor changed
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new weight
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### Part Two: Rooster in Space

It is now time for Reggie to explore several different planets for the P.O.O.P. The optimal weight range for poultry is between 20 N and 60N. Reggie was chosen because he represents the average of the poultry population. Fill out the chart to determine which planets would be best to P.O.O.P on.

Name or Planet	Mass of planet (kg)	Radius of Planet (m)	Reggie's Weight
Mars	6.4 E 23	3.4 E 6	
Jupiter	1.9 E 27	7.1 E 7	
Uranus	8.7 E 25	2.6 E 7	
Planet 23B	6.3 E 10	3.1 E 4	
Planet 6567	5.7 E 30	8.8 E 10	

9) What planets would the P.O.O.P fit best on?

### Part Three: Reggie's Memoirs

10) Reggie went to another planet, of which he had told nobody until now, on this planet, he had a weight of 50 N and the mass of the planet was  $8.2 \times 10^{24}$  kg. What was the radius of the planet?

radius
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11) Reggie went to yet another planet, of which he again told nobody until not, on this planet he had a weight of 200 N and the radius of the planet was  $4.5 \times 10^{10}$  m. What was the mass of the planet?

mass
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