Lesson 5 - Weight

Physics - KS3

Forces and Motion

Mrs Wolstenholme

Calculating Weight

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

$$W = m \times g$$

Calculating Weight

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

Calculate the weight of a 59 kg astronaut in a gravitational field with a strength of 9.8 N/kg.

W = m x g

W = 59 x 9.8

W = 578.2 N

What is the unit of Weight?

Option 1

Newton (N)

Option 2

Newton per kilogram (N/kg)

Option 3

Kilogram (kg)

Option 4

Metres (m)

What is the unit of mass in this equation?

Option 1

Newton (N)

Option 2

Newton per kilogram (N/kg)

Option 3

Kilogram (kg)

Option 4

Grams (g)

What is the unit of gravitational field strength?

Option 1

Newton (N)

Option 2

Newton per kilogram (N/kg)

Option 3

Kilogram (kg)

Option 4

Metres (m)

In the equation W = m x g, what does m stand for?

Option 1

metre

Option 2

mustard

Option 3

mass

Option 4

milk

In the equation W = m x g, what does g stand for?

Option 1

Gravitational field strength

Option 2

Grass

Option 3

Green

Option 4

Geography

In the equation W = m x g, what does W stand for?

Option 1

Width

Option 2

Water

Option 3

Wasp

Option 4

Weight

Complete the task

$$W = m \times g$$

1. What does W stand for?
2. What is the unit of W?
3. What does m stand for?
4. What is the unit of m?
5. What does g stand for?
6. What is the unit of g?

Calculating Weight: Example

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

Calculate the weight of a 55 kg astronaut in a gravitational field with a strength of 2N/kg.

W = m x g

W = 55 x 2

W = 110 N

Calculating Weight: Example

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

Calculate the weight of a 100 g bag of sweets in a gravitational field with a strength of 9.8 N/kg.

Mass = 100 g ÷ 1000 = 0.1 kg

W = m x g

W = 0.1 x 9.8

W = 0.98 N

Quick Practice

Change these masses into kg

1. 4000 g
2. 300 g
3. 21 g
4. 650 g

Calculating Weight: Your Turn

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

Calculate the weight of a 3 kg object in a gravitational field with a strength of 10 N / kg.

Calculating Weight: Your Turn

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

Calculate the weight of a 400 g object in a gravitational field with a strength of 5 N / kg.

Calculating Mass

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

Calculate the mass of a 525.1 N astronaut in a gravitational field with a strength of 8.9 N/kg.

W = m x g

525.1 = m x 8.9

525.1 ÷ 8.9 = m x 8.9 ÷ 8.9

525.1 ÷ 8.9 = m

m = 59 kg

What is the next step?

400 = m x 4

Option 1

400 **x 4** = m x 4 **x4**

Option 2

400 **÷ 4** = m x 4 **÷ 4**

Option 3

400 **x 4** = m x 4 **÷ 4**

Option 4

PANIC!!

What is the next step?

600 = m x 2

Option 1

600 **÷ 2** = m x 2 **÷ 2**

Option 2

600 **x 2** = m x 2 **x 2**

Option 3

600 **÷ 3** = m x 3 **÷ 3**

Option 4

PANIC!!

What is the next step?

450 = m x 10

Option 1

450 x 10 = m x 10 x 10

Option 2

450 ÷ 10 = m x 10 ÷ 10

Option 3

450 ÷ 450 = m x 10 ÷ 450

Option 4

PANIC!!

Calculating Mass: Your Turn

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

Calculate the mass of a 670 N astronaut in a gravitational field with a strength of 9.8 N/kg.

W = m x g

Calculating Mass: Your Turn

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

Calculate the mass of an object 450N object in a gravitational field with a strength of 20 N / kg.

W = m x g

Astronaut Tim Peake has a mass of 58 kg. Calculate his weight on different planets

Planet	g (N/kg)	Weight (N)
Mercury	3.7	W = m x g = 58 x 3.7 = 214.6
Venus	8.9	
Earth	10.0	
Mars	3.7	
Jupiter	23.1	
Saturn	9.0	
Uranus	8.7	
Neptune	11.0	

Weight on Different planets

Different planets have different gravitational field strengths.

This is because they have different _____. The larger the mass of the planet, the _____ the gravitational field strength.

Our weight will be different on different planets because of the different _____.

Our _____ does not change.

Independent Practice

÷1000

g → kg

Weight	=	mass	x	gravitational field strength
(N)		(kg)		(N/kg)

1. Calculate the weight of a 5kg object in a gravitational field with a strength of 9 N / kg.

2. Calculate the weight of a 2.1 kg object in a gravitational field with a strength of 23.1 N / kg.

3. Calculate the weight of a 1200g object in a gravitational field with a strength of 9.0 N / kg.

4. Calculate the weight of a 90 g object in a gravitational field with a strength of 3.7 N / kg.

5. Calculate the mass of a 4500N object in a gravitational field with a strength of 8 N / kg.

6. Calculate the mass of a 3200N object in a gravitational field with a strength of 1.6 N / kg.