# Rock Weight Lifting

**Name: Answers**

# Introduction

When it comes to athletic ability, Cam and Sam are two very competitive individuals. They like to compare run times, how high they can jump and how strong they are.

Whilst working in the garden, they both posted photos of themselves lifting large rocks on Instagram. Being the competitive individuals they are, they both boasted that their rock was much bigger than the other's. In order to settle the dispute they decided to measure the rocks that they had managed to lift.

They went about doing this but their cleverest friend, Amelia, commented on their Instagram that the largest rock wasn't the heaviest rock and suggested that they would need to find what rock type they had lifted and its density.

1.  **The rocks that Cam and Sam lifted were rectangular prisms. What formula is used to determine the volume of a rectangular prism?**

| Length x Width x Height |
| --- |

2.  **What does Amelia mean when she refers to "density of the rock"? Why is this important when working out the weight of a rock?**

| Density refers to how closely packed a material is. If two different materials have the same volume then the more dense material will weigh more. |
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# Task

Work out the weight of the rocks that Cam and Sam had been lifting to determine who is the strongest.

# Rock type, size and density

The following table shows the information about the rocks that both Cam and Sam were able to lift.

**Table One: Rock lifting characteristics**

| Athlete | Rock dimensions L x W x H (cm) | Rock Type | Rock density (D) |
| --- | --- | --- | --- |
| Cam | 40cm x 35cm x 30cm | Basalt | 3.0g/cm$^3$ |
| Sam | 42cm x 38cm x 31cm | Sandstone | 2.4g/cm$^3$ |

# Cam's rock calculation

**Step 1**

Draw Cam's rock showing length, width and height dimensions (complete this on separate page and take a photo of this and submit it when you're finished).

**Step 2**

Calculate the volume of Cam's rock by using the following formula (show working out on a separate page and enter answer below):

$$V \text{ (cm}^3) = L \times W \times H$$

Where:          V = Volume          L =Length          W = Width          H = Height

**Volume of Cam's rock:** 40 x 35 x 30 = 42 000cm$^3$

**Step 3**

Calculate the weight of Cam's rock by using the following formula. Use the appropriate density value from table one (show working out on a separate page and enter answer below):

$$W \text{ (g)} = D \text{ (g/cm}^3) \times V \text{ (cm}^3)$$

Where:          W = Weight          D = Density          V = Volume

**Weight of Cam's rock:** 3.0 x 42000 = 126 000 g

# Sam's rock calculation

**Step 1**

Draw Sam's rock showing length, width and height dimensions (Complete this on separate page and take a photo of this and submit it when you're finished).

**Step 2**

Calculate the volume of Sam's rock by using the following formula (show working out on a separate page and enter answer below):

$$V \text{ (cm}^3) = L \times W \times H$$

Where:          V = Volume          L =Length          W = Width          H = Height

**Volume of Sam's rock:** 42 x 38 x 31 = 49 476cm$^3$

**Step 3**

Calculate the weight of Sam's rock by using the following formula. Use the appropriate density value from table one (show working out on a separate page and enter answer below):

$$W \text{ (g)} = D \text{ (g/cm}^3) \times V \text{ (cm}^3)$$

Where:          W = Weight          D = Density          V = Volume

**Weight of Sam's rock:** 2.4 x 49476 = 118 742 g

# Conclusion

**3. Who lifted the biggest rock?**

Sam - 49476cm$^3$

**4. There are 1000g in a kg. Use this knowledge to convert the weight of the rocks to kg?**

**Cam's rock in kg:** 126 kg

**Sam's rock in kg:** 118.742 kg

**5. Who lifted the heaviest rock?**

Cam – 126 kg

**6. Who is the stronger of the two?**

Cam can lift 7.3 kg more than Sam.

**7. The ability to use formulas to determine different values is used in many jobs. Describe two jobs that often use formula.**

Carpenter to work out SA of walls to order equipment. Vet to work out medication to give different size animals.

*\*Remember when submitting your work to include a photo of your diagrams and working out.*

# Further challenge

Tommy, another friend of Sam and Cam, overhears the boys boasting about their rock lifting abilities and informs them that he once lifted a gold bar that weighed 140 kg with one hand!

**Sam and Cam are able to find out that the density of gold is 19.3g/cm$^3$.**

Using the formulas provided above determine what the volume of the gold bar would have been that Tommy claims to have lifted. Enter the volume below and show the working out on separate page.

**Volume of Tommy's gold bar:** 140 000/19.3 = 7 253.9 cm$^3$