



## GEOLOGICAL EXPEDITION #4657 VOLCANIC MEASUREMENT AND ANALYSIS

Volcano studies form an extremely important sector of our geological studies. The department is coming under increasing pressure to save money and streamline our resources. We must fight to maintain our volcanic studies. Although a volcanic eruption can be an awesome display of the Earth's power, it also causes disastrous loss of life and property, especially in densely populated regions of the world. As such, we can argue our work is cheaper than the impact of an unmonitored volcano. We must only think of Vesuvius or Eyjafjallajökull in Iceland to understand the importance of our work.

Calculate carefully, as your expedition cost analysis will be submitted to the committee for review and authorisation.

Focus and accuracy is needed.



### 1. Individual Kit List

|               |     |
|---------------|-----|
| Rucksack      | £17 |
| Waterproofs   | £9  |
| Thermals      | £13 |
| Walking Boots | £26 |
| Torch         | £6  |
| Sleeping Bag  | £37 |
| Sleep mat     | £48 |
| Survival Bag  | £11 |

There are **13** members in your team.  
Calculate the total cost of individual kit for the team.

### 2. Camp Kit

Camp kit costs will depend on the length of your expedition. Use the details below to calculate your expected expedition length. Note: You need to add one fifth contingency to the total days. Formula: days x team number = length

|             | Current Study |
|-------------|---------------|
| Travel Days | 19            |
| Study Days  | 65            |
| Rest Days   | 11            |

## Reasoning and Problem Solving – Multiplication and Division – Year 5

Each camp day you have calculated will have the following costs: food £23, first aid £7, fuel £17, life and accident insurance £51 and wages £98.  
Showing a breakdown of each cost plus a total cost for the camp, calculate your full camp costs.



### 3. Technical resources

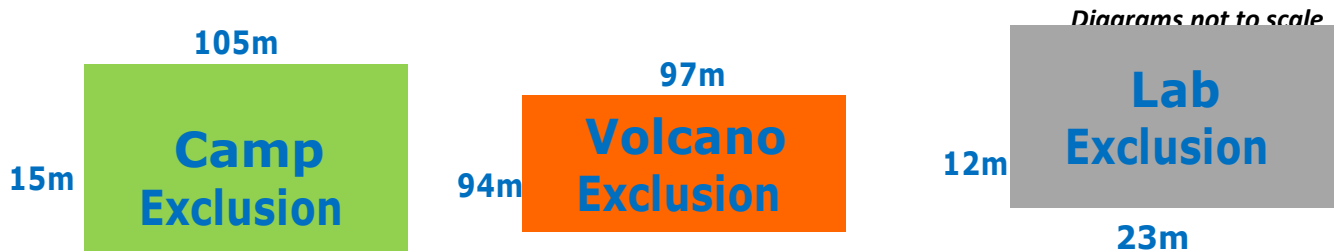
For each selected item please ensure you add £5 per day insurance to the hire cost.



| Equipment            |   | Hire (cost per day) | Number of days | Hire Cost | £5 per day Insurance | Total cost |
|----------------------|---|---------------------|----------------|-----------|----------------------|------------|
| Thermometer          | ✓ | £1,234              | 65             |           |                      |            |
| Soil collection pods | ✓ | £2,543              | 23             |           |                      |            |
| Chemical analysis    | ✓ | £7,325              | 30             |           |                      |            |
| Richter graph        | ✓ | £5,731              | 35             |           |                      |            |

### 4. Permits

You will need to ensure you have adequate permits from local agencies for any exclusion zones which are necessary. Please detail the daily cost of an exclusion zone permit below. These are charged at £7 per metre<sup>2</sup>.



**5. Transportation**



Helicopter transportation saves time, reducing days spent on site and therefore costs. Costing options for Helicopter transport is detailed below.

Calculate cost per passenger to help maximise value for money. Note: 2 members of the team will be on rest each day, and 2 more will remain at the lab.

| Helicopter | Cost per trip | Per passenger | Tick to select option |
|------------|---------------|---------------|-----------------------|
| 4 seater   | £1,224        |               |                       |
| 8 seater   | £2,943        |               |                       |
| 10 seater  | £3,510        |               |                       |

Jeeps are needed to transport kit and workers (except the ones on rest days). Calculate the best daily option to hire. Note: The daily kit needed takes up 3 seats.

| Jeep     | Cost per trip<br>(outward and return journey) | Total Daily Cost | Price per Person | Tick to select option |
|----------|---|------------------|------------------|-----------------------|
| 4 seater | £242  |                  |                  |                       |
| 8 seater | £473  |                  |                  |                       |

**6. PRE EXPEDITION TRAINING AND BRIEFING**

Now you are all ready for your training and pre-expedition briefing. An external company has quoted £346 per person for three days training. Internally we know we can run the training for £4,364 for the whole group. Which is the most cost effective?



Brilliant work the whole expedition is approved! Thanks for your help!

## Reasoning and Problem Solving – Multiplication and Division – Year 5

1.  $£17 + £9 + £13 + £26 + £6 + £37 + £48 + £11 = £167$ .  $£167 \times 13 = £2,171$ . Calculation may stimulate discussion whether to add then multiply (most efficient) or multiply then add (less efficient, more chance for errors).

2.  $19 + 65 + 11 = 95$  days;  $95 \div 5 = 19$ ;  $95 + 19 = 114$ ;  $114 \times 13 = 1,482$  days.

|                  |                     |                 |
|------------------|---------------------|-----------------|
| <b>Food</b>      | <b>£23 x 1,482</b>  | <b>34, 086</b>  |
| <b>First aid</b> | <b>£7 x 1,482</b>   | <b>10,374</b>   |
| <b>Fuel</b>      | <b>£17 x 1,482</b>  | <b>25,194</b>   |
| <b>Insurance</b> | <b>£51 x 1,482</b>  | <b>75,582</b>   |
| <b>Wages</b>     | <b>£98 x 1,482</b>  | <b>145,236</b>  |
| <b>Total</b>     | <b>£196 x 1,482</b> | <b>290, 472</b> |

3.

| Equipment            |   | Hire<br>(cost per day) | Number of<br>days | Hire Cost | £5 per day<br>Insurance | Total cost |
|----------------------|---|------------------------|-------------------|-----------|-------------------------|------------|
| Thermometer          | ✓ | £1,234                 | 65                | £80, 210  | £325                    | £80,535    |
| Soil collection pods | ✓ | £2,543                 | 23                | £58, 489  | £115                    | £58,604    |
| Chemical analysis    | ✓ | £7,325                 | 30                | £219, 750 | £150                    | £219,900   |
| Richter graph        | ✓ | £5,731                 | 35                | £200,585  | £175                    | £200,760   |

4. **Camp exclusion zone:  $105 \times 15 = 1,575$ , costing  $£7 \times 1,575 = £11,025$**

**Volcano exclusion zone:  $97 \times 94 = 9,118$ , costing  $£7 \times 9,118 = £63,826$**

**Laboratory exclusion zone:  $12 \times 23 = 276$ , costing  $£7 \times 276 = £1,932$**

5.

| Helicopter | Cost per trip | Per passenger   | Tick to<br>select<br>option |
|------------|---------------|---|-----------------------------|
| 4 seater   | £1,224        | 9 people (13 minus 2 on rest day and 2 at the lab) would need 3 helicopters: $3 \times £1,224 = £3,672$ . $£3,672 \div 9 = £408$ per person |                             |
| 8 seater   | £2,943        | 9 people (13 minus 2 on rest day and 2 at the lab) would need 2 helicopters: $2 \times £2,943 = £5,886$ . $£5,886 \div 9 = £654$ per person |                             |
| 10 seater  | £3,510        | 9 people (13 minus 2 on rest day and 2 at the lab) would need 1 helicopters: $1 \times £3,510 = £3,510$ . $£3,510 \div 9 = £390$ per person | ✓                           |

| Jeep     | Cost per trip<br>(outward and return<br>journey) | Total Daily Cost  | Price per Person     | Tick to<br>select<br>option |
|----------|--|---|----------------------|-----------------------------|
| 4 seater | £242   | 11 people plus 3 seats for kit would need 4 jeeps: $4 \times £242 = £968$ . | $£986 \div 11 = £88$ |                             |
| 8 seater | £473   | 11 people plus 3 seats for kit would need 2 jeeps: $2 \times £473 = 946$    | $£946 \div 11 = £86$ | ✓                           |

6.  $£346 \times 13 = £4,498$  so more cost effective to use in house training.

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