

CULIN LI 30M2 MISSION HEIGHTS

1st page

Amount of plants needed

~~Answer~~ Total amount of plants needed must be divisible by $(8+5+3)$
 $\rightarrow 16$

One pot: $60 \div 16 = 4$ (rounded up because there can not be part of a plant or less than 60 in total)

So: there can be

$$\begin{aligned} & 8 \times 4 = \boxed{32 \text{ flowers}} & 5 \times 4 = \boxed{20 \text{ shrubs}} & \text{(and)} & 3 \times 4 = \boxed{12 \text{ trees}} \\ & \text{Total amount of plants: } 32 + 20 + 12 = 64 \text{ (which is more than 60)} \end{aligned}$$

1st option Option: 1

I have decided not to round the prices until the total price is calculated because the school will be buying all of them in one transaction.

~~per flower~~

$$\begin{aligned} \text{per flower} &= \text{NZD } \$3.75 \times 0.85 \\ &= \text{NZD } \$3.125 \text{ each (see above for explanation)} \end{aligned}$$

$$\begin{aligned} \text{per shrub} &= \text{NZD } \$11.50 \times 0.87 \\ &= \text{NZD } \$10.005 \text{ each} \end{aligned}$$

$$\begin{aligned} \text{per tree} &= \text{NZD } \$15.90 \times \frac{8}{9} \\ &= \text{NZD } \$14.13 \text{ (recurring) each} \end{aligned}$$

Total price:

$$\begin{aligned} &= \text{NZD } \$3.125 \times 32 + \text{NZD } \$10.005 \times 20 + \text{NZD } \$14.13 \times 12 \\ &= \text{NZD } \$99.60 + \text{NZD } \$200.10 + \text{NZD } \$169.60 \\ &= \boxed{\text{NZD } \$469.30} \text{ exactly} \end{aligned}$$

This option is too expensive, and therefore not a good option.

See 2nd option by turning the page over

2nd page

2nd option

Option: 2

Price paid: Total price $\times \frac{5}{6}$

$$\begin{aligned} \text{Total price} &= (\text{NZD } \$3.75 \times 32 + \text{NZD } \$11.50 \times 20 + \text{NZD } \$15.90 \times 12) \times \frac{5}{6} \\ &= (\text{NZD } \$120 + \text{NZD } \$230 + \text{NZD } \$190.80) \times \frac{5}{6} \\ &= (\text{NZD } \$540.80) \times \frac{5}{6} \\ &= \boxed{\text{NZD } \$450.67} \text{ (2 decimal places) (exact price NZD } \$450\frac{2}{3}) \end{aligned}$$

This option is better than the first option, but it is still $\frac{2}{3}$ of NZD \$1 more than NZD \$450.

3rd option

Option: 3

I have decided that the final price would be calculated by

$$(\text{Price of } \overset{\text{dry}}{\text{flowers}} + \text{GST}) + (\text{Price of } \overset{\text{all}}{\text{shrubs}} + \text{GST}) + (\text{Price of } \overset{\text{all}}{\text{trees}} + \text{GST}) \div 0.93$$

because I ~~assume~~ ^{assume} that the ~~price~~ final price will be paid in AUD which the school must exchange NZD into AUD first.

$$\begin{aligned} \text{Price per flower} &= \text{AUD } \$2.00 \times 1.15 \\ &= \text{AUD } \$2.30 \text{ each (exactly)} \end{aligned}$$

$$\begin{aligned} \text{Price per shrub} &= \text{AUD } \$7.80 \times 1.15 \\ &= \text{AUD } \$8.97 \text{ each (exactly)} \end{aligned}$$

$$\begin{aligned} \text{Price per tree} &= \text{AUD } \$11.40 \times 1.15 \\ &= \text{AUD } \$13.11 \text{ each (exactly)} \end{aligned}$$

$$\begin{aligned} \text{Total price} &= \text{AUD } \$2.30 \times 32 + \text{AUD } \$8.97 \times 20 + \text{AUD } \$13.11 \times 12 \\ &= \text{AUD } \$73.60 + \text{AUD } \$179.40 + \text{AUD } \$157.32 \\ &= \text{AUD } \$410.32 \end{aligned}$$

$$\text{Final price in NZD} = \frac{\text{AUD } \$410.32}{0.93} = \text{NZD } \$ \text{ final price}$$

$$\begin{aligned} S_0 &= \text{AUD } \$410.32 \div 0.93 = \text{the final price in NZD} \\ &= \boxed{\text{NZD } \$441.20} \text{ (2 decimal places)} \end{aligned}$$

(NZD \$1 = AUD \$0.93)

This is cheapest for the school, as long as the exchange rate is as given

COLIN LI 30M2 MISSION HEIGHTS (3rd page)

Here are the final prices (rounded to 2 decimal places):

- 1st option = NZD\$469.30
- 2nd option = NZD\$450.67
- 3rd option = NZD\$441.20 (AUD\$410.32) ✓

Only the 3rd option ~~fulfills~~ fulfils the two criteria:

	1st option	2nd option	3rd option
maximum NZD\$450.00 (164 plants)	No	No	Yes
60 or more plants in correct ratio	(Yes)	(Yes)	Yes

Discussion

The 3rd option is the cheapest. However, it has the biggest risk, because exchange rates fluctuate. This means that the school must be sure that they will get at least AUD\$410.32 when they exchange their maximum of NZD\$450.00 ✓

The 1st and 2nd options have equal risk and the 2nd option is cheaper, meaning that the 1st option is definitely not the best option. ✓

We are left with two options:

	2nd option (FP) ✓	3rd option (Green Garden)
Price	NZD\$450.67	NZD\$441.20 (AUD\$410.32)
Stability of price	Stable	Affected Affected by fluctuating exchange rates
Cheaper?	more expensive	cheaper only if NZD\$1 > AUD\$0.9118
Below NZD\$450?	No	Yes, only if NZD\$1 > AUD\$0.9118

* For the 3rd option with Green Garden to be below NZD\$450, the exchange rate must be ~~at least~~ $AUD\$410.32 \div NZD\450
 $\rightarrow NZD\$1 > AUD\$0.911822222\dots$

Turn the page

Discussion (continued)

~~Buying from Green Garden~~

Buying from Green Garden would probably still be the best option, because a good exchange rate will bring the actual total cost (affected by exchange rates) below NZD \$450. None of the options from FP (1 and 2) ^{cost} below the maximum of NZD \$450.00.

Therefore, ~~the~~ the 3rd option with Green Garden is best for the school, as it is the only option which is possible to cost below NZD \$450.00.

Otherwise, if the school wants an option with less risk (of exchange rates), the school would choose the 2nd option with FP (the New Zealand company).

Further considerations:

- The plants might die or become damaged during transport. They will have to replace any dead plants, if they want to keep the ratio.
- Green Garden is so big of a company that they have branches overseas in New Zealand. However, FP is only a 'small local New Zealand business'. The school will have to decide between a large company, which is ~~successful~~ ^{successful} but overseas, or a smaller ~~company~~ ^{local} business. The smaller a business is, the easier it is that the business will collapse.
- Only two ~~options~~ companies have been investigated. To find the best value, the school must research from a wide range of companies to compare to find the best value.
- It is very unusual that even though Green Garden has branches in Auckland, they require their customers to pay in AUD - has the school researched ~~Auckland prices~~ ^{Auckland prices} (NZD)? NZD prices will be different.
- ~~There can be hidden fees, like commission, when ~~paying~~ handling exchanged money or transferring it.~~
- Prices and discounts can change without notice.

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Discussion (continued)

- Prices for delivering the plants to the school (if applicable) have not been discussed. It might not be included in the final prices. A company might (seem) be cheap, because their delivery charges are high, and they have not included it into the price.
- 'Flowers', 'shrubs', and 'trees' are very general terms, and the school should be more specific in which species of plants that they want to buy. Prices differ depending on the species.
- Plants cost differently depending on the season.
- The school should also consider whether they need to spend money on fertilisers or pesticides, as they may be needed for ~~the~~ plant care.
- The school will need to replace their plants if students damage them or they get damaged or die after being planted in the school.
- Plants must be kept away from diseases.
- ~~Will~~ Will the school go to pay ~~to~~ in the stores or pay on line? Paying on line can also incur further charges.

Buying plants is not just limited to buying them. It also includes charges like shipping, and also charges for caring for them in products, such as fertiliser and pesticides. It is important that these factors are considered. I would recommend that the school chose the third option of Green Garden, because their plants cost the cheapest. However, this is affected by which exchange rates they use. Buying in NZD is much safer as there is no risk with exchange rates.