Essentials Mathematics
Practical Application
Task 2.11
In Class Investigation

Name: Solutions

Bonus marks are available for:	Possible score	Your score
Argument: formulae, use of equal signs (=), showing all working	1	
Numbering and writing: easily read	1	
Units: stated where appropriate	1	

This investigation is to be completed during class time.   **Total marks: 65**

You must give reasons and/or working to justify all of your responses.

You should make use of as many concepts from normal class work as you can.

Introduction

Greg has applied for a job in Melbourne (Victoria) and has been offered an interview.
The company will pay for an economy airfare.
His interview will be over a dinner in Melbourne on Thursday, March 14.

- Greg lives in Geraldton and needs to have a few things organised before he goes to Melbourne.
- He has needed a car for a while now and this will be the best time to get one.
- Greg has gathered some data on two makes of cars, Voertuig and Coche.

Vehicle	Automatic (A) or Manual (M)	City consumption (L/100km)	Highway consumption (L/100km)	Engine size (L)
Voertuig	A	9.5	5.6	1.6
	M	8.5	5.6	1.6
	A	11	6.8	2
	M	10.5	6.6	2
	A	18	12.5	3.2
	M	17	11	3.2
Coche	A	9	6.6	1.6
	M	8	6	1.6
	A	11	6.6	2
	M	9	5.4	2
	A	12.5	7.8	4
	M	12	7.8	4

Question 1. [2, 2 = 4 marks]

How many Litres of fuel would be consumed if the 2L manual Voertuig was driven:

(a) 400km on a highway?

$$6.6 : 100$$
$$26.4 : 400$$

26.4 L.

(b) 50km in the city?

$$10.5 : 100$$
$$5.25 : 50$$

5.25 L

Question 2. [2, 1 = 3 marks]

Fully identify the car that has the best fuel consumption for:

(a) city driving.

Coche 1.6 L @ 8 L/100km manual

(b) highway driving.

Coche 2L @ 5.4 L/100km Manual.

2

Question 3. [2, 2 = 4 marks]

(a) Greg believes the data shows he should get a small, automatic car. Do you agree? (Only the reasons will be marked, not 'yes' or 'no'.)

No - from data manual cars generally had lower fuel cosumption
lowest was actually 2L car not small car

(b) If fuel consumption was the only consideration, which car would be best to buy? Justify your answer.

Coche. 1.6 L Manual as both fuel consumption were lowest.

Question 4. The data collected by Greg are important considerations when deciding which car to buy. However, he has not included other things that would be important in his situation. Give two different issues he should also consider.   [2 marks]

- Size of car - passengers you need to carry
- Type of Driving
- 4 WDing
- Safety features
- Cargo
- Towing

Question 5. Greg has found a car to buy, however it costs $12000. He only has $2000 saved, so decides to borrow the rest of the money from a bank. He takes out a loan at 8.7% p.a. for 3 years.   [3 marks]

(a) How much does he borrow from the bank? $12000 - 2000 = \$10000$

(b) How much interest will be charged over the 3 years?

$I = prt$
$= 10000 \times 0.087 \times 3$
$= \$2610$

(c) How much, IN TOTAL, does he have to repay to the bank?

$10000 + 2610 = \$12610$

Question 6. This money must be paid back to the bank. Greg chooses to make monthly repayments for 3 years.
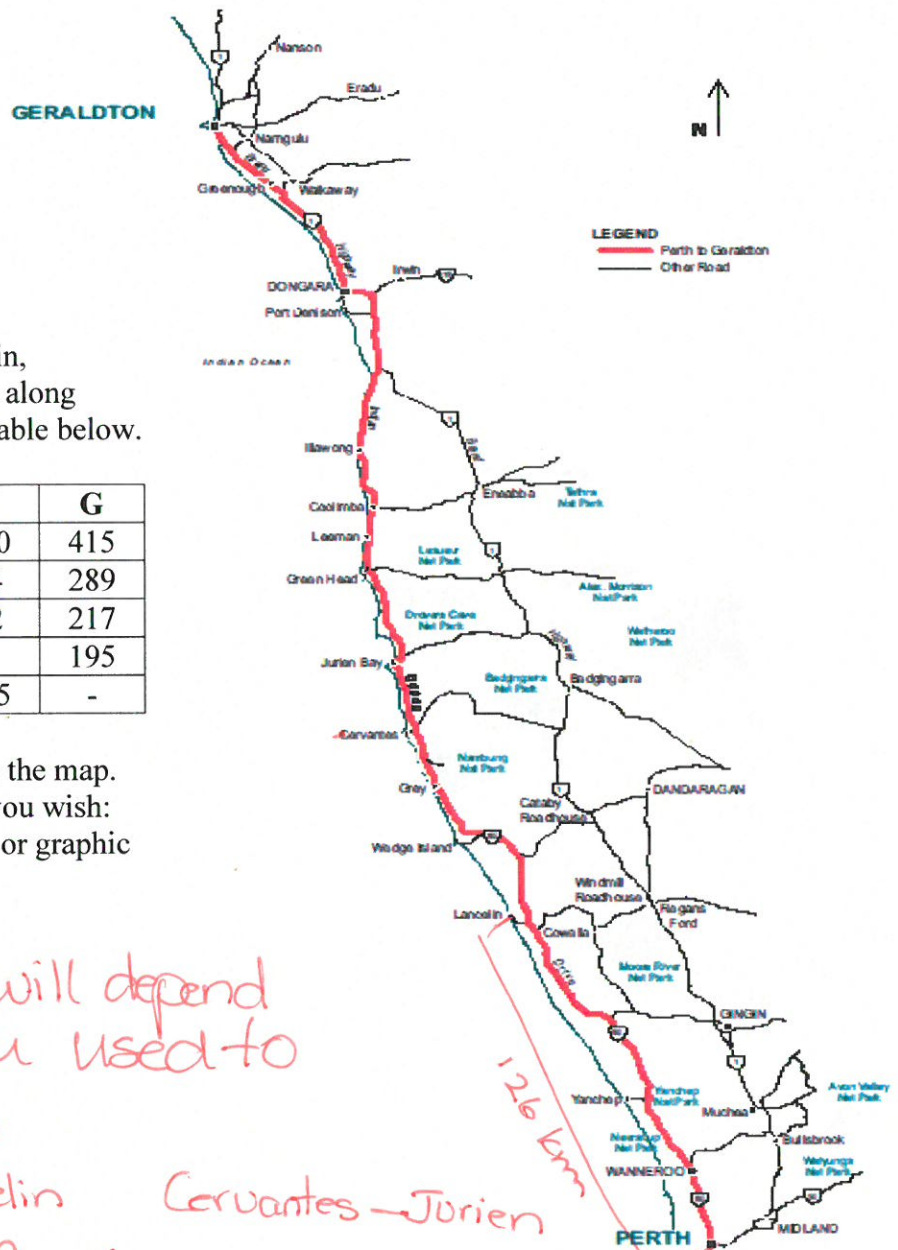[2 marks]

3

(d)   How much will each monthly payment be?

36 months in 3 yrs ✓

12610 ÷ 36 = $350.28.

(e)   How much will he have paid IN TOTAL for the car?

$2000 + $10000 + $2610 = $14610

PERTH TO GERALDTON ROUTE
via Indian Ocean Drive

Question 7. [3 marks]

The distances between Perth, Lancelin, Cervantes, Jurien Bay and Geraldton along Indian Ocean Drive is shown in the table below.

	P	**L**	**C**	**J**	**G**
P	-	126	198	220	415
L	126	-	72	94	289
C	198	72	-	22	217
J	220	94	22	-	195
G	415	289	217	195	-

Determine an **approximate** scale for the map. You may give it in whichever form you wish: Fractional scale, Written description or graphic scale.
Show reasoning clearly.

The Answer will depend on scale you used to photocopy.

Perth → Lancelin
8.4cm : 126km ✓
1cm : 15km

Cervantes — Jurien
1.5cm : 22km ✓
1cm : 14.67km

Average out the scale found for distance between a few towns.
1cm : 15km

126 km

4

Question 8. [4 marks]

Greg is driving from Geraldton to Perth Airport to catch his flight to Melbourne. The map below shows the driving time (in minutes) between various towns along the way.

Calculate the fastest route from Geraldton to Perth Airport.
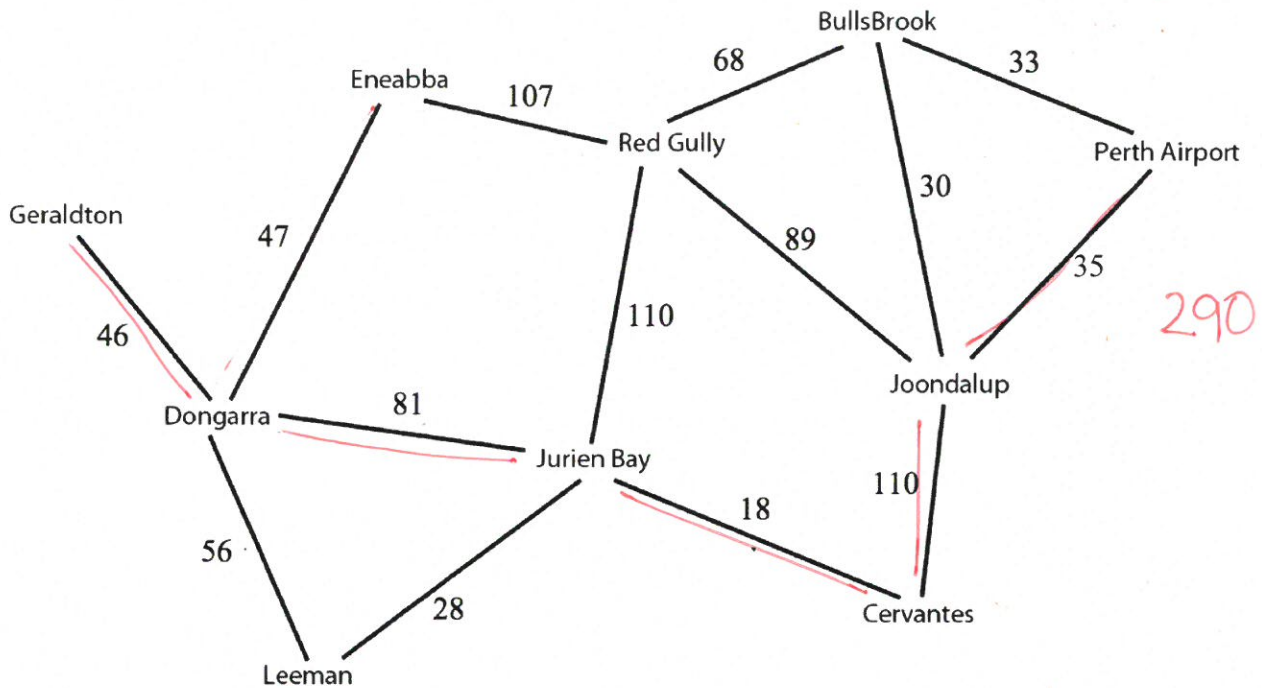
State this route and the time taken.

Geraldton →(46) Dongarra →(81) Jurien Bay →(18) Cervantes →(110) Joondalup ↓(35) Perth Airport

290min

Greg's mother wants him to drop a fruitcake off to his Aunt Mabel who lives in Leeman.

What route should he now take, and how long will it now take for him to get to Perth Airport?

Geraldton →(46) Dongarra →(56) Leeman →(28) Jurian →(18) Cervantes →(110) Joondalup ↓(35) Perth Airport

293min .

Question 9 [1,3,1,2: 7 marks]

Greg has decided to leave for Perth at 0630 from Geraldton.
Below is a graph of part of this trip.
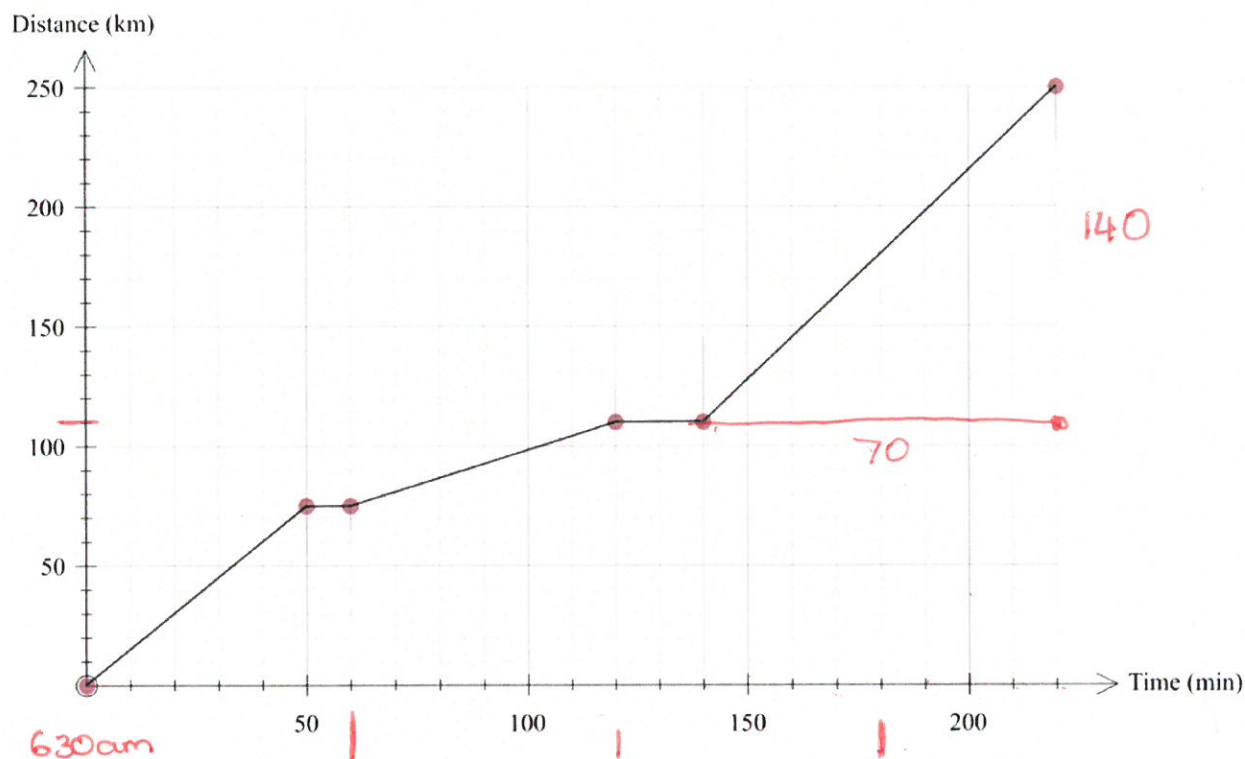
Distance (km)

630am

At what <u>time</u> did Greg have his first stop and how long is it?   6·30am + 50min

7·20am

How fast in Greg travelling after his second stop?
$\dfrac{Distance}{time} = \dfrac{140}{70} = 2km/min$.

How fast did Greg travel on average?
$\dfrac{Distance}{Time} = \dfrac{250}{220} = 1·14km/min$

What <u>time</u> does the graph stop recording?

9·40am .

Question 10. [3 marks]
On the drive down from Geraldton, Greg needed to buy a drink. The service station he stopped at has a special.

375 mL cola for $2.60   or   600 mL cola for $4.00

Which is the better buy? Show working for marks to be awarded.

375ml ⟷ 2.60
100ml ⟷ .69¢

600ml ⟷ 4.00
100ml ⟷ 0.67¢ .

The 600ml bottle is slightly better buy .

6

Greg can not afford to spend more time in Melbourne than he must.
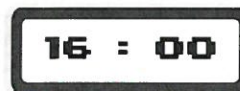
Question 11. [1, 1 = 2 marks]

He had to remind himself of the time-zone differences between cities in Australia. An internet search he did that afternoon showed the following clocks for Perth, Adelaide and Brisbane. (Remember that these are the times in each city at the same moment.)
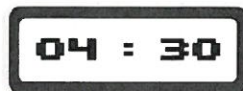
Perth (2pm)	Adelaide (12 hour clock)	Brisbane
🕑	04 : 30	16 : 00

4.30pm

reasonable Answer ⇒ knowledge of time difference

What is the time difference between:

(a) Perth and Adelaide?

2hrs 30min

(b) Adelaide and Brisbane?

30mins behind

Greg then looked up the flight times for the day he had the interview.
He saw the first plane left Perth at 6.10am and arrived in Melbourne at 12.45pm.

Flights Out

From		To	
06:10	Perth	12:45	Melbourne

9:45 10:45 11:45

Question 12. [2 marks]

Calculate the flight time for this trip.
Note: Melbourne is 3 hours ahead of Perth.

06:10 ⟶ 09.45 .

3hrs 35mins

The dinner in Melbourne was for 7.00pm at a restaurant in the city.
It usually takes 1 hour and 30 minutes to collect luggage and catch a taxi to the city from the Melbourne airport. The taxi can drop Greg at the restaurant in this time.

Flights Out

From		To	
06:10	Perth	12:45	Melbourne
08:35	Perth	15:10	Melbourne
09:50	Perth	16:25	Melbourne
10:50	Perth	17:25	Melbourne
12:50	Perth	19:25	Melbourne
14:30	Perth	21:05	Melbourne
17:05	Perth	23:40	Melbourne
17:50	Perth	00:25 (Fri)	Melbourne
23:35	Perth	06:10 (Fri)	Melbourne

From		To	
08:25	Perth	13:50	Adelaide
14:35	Adelaide	16:25	Melbourne

08:25	Perth	13:50	Adelaide
15:35	Adelaide	17:25	Melbourne

09:05	Perth	16:20	Sydney
17:00	Sydney	18:35	Melbourne

Question 13. [3, 2 = 5 marks]

(a) What is the latest time that Greg can leave Perth to be sure he will get to the restaurant on time? Show your reasoning carefully.

Add 1hr 30min < 7pm
7pm - 1hr 30min
must get in before 5.30pm
or 15.35
After 7pm so leave perth 10.50

(b) If you were Greg, would you leave at this time? (ie. At the time you said in number 3a?) Give reasons for your answer.

If he left at 12.50 he would arrive at 5.55pm + 1hr 30 → too late

Question 14. [2 marks]

Greg noticed that he could catch a plane from Perth that landed in Adelaide on the way to Melbourne. Two different planes leave Perth at 8:25 and land in Adelaide at 13:50.

If Greg decided to catch one of these planes, which would you suggest he take. Why?

08.25 out of Perth via Adelaide. Arrives melbourne 17.25 which allows 1hr 30mins to get to restaurant before 19.00pm (7pm)

8

Greg arrived in Melbourne on time and met Marissa at the restaurant. Marissa is the Manager of a New Zealand company with an office in Melbourne. She was with two other people from the company, Peter and Paulla

The menu at the restaurant included:
(Note that each dish has a number.)

ENTRÉE

2x (1.) **Chicken Skewer** (2 skewers) — **$6.00**
Grilled chicken on skewer with onion and capsicum in BBQ sauce.

2. **Beef Skewer** (2 skewers) — **$6.50**
4x (3.) **Prawn Skewer** (2 skewers) — **$8.00**
4x (4.) **Squid Teriyaki** — **$6.00**
Grilled squid (150-200mg) basted with Japanese BBQ sauce and sprinkle of sesame seeds.

5. **Grilled Chicken Wing** (5-6 pieces) — **$6.00**
6. **Fried Dumpling** (6 pieces) — **$6.20**
Pan-fried dumplings with minced beef and vegetable filling.

7. **Deep Fried Bean Curd** — **$6.00**
Deep-fried bean curd in sweet wine sauce with grated white radish and chopped shallots.

8. **Spring Roll** (2 rolls) — **$6.00**
Deep-fried spring rolls with minced beef and vegetable filling.

9. **Vinegared Prawn** (4 pieces) — **$8.00**
Boiled prawn with lightly salted cucumber in special vinegar.

10. **Vinegared Cuttlefish** — **$7.00**
1x (11.) **Vinegared Assorted** — **$8.50**
Selection of seafood with lightly salted cucumber in special vinegar.

12. **Vegetarian Spring Roll** (3 rolls) — **$6.00**
13. **Green Beans** — **$5.50**
Lightly salted Japanese steamed beans.

RAW FISH & SUSHI

2x (20.) **Assorted Sashimi** — **$17.20**
Combination slices of raw fish laid between slices of lemon and served over salad.

21. **Raw Beef Sashimi** — **$14.50**
Finely sliced raw beef served over onion and shallots.

22. **Combination Sushi** — **$12.00**
A combination of raw and cooked seafood on beds of sushi rice.

3x (23.) **Raw Beef Sushi** (2 pieces) — **$5.50**
Finely sliced raw beef with garlic and shallots on a bed of sushi rice.

1x (24.) **Futomaki** (8 pieces) — **$8.80**
Filling of egg, sweet carrot, cucumber, seafood stick and ground fish powder.

25. **Prawn Rolls** — **$12.20**
Rolled sushi with prawn, cucumber and sesame seeds wrapped in dry seaweed.

26. **Cucumber Rolls** — **$6.00**
27. **Pickle Rolls** — **$6.00**
28. **Egg Rolls** — **$5.50**
29. **Tuna Rolls** — **$14.00**
30. **Crab and Salad Hand Roll** (2 cones) — **$9.20**
Rolled up like an ice cream cone with avocado, crabstick and salad.

31. **California Roll** (8 pieces) — **$9.20**
32. **Salmon Sushi** (2 pieces) — **$5.50**
Sliced raw salmon with wasabi on a bed of sushi rice.

33. **Tuna Sushi** (2 pieces) — **$7.00**
34. **Prawn Sushi** (2 pieces) — **$4.80**
Cooked prawn with wasabi on a bed of sushi rice.

A LA CARTE

40. **Fried Seafood Tempura** — **$16.80**
Selection of deep-fried seafood and vegetables in Japanese style batter.

2x (41.) **Deep Fried Prawn Cutlet** (6 pieces) — **$15.80**
Deep-fried prawn cutlet coated with Japanese breadcrumbs, served with Donkatus sauce.

42. **Deep Fried Beef Cutlet** — **$14.50**
43. **Deep Fried Fish Cutlet** — **$14.00**
44. **Deep Fried Seafood Cutlet** — **$17.80**
45. **Deep Fried Pork Cutlet** — **$13.00**
46. **Deep Fried Chicken Cutlet** — **$11.50**
47. **Deep Fried Cuttlefish Cutlet** (8 pieces) — **$11.50**
3x (48.) **Vegetables Tempura** — **$9.50**
Selection of thinly chopped vegetables in tempura batter.

49. **Stir Fried Vegetables** — **$9.50**
Stir-fried assorted vegetables with white wine and warishita sauce.

50. **Teppanyaki Beef Rolls** — **$12.00**
Finely sliced beef rolls wrapped with garlic and spring onions, cooked on hot platter with stir-fried vegetables and finished with sprinkle of sesame seeds.

They decided to share different dishes, and so they ordered the following:

Dish number	Number of those dishes ordered
1	2
3	4
4	1
11	1
20	2
23	3
24	1
41	2
48	3

2×6.00
4×8.00
1×6.00
1×8.50
2×17.20
3×5.50
1×8.80
2×15.80
3×9.50

Greg used the calculator on his smart-phone to calculate the total cost of the food.

Question 15 [2, 1, 2 = 5 marks]

(a) Peter estimated the total to be $230 by rounding the cost of each dish up to the nearest $10.
   (i) Describe a better way to estimate the total cost.

   · ·Any reasonable answer

   (ii) Show clearly how you would estimate the total cost, and state your estimate.

   Any reasonable answer

(b) Find the actual total cost.

   $178.30

(c) Greg typed in: 12 + 32 + 6 + 8.5 + 34.4 + 15.5 + 8.8 + 31.6 + 28.5   ✓ ✓ ✓ ✓ ✓ 16.5 ✓ ✓ ✓
   He got a total of $177.30, but made one mistake.

   (i) Can you describe why Greg entered the numbers he did?

   $2 \times 6 = 12$
   $4 \times 8 = 32$ as above .
   $1 \times 6 = 6$

   (ii) What one error did Greg make?

   15·50 should have been $3 \times 5.50 = \$16.50$
                           not $15.50

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Greg was told that if he got the job, he would be paid $120 000 per year. He thought that was great, until he realised that Marissa meant New Zealand dollars.

Question 16 [2 marks]

One Australian dollar is worth 0. 7946 New Zealand dollars. (ie. AUS$1 = NZ$0.7946)

Au : Nz
1 : 0.7946

How much will Greg earn in Australian dollars, if he accepts the job?

1 → 0.7946
? → 120 000

∴ $ 95350

The name of the company that Marissa manages is called Fire-up. They make cable that is intended for electronic devices. The cable is imported from New Zealand in two rolls. One roll contains 100m of cable and weighs 250g. The other roll is 300m long and weighs 800g.

	Length	Weight
Small roll	100 metres	250 grams
Large roll	300 metres	800 grams

Question 17   [2, 3, 4 = 9 marks]

(a) Greg was asked how he would fill an order for 1km of cable. What answer would you give if you were Greg?

1km = 1000m .

3 × 300m = 900m
1 × 100m = 100m
*   ─────*
*   1000m*

(b) (i) How many metres are there in 11.52km?

11.52km × 1000 = 11520m

(ii) How would you fill an order for 11.52km of cable?

38 × 300m = 11400
2 × 100   =   200
*   ─────*
*   11600m*

11

(c) Small rolls of cable are sold for $100 each and large rolls are sold for $280.

	Price
Small roll	$100
Large roll	$280

(i) How much would it cost a customer for 11.52km of cable if the order was filled the way you answered in (bii) above?

$38 \times \$280 = \$10\,640$
$2 \times \$100 = \$200$
$\$10\,840$

(ii) Is there another way of filling the order that would cost the customer less? Be thorough in giving your answer.

$39 \times \$280 = \$10\,920$

_or_

$12 \times \$100 = \$12\,000$