Task Car Racing

The Taggerty brothers decided to race their remote control cars over a distance of10 metres.

- David's car was given a 4 metre head start and it raced at a $\frac{1}{4}$ metre per second.
- Liam's car's journey can be described by the equation d= $\frac{3}{4}$t+1
- Simon's car was given no head start. His car raced at 1 metre per second for whole race.

Represent the information above as either three equations or three graphs on the same set of axes.

For the following questions give explanations for your answers using either your graph or equations.

- Who was in the lead at the halfway point?
- Pick two different distances and say who is in the lead at those points?
- Give the times that Liam is in the lead.
- David realised that he needed to be able to change the speed of his car. Investigate ways that David could always be in the lead of the race.

The grid below has been given to help you.

Cost of Communication

A Communications company Oftel is setting up a network for a small town. The costs of setting up different networks are given in the table below.

Cost of communication

Radio Link	**Fibre Optic**	**Copper Cable**
The cost of setting up is a fixed fee of $40,000 for any distance.	The cost of setting up is given by the equation C= 5,000d+20,000	The cost of setting up is a fixed fee of $5,000 and then $15,000 per km.

Represent the different set up costs using the same representation for example three equations or three graphs with the same variables and scale.

Recommend for two different distances the best network for Oftel's directors to build.

Recommend the distances that would be cheapest for a fibre optic network.

A manufacturer of Fibre optic cable wants the costs to always be cheaper than the other options. Write and describe at least two different ways this company could realistically change the charges to achieve this goal. Be sure to include examples of the charges they could use.

APPLES

You will be assessed on your depth of understanding and application of linear graphs. It is important that you communicate your thinking and your solutions clearly and relate your findings to the context. Your overall grade will be determined by the quality of your solution.

Introduction

Isaac and Leon are setting up a fruit shop. They will buy apples and other fruits from wholesale fruit growers and then sell them locally. They have narrowed their selection to three growers.

Growers A, Growers B and Growers C.

These three growers are selected because they grow apples of similar quality and can deliver the apples on time. Any one of the three growers might be suitable.

Task

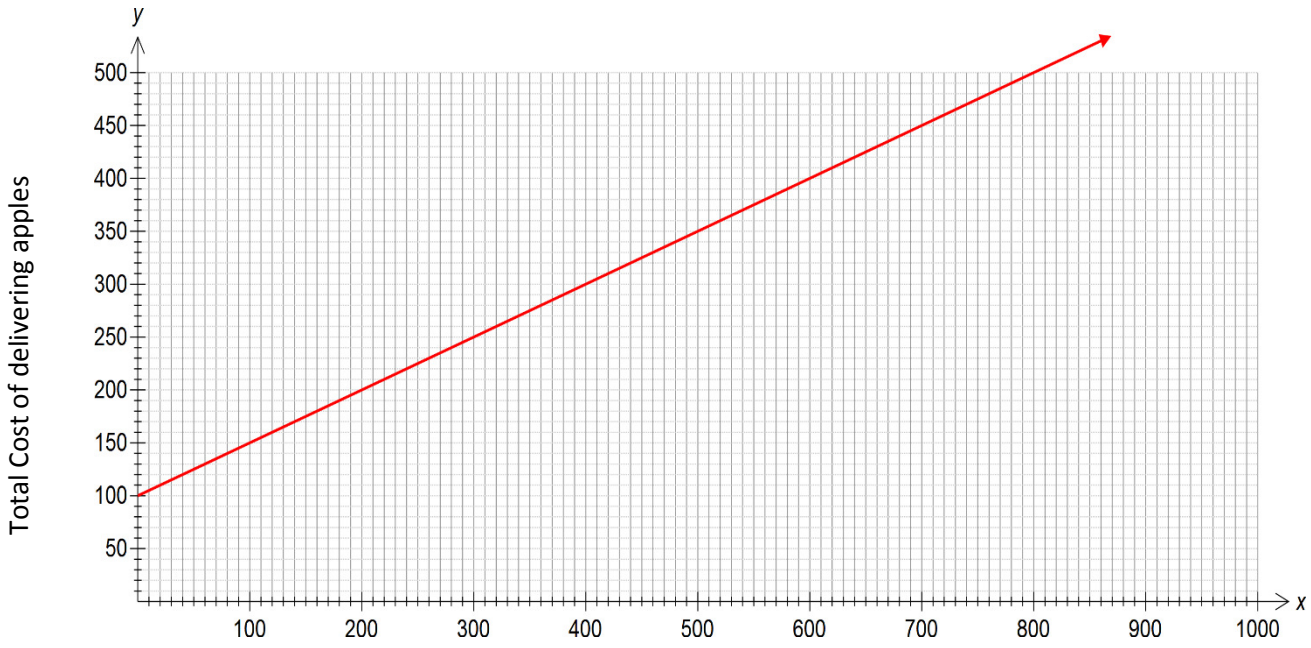
Your task is to investigate the following information and suggest the most suitable apple grower for their business. You must justify your choice with valid reasons.

Use the information provided below about the three growers to complete the task.

Grower A : One time delivery charge is $200 and extra 40 cents per Box(each box has 1kg of apples.)

Grower B

The cost equation is $C = \$400 + 0.20b$ Where C is the total cost, in dollars, and b is the number of boxes delivered. (1 box = 1kg apples)



Question One

a) For the grower A

i) What is the fixed cost? _____

ii) What is the extra cost per box?

_____

iii) Form an equation to show the total cost of the apple boxes.

_____

b) For the grower C

i) What is the fixed cost? _____

ii) What is the extra cost per box?

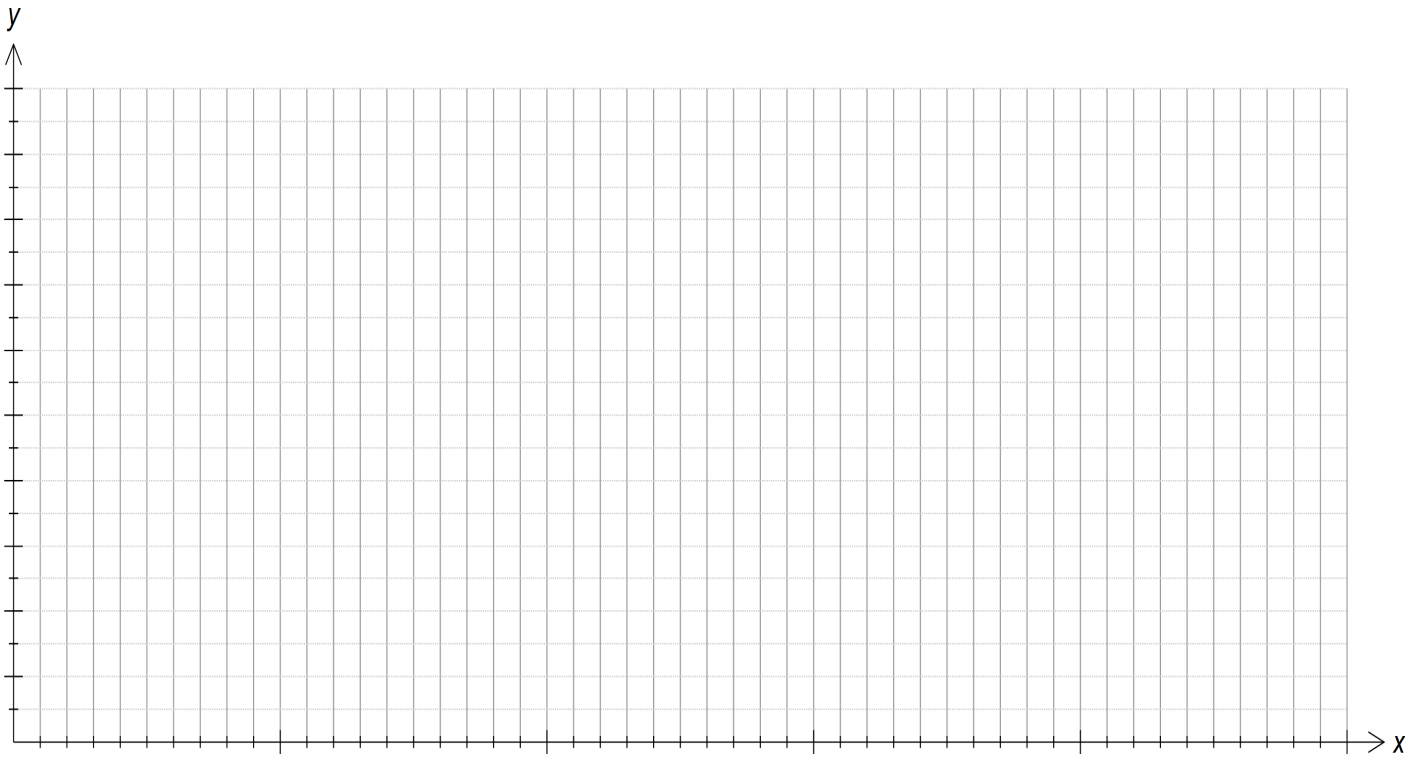
_____

iii) Form an equation to show the total cost of the apple boxes.

_____

Question Two

Show all three growers costs on the graph below labelling clearly. Use a scale of 0 to 1500 on the x axis.



Question Three

Isaac and Leon believe that they will be selling up to 100 boxes per month in the early stages of their business. They hope to grow the business in the future and expects to be selling up to 5 times this amount after a year when this business is established.

Recommend to Isaac and Leon the most suitable grower for their business. Communicate your thinking clearly and justify your choice with valid reasons.

KEYCHAIN BUSINESS

You will be assessed on your depth of understanding and application of linear graphs. It is important that you communicate your thinking and your solutions clearly and relate your findings to the context. Your overall grade will be determined by the quality of your solution.

Introduction

Mr Carter is starting a small business. He will buy keychains in bulk from a wholesale keychain manufacturers and then sell them locally. He has narrowed his selection to three manufacturers;

Bobkey company, Sunchain company and Globalgiant company.

These three manufacturers have been selected because they produce keychains of similar quality and can deliver the goods on time. Any one of the three might be suitable.

Task

Your task is to investigate the information and suggest the most suitable choice of manufacturer for the business. You must justify your choice with valid reasons.

Use the information provided below about the three manufacturers to complete the task.

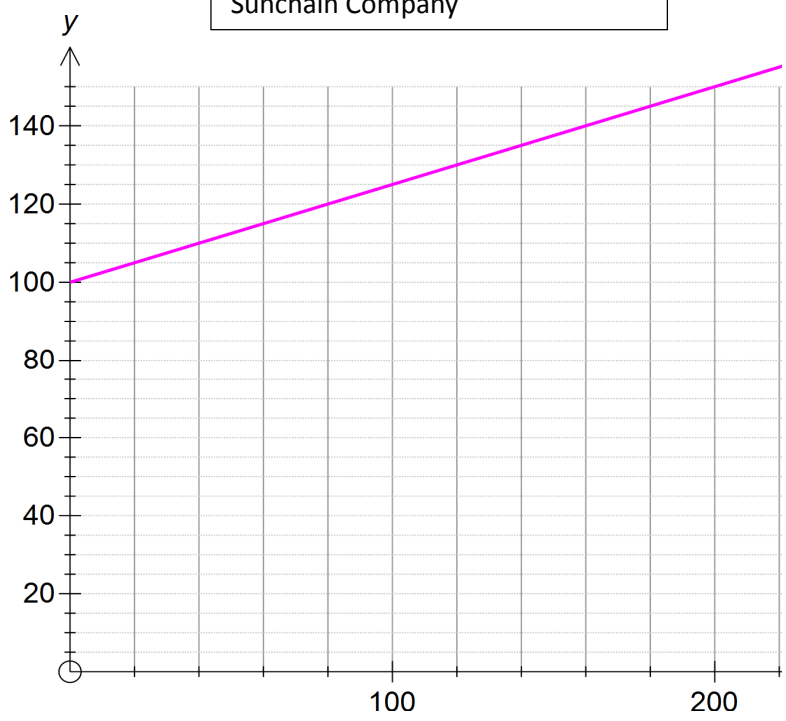
Bobkey Company : Fixed price (deposit) is $200 and it costs $75 for every 500 keychains produced.

Globalgiant: The cost equation is:

C= 0.35 x + 75

Where C is the total cost of producing, in dollars, and x is the number of keychains produced.

Sunchain Company



Question One

a) For the Bobkey Company

i) What is the fixed cost? _____

ii) What is the additional cost per keychain?

_____

iii) Form an equation to show the total cost of producing the keychains.

_____

b) For the Sunchain Company

i) What is the fixed cost? _____

ii) What is the additional cost per keychain?

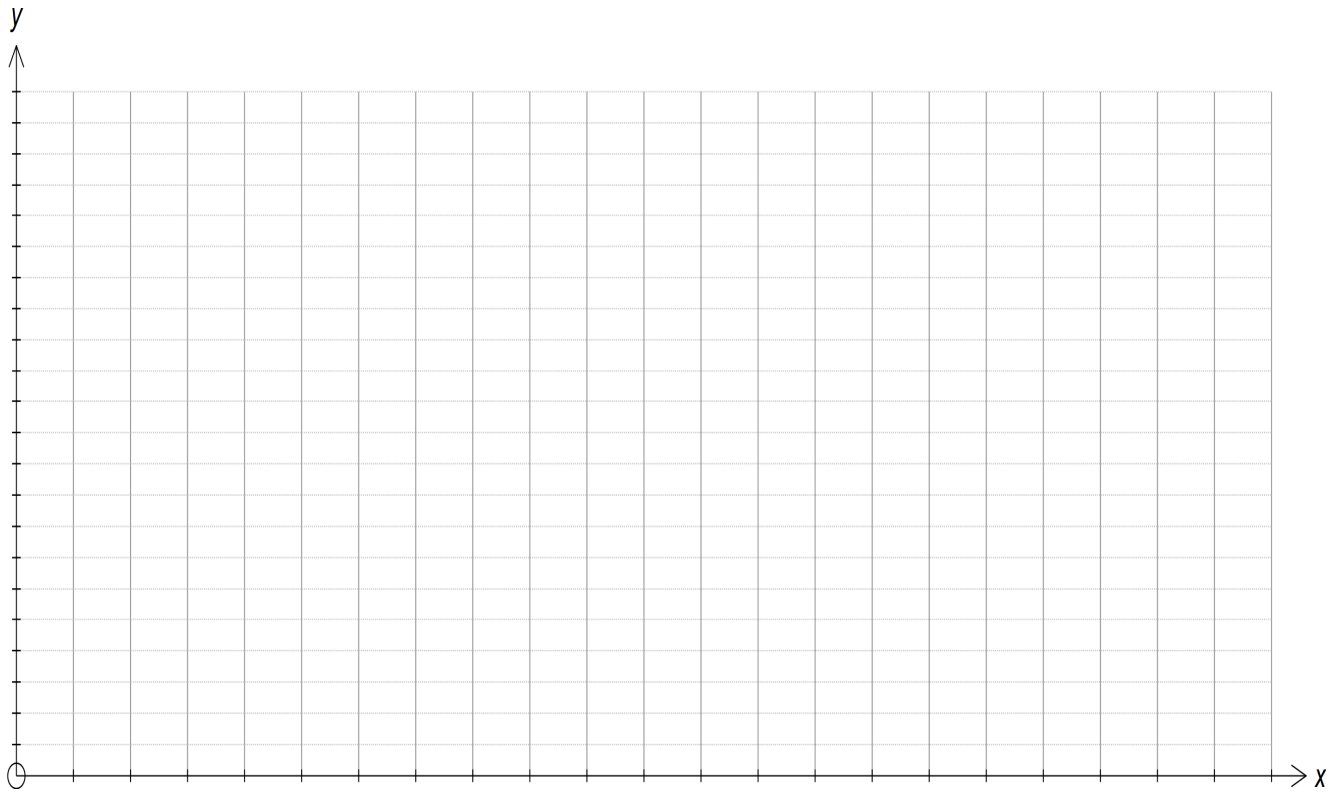
_____

iii) Form an equation to show the total cost of producing the keychains.

_____

Question Two

Show the three companies' cost on the graph below labelling clearly. Use a scale of 0 to 1500 for the x-axis.



Question Three

Mr Carter believes he will be selling up to 50 keychains per month in the early stages of his business. He hopes to grow the business in the future and expects to be selling up to four times this amount after a year when his business is established.

Recommend to Mr Carter the most suitable manufacturer for his business. Communicate your thinking clearly and justify your choice with valid reasons.

ELECTRICIANS

This assessment activity requires you to interpret and compare the charges different Electricians use.

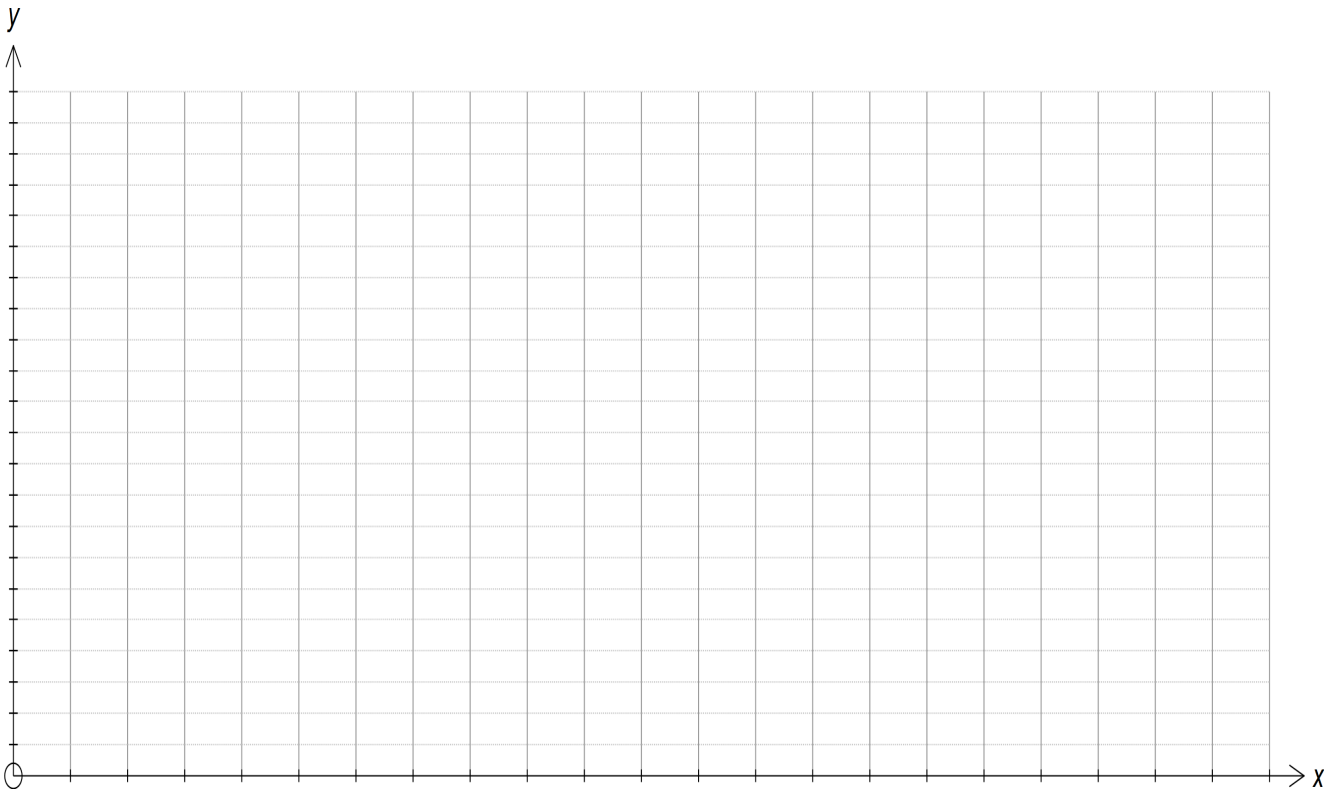
Task

Carla needs to call an electrician to fix her hot water cylinder with the electrical problem in it and she gets the following table of information from her friend.

Electrical Company Charges:

Bright Company	**Shock Company**	**One charge Company**
Fixed charge: $50.00 Per hour: $20	C = 30 H + 30 C is the cost in dollars, and H is the time in hours	$150 flat fee up to 6 hrs. Additional charges apply over 6 hrs.

1. Show the three companies' charges
   a) By writing an equation for each of the company using the same variables.
   b) On the same graph using same scale and labeling clearly.



2. Recommend which company to call if the work requires a timeframe of
   a) 30 minutes b) 2 hours c) 4 hours

3. Recommend the time/s for which it would be cheapest to use
   a) Bright Company. b) Shock Company. c) One charge Company.

4. John who owns E'Lite electrical Company, wants to be the cheapest company so that people can call always. Write and describe at least two different ways John could realistically charge to achieve this goal. Include specific examples of the rates he could use.

TAXIS

A. Find the equation for the total charges of 4 different taxi companies given the following information.

Hint: Use Cost = (rate)D + fixed charge and D = the number of kilometres

Company 1. Fixed charge = $10 Cost per km =$ 0.75

Company 2. Fixed charge = $15 Cost per km =$ 0.25

Company 3. Fixed charge = $ 5 Cost per km =$ 1

Company 4. Fixed charge = $20 for distances up to 30 km

B. Complete the table to show the charges for different destinations.

New Lynn = 3 km Vector arena = 14 km North shore stadium = 30

	Co1 Eqn.	Co 2 Eqn.	Co 3 Eqn.	Co 4 Eqn.
New Lynn				
Vector Arena				
Nth Shore Stadium				

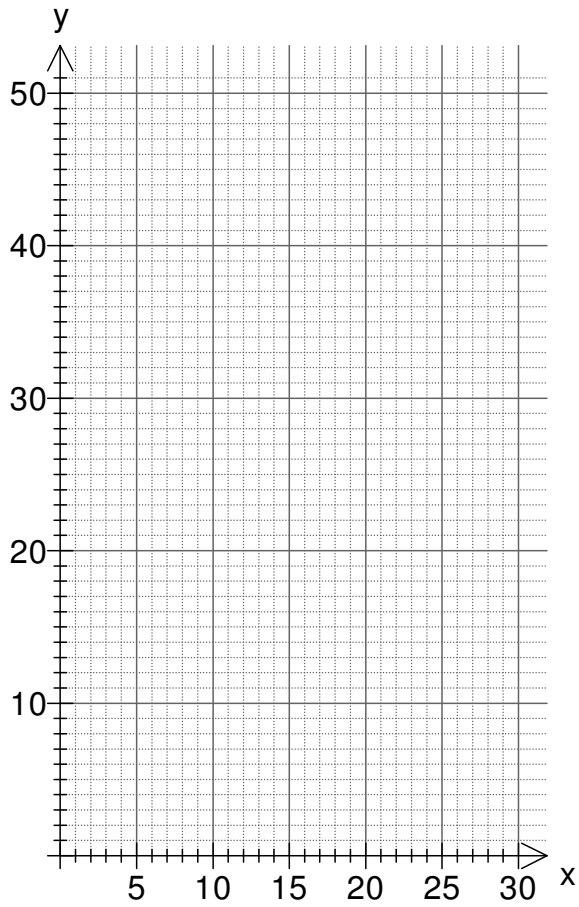
C. Recommend which Taxi Co. 1 to 4 is the best to use for each destination. Write down your answers clearly.

New Lynn

Vector arena

North shore stadium

D. Graph the charges for each of the 4 taxis on the same grid



E. Recommend distances for which it would be cheapest to use.

Taxi 1

Taxi2

Taxi3

Taxi 4

GREETING CARDS

Mr Smith is starting a small business. He will buy greeting cards in bulk from a wholesale dealer and then sell them locally. He has narrowed his selection to three dealers;

Simplycards, Smartyarty, and Funcards.

These three dealers have been selected because they supply cards of similar quality and can deliver the cards on time. Any one of the three might be suitable.

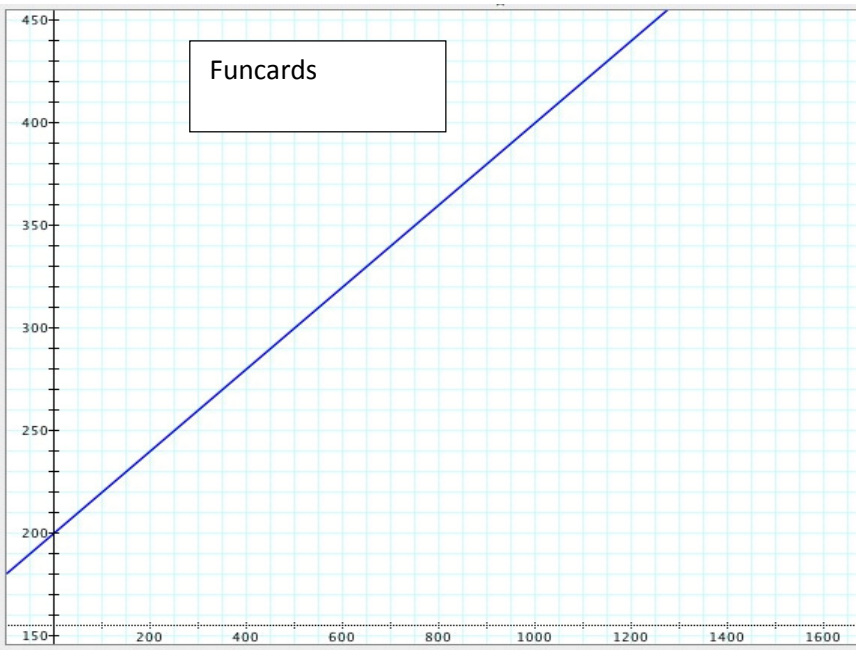
Your task is to investigate the information and suggest the most suitable choice of a dealer for the business. You must justify your choice with valid reasons.

Use the information provided below about the three dealer to complete the task.

Simplycards: The cost equation is: C= 0.30 x + 75

where C is the total cost of supplying the cards, in dollars, and x is the number of cards.

Smartyarty: deposit is $400 and it costs $80 for every 500 cards supplyed.



Question One

a) For the Smartyarty dealer

i) What is the fixed cost?

ii) What is the additional cost per card?

iii) Form an equation to show the total cost of supplying the cards.

b) For the Funcard dealer

i) What is the fixed cost?

ii) What is the additional cost per card?

iii) Form an equation to show the total cost of supplying the cards.

Question Two

Show the three dealers' cost on the graph below labelling clearly. Use a scale of 0 to 6000 for the x-axis, 0 to 1500 for the y-axis.

Question Three

Mr Smith believes he will be selling up to 500 cards per month in the early stages of his business. He hopes to grow the business in the future and expects to be selling up to four times this amount after a year when his business is established.

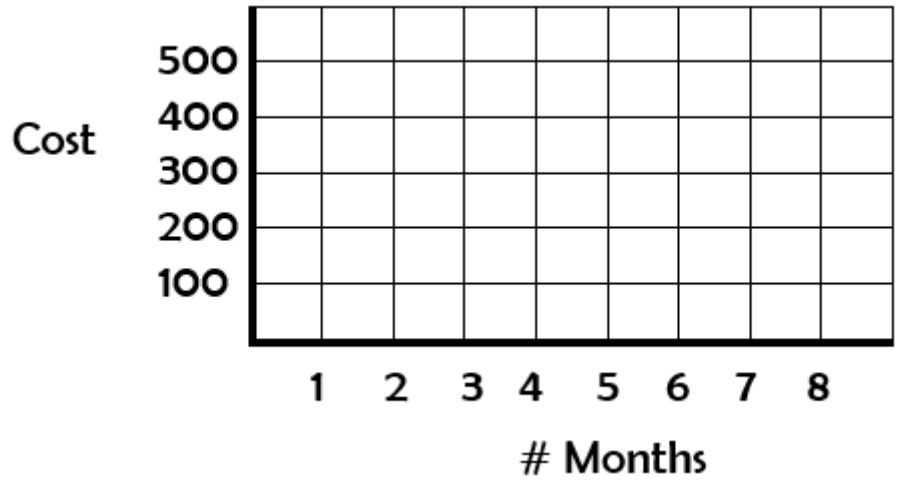
Recommend to Mr Smith the most suitable dealer for his business. Communicate your thinking clearly and justify your choice with valid reasons.

Sky TV

To get sky installed costs $200 and a further $50 per month thereafter. Copy and complete the table for this information below:

# Months (x)	0	1	2	3	4
Cost (y)					

Now plot this information on a graph:



1) What is the equation of the line?

2) What does the y-intercept represent?

3) What does the gradient represent?

4) Use the graph to find how much SKY will have been paid in total after 8 months

5) Use the equation to find how much SKY will have been paid in total after 2 years (24 months)

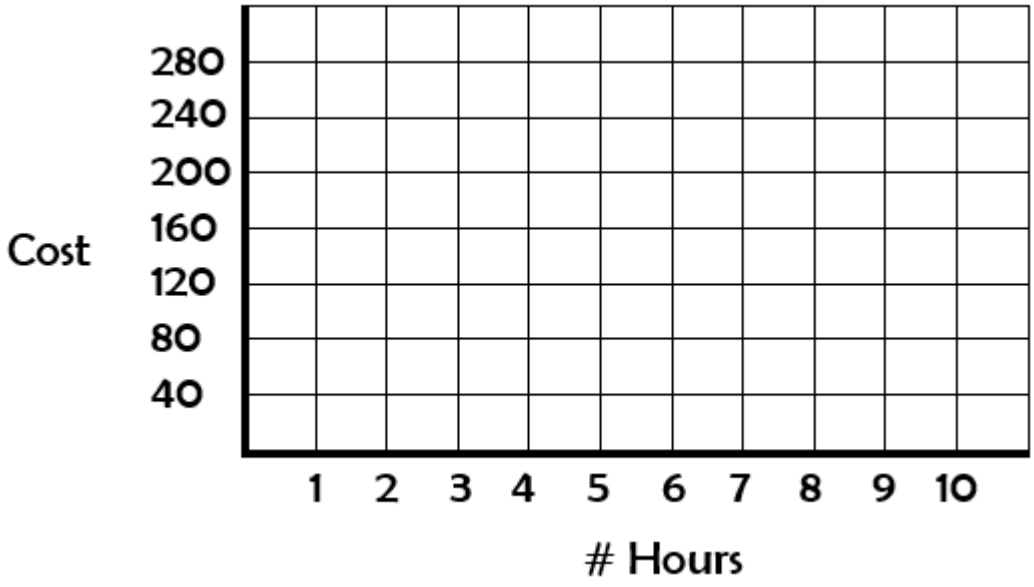
6) A subscriber who has paid $400 in total has been with SKY for how many months?

Bob the Builder

Bob is a top quality builder who charges $20 per hour plus a standard call out fee of $40. Copy and complete Bob's charge out table below:

# Hours (h)	0	1	2	3	4
Cost (c)					

Now plot this information on a graph:



1. What is the equation of the line?

2. What does the y-intercept represent?

3. What does the gradient represent?

4. Use the graph to find how much Bob will charge in total after
   a) 8 hours
   b) 5 ½ hours

5. Use the equation to find out how much Bob will charge for 16 hours

6. Bob charged $180 for a particular job. How long did he spend on it?

7. Bob spent two 8 hour days and a further 3 hrs on a job. How much did he charge?

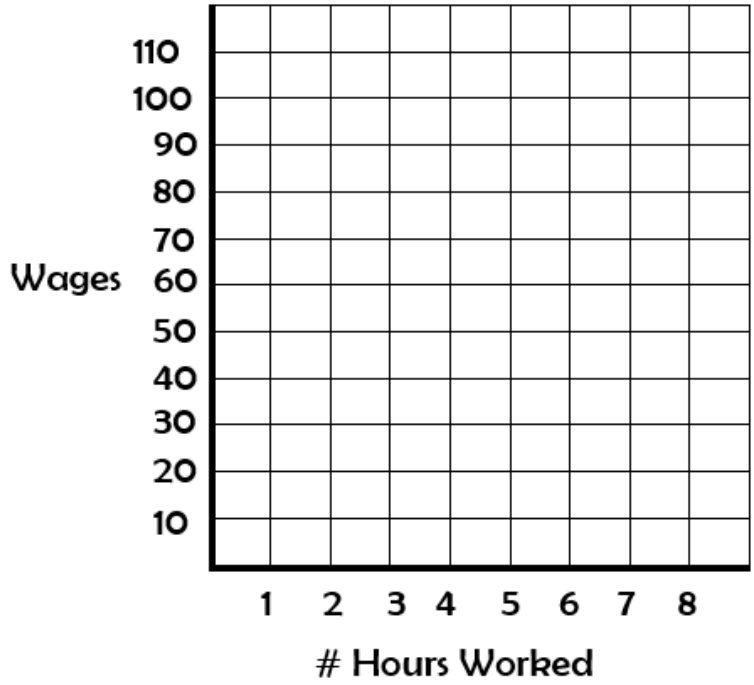
Postman Pat

Pat is an effective postman who delivers mail around the local district together with his cat. He earns $10 per hour and always gets $30 extra for food and petrol. Copy and complete the table for Pat's wages below:

# Hours (x)	0	1	2	3	4
Wages (y)					

Now plot this information on a graph:

1. What is the equation of the line?
2. What does the y-intercept represent?
3. What does the gradient represent?
4. Use the graph to find how much Pat will earn after 8 hours
5. If Pat works 8 hours a day, 5 days a week, calculate how much he earns in 1 week



One day Pat got talking with his black and white cat and together they decided he needed a pay rise. So he went to his boss and they agreed that he would now be paid $15 per hour but would not be paid any money for food and petrol.

6. Copy and complete the table for Pat's new wages scheme

# Hours (x)	0	1	2	3	4
Wages (y)					

Plot this information on the graph

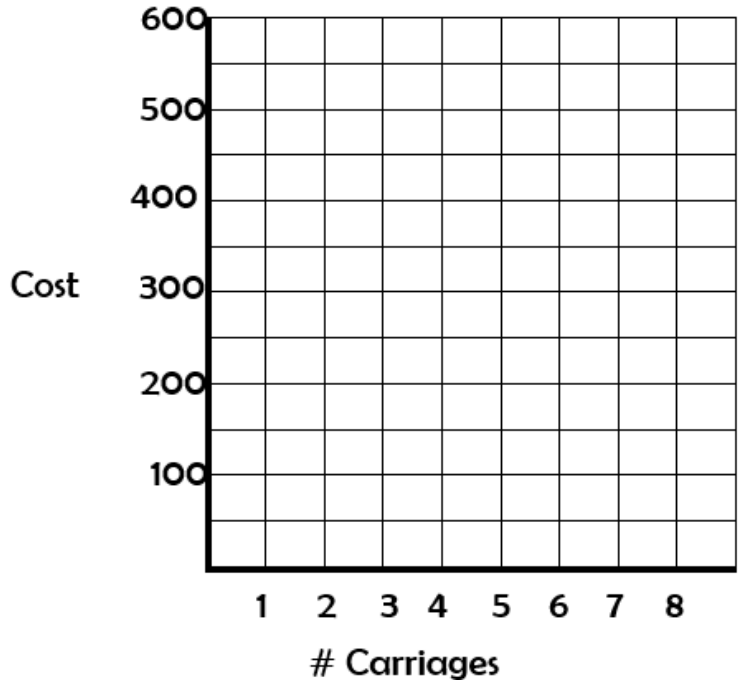
7. What is the equation of the new line?
8. What is the y-intercept?
9. What is the gradient?
10. Use the graph to find how much Pat will now earn after 8 hours
11. If Pat works for 2 hours, is he better off with his new pay scheme or his old pay scheme, and by how much?
12. How many hours does Pat have to work for before he is earning more than before in his new pay scheme?

Thomas the Tank Engine

Thomas the Tank Engine pulls carriages for a living. He is always smiling because he loves his job and, well, pulling carriages is what trains do best. However, Thomas needs to pay the Fat Controller some rent and so he charges people $50 surcharge plus $60 per carriage. Copy and complete the table for Thomas's carriage rates below:

# Carriages (x)	0	1	2	3	4
Cost (y)					

Now plot this information on a graph:



1. What is the equation of the line?
2. What does the y-intercept represent?
3. What does the gradient represent?
4. Use the graph to estimate how much Thomas will earn for pulling 8 carriages
5. If Thomas pulls 6 carriages a day, 5 days a week, calculate how much he earns in 1 week

One day the Fat Controller told Thomas he didn't need to pay rent anymore due. So Thomas decided to scrap the $50 surcharge but raise the cost per carriage to $80.

Copy and complete the table for Thomas's new carriage rates

# Carriages (x)	0	1	2	3	4
Cost (y)					

Plot this information on the graph

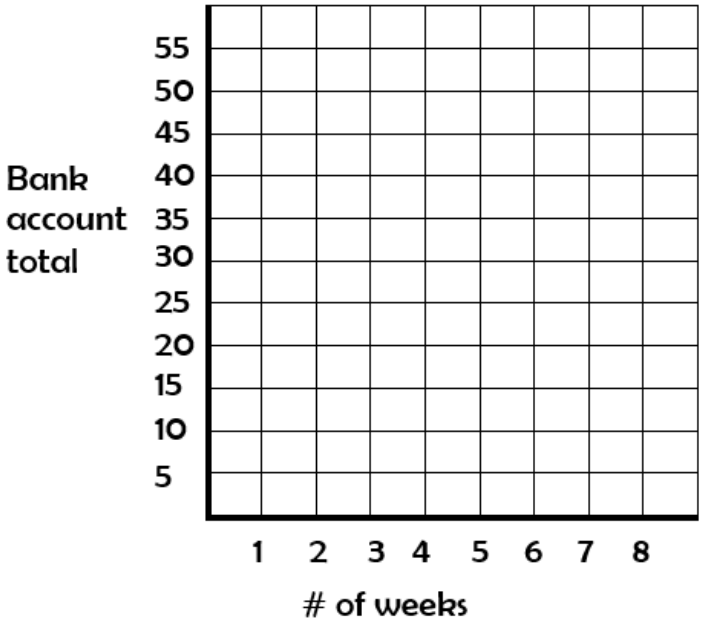
6. What is the equation of the new line?
7. What is the y-intercept?
8. What is the gradient?
9. Use the graph to find how much Thomas will now earn for pulling 8 carriages
10. If Thomas pulls 5 carriages, does he earn more now than before?
11. How many carriages does Thomas have to pull before he is earning more than before?

Gareth's Money

Gareth is saving money for a car. He has $16 in his bank account to start. Gareth puts $6 into his account each week. Complete the table for Gareth's bank account total below:

# weeks (x)	0	1	2	3	4
Bank account total y)					

Now plot this information on a graph:



1. What is the equation (rule) of the line?
2. What does the y-intercept represent?
3. What does the gradient represent?
4. Use the graph to find how much Gareth will have after 7 weeks
5. If Gareth saves for 2 years (52 weeks in 1 year) how much will be in his bank account?

Justin is also saving for a car. He starts with $28 in his account at the start and saves only $4 each week

6. Complete the table for Justin's savings

# Weeks (x)	0	1	2	3	4
Savings (y)					

Plot this information on the same graph (different coloured line)

7. What is the equation of the new line?
8. What is the y-intercept
9. What is the gradient?
10. Use the graph to find how much Justin will have saved after 7 weeks
11. Who has the most money in the first few weeks?
12. In how many weeks does Gareth and Justin have the same money?
13. How can you tell this from the graph?
14. If Justin saves for 2 years (52 weeks in 1 year) how much will be in his bank account then?

TAXI CHARGES

This activity requires you to interpret and compare the charges the taxi companies use for different trips.

You will be assessed on your understanding and application of linear graphs and linear equations and on your ability to communicate your solutions clearly and accurately.

Task

At Tauranga airport, there are three different taxi companies with taxis available for hire: Fred's Taxi Company, P & G Taxis, and Flatrate Taxis.

Below is the hire charge for each company and the distances to common destinations in Tauranga from the airport.

1. Represent the three taxi companies' charges using the same representation (for example, three equations or three graphs).
2. Recommend which taxi company to use for a trip to two of the common destinations.
3. Recommend distances for which it would be cheapest to use P & G Taxis.
4. Fred, who owns Fred's Taxi Company, wants to be the cheapest taxi company people can use to travel to any destination. Describe at least two different ways Fred could realistically change his hire charges to achieve this goal. Include specific examples of the rates he could use.

Taxi company charges

Fred's Taxi Company	**P & G Taxis**	**Flatrate Taxis**
Fixed charge: $5.00 Per kilometre: $0.50	C = 0.65D + 2 Where C is the cost in dollars, and D is the distance in kilometres	$25.00 flat fee to any destination up to 60 km. Additional charges apply over 60 km.

Distances from airport

Destination	**Kilometres**
City centre	17
Port	24
Bethlehem	45

SPRINT TRIATHLON

Sprint triathlon is an event for beginning triathletes. It consists of three events: swimming, cycling, and running, which are completed in that order. Typical times, by type of athlete, are shown in the table below:

		Type of athlete		
Event	**Distance**	Not Athletic	Somewhat Athletic	Very Athletic
Swim	750 metres	40 minutes	30 minutes	20 minutes
Cycle	18 000 metres	60 minutes	50 minutes	40 minutes
Run	5 000 metres	40 minutes	25 minutes	20 minutes

This activity requires you to prepare a short race commentary for yourself and a friend competing in a sprint triathlon. The commentary needs to be supported with graphical and algebraic representations and should include information about the positions of you both at different times in the race (for example, at the end of the different events and when competitors changed positions) and who the winner was.

You then need to suggest suitable new target times for the loser and a strategy so that they can work towards improving their time and placing in relation to the person they have just lost against.

You will be assessed on the quality of your discussion and reasoning, and how well you link this to the context.

Task

First choose times from the table to be your times for the three events. You will use this information in completing the task.

Your friend (give them a name so that you can use it in your commentary) has a similar level of fitness to you.

- Your friend starts two minutes after you in the swim event. They swim as fast as they can to make up for lost time and finish the swim event two minutes ahead of you.
- Unfortunately for them, the swim tires them out and they cycle on average 10 metres per minute slower than you.
- You both complete the run in the same time.

Write a commentary of the race, which includes:

- a distance/time graph of the entire race for you and your friend
- your and your friend's average speeds for each event and for the entire race
- the distances at which you passed each other during the race
- a conclusion stating which of the two of you finished first
- an appropriate new target time for the loser of the race, with a description of how the distance/time graphs for each event would have to change in order to meet the target.

Show your calculations in your commentary

CONCRETE

Cory needs some concrete for home handyman projects he is planning. As part of costing the projects he has obtained quotes from three different firms that supply ready-mixed concrete delivered to the site.

Below shows the quotes from each firm and the volume of concrete Cory has calculated he will need for each of his projects.

Represent the quotes from the three firms using the same representation (e.g. three equations or three graphs).

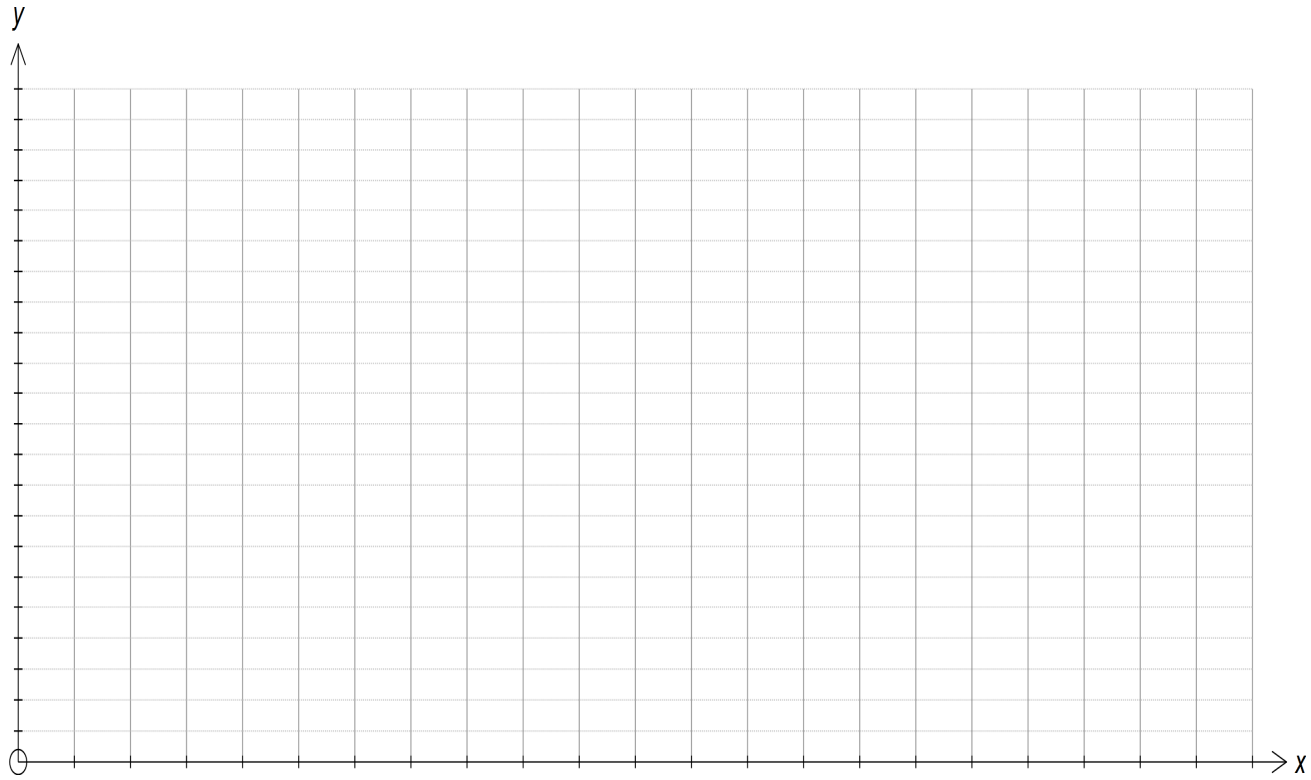
Recommend which firm Cory should use to supply the concrete for two of the projects.

Recommend volumes for which it would be cheapest for Cory to use Valley Concrete.

How could Central Construction change their quote to be the cheapest firm for any volume of ready-mixed concrete? Describe at least two different ways they could realistically change their quote to achieve this goal. Include specific examples of the rates they could use.

Central Construction	**Valley Concrete**	**Woruk Pre-Mix**
C = 160 m + 230 Where C is the cost in dollars and m is the volume of concrete in cubic metres.	Fixed charge: $90 Per cubic metre: $240	$550 for any volume of concrete up to 2 m^3. $120 per cubic metre for amounts over 2 m^3 with a maximum of 4 m^3.

Project	**Volume of concrete (m^3)**
Carport	2.6
Sleepout	2.2
Patio	1.4



Number of keychains

PRIMARY INDUSTRIES

Dan wants to know the cost of transporting the stock he will be selling in the autumn.

Below shows the trucking costs from two local transport firms and Resource B shows the numbers of stock Dan plans to sell.

For each stock type, represent the costs from the two local transport firms using the same representation (for example equations or graphs).

Recommend which firm Dan should use for transporting all of his stock.

Recommend the cattle numbers for which it would be cheaper to use Ashley Transport.

How could Ashley Transport change their quote so that they are competitive for transport of large numbers of lambs, ewes and cattle? Suggest at least two ways in which they could realistically change their prices to be competitive. Include specific examples of the rates they could use.

Country Transport	**Ashley Transport**
Cattle $35 a head plus a fixed charge of $100	**Cattle** C = 38h + 10 where C is the cost in dollars and h is the number of head of cattle
Ewes $3.50 a head plus a fixed charge of $50	**Ewes** $4 a head
Lambs $2 a head plus a fixed charge of $125	**Lambs** $2.50 a head

Description of stock	**Number of animals**
Annual draft ewes	280
Store lambs	300
Cattle	35