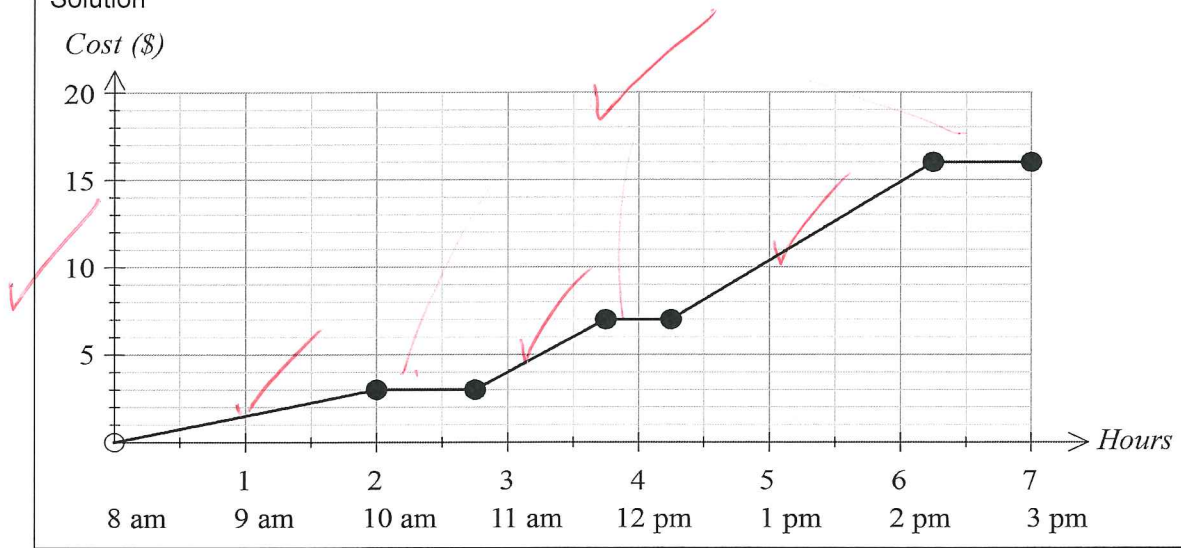
Linear with a difference

Extended investigation **Part 2: In-class validation**
Solutions

Question 1

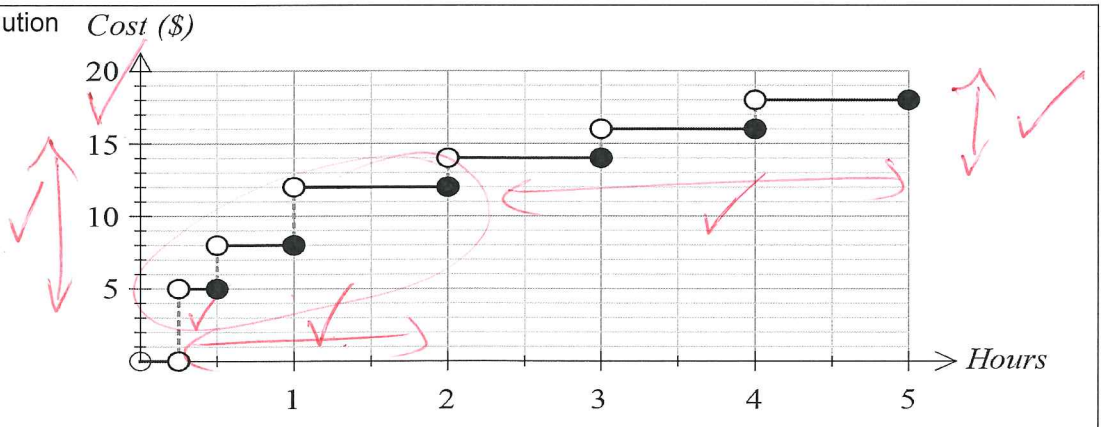
Solution



Marking key/mathematical behaviours	Marks
• Scales vertical axis	1
• Represents parking for 2 hours at $1.50 per hour	1
• Shows zero gradient for no change in costs (including to 3 pm)	2
• Draws rise of $4 for 1 hour	1
• Draws rise of $4.50 for 2 hours	1

Question 2

Solution



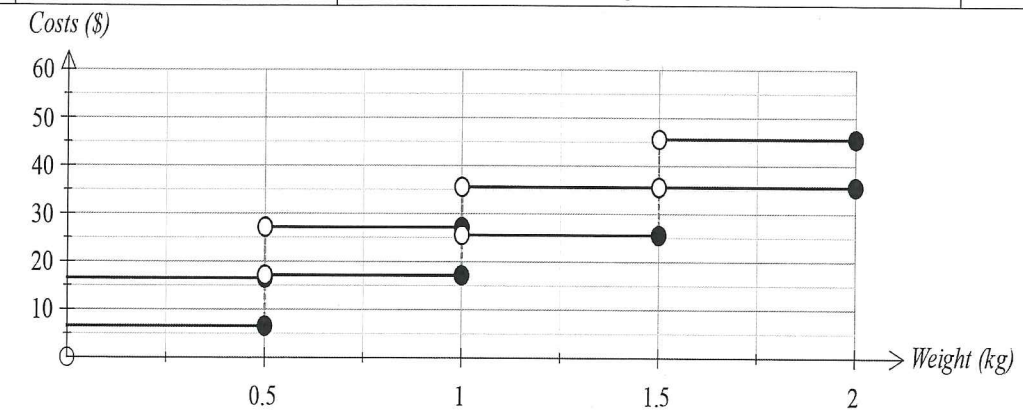
Marking key/mathematical behaviours	Marks
• Scales vertical axis	1
• Shows the correct costs up to 2 hours	2
• Costs are matched to correct time periods	1
• Open and closed circles used correctly	2
	1

• Increases hourly cost by 2 from 2-5 hours	

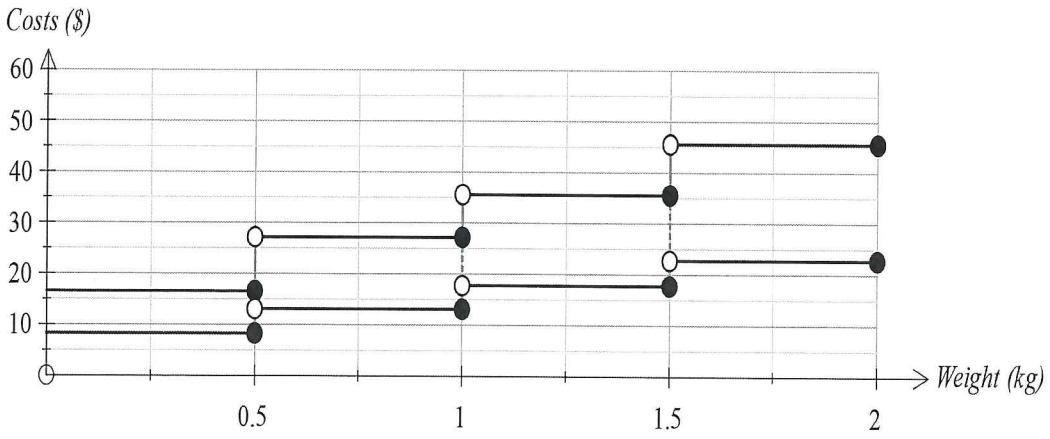
Question 3

	Solution	Marking key/mathematical behaviours	Marks
(a)	$16 – $17	• Reads graph correctly	1
(b)	$16 – $17	• Reads graph correctly	1
(c)	1.5 kg	• Interprets graph correctly	1
(d)	Any weight up to and including 1 Kg	• Reads values from 0.5 to 1 kg • Includes values from 0 to 0.5 kg	1 1
(e)	See below	• Moves each line down 10 $ • Keeps weight ranges correct	1 1
(f)	See below	• Moves each line down 50% in all ranges • Keeps weight ranges correct	2 1

(e)



(f)



Question 4

	Solution	Marking key/mathematical behaviours	Marks
(a)	200 km	• Interprets vertical intercept	1
(b)	6 hours	• Interprets horizontal intercept	1
(c)	First hour Steepest line segment	• Identifies highest speed • Links speed to gradient	1 1
(d)	0.5 hours	• Interprets zero gradient - reads time • ~~Correct units~~	1 ~~1~~
(e)	24 km/h	• Determines speed	1

-1 units overall.

	60 km ÷ 2.5 h = 24 km/h	• Provides evidence of determination	1
(f)	120 km Draws line (3,60) to (5, 22)	• Calculates distance • Draws straight line	1 1

Question 5

Station	Distance from city (km)	Cost from the city	Time taken from city (mins)	Time taken since last station (mins)	Distance since last station (km)	Cost since the last station	Cost /Km
1	7.3	$2.90	6	6	7.3	$2.90	$0.40
2	11.7	$4.40	9	3	4.4	$1.50	$0.38
3	13.8	$4.40	11	2	2.1	0	$0.32
4	20.5	$5.30	16	5	6.7	$0.90	$0.26
5	32.9	$6.30	23	7	12.4	$1.00	$0.19
6	37.39	$6.30	29	6	4.49	0	$0.17
7	43.2	$7.80	33	4	5.81	$1.50	$0.18
8	47.6	$7.80	36	3	4.4	0	$0.16
9	70.19	$10.30	48	12	22.59	$2.50	$0.15

	Solution	Marking key/mathematical behaviours	Marks
(a)	See table	• Calculates differences in time • Calculates differences in cost	2 2
(b)	(i) 6 (ii) 47.5 km (iii) Move all lines with open and closed circles up by 1 unit (iv) Graph lines would be lowered by increasing amounts (v) The lines would shrink horizontally and circles would move left.	• Interprets horizontal values • Reads differences in vertical values • Identifies vertical translation up 1 unit • Identifies downwards movement • Indicates amount of movement varies • Interprets horizontal changes • Indicates vertical values remain	1 1 2 1 1 1 1
(c)	Piece-wise linear The gradient is constant but not 0 between time periods	• Identifies correct type of graphs • Indicates understanding of variation in gradients	1 1
(d)	Generally true Shows decreasing costs – see table above	• Concludes correctly • Provides evidence to support conclusion • Provides several pieces of evidence to support conclusions	1 1 1