Date_____ Name Answer Key

Review: Linear Relations

Section A – Learning Outcome 1:

Be able to graph linear relations

1. **Complete the table of values for each linear relation. Show your work for the first two points in table C.**

a)

$y = 3x - 4$	
x	y
1	$3(1)-4=-1$
2	$3(2)-4=2$
3	$3(3)-4=5$
4	$3(4)-4=8$
5	

b)

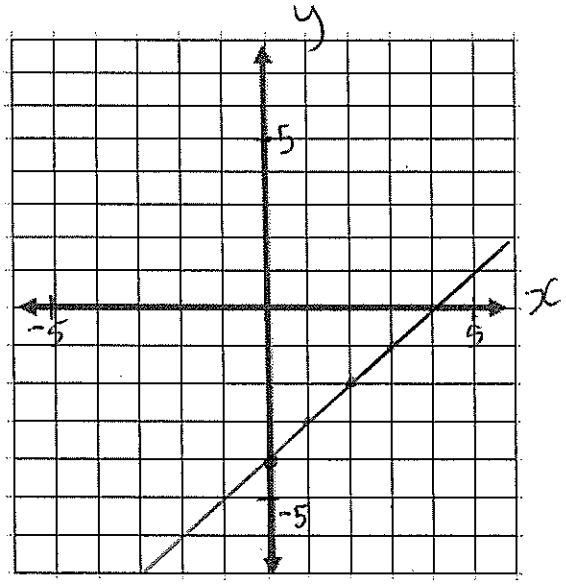
$y = -2x + 4$	
x	y
−2	$-2(-2)+4=8$
0	$-2(0)+4=4$
2	$-2(2)+4=0$
4	$-2(4)+4=-4$
6	$-2(6)+4=-8$

c)

$x + 3y = 12$	
x	y
3	$3+3y=12 \rightarrow 3y=9 \rightarrow y=3$
6	$6+3y=12 \rightarrow 3y=6 \rightarrow y=2$
9	$9+3y=12 \rightarrow 3y=3 \rightarrow y=1$
12	$12+3y=12 \rightarrow 3y=0 \rightarrow y=0$
15	$15-3y=12 \rightarrow 3y=-3 \rightarrow y=-1$

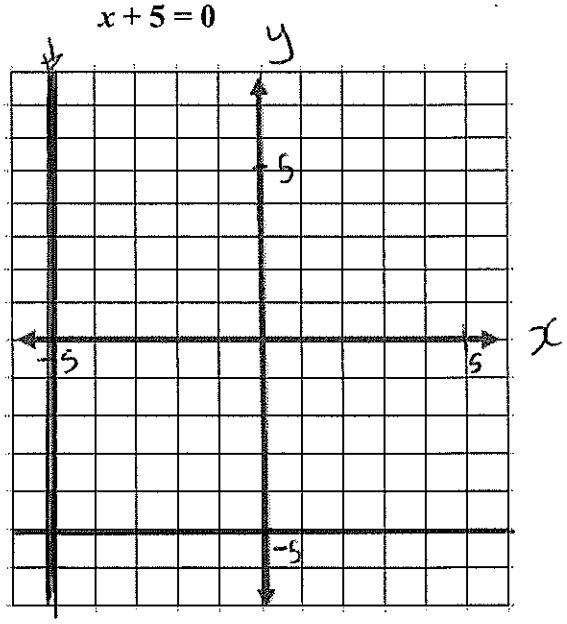
2. **Graph each linear relation. Explain your work or show it. Label the axis's on your graphs.**

a) $y = x - 4$



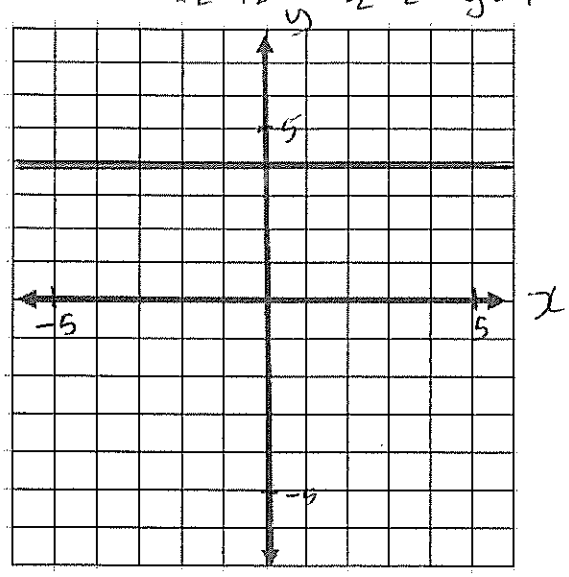
x	y
0	−4
1	−3
2	−2
3	−1

b) $x + 5 = 0$



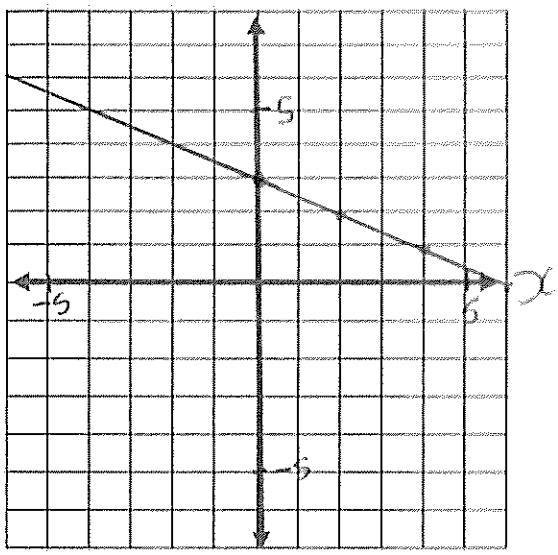
x	y
−5	1
−5	2
−5	3
−5	4

c) $2y - 2 = 6$ $\quad +2 \quad +2$ $\quad \frac{2y}{2} = \frac{8}{2}$ $\quad y = 4$



x	y
0	4
1	4
2	4
3	4

d) $x + 2y = 6$



x	y
0	3
2	2
4	1
6	0

Section B – Learning Outcome 2:

Able to generalize a pattern arising from a problem-solving context using linear equations and verify by substitution.

3. **A balloon is floating at a height of 10 000 m. It starts to descend at a steady rate of 400 meters per minute.**

a) Make a table shows the height of the balloon every minute after it begins its descent

t	h
0	10 000
1	9600
2	9200
3	8800
4	8400
t	h = 10000-400t

b) Write an equation that relates the height of the balloon, *h*, to the time , t, since it started its descent. Verify the equation.

$h = 10\,000 - 400t$

or $h = -400t + 10\,000$

c) What is the height of the balloon after 8 min?

$h = 10000 - 400(8)$

$= 10\,000 - 3200$

$= 6800\,m$

d) How long after starting its descent does the balloon touch ground?

After 25 minutes

$0 = 10\,000 - 400t$

$-10\,000 \quad -10\,000$

$\frac{-10000}{-400} = \frac{-400t}{-400}$

4. The pattern in each table below continues. For each table:

a)

Term Number t	Term Value v
1	-1
3	3
5	7
7	11
t	v =

+2, +2, +2 ; +4, +4, +4

b)

Term Number t	Term Value v
1	5
2	2
3	-1
4	-4
t	v =

-3, -3, -3

$\frac{4}{2} = 2$

i) Describe the pattern that relates v to t.

a) When t increases by 2, v increases by 4.

b) When t increases by 1, v decreases by 3

ii) Write an equation that relates v to t.

a) $v = 2t - 3$

b) $v = -3t + 8$ or $v = 8 - 3t$

iii) Verify your equation by substituting values from the table.

a) $v = 2t - 3$

$(t = 3)$ $2(3) - 3 = 3$ ✓

$(t = 5)$ $2(5) - 3 = 7$ ✓

b) $v = -3t + 8$

$(t = 2)$ $-3(2) + 8 = 2$ ✓

$(t = 3)$ $-3(3) + 8 = -1$ ✓

Section C – Learning Outcome 3:

Be able to match equations and graphs of linear equations.

5. Match each equation with a graph on the grid below. **Show all steps.** Put the correct letter inside the box beside the matching graph.

A) $y = x + 4$

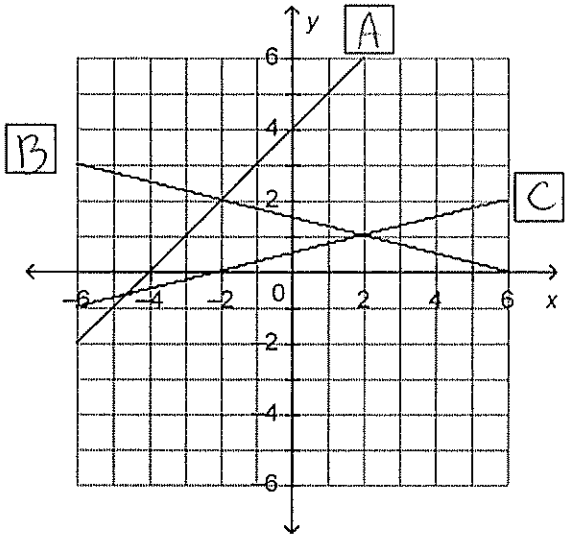
x	y
0	4
1	5
2	6

B) $x + 4y = 6$

x	y
0	1.5
1	1.25
2	1

C) $x - 4y = -2$

x	y
0	0.5
1	0.75
2	1



Section D – Learning Outcome 4:

Be able to graph linear relations, analyse the graph, and interpolate or extrapolate to solve problems

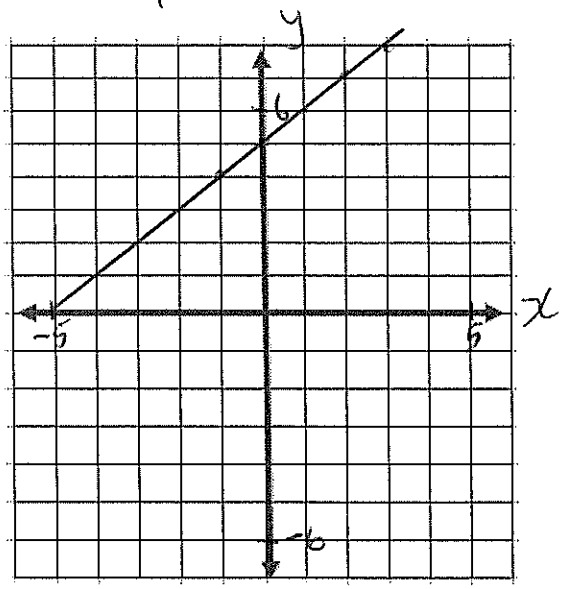
6. The difference between two numbers is 5. Let x and y represent the two numbers.

a) Complete a table for values of x from -1 to 3. $y - x = 5$

x	y
-1	4
0	5
1	6
2	7
3	8

b) Graph the data. Label your axis's. Should you join the points? Explain.

Yes. It is an equation so we can interpolate



c) Write an equation that relates x and y.

$y - x = 5$ or $y = x + 5$

d) Determine the value of x when $y = 0$
Did you interpolate or extrapolate? Explain.

$y = x + 5$

$0 = x + 5$

$x = -5$

Extrapolated → outside data points (extended graph)

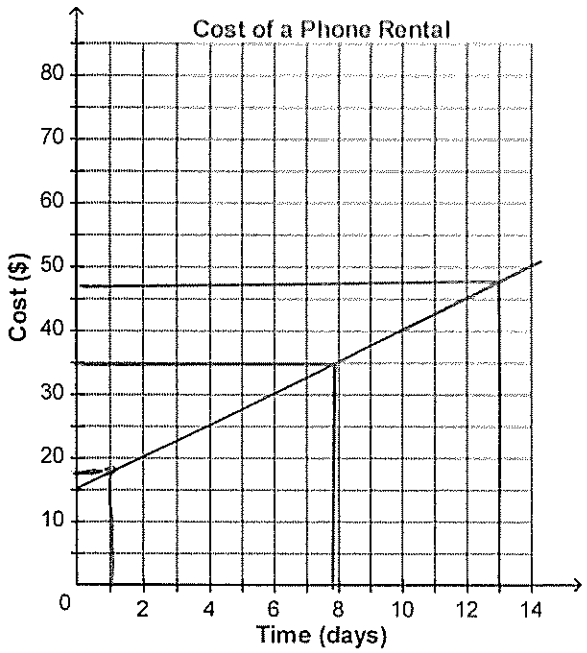
e) Determine the value of y when $x = -3$.
Did you interpolate or extrapolate? Explain.

$y = -3 + 5$

$y = 2$

Extrapolated → outside data points (extended graph)

7. **A resort rents out mobile phones by the day. This graph shows how the cost to rent a phone relates to the number of days the phone is rented.**



a) Estimate the cost to rent a phone for 1 day:
Is this interpolation or extrapolation? Explain.

≈$17.50 Interpolation (within data points)

b) Estimate the cost to rent a phone for 13 days: $47.50

Is this interpolation or extrapolation? Explain.

Continued graph. Outside of data points

c) A customer paid $35.00 to rent a phone. For how many days did the customer rent the phone?

8 days.