Phone: +442081445350

www.chemistryonlinetuition.com

Email:asherrana@chemistryonlinetuition.com

PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)
TOPIC:	LINEAR MODEL
PAPER TYPE:	SOLUTION - 6
TOTAL QUESTIONS	8
TOTAL MARKS	37

Q1.

Find the slope (m):

m = change in y / change in x

= (32,000 - 8,000) / (6 - 2) = 24,000 / 4 = 6,000

Use one of the points (let's use (2,8)) to find the y-intercept (b):

y = mx + b

8,000 = 6,000(2) + b

b = 8,000 - 12,000 = -4,000

So, the equation that models the balance (B) in thousands of dollars over time (t in years) for this savings account is:

B = 6,000t - 4,000

This equation can be used to predict the balance for any given time in the future. For example, if you want to know the balance after 3 years (t = 3):

B = 6,000(3) - 4,000 = 14,000

Therefore, the balance after 3 years would be $14,000.

Q2.

To find the slope (m) of a savings account, we need to use the formula:

m = (change in y) / (change in x).

In this case, we have the values of 40,000 and 10,000 for y, and 8 and 3 for x. So, m = (40,000 - 10,000) / (8 - 3) = 30,000 / 5 = 6,000.

Using one of the points on the graph (let's use (3, 10),
we can find the y-intercept (b) of the equation that models the balance (B) in thousands of dollars over time (t in years) for this savings account.
The equation is: $B = mt + b$.

So, plugging in the values of m and the point (3, 10), we get:

$10{,}000 = (6{,}000 \times 3) + b$

Solving for b, we get:

$b = 10{,}000 - 18{,}000 = -8{,}000$

Therefore, the equation that models the balance (B) is:

$B = 6{,}000t - 8{,}000$

This equation can be used to predict the balance for any given time in the future.
For example, if you want to know the balance after 5 years (t = 5), you can plug in t = 5:

$B = 6{,}000(5) - 8{,}000 = 22{,}000$

So, the balance after 5 years would be $22,000.

Q3.

To find the slope (m) of the line, we use the formula:

m = change in y / change in x

We have been given the values for two points (9000, 4) and (45000, 9).
We can use these values to find the slope of the line.

m = (9 - 4) / (45000 - 9000)
m = 5 / 36000
m = 1/7200

To find the y-intercept (b), we can use one of the given points, say (9000, 4), and substitute the values of m, x and y into the equation y = mx + b.

4 = (1/7200) * 9000 + b

b = 4 - (1/7200) * 9000
b = 7/2

Therefore, the equation of the line is:

y = (1/7200) * x + 7/2

This equation can be used to find the value of y (which represents the number of accidents) for any given value of x (which represents the number of cars).

For example, if x = 20000, then

y = (1/7200) * 20000 + 7/2

y = 11/2

This means that if there are 20000 cars on the road, we can expect around 5.5 accidents.

Q4.

To find the slope (m):

m = change in y / change in x

In this case, the values are:

m = (60,000 - 20,000) / (5 - 00010)

We don't know the value of 00010, but we do know that:

m = 40,000 / 5

Simplifying this expression, we get:

m = 8,000

Next, we can find the y-intercept (b) using the point (5,20):

y = mx + b

20,000 = 8,000(5) + b

Subtracting 40,000 from both sides, we get:
b = -20,000

So, the equation that models the balance (B) in thousands of dollars over time (t in years) for this savings account is:
B = 8,000t - 20,000

This equation can be used to predict the balance for any given time in the future. For example, if you want to know the balance after 7 years (t = 7):

B = 8,000(7) - 20,000

Simplifying this expression, we get:
B = 36,000
Therefore, the balance after 7 years would be $36,000.

Q5.

Find the slope (m):
m = change in y / change in x

= 85,000 - 25, 00012 - 6 / 60,000/6
= 10,000

Use one of the points (let's use (6,25)) to find the y-intercept (b)

$y = mx + b$

$25,000 = 10,000(6) + b$

$b = -35,000$

So, the equation that models the balance (B) in thousands of dollars over time (t in years) for this savings account is:

$B = 10,000t - 35,000$

This equation can be used to predict the balance for any given time in the future. For example, if you want to know the balance after 8 years (t = 8):

$B = 10,000(8) - 35,000$

$= 45,000$

Therefore, the balance after 8 years would be $45,000.

Q6.

Given the values of change in B and change in t, we can find the slope (m) using the formula:

m = change in B / change in t. In this case, the values of change in B and change in t are 70,000 and 7, respectively.

Therefore, the slope is: m = 70,000 / 7 = 10,000.

Using one of the given points (7,30), we can find the y-intercept (b) using the formula:

B = mt + b. We substitute the values of m, t, and B from the point (7,30) and solve for b. After simplification, we get: b = -40,000.

Thus, the equation that models the balance (B) in thousands of dollars over time (t in years) for this savings account is: B = 10,000t - 40,000.

This equation can be used to predict the balance for any given time in the future.

For example, if you want to know the balance after 10 years (t = 10), you can substitute the value of t in the equation and solve for B.

After solving, we get: B = 10,000(10) - 40,000 = 60,000.

Therefore, the balance after 10 years would be $60,000.

Q7.

To find the slope (m) of a savings account balance over time, we can use the

Find the slope (m):

m = change in y/change in x

= 120,000 - 35,000 - 8

= 85,000/8

= 10,625

Use one of the points (let's use (8, 35)) to find the y-intercept (b):

y = mx + b

35,000 = 10,625(8) + b

35,000 = 85,000 + b

b = 35,000 - 85,000

b = -50,000

So, the equation that models the balance (B) in thousands of dollars over time (t in years) for this savings account is:

B = 10,625t - 50,000

This equation can be used to predict the balance for any given time in the future. For example, if you want to know the balance after 12 years (t = 12):

B = 10,625(12) - 50,000

= 71,500

Therefore, the balance after 12 years would be $71,500.

Q8.

Find the slope (m):

m = change in y / change in x

= (150,000 - 40,000 - 9) / (110,000 / 9) ≈ 12,222.22

Use one of the points, let's say (9, 40), to find the y-intercept (b):

$y = mx + b$

$40{,}000 = 12{,}222.22(9) + b$

$b = 40{,}000 - 110{,}000 \approx -70{,}000$

Therefore, the equation that models the balance (B) in thousands of dollars over time (t in years) for this savings account is:

$B = 12{,}222.22t - 70{,}000$

This equation can be used to predict the balance for any given time in the future. For example, if you want to know the balance after 15 years (t = 15):

$B = 12{,}222.22(15) - 70{,}000 \approx \$75{,}833.30$

Therefore, the balance after 15 years would be approximately $75,833.30.

DR. ASHAR RANA

CHEMISTRY ONLINE
TUITION

Phone: +442081445350
www.chemistryonlinetuition.com
Email: asherrana@chemistryonlinetuition.com

- Founder & CEO of Chemistry Online Tuition Ltd.
- Tutoring students in UK and worldwide since 2008
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CONTACT INFORMATION FOR
CHEMISTRY ONLINE TUITION

- UK Contact: 02081445350
- International Phone/WhatsApp: 00442081445350
- Website: www.chemistryonlinetuition.com
- Email: asherrana@chemistryonlinetuition.com

Address: 210-Old Brompton Road, London SW5 OBS, UK