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PURE MATH

ALGEBRA AND FUNCTION

Level & Board	**EDEXCEL (A-LEVEL)**
TOPIC:	**LINEAR MODAL**
PAPER TYPE:	**SOLUTION - 5**
TOTAL QUESTIONS	8
TOTAL MARKS	44

Q1.

To find the slope of a line (m), we use the formula: m = (change in y) / (change in x).

In this case, the change in y is 10,000 (the difference between 15,000 and 5,000), and the change in x is 2 (the difference between 3 and 1). So,

m = 10,000 / 2 = 5,000.

To find the y-intercept (b), we use one of the given points on the line. Let's use the point (1, 5).

We can use the formula:

y = mx + b, where y is the value of the y-coordinate, x is the value of the x-coordinate, m is the slope, and b is the y-intercept.
Plugging in the values, we get:

5 = 5,000(1) + b

Simplifying, we get:

b = 5 - 5,000 = -4,995

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

B = 5,000t - 4,995

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 4 years (t = 4), you can plug in the value of t and solve for B:

B = 5,000(4) - 4,995 = 20,005

Therefore, the balance after 4 years would be $20,005.

Q2.

To find the slope (m), we use the formula m = change in y/change in x. Given two points (32000,5) and (8000,2),

the change in y is 32000 - 8000 = 24000, and the change in x is 5 - 2 = 3. So,

m = 24000/3 = 8000.

To find the y-intercept (b), we use one of the given points and plug in the value of m. Let's use (2,8).

Therefore, 8 = 8000(2) + b. Solving for b, we get b = -16000.

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Hence, the equation that represents the balance (B) in thousands of dollars over time (t in years) for this savings account is B = 8000t - 16000.

We can use this equation to predict the balance for any given time in the future.

For example, if we want to know the balance after 3 years (t = 3), then B = 8000(3) - 16000 = $16000.

Q3.

To find the slope (m) of a savings account balance in thousands of dollars over time in years (t), we use the formula: $\Delta B/\Delta t$.

In this case, the change in B is 20,000 - 4,000, and the change in t is 6 - 2.

So, the slope is (20,000 - 4,000)/(6 - 2) = 16,000/4 = 4,000.

Next, we can use one of the points, say (2,4), to find the y-intercept (b) of the equation that models the balance in thousands of dollars over time in years.

The formula for a linear equation is: B = m*t + b. Substituting the values we have, we get 4,000 = 4,000(2) + b, which simplifies to b = -4,000.

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

B = 4,000t - 4,000. This equation can be used to predict the balance for any given time in the future.

For instance, if we want to know the balance after 3 years,
we substitute t = 3 in the equation and get: B = 4,000(3) - 4,000 = 8,000.

Hence, the balance after 3 years would be $8,000.

Q4.

Find the slope (m):
m=change in y/change in x = (24,000 - 6,000) / (5 - 2) = 18,000 / 3 = 6,000

Now, use one of the points (let's use (2,6)) to find the y-intercept (b):
y = mx + b

6,000 = 6,000(2) + b
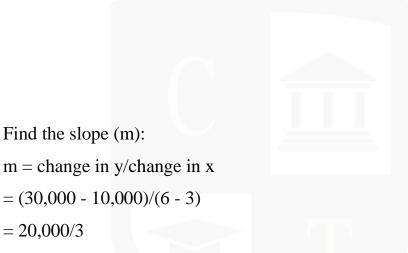
b = 6,000 - 12,000 = -6,000

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 - 6,000

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 4 years (t = 4):

B = 6,000(4) - 6,000 = 18,000

Therefore, the balance after 4 years would be $18,000.

Q5.

Find the slope (m):

m = change in y/change in x

= (30,000 - 10,000)/(6 - 3)

= 20,000/3

Now, use one of the points (let's use (3, 10)) to find the y-intercept (b):

y = mx + b

10,000 = (20,000/3)(3) + b

10,000 = 20,000 + b

b = -10,000

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

B = (20,000/3)t - 10,000

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 4 years (t = 4):

B = (20,000/3)(4) - 10,000

$= 26,666.67$

Therefore, the balance after 4 years would be approximately \$26,666.67.

Q6.

Find the slope (m):

m = change in y/change in x
$= (15,000 - 5,000)/(4 - 2)$
$= 10,000/2$
$= 5,000$

Now, use one of the points (let's use (2,5)) to find the y-intercept (b):

$y = mx + b$
$5,000 = 5,000(2) + b$
$b = 5,000 - 10,000$
$b = -5,000$

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

$B = 5,000t - 5,000$

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 = 5,000(3) - 5,000

= 10,000

Therefore, the balance after 3 years would be $10,000.

Q7.

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

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

In this case, the changes are as follows:

change in y = $28,000 - $7,000 = $21,000
change in x = 5 - 2 = 3

So, the slope is:

m = 21,000 / 3 = 7,000

Now, we can use one of the points on the line, such as (2, 7), to find the y-intercept (b). Using the formula y = mx + b, we can substitute the values we have found to solve for b:

7 = (7,000)(2) + b

$7 = 14{,}000 + b$

$b = -7{,}000$

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

$B = 7{,}000t - 7{,}000$

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

$B = 7{,}000(3) - 7{,}000 = \$14{,}000$

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

Q8.

To find the slope (m), we use the formula m = (change in y)/(change in x). In this case,

The change in y is 42,000 - 12,000 and the change in x is 7 - 3.

Therefore, m = (42,000 - 12,000)/(7 - 3) = 30,000/4 = 7,500.

Next, we use one of the points (3, 12) to find the y-intercept (b).

We plug in the values of the point into the slope-intercept form of the equation, $y = mx + b$, and solve for b.

So, we have $12,000 = 7,500(3) + b$, which gives us

$b = 12,000 - 22,500 = -10,500$.

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

$B = 7,500t - 10,500$.

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

For example, if we want to know the balance after 5 years ($t = 5$), we simply plug in $t = 5$ into the equation to get

$B = 7,500(5) - 10,500 = 32,500$.

Therefore, the balance after 5 years would be $32,500.

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