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PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)
TOPIC:	STRAIGHT LINE
PAPER TYPE:	SOLUTION - 4
TOTAL QUESTIONS	8
TOTAL MARKS	45

Q1.

To find the slope (m) between two points - point E (-1, 3) and point F (5, 7), we use the following formula:

$m = (y2 - y1) / (x2 - x1)$

Substituting the values for x and y, we get:

$m = (7 - 3) / (5 - (-1))$

$m = 4 / 6$

$m = 2/3$

Now, we use the point-slope form with one of the points,

let's use point E (-1, 3):

$y - y1 = m(x - x1)$

Substituting the values, we get:

$y - 3 = (2/3)(x - (-1))$

Distributing the fraction, we get:

$y - 3 = (2/3)x + (2/3)$

Isolating y, we get:

$y = (2/3)x + (11/3)$

Therefore, the equation of the line passing through the points E(-1, 3) and F(5, 7) is $y = (2/3)x + (11/3)$.

Q2.

To calculate the slope (m) between two points

(x1=2, y1=5) and (x2=5, y2=-3), we use the formula:

$m = (y2 - y1) / (x2 - x1)$

$m = (-3 - 5) / (5 - 2) = -8 / 3$

Next, we can use the point-slope form of the equation to find the equation of the line passing through the two points. For example, using point G(2,5), we can write:

$y - 5 = (-8 / 3) \ (x - 2)$

Simplifying this equation, we get:

$y - 5 = (-8 / 3) \ x + (16 / 3)$

Finally, we can write the equation in slope-intercept form, $y = mx + b$, where m is the slope and b is the y-intercept. For our example, the equation of the line passing through G(2,5) and H(5,-3) is:

$y = (-8 / 3) x + (31 / 3)$

Q3.

(a)

Finding the value of "n"

We can find the slope of line 3 (l3) by looking at the coefficient of "x" in the equation when it's in the form y=mx+c. Let's rearrange the equation for line 3 to find its slope:

$3x - 2y + 5 = 0$

$-2y = -3x - 5$

$y = 3/2x + 5/2$

Now, let's compare this with the equation for line 4 (l4), $y = nx - 2$. The slope of line 3 is 3/2, so for line 4, the slope "n" must be the negative reciprocal of 3/2, which is -2/3. Therefore, n = -2/3.

(b)

Finding the x-coordinate of point "Q"

Let's find the point of intersection Q by solving the system of equations formed by lines 3 and 4:

$3x - 2y + 5 = 0$

$y = -2/3x + 2$

Substitute the expression for y from the second equation into the first:

$3x - 2(-2/3x + 2) + 5 = 0$

Now, solve for x:

$3x + (4/3)x + 13/3 = 0$

$13x = -13$

$x = -1$

So, the x-coordinate of point Q is -1.

Q4.

To find the equation of the line passing through two points,

(x1, y1) and (x2, y2), you can use the point-slope form of the equation of a line: $y - y1 = m(x - x1)$, where m is the slope of the line.

First, let's find the slope (m) using the coordinates of points A(3, 1) and B(4, -2):

$m = (y2 - y1) / (x2 - x1) = (-2 - 1) / (4 - 3) = -3$

Now that we have the slope (m) let's use point-slope form with point A(3, 1):

$y - 1 = -3(x - 3)$

Distribute the -3:

$y - 1 = -3x + 9$

Add 1 to both sides:

$y = -3x + 10$

Therefore, the equation of the line passing through points A(3, 1) and B(4, -2) is $y = -3x + 10$.

Q5.

(a)

Finding the value of "p"

To find the slope of "5l5", we can rearrange the equation to the form $y=mx+c$ where "m" is the coefficient of "x". Thus, for the equation of "5l5":

$4x + 3y - 6 = 0$

$3y = -4x + 6$

$y = (-4/3)x + 2$

Now, we can compare this with the equation for "6l6", which is $y = px + 2$. We know that the slope of "5l5" is -4/3, so the slope of "6l6" must be the negative reciprocal of -4/3, which is 3/4. Therefore, $p = 3/4$.

(b)

Finding the x-coordinate of point "R"

To find the point of intersection "R", we can solve the system of equations formed by "5l5" and "6l6":

$4x + 3y - 6 = 0$

$y = (3/4)x + 2$

Substitute the expression for "y" from the second equation into the first:

$4x + 3((3/4)x + 2) - 6 = 0$

Now, solve for "x":

$4x + (9/4)x + 6 - 6 = 0$

$(16/4)x + (9/4)x = 0$

$25/4\ x = 0$

$x = 0$

Thus, the x-coordinate of point "R" is 0.

Q6.

(a)

To find the value of 'm' for which line '1' and line '2' are perpendicular, we can use the fact that the product of the slopes of two perpendicular lines is -1.

The equation of line '1' is given as $2x + 4y - 3 = 0$, and the equation of line 'l2' is $y = mx + 7$.

Let's compare the slopes of line '1' and line '2':

For 'l1', we rearrange the equation to get it in the form $y = mx + c$, where 'm' is the slope:

$2x + 4y - 3 = 0$

$4y = -2x + 3$

$y = -1/2x + 3/4$

Now, we compare this with the equation for 'l2', $y = mx + 7$. We get the slope of line '1' as -1/2, so for line '2', the pitch 'm' must be the negative reciprocal of -1/2, which is 2.

So, m = 2.

(b)

we find the point of intersection 'P' by solving the system of equations formed by line '1' and line '2':

$2x + 4y - 3 = 0$

$y = 2x + 7$

We substitute the expression for 'y' from the second equation into the first:

$2x + 4(2x + 7) - 3 = 0$

Now, we solve for 'x':

$2x + 8x + 28 - 3 = 0$

$10x + 25 = 0$

$10x = -25$

$x = -5/2$

So, the x-coordinate of point 'P' is -5/2.

Q7.

To calculate the slope (m), we use the formula:

$m = (y2 - y1) / (x2 - x1)$

For the two given points, C (2, 5) and D (6, -1), we can substitute the values to get:

$m = (-1 - 5) / (6 - 2) = -6 / 4 = -3 / 2$

Next, we use point-slope form to derive the equation of the line.

Let's use point C (2, 5) for this:

$(y - y1) = m(x - x1)$

Substituting the values, we get:

$(y - 5) = (-3 / 2) (x - 2)$

Simplifying the equation:

$2y - 10 = -3x + 6$

$3x + 2y = 16$

Therefore, the equation of the line passing through points

C(2, 5) and D(6, -1) is $3x + 2y = 16$.

Q8.

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

$m = (y2 - y1) / (x2 - x1)$

Substituting the values of the given points I(1,4) and J(2,6), we get:

$m = (6 - 4) / (2 - 1) = 2$

Using point-slope form with point I(1,4), we get:

$(y - y1) = m(x - x1)$

Substituting the value of m and the coordinates of point I(1,4), we get:

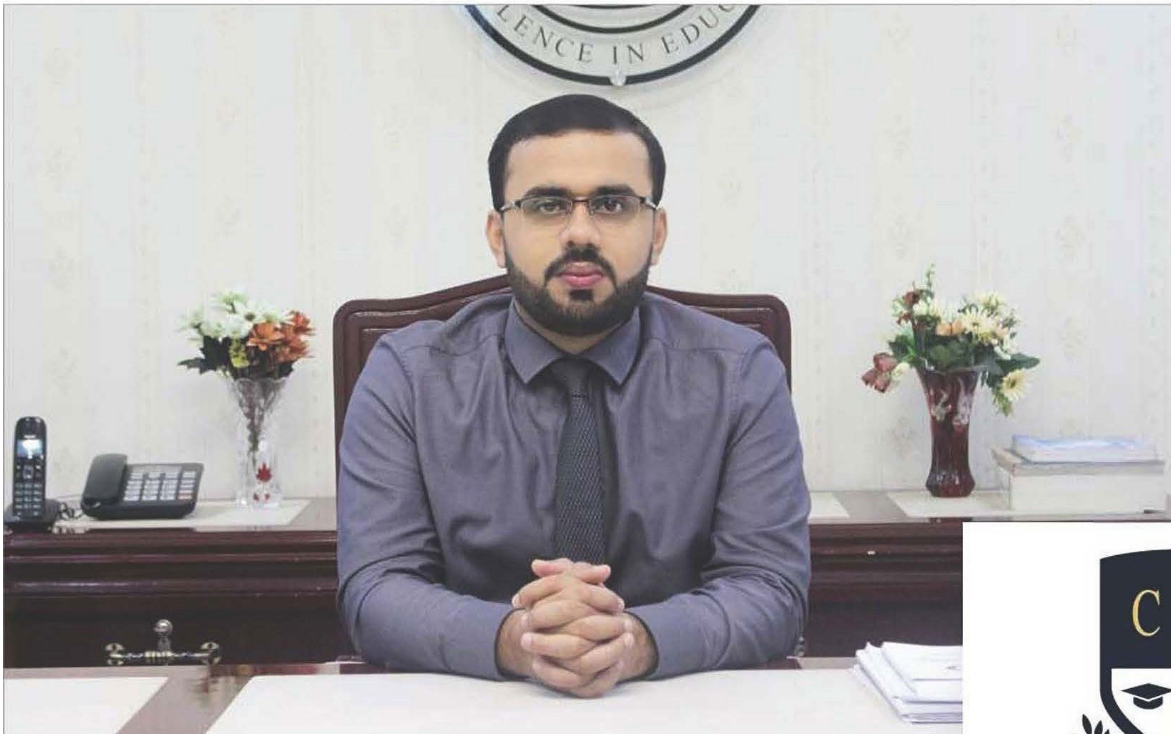
$(y - 4) = 2(x - 1)$

Simplifying further, we get:

$y = 2x + 2$

Therefore, the equation of the line passing through points I(1,4) and J(2,6) is

$y = 2x + 2$.



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