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## PURE MATH

## ALGEBRA AND FUNCTION

Level \& Board
EDEXCEL (A-LEVEL)

TOPIC:

PAPER TYPE:

TOTAL QUESTIONS

TOTAL MARKS45 individual/ company/organization involved in copyright abuse.

## Q1.

To calculate the slope (m), we use the formula:
$\mathrm{m}=(\mathrm{y} 2-\mathrm{y} 1) /(\mathrm{x} 2-\mathrm{x} 1)$
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:
$(y-y 1)=m(x-x 1)$
Substituting the values, we get:
$(y-5)=(-3 / 2)(x-2)$
Simplifying the equation:
$2 y-10=-3 x+6$
$3 x+2 y=16$
Therefore, the equation of the line passing through points
$C(2,5)$ and $D(6,-1)$ is $3 x+2 y=16$.

## Q2.

To find the slope (m), we use the formula:
$\mathrm{m}=(\mathrm{y} 2-\mathrm{y} 1) /(\mathrm{x} 2-\mathrm{x} 1)$
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 $\mathrm{I}(1,4)$, we get:
$(y-y 1)=m(x-x 1)$
Substituting the value of $m$ and the coordinates of point $\mathrm{I}(1,4)$, we get:
$(y-4)=2(x-1)$

Simplifying further, we get:
$y=2 x+2$
Therefore, the equation of the line passing through points $\mathrm{I}(1,4)$ and $\mathrm{J}(2,6)$ is $y=2 x+2$.

## Q3.

(a)

Finding the value of " n "
We can find the slope of line 3 (13) by looking at the coefficient of "x" in the equation when it's in the form $y=m x+c$. Let's rearrange the equation for line 3 to find its slope:
$3 x-2 y+5=0$
$-2 y=-3 x-5$
$y=3 / 2 x+5 / 2$
Now, let's compare this with the equation for line 4 (14), $y=n x-2$. 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:
$3 x-2 y+5=0$
$y=-2 / 3 x+2$
Substitute the expression for $y$ from the second equation into the first:
$3 x-2(-2 / 3 x+2)+5=0$
Now, solve for x :
$3 x+(4 / 3) x+13 / 3=0$
$13 x=-13$
$\mathrm{x}=-1$
So, the x -coordinate of point Q is -1 .

## Q4.

(a)

Finding the value of "p"
To find the slope of "515", we can rearrange the equation to the form
$y=m x+c$ where " $m$ " is the coefficient of " $x$ ". Thus, for the equation of " 515 ":
$4 x+3 y-6=0$
$3 y=-4 x+6$
$y=(-4 / 3) x+2$

Now, we can compare this with the equation for "6l6", which is $\mathrm{y}=\mathrm{px}+2$.
We know that the slope of "515" is $-4 / 3$, so the slope of " 616 " 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 "515" and "616":
$4 x+3 y-6=0$
$y=(3 / 4) x+2$
Substitute the expression for " $y$ " from the second equation into the first:
$4 x+3((3 / 4) x+2)-6=0$
Now, solve for "x":

$$
\begin{aligned}
& 4 x+(9 / 4) x+6-6=0 \\
& (16 / 4) x+(9 / 4) x=0 \\
& 25 / 4 x=0 \\
& x=0
\end{aligned}
$$

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

Q5.
To find the equation of the line passing through two points, ( $\mathrm{x} 1, \mathrm{y} 1$ ) and ( $\mathrm{x} 2, \mathrm{y} 2$ ), you can use the point-slope form of the equation of a line: $y-y 1=m(x-x 1)$, where $m$ is the slope of the line.

First, let's find the slope ( m ) using the coordinates of points
$A(3,1)$ and $B(4,-2)$ :
$m=(y 2-y 1) /(x 2-x 1)=(-2-1) /(4-3)=-3$
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 :
$y-1=-3 x+9$
Add 1 to both sides:
$y=-3 x+10$
Therefore, the equation of the line passing through points $\mathrm{A}(3,1)$ and
$\mathrm{B}(4,-2)$ is $\mathrm{y}=-3 \mathrm{x}+10$.

## 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 $2 x+4 y-3=0$, and the equation of line ' 12 ' is $\mathrm{y}=\mathrm{mx}+7$.

Let's compare the slopes of line '1' and line '2':
For 'l1', we rearrange the equation to get it in the form $\mathrm{y}=\mathrm{mx}+\mathrm{c}$, where ' m ' is the slope:
$2 \mathrm{x}+4 \mathrm{y}-3=0$
$4 y=-2 x+3$
$y=-1 / 2 x+3 / 4$
Now, we compare this with the equation for ' 12 ', $\mathrm{y}=\mathrm{mx}+7$. 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 ':
$2 x+4 y-3=0$
$y=2 x+7$
We substitute the expression for 'y' from the second equation into the first:
$2 x+4(2 x+7)-3=0$
Now, we solve for ' $x$ ':
$2 \mathrm{x}+8 \mathrm{x}+28-3=0$
$10 x+25=0$
$10 x=-25$
$x=-5 / 2$
So, the $x$-coordinate of point ' $P$ ' is $-5 / 2$.

Q7.
To find the slope (m) between two points - point E (-1, 3) and point F (5, 7),
we use the following formula:
$\mathrm{m}=(\mathrm{y} 2-\mathrm{y} 1) /(\mathrm{x} 2-\mathrm{x} 1)$
Substituting the values for $x$ and $y$, we get:
$m=(7-3) /(5-(-1))$
$\mathrm{m}=4 / 6$
$\mathrm{m}=2 / 3$
Now, we use the point-slope form with one of the points,
let's use point $\mathrm{E}(-1,3)$ :
$\mathrm{y}-\mathrm{y} 1=\mathrm{m}(\mathrm{x}-\mathrm{x} 1)$
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 $\mathrm{E}(-1,3)$ and $F(5,7)$ is $y=(2 / 3) x+(11 / 3)$.

## Q8.

To calculate the slope (m) between two points
( $\mathrm{x} 1=2, \mathrm{y} 1=5$ ) and ( $\mathrm{x} 2=5, \mathrm{y} 2=-3$ ), we use the formula:
$m=(y 2-y 1) /(x 2-x 1)$
$m=(-3-5) /(5-2)=-8 / 3$
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, $\mathrm{y}=\mathrm{mx}+\mathrm{b}$, where $m$ is the slope and $b$ is the $y$-intercept. For our example, the equation of the line passing through $\mathrm{G}(2,5)$ and $\mathrm{H}(5,-3)$ is:
$y=(-8 / 3) x+(31 / 3)$


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