GRADE 11_Analitical Geometry

11.8 Parallel and perpendicular lines

1. Parallel and perpendicular lines.

1.1 Calculate the gradient of BC and DE and state whether the are parallel or perpendicular if B(-3;3), C(1;5), D(2;3) and E(0;-1) are given.

1.2 Calculate the gradient of AB and CD and state whether the are parallel or perpendicular if A(-1;3), B(2;7), C(4;-5) and D(8;-8) are given.

2. Determine variables when lines are perpendicular or parallel.

2.1 Calculate the value of d if NF and ED are perpendicular.
N(-2 ; -5), F(-1 ;-10), E(3 ; d) and D(8 ; -1)

2.2 Calculate the value of q if NF and ED are parallel.
N(3 ; -4), F(4 ; 0), E(q ; -4) and D(3 ; 0)

Memo

1. Parallel and perpendicular lines. [8.8.4.1]

1.1 $m_{BC} = \frac{2}{4} = \frac{1}{2}$ and $m_{DE} = \frac{-4}{-2} = 2$

$m_{BC} \neq m_{DE}$

BC not parallel to DE

$m_{BC} \times m_{DE} \neq -1$

BC not perpendicular to DE.

1.2 $m_{AB} = \frac{4}{3}$ and $m_{CD} = \frac{-3}{4}$

$m_{AB} \neq m_{CD}$

AB not parallel to CD

$m_{AB} \times m_{CD} = \frac{4}{3} \times \frac{-3}{4} = -1$

AB $\perp$ CD

2. Determine variables when lines are perpendicular or parallel. [8.8.4.2]

2.1 N(-2 ; -5), F(-1 ;-10), E(3 ; d) and D(8 ; -1)

$m_{NF} = \frac{-5}{1} = -5$ and $m_{ED} = \frac{1}{5}$

$\frac{1}{5} = \frac{-1-d}{8-3}$

$-1-d = 1$

$\therefore d = -2$

2.2 N(3 ; -4), F(4 ; 0), E(q ; -4) and D(3 ; 0)

$m_{NF} = \frac{4}{1} = 4$ and $m_{ED} = 4$

$$4 = \frac{0+4}{3-q}$$

$$12 - 4q = 4$$

$$\therefore q = 2$$