

Unit 3

1 $3y + x - 3 = 0$

2 $y + 2x - 5 = 0$

3 $y = 2$

4 $m_{AB} = m_{CD} = -2$, hence $\overline{AB} \parallel \overline{CD}$,

$m_{AD} = m_{BC} = \frac{1}{2}$, hence $\overline{AD} \parallel \overline{BC}$,

$m_{AB} = -\frac{1}{m_{AD}}$, hence $\overline{AB} \perp \overline{AD}$,

$m_{BC} = -\frac{1}{m_{DC}}$, hence $\overline{BC} \perp \overline{CD}$

$\overline{AB} = \overline{CD} = 5\sqrt{5}$, $\overline{AD} = \overline{BC} = 2\sqrt{5}$

5 The design is not compliant with the limitation, because the gradient of the belt is 0.404 or, viceversa, a gradient of value 0.4 would imply an angle equals to 21.8°

6 $\theta_x = 36.87^\circ$

$\theta_y = 53.13^\circ$

7 $x^2 + y^2 - 10x + 6y - 2 = 0$

8 a $C(5, -7)$, $r = 5\sqrt{5}$

b Hint: substitute the coordinates of the point into the equation of the circle

9 $C(-3, 1)$, $r = 2$

10 a $C(2, 2)$

b $x^2 + y^2 - 4x - 4y - 5 = 0$

c $2y + 3x = 10$

11 Pupil's own answer

12 a $c = -1$ and $c = 7$, the line touches the circle.

b $-1 < c < 7$, the line intersects the circle at two points

c $c < -1$ and $c > 7$, the line does not meet the circle

13 a $u_{n+1} = 0.7u_n + 25\text{mg/m}^3$

b Yes, the current fertiliser treatment will maintain the required level of potassium, because $L = 83\frac{1}{3}\text{mg/m}^3$

14 a $u_3 = 9460$

b $L = 60000$

15 $x = \frac{6}{4+\pi}$

16 $A = \frac{45}{4}$

17 $A = \frac{4}{3}$

18 $A = 9$