



National 5 Mathematics

Straight Lines - Solutions

Marks are indicated in brackets after each question number

2014 Paper 1 Question 6, (3) (1)

a) $A = (5, 200), B = (25, 500)$

$$m_{AB} = \frac{500 - 200}{25 - 5} = 15$$

Using $y - b = m(x - a)$ with $(5, 200)$ gives

$$y - 200 = 15(x - 5)$$

$$y - 200 = 15x - 75$$

$$y = 15x + 125$$

$$C = 15F + 125$$

b) $C = 15F + 125$

Substituting $F = 40$ gives

$$C = (15 \times 40) + 125$$

$$= 725$$

2014 Paper 1 Question 11, (2) (2)

a) $4x + 3y = 12$

$$3y = -4x + 12$$

$$y = -\frac{4}{3}x + 4$$

So, the gradient is $-\frac{4}{3}$.

b) On the x-axis $y = 0$, so let $y = 0$ to give

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

$$x = 3$$

Giving, the point $(3, 0)$.



2015 Paper 1 Question 8, (3)

Let $A = (-2, 5), B = (3, 15)$

$$m_{AB} = \frac{15 - 5}{3 - (-2)} = 2$$

Using $y - b = m(x - a)$ with $(3, 15)$ we have

$$y - 15 = 2(x - 3)$$

$$y - 15 = 2x - 6$$

$$y = 2x + 9$$

2016 Paper 1 Question 5, (3) (1)

a) $D = (3, 100), E = (15, 340)$

$$\begin{aligned} m_{DE} &= \frac{340 - 100}{15 - 3} \\ &= \frac{240}{12} \\ &= 20 \end{aligned}$$

Using $y - b = m(x - a)$ with $(3, 100)$ gives

$$y - 100 = 20(x - 3)$$

$$y - 100 = 20x - 60$$

$$y = 20x + 40$$

$$W = 20A + 40$$

b) $W = 20A + 40$

1 year = 12 months

$$W = (20 \times 12) + 40$$

$$= 280 \text{ kg.}$$

2017 Paper 1 Question 6, (3)

$$\begin{aligned} m_{AB} &= \frac{6 - (-2)}{-1 - 3} \\ &= -2 \end{aligned}$$



Using $y - b = m(x - a)$ with $(3, -2)$ gives

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

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

$$y = -2x + 4$$

2017 Paper 2 Question 11, (2)

$$3x - 5y - 10 = 0$$

$$3x - 10 = 5y$$

$$5y = 3x - 10$$

$$y = \frac{3}{5}x - 2$$

So, the gradient of the line is $\frac{3}{5}$.

2018 Paper 1 Question 7, (3) (1)

a) $A = (8, 14), B = (12, 20)$

$$\text{Gradient} = \frac{20 - 14}{12 - 8} = \frac{6}{4} = \frac{3}{2}$$

Write $y = mx + c$ using P and d to give

$$P = md + c$$

$$P = \frac{3}{2}d + c$$

Substitute $(8, 14)$ to give

$$14 = \frac{3}{2} \cdot 8 + c$$

$$14 = 12 + c$$

$$c = 2$$

$$P = \frac{3}{2}d + 2$$

b) Let $d = 5$ to give

$$P = \frac{3}{2}(5) + 2$$

$$= \frac{15}{2} + 2$$

$$= 7.5 + 2$$

$$= 9.5$$



So, £ 9.50.

2018 Paper 2 Question 14, (2)

$$2x - 5y = 20$$

For y - intercept, let $x = 0$

$$0 - 5y = 20$$

$$-5y = 20$$

$$y = -4$$

$(0, -4)$

2019 Paper 1 Question 6, (3) (1)

a) Choose two points that lie on the line of best fit, $(1.5, 14)$, $(3.5, 8)$

$$\begin{aligned}\text{Gradient} &= \frac{14 - 8}{1.5 - 3.5} \\ &= \frac{6}{-2} \\ &= -3\end{aligned}$$

Using $y - b = m(x - a)$ with $(1.5, 14)$ gives

$$y - 14 = -3(x - 1.5)$$

$$y - 14 = -3x + 4.5$$

$$y = -3x + 18.5$$

$$F = -3E + 18.5$$

b) Substituting $E = 1.1$ gives

$$F = (-3 \times 1.1) + 18.5$$

$$= -3.3 + 18.5$$

$$= 15.2$$

2019 Paper 2 Question 13, (3)

$$\begin{aligned}\text{Gradient} &= \frac{9 - 4p^2}{6 - 4p} \\ &= \frac{(3 - 2p)(3 + 2p)}{2(3 - 2p)} = \frac{3 + 2p}{2}\end{aligned}$$



2022 Paper 1 Question 6, (3)

$$m = \frac{7 - (-1)}{-5 - (-3)} = \frac{8}{-2} = -4$$

Using $y - b = m(x - a)$ with $(-3, -1)$ gives

$$y - (-1) = -4(x - (-3))$$

$$y + 1 = -4(x + 3)$$

$$y + 1 = -4x - 12$$

$$y = -4x - 13$$

2023 Paper 1 Question 7, (3) (1)

a) The points given on the line are $(5, 20000)$ and $(25, 50000)$.

$$m = \frac{50000 - 20000}{25 - 5}$$

$$m = \frac{30000}{20}$$

$$m = \frac{3000}{2} = 1500$$

Using $y - b = m(x - a)$ with $(5, 20000)$ gives

$$y - 20000 = 1500(x - 5)$$

$$y - 20000 = 1500x - 7500$$

$$y = 1500x + 125000$$

Rewrite with P and T to give

$$P = 1500T + 125000$$

b) Substitute $T = 8$ to give

$$P = 1500(8) + 125000$$

$$P = 24,500$$

So, £24,500.



2024 Paper 1 Question 9, (3) (1)

a) $A = (3, 26), B = (10, 12)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{26 - 12}{3 - 10} = \frac{14}{-7} = -2$$

Using $y - b = m(x - a)$ with $(10, 12)$ gives

$$y - 12 = -2(x - 10)$$

$$y - 12 = -2x + 20$$

$$y = -2x + 32$$

$$D = -2T + 32$$

b) Substitute $T = 7$ into $D = -2T + 32$ to give

$$D = -2(7) + 32$$

$$= -14 + 32$$

$$= 18$$

So, 18 km

2024 Paper 2 Question 11, (2)

$$x + 4y - 24 = 0$$

$$4y = -x + 24$$

$$y = -\frac{1}{4}x + 6$$

So, the gradient is $-\frac{1}{4}$

2025 Paper 1 Question 6, (3)

$$m = \frac{12 - 2}{1 - 6} = \frac{10}{-5} = -2$$

Using $y - b = m(x - a)$ with $(1, 12)$ gives

$$y - 12 = -2(x - 1)$$

$$y - 12 = -2x + 2$$

$$y = -2x + 14$$