N5 – Straight Line Solutions

1. 2010 Paper 1 Q9

(a) B is the x-intercept so set $y=0$:

$y = \frac{1}{3}x + 2$

$y=0$: $0 = \frac{1}{3}x + 2$ ✓

$\frac{1}{3}x + 2 = 0$

$\frac{1}{3}x = -2$

$x = -6$ ✓

so B has coordinates $(-6, 0)$ 2 · KU

(b) for $y<0$ (line below the x-axis)

$\Rightarrow$ $x < -6$ ✓ 1 · RE

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2. 2009 Paper 2 Q6

(a) · Equation of str. line: $y = mx + c$ ✓

· 2 points of the line: A(9,21) (x_1, y_1) B(15,33) (x_2, y_2)

$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1}$

$m_{AB} = \frac{33-21}{15-9}$

$m_{AB} = \frac{12}{6}$

$m_{AB} = 2.$ ✓

· equation: $y = 2x + c$

(9, 21) x y $21 = 2 \times 9 + c$ (4 KU)

$21 = 18 + c$ ✓

$3 = c$

· Equation: $y = 2x + 3$ ✓

(b) $x = 20$ (film score = 20), $y = 2 \times 20 + 3$ ✓

$y = 43$ (2 RE)

sports score - 43 ✓

3. 2008 Paper 1 Q4.

Equation of str. line: $y = mx + c$

$c = 18$ (from graph)

$m = \frac{\text{vertical}}{\text{horizontal}}$

$m = -18/9 = -2.$

or can use $\frac{y_2 - y_1}{x_2 - x_1}$ (0,18) (9,0)

Equation is: $\underline{y = -2x + 18}$.

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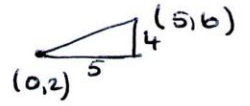
4. 2007 Paper 1 Q.6

Equation of straight line: $y = mx + c$ ✓

$c = 2$, ✓ $m = 4/5$ ✓



or use $\frac{y_2 - y_1}{x_2 - x_1}$

Equation is: $y = 4/5x + 2$

$\underline{f = 4/5 d + 2}$ ✓ (4ku)

(must have correct letters for full marks)

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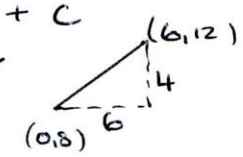
5. 2006 Paper 1 Q.4

Equation of str. line: $y = mx + c$

$c = 8$, ✓ $m = 4/6 = 2/3$ ✓



or use $\frac{y_2 - y_1}{x_2 - x_1}$

Equation is: $\underline{y = 2/3x + 8}$ ✓ (3ku)

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6. 2005 Paper 2 Q.9

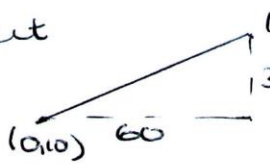
(a) fixed rental = £10. ✓ (1 RE)

(b) call charge per minute = gradient

$= £\frac{3}{60}$

$= £1/20$

$= \underline{5p}$.



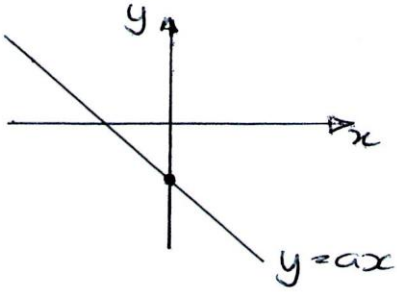
or use $\frac{y_2 - y_1}{x_2 - x_1}$

.7. 2004 Paper 1 Q.10

$y = ax + b$.

- If $a < 0$ gradient is negative so the line slopes downwards.
- If $b < 0$ the y-intercept is negative.

Answer:



✓ - line slopes downwards
✓ - line cuts y-axis below 0
✓ - straight line.

(3RE)

Nb: It doesn't matter how steep you make the line.

.8. 2004 Paper 2 Q.2

Equation of straight line: $y = mx + c$

$m = \frac{-100}{150} = -\frac{2}{3}$ ✓ $\quad c = 100$ ✓

(a) Equation: $y = -\frac{2}{3}x + 100$

$V = -\frac{2}{3}t + 100$ ✓ (3ku)

(b) $V = 70$, $\quad (100 - 30)$

$70 = -\frac{2}{3}t + 100$ ✓

$\frac{2}{3}t + 70 = 100$

$\frac{2}{3}t = 30$ ✓

$t = \frac{30 \times 3}{2}$

$t = 45$ minutes ✓ (3RE)

.9. 2003 Paper 1 Q.6

(a) $m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad A(-1, -7)$ $\quad B(4, 3)$

$x_1\ y_1$ $\quad x_2\ y_2$

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

$m = \frac{10}{5}$

$m = 2$ ✓ (1ku)

(b) $y = 2x - 5$ ✓ (1ku)

(c) $(3k, k)$

x, y

substitute into equation:

$k = 2 \times 3k - 5$ ✓

$k = 6k - 5$

$-5k = -5$

$k = 1$ ✓ (2RE)

10. 2002 Paper 1 Q.12

A (0,12) B(90,82) Eqn of str.line: $y = mx + c$ ✓

$c = 12$, ✓ $m = \frac{82-12}{90-0}$

$m = \frac{70}{90} = 7/9$ ✓

Equation: $y = 7/9x + 12$

$\underline{g = 7/9h + 12}$ ✓ (4RE)

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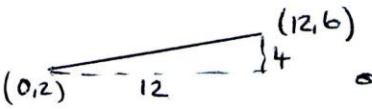
11. 2001 Paper 2 Q.4

(a) Equation of str.line: $y = mx + c$

$c = 2$, ✓ $m = \frac{4}{12} = \frac{1}{3}$ ✓



or use $\frac{y_2 - y_1}{x_2 - x_1}$

Equation: $y = \frac{1}{3}x + 2$ ✓

$3y = x + 6 \Rightarrow 3y - x = 6$. (3KU)

(b) Simultaneous equations:

$3y - x = 6$ (1) $\times 5 \Rightarrow 15y - 5x = 30$ (3) ✓

$4y + 5x = 46$ (2)

(2)+(3) $19y = 76$

$y = 4$ ✓

Substitute $y = 4$ into (1)

$3y - x = 6$

$3 \times 4 - x = 6$

$12 - x = 6$

$-x = -6$

$x = 6$ ✓ (4RE)

The coordinates are: $\underline{(6,4)}$ ✓

.12. 2001 Paper 1 Q.6

A (a^2, a) (x_1, y_1) T (t^2, t) (x_2, y_2)

$$m_{AT} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_{AT} = \frac{t - a}{t^2 - a^2} \checkmark$$

$$m_{AT} = \frac{(t-a)}{(t-a)(t+a)} \checkmark$$

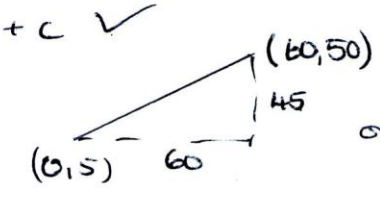
$$m_{AT} = \frac{1}{(t+a)} \checkmark$$

(3kU)

.13. 2000 Paper 1 Q.10

Equation of str. line: $y = mx + c$ ✓

$c = 5$ ✓ $m = \frac{45}{60} = \frac{3}{4}$ ✓



or use $\frac{y_2 - y_1}{x_2 - x_1}$

Equation: $y = \frac{3}{4}x + 5$

$V = \frac{3}{4}t + 5$ ✓

(4kU)

.14. FP9 Paper 1 Q6

Equation of str. line: $y = mx + c$

$m = \frac{3}{6} = \frac{1}{2}$ ✓

or use $\frac{y_2 - x_1}{x_2 - x_1}$

Equation: $y = \frac{1}{2}x + c$ ✓

(4, 0) x, y

$0 = \frac{1}{2} \times 4 + c$

$-2 = c$ ✓

Equation: $y = \frac{1}{2}x - 2$

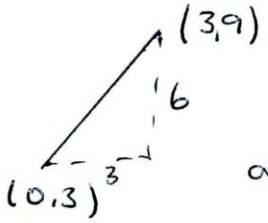
$T = \frac{1}{2}s - 2$ ✓

(4kU)

.15. 1996 Q8

Equation of str. line: $y = mx + c$

$c = 3$ ✓ $\quad m = 6/3 = 2$ ✓



or use $\frac{y_2 - y_1}{x_2 - x_1}$

Equation: $y = 2x + 3$ ✓

$\underline{p = 2t + 3}$ ✓

(4 ku)

.16. 1992 Paper 1 Q8.

Equation of str. line: $y = mx + c$

$c = 40$ (from graph) ✓ $\quad m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad (0,40)$ $\quad (400,240)$

$m = \frac{240 - 40}{400 - 0}$

$m = \frac{200}{400} = \frac{1}{2}$ ✓

Equation: $y = \frac{1}{2}x + 40$ ✓

$\underline{p = \frac{1}{2}t + 40}$ ✓

(4) ku.

.17. 1990 Paper 1 Q9.

Equation of str. line: $y = mx + c$

$c = 138$. ✓ (from graph) $\quad m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad (0,138)$ $\quad (60,156)$

$m = \frac{156 - 138}{60 - 0}$

$m = \frac{18}{60} = \frac{3}{10}$ ✓

Equation: $y = \frac{3}{10}x + 138$ ✓

$\underline{s = \frac{3}{10}t + 138}$ ✓

(4 ku)