**Year 11 to Year 12 Transition Paper**

**Straight Line Graphs**

**Mark Scheme**

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| **Question** | **Scheme** | **Marks** |
| **1(a)** | $$3y=2x+24$$ | M1 |
| $$y=\frac{2}{3}x+8$$ | A1 |
|  | **(2)** |
| **(b)** | $$y=\frac{2}{3}x+c, 3y=2x+c$$ | M1 |
| $$y=\frac{2}{3}x+1$$ | A1 |
|  | **(2)** |
| **(4 marks)** |
| **Notes****(a)** M1 $3y=2x+24$ or $y-\frac{2}{3}x=$ $\frac{24}{3}$A1 cao**(b)**M1 for use of correct gradient in the equation of a straight line in any form, eg $y=\frac{2}{3}x+c, 3y=2x+c$A1 for $y=\frac{2}{3}x+1 $oe |

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| **Question** | **Scheme** | **Marks** |
| **2** | States gradient of is oe  or rewrites as  | B1 |
| Attempts to find gradient of line joining and | M1 |
|   | A1 |
|  States neither with suitable reasons | A1 |
| **(4 marks)** |
| **Notes****B1:** States that the gradient of line is or writes in the form **M1:** Attempts to find the gradient of line using Condone one sign error Eg allow **A1:** For the gradient of or the equation of  Allow for any equivalent such as or **A1: CSO ( on gradients)**Explains that they are neither parallel as the gradients not equal nor perpendicular asoeAllow a statement in words ''they are not negative reciprocals '' for a reason for not perpendicular and ''they are not equal'' for a reason for not being parallel |

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| **Question** | **Scheme** | **Marks** |
| **3****(Way 1 )** | Use *y* = *mx + c* with both (3, 1) and (4, 2) and attempt to find *m* or *c*  | M1 |
| *m* = 3 | A1 |
| *c =* 10 so *y* = 3*x* + 10 | A1 |
|  | **(3)** |
| **Or****(Way 2)** | Uses $\frac{y -y\_{1}}{x -x\_{1}}$ = $\frac{y\_{2}-y\_{1}}{x\_{2}-x\_{1}}$ with both (3,1) and (4, −2) | M1 |
| Gradient simplified to −3 (may be implied) | A1 |
| *y* = −3*x* + 10 oe | A1 |
|  | **(3)** |
| **Or****(Way 3)** | Uses *ax* + *by* + *k* = 0 and substitutes both *x* = 3 when *y* = 1 and *x* = 4 when *y* = −2 with attempt to solve to find *a*, *b* or *k* in terms of one of them | M1 |
| Obtains *a* = 3*b*, *k* = − 10*b* or 3*k* = − 10*a* | A1 |
| Obtains *a* = 3, *b* = 1, *k* = − 10Or writes 3*x* + *y* – 10 = 0 oe | A1 |
|  | **(3)** |
| **(3 marks)** |
| **Notes**M1: Need correct use of the given coordinatesA1: Need fractions simplified to – 3 (in way 1 and 2)A1: Need constants combined accuratelyN.B. Answer left inform (y – 1) = − 3 (x −3) or (y−(−2)) = − 3(x−4) is awarded M1A1A0 as answers should be simplified by constant being collected*Notes that a correct answer implies all three marks in this question.*  |

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| **Question** | **Scheme** | **Marks** |
| **4(a)** |   Gradient of perpendicular =  | M1 |
|  Either or  | A1 |
|  | **(2)** |
| **(b)** | Combines 'their' with  | M1 |
|  oe | A1 |
|  |  | **(2)** |
| **(4 marks)** |
| **Notes** |
| **(a)****M1:** Attempts to set given equation in the form with oe such as **AND** deduces that Condone errors on the An alternative method is to find both intercepts to get gradient and use the perpendicular gradient rule.**A1:** Correct answer. Accept **either** **or**  This must be simplified and not left as or unless you see . Watch: There may be candidates who look at and incorrectly state that the gradient is 2 and use the perpendicular rule to get They will score M0 A0 in (a) and also no marks in (b) as the lines would be parallel. In a case like this don't allow an equation to be ''altered'' Candidates who state or **with no incorrect working** can score both marks (b)**M1:** Substitutes their into , condoning slips, in an attempt to form and solve an equation in *x*. Alternatively equates their with their in an attempt to form and solve, condoning slips, an equation in *x*. Don't be too concerned by the mechanics of the candidates attempt to solve. (E.g. allow solutions from their calculators). You may see with being found before the value of *x* appearsIt cannot be awarded from ''unsolvable'' equations (e.g. lines that are parallel). **A1:** The answer alone can score both marks as long as both equations are correct and no incorrect working is seen. Remember to isw after the correct answer and ignore any *y* coordinate |

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| **Question** | **Scheme** | **Marks** |
| **5(a)** | Gradient of **L1** is − | M1 |
| *y* = −*x* + *c*1 = − × 2 + *c**c =*  | M1 |
| *y* = −*x* +  | A1 |
|  | **(3)** |
| **(b)** | Gradient of **L1** is − | M1 |
| Gradient of **L3** = *y* – −5 =  (*x* – 0) | M1 |
| 4*x* − 3*y* − 15 = 0 | A1 |
|  | **(3)** |
| **(6 marks)** |
| **Notes****(a)** M1 for method to find gradient of **L1** or sight of “*m* = − ”M1 for method to find equation, ie use of *y* – *y*1 = *m*(*x* – *x* 1) or *y* = *mx* + *c,* with attempt to find *c*A1 for *y* = −*x* + **(b)**M1 for method to find gradient of **L3,** eg use of - or sight of “*m* = ”M1 for method to find equation, ie use of *y* – *y*1 = *m*(*x* – *x* 1) or *y* = *mx* + *c,* with attempt to find *c*A1 for 4*x* − 3*y* − 15 = 0 or -4*x* + 3*y* + 15 = 0 (accept 4*x* + −3*y* + −15 = 0) |

| **Question** | **Scheme** | **Marks**  |
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| **6(a)** |  oe |  or exact equivalents such as 1.25 but **not**  | B1 |
|  | **(1)** |
| **(b)** |  | Uses a line with a parallel gradient oe or their gradient from part (a). Evidence is or similar. | M1 |
|  | Method of finding an equation of a line with numerical gradient and passing through. Score even for the perpendicular line. Must be seen in part (a). | M1 |
|  | Correct equation. Allow for -10 | A1 |
|  | **(3)** |
| **(c)** |  | Follow through on their 'c'. Allow also if – 10 is marked in the correct place on the diagram. Allow *x* = 0, *y* = -10 (the *x* = 0 may be seen “embedded” but not just *y* = -10 with no evidence that *x* = 0) | B1ft |
|  |  Correct coordinates. Allow also if 8 is marked in the correct place on the diagram. Allow *y* = 0, *x* = 8 (the *y* = 0 may be seen “embedded” but not just *x* = 8 with no evidence that *y* = 0) | B1  |
| **Do not penalise lack of “0” twice so penalise it at the first occurrence but check the diagram if necessary.** |  |
|  | **(2)** |
| **(d)****Way 1** | Area of Parallelogram =  | Uses area of parallelogram = Follow through on their 10 and their 8 | M1 |
| = 104 | cao | A1 |
| **Correct answer only scores both marks** | **(2)** |
| **(d)****Way 2** | Trapezium *AOCD* + Triangle *OCB* | A correct method using their values for *AOCD* + *OCB*. | M1 |
| = 104 | cao | A1 |
|  | **(2)** |
| **(d)****Way 3** | 2 Triangles + Rectangle | A correct method using their values for 2x*OBC* + rectangle. | M1 |
| = 104 | cao | A1 |
|  | **(2)** |
| **(d)****Way 4** | Triangle *ACD* + Triangle *ACB* | A correct method using their values for *ACD* + *ABC*. | M1 |
| = 104 | cao | A1 |
|  | **(2)** |
|  |  | **(8 marks)** |

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| **Question** | **Scheme** | **Marks** |
| **7(a)** | *l*: passes through (5, 8) and (3,11) |  |
| Gradient of *l* is  | A correct gradient in any form, simplified or unsimplified. (May be implied by subsequent work) | B1 |
| **or****and** | or with their gradient **or** uses with or (5, 8) and their gradient and reaches as far as *c* = … | M1 |
| Correct equation of *l* in **any form**. | A1 |
|  or e.g.  | Correct equation in the **required form**. (Allow any integer multiple) | A1  |
|  |  | **[4]** |
| **(b)** | **or** | Fully correct method for the length of *AB* or *AB*2 | M1 |
|  =  | Cao | A1 |
|  |  | **[2]** |
| **(c)****Way 1** |  | Correct use of Pythagoras for *BC* and sets equal to (5 – *t*) (Allow (*t* – 5)) | M1 |
|  | Solves for *t* using correct processing. **Dependent on the previous mark.** | **d**M1 |
|  | Allow equivalent answers e.g.1.75 (allow *x* = .. or *t* = … or just the correct value) | A1 |
|  |  | **[3]** |
| **(c)****Way 2** | Midpoint of (5, 8) and (3, 11) is (4, 9.5)  | Finds equation of perpendicular bisector using perpendicular gradient and midpoint. Must be a correct method for the midpoint and a correct straight line method using the negative reciprocal gradient from (a) | M1 |
|  | Substitutes *y* = 8 into their perpendicular bisector and solves for *x*. **Dependent on the previous mark.** | **d**M1 |
|  | Allow equivalent answers e.g.1.75 (allow *x* = .. or *t* = … or just the correct value) | A1 |
|  |  | **[3]** |
| **(d)****Way 1** |  | Fully correct methodfollowing through their non-zero value for *t* | M1 |
|  | Area of triangle is or equivalent fraction e.g.  | A1 |
|  |  |  | **[2]** |
| **(d)****Way 2** | Fully correct methodfollowing through their non-zero value for *t* | M1 |
|  | Area of triangle is or equivalent fraction e.g.  | A1 |
|  |  |  | **[2]** |
| **(d)****Way 3** |  | Fully correct methodfollowing through their non-zero value for *t* and their midpoint | M1 |
|  | Area of triangle is or equivalent fraction e.g. or possibly  | A1 |
|  |  | **[2]** |
|  |  |  | **11 marks** |

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| **Question** | **Scheme** | **Marks** |
| **8(a)** | $\frac{-2-5}{6-2} $(= − $\frac{7}{4}$) | M1 |
| $$y-5=-\frac{7}{4}(x-2)$$ | M1 |
|  7*x +* 4*y =* 34 | A1 |
|  | **(3)** |
| **(b)** | **L2** gradient found | M1 |
| 5 = $\frac{4}{7}$ × 7 + *c* or $\frac{y-5}{x-7}$ = $\frac{4}{7}$ | M1 |
|  | A1 |
|   | **(3)** |
| **(c)** | No, with reason | M1 |
|  | **(1)** |
| **(7 marks)** |
| **Notes** |
| **(a)**M1 for method to find gradient of **L1**, eg $\frac{-2-5}{6-2} $(= − $\frac{7}{4}$)M1 for a correct equation in any form, eg $y-5=-\frac{7}{4}(x-2)$A1 for 7*x* + 4*y* = 34 oe with integer coefficients in the form *ax* + *by* = *c***(b)**M1 for method to find gradient of **L2**M1 (dep M1) for a method to find the equation in any form eg 5 = $\frac{4}{7}$ × 7 + *c* or $\frac{y-5}{x-7}$ = $\frac{4}{7}$A1 ft from (a) for $y= \frac{4}{7} x+1$ **(c)**M1 for No, with reason, eg 3× $\frac{1}{3} \ne -1$ |

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| **Question** | **Scheme** | **Marks** |
| **9(a)** | $$y=\frac{4}{5}x+c$$ | M1 |
| *y* $- -1= \frac{4}{5}$ (*x* – 2) or $y=\frac{4}{5}x-\frac{13}{5}$ | M1 |
| $$4x-5y-13=0$$ | A1 |
|  | **(3)** |
| **(b)** | **L2 =** $\frac{4}{5}$ | M1 |
| See notes | M1 |
| $$y=\frac{4}{5}x+\frac{8}{5}$$ | A1 |
|   | **(3)** |
| **(c)** | $-\frac{3}{2}$ or $\frac{2}{3}$ | M1 |
| Perpendicular with reason | A1 |
|  | **(2)** |
| **(8 marks)** |
| **Notes** |
| **(a)**M1 for correct use of gradient, eg$ y=\frac{4}{5}x+c$M1 for a correct equation in any form, eg *y* $- -1= \frac{4}{5}$ (*x* – 2) or $y=\frac{4}{5}x-\frac{13}{5}$A1 for $4x-5y-13=0$ oe with integer coefficients **(b)**M1 for gradient of **L2 =** $\frac{4}{5}$ ft from (a)M1 for a complete method to find equationA1 for$ y=\frac{4}{5}x+\frac{8}{5}$ oe**(c)**M1 for at least one correct gradient , $-\frac{3}{2}$ or $\frac{2}{3}$A1 for line is perpendicular with reason, eg $-\frac{3}{2}$ × $\frac{2}{3}$ = $-1$ oe |

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| **Question** | **Scheme** | **Marks** |
| **10(a)** | Gradient = $-\frac{4}{3}$ | M1 |
| *c* (= 4) | M1 |
| $$4x+3y-12=0$$ | A1 |
|  | **(3)** |
| **(b)** | $$-\frac{4}{3}$$ | B1 |
|   | **(1)** |
| **(4 marks)** |
| **Notes** |
| **(a)**M1 for method to find gradient of **L,** eg $-\frac{4}{3}$M1 for complete method to find the value of *c* (= 4)A1 $4x+3y-12=0$ oe in correct form**(b)**B1 ft their gradient from (a) |

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| **Question** | **Scheme** | **Marks** |
| **11(a)** | *x* − 2*y* = 2 |  |
|  | **(1)** |
| **(b)** | $$y=\frac{1}{2}x+c$$ | M1 |
| $$-6=\frac{1}{2}×-2+c$$ | M1 |
| $y=\frac{1}{2}x$ − 5 | A1 |
|   | **(3)** |
| **(4 marks)** |
| **Notes** |
| **(a)**B1 for eg *x* − 2*y* = 2 or −*x* + 2*y* = −2**(b)**M1 for use of gradient of $L\_{2}$ = $\frac{1}{2}$ , eg $y=\frac{1}{2}x+c$M1 for a correct method to find *c*, eg $-6=\frac{1}{2}×-2+c$A1for$ y=\frac{1}{2}x$ – 5 |

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| **Question** | **Scheme** | **Marks** |
| **12** | Gradient of *L*1is − *y* = *x* +  | M1 |
| Gradient of *L*2=  | M1 |
| *y* – 5 =  (*x* – 1) | M1 |
| *y* = *x* +  | A1 |
|   | **(4)** |
| **(4 marks)** |
| **Notes**M1 for attempt to find gradient of *L*1 or sight of *m* = −M1 for substitution into M1 for attempt to use *y* – *y*1 = *m*(*x* – *x* 1) or *y* = *mx* + *c*, with attempt to find *c*A1 for *y* = *x* +  |

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| **Question** | **Scheme** | **Marks** |
| **13(a)** | gradient of –$\frac{2}{5}$ | M1 |
| find *c* | M1 |
| $$y=-\frac{2}{5}x+\frac{26}{5}$$ | A1 |
|  | **(3)** |
| **(b)** | *mn* = $-1$ | M1 |
| $$y=\frac{5}{2}x-\frac{7}{2}$$ | A1 |
|  | **(2)** |
| **(5 marks)** |
| **Notes****(a)** M1 for use of the gradient of –$\frac{2}{5}$ in an equation of a straight line M1 (dep M1) for method to find *c*A1$ y=-\frac{2}{5}x+\frac{26}{5}$ **(b)**M1 for using *mn* = $-1 $eg gradient of perpendicular line shown as $\frac{5}{2}$A1 for $y=\frac{5}{2}x-\frac{7}{2}$ oe |