HIGHER

6.6 Parallel and Perpendicular Lines: 1-hour Pack

Total Marks

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 On a coordinate grid, distances are measured in kilometres from a fixed reference point. Road A passes through the villages at J(1, 2) and K(5, 10).

(a) Find the gradient of Road A. **(2)**

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(b) A new road, Road B, is to be built through the junction at M(3, 4), parallel to Road A. Find the equation of Road B. **(3)**

.....

(c) A third road, Road C, must be perpendicular to Road A and pass through the point N(9, 1). Find the equation of Road C, giving your answer in the form ax + by + c = 0, where a, b and c are integers. **(4)**

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(Total for Question 1 is 9 marks)

2 The line L has equation x + 4y = 6. The line M has equation y = x/3 - 2. Show whether L and M are perpendicular.

(Total for Question 2 is 3 marks)

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3 A is the point (-4, -4) and B is the point (0, -6). Find an equation of the perpendicular bisector of AB.

(Total for Question 3 is 4 marks)

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4 Find an equation of the line that is parallel to $-4x + 3y = 6$ and passes through the point (9, 2).

(Total for Question 4 is 3 marks)

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5 The line L has equation $y = -x - 6$. The line M has equation $y = 3x - 1$. Show whether L and M are perpendicular.

(Total for Question 5 is 3 marks)

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6 Find an equation of the line that is perpendicular to $y = 2x$ and passes through the point (-4, -4).

(Total for Question 6 is 4 marks)

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7 A is the point (2, -2) and B is the point (8, 0). Find an equation of the perpendicular bisector of AB.

(Total for Question 7 is 4 marks)

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8 Find an equation of the line that is parallel to $4x + 6y = 5$ and passes through the point (0, 1).

(Total for Question 8 is 3 marks)

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9 A straight line passes through the points (-3, 7) and (5, -1).
Find the equation of the line, giving your answer in the form $y = mx + c$

(Total for Question 9 is 3 marks)

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10 Show that the line $y = 2x - 5$ is parallel to the line with equation $6x - 3y + 9 = 0$

(Total for Question 10 is 3 marks)

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11 A line has equation $4x + 2y = 10$.

(a) Rearrange the equation into the form $y = mx + c$. **(2)**

(b) State the gradient of a line that is parallel to this line. **(1)**

(c) State the gradient of a line that is perpendicular to this line. **(1)**

(Total for Question 11 is 4 marks)

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12 C has coordinates (-2, 5) and D has coordinates (2, -3). Show that the line CD is perpendicular to the line with equation $y = 1/2\ x + 4$.

(Total for Question 12 is 3 marks)

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Mark scheme · 6.6 Parallel and Perpendicular Lines: 1-hour Pack

Question 1

(a) correct substitution, e.g. (10 - 2)/(5 - 1)	**M1**
(a) 2 (cao)	**A1**
(a) Answer: 2	
(b) uses gradient 2 for Road B (parallel to Road A), ft their part (a)	**M1**
(b) correct method, e.g. y - 4 = 2(x - 3)	**M1**
(b) y = 2x - 2 (cao)	**A1**
(b) Answer: y = 2x - 2	
(c) identifies the perpendicular gradient as -1/2, ft their part (a)	**P1**
(c) correct method using point N(9, 1), e.g. y - 1 = -(1/2)(x - 9)	**M1**
(c) rearranges into integer form with all terms on one side	**M1**
(c) x + 2y - 11 = 0 (oe, integer coefficients) (cao)	**A1**
(c) Answer: x + 2y - 11 = 0	

Question 2

gradient of L found	**M1**
gradient of M found	**M1**
No, the gradients -1/4 and 1/3 multiply to -1/12, not -1	**A1**
Answer: No, the gradients -1/4 and 1/3 multiply to -1/12, not -1	

Question 3

midpoint (-2, -5)	**M1**
gradient of AB = -1/2	**M1**
perpendicular gradient 2 and substitutes the midpoint	**M1**
y = 2x - 1 oe	**A1**
Answer: y = 2x - 1	

Question 4

gradient 4/3 identified	**M1**
substitutes (9, 2) into y = 4/3x + c	**M1**
y = 4x/3 - 10 oe	**A1**
Answer: y = 4x/3 - 10	

Question 5

gradient of L found	**M1**
gradient of M found	**M1**
No, the gradients -1 and 3 multiply to -3, not -1	**A1**
Answer: No, the gradients -1 and 3 multiply to -3, not -1	

Question 6

gradient of the given line = 2	**M1**
perpendicular gradient -1/2	**M1**
substitutes (-4, -4) to find c	**M1**
y = -x/2 - 6 oe	**A1**
Answer: y = -x/2 - 6	

Question 7

midpoint (5, -1)	**M1**
gradient of AB = 1/3	**M1**
perpendicular gradient -3 and substitutes the midpoint	**M1**
y = -3x + 14 oe	**A1**
Answer: y = -3x + 14	

Question 8

gradient -2/3 identified	**M1**
substitutes (0, 1) into y = -2/3x + c	**M1**
y = -2x/3 + 1 oe	**A1**
Answer: y = -2x/3 + 1	

Question 9

correct gradient found, e.g. (-1 - 7)/(5 - (-3)) = -1 (oe)	**M1**
correct method to find c using their gradient and one of the given points	**M1**
y = -x + 4 (oe, e.g. y = 4 - x) (cao)	**A1**
Answer: y = -x + 4	

Question 10

rearranges 6x - 3y + 9 = 0 into the form y = mx + c	**M1**
states both gradients are 2	**M1**
correct conclusion with full reasoning: both lines have gradient 2 and different y-intercepts (-5 and 3), so they are parallel and distinct (cso)	**C1**
Answer: Parallel, since both lines have gradient 2	

Question 11

(a) 2y = -4x + 10 oe	**M1**
(a) y = -2x + 5	**A1**
(a) Answer: y = -2x + 5	
(b) -2 ft from part (a)	**B1**
(b) Answer: -2	
(c) 1/2 ft from part (a)	**B1**
(c) Answer: 1/2	

Question 12

gradient of CD = (-3 - 5) / (2 - (-2)) oe	**M1**
gradient of CD = -2	**A1**
(-2) x (1/2) = -1 stated, so lines are perpendicular (dep on correct gradient)	**B1**
Answer: Shown: gradient of CD = -2; (-2) x (1/2) = -1, so CD is perpendicular to y = 1/2 x + 4.	

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