HIGHER

6.6 Parallel and Perpendicular Lines: Test Pack

Total Marks

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write down the gradient of the line with equation $y = 5x + 1$.

(Total for Question 1 is 1 mark)

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2 A = (2, 3), B = (6, 11)
C = (-1, 5), D = (3, -3)

(a) Work out the gradient of the line through A and B. **(2)**

.....

(b) Work out the gradient of the line through C and D. **(2)**

.....

(Total for Question 2 is 4 marks)

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3 Line A has equation $y = 4x + 3$. Line B has equation $y = 4x - 5$. State, giving a reason, whether lines A and B are parallel.

(Total for Question 3 is 2 marks)

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4 A line has gradient -3/4. What is the gradient of a line perpendicular to it?

- ☐ A) -3/4
- ☐ B) 3/4
- ☐ C) -4/3
- ☐ D) 4/3

(Total for Question 4 is 1 mark)

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5 A straight line has equation $3x + 2y = 12$

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

(b) State the gradient of the line and the coordinates of the point where it crosses the y-axis. **(2)**

(Total for Question 5 is 4 marks)

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6 Line l has equation $5x - 2y = 8$
Point A has coordinates (4, -3).
Find the equation of the line perpendicular to l that passes through A. Give your answer in the form $y = mx + c$

(Total for Question 6 is 4 marks)

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7 Write down the gradient of a line that is perpendicular to the line $3x + 2y = 4$.

(Total for Question 7 is 2 marks)

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8 Find an equation of the line that is parallel to y = 3x - 1 and passes through the point (0, 1).

(Total for Question 8 is 3 marks)

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9 The line L has equation y = -x/2 - 5. The line M has equation y = 2x - 5. Show whether L and M are perpendicular.

(Total for Question 9 is 3 marks)

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10 Find an equation of the line that is perpendicular to y = 3x/2 - 3 and passes through the point (-9, 5).

(Total for Question 10 is 4 marks)

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11 Find the equation of the line parallel to y = 3x - 4 that passes through the point (2, 5).
Give your answer in the form y = mx + c

(Total for Question 11 is 3 marks)

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12 The line joining the points A(k, 3) and B(5, 11) is parallel to the line with equation $y = 4x + 2$
Find the value of k.

(Total for Question 12 is 3 marks)

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13 A line passes through the points (0, 1) and (4, 9). Determine, showing your working, whether this line is parallel to, perpendicular to, or neither parallel nor perpendicular to the line with equation $y = -1/4\ x + 3$.

(Total for Question 13 is 3 marks)

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14 Show that the points A(1, 1), B(4, 7) and C(6, 11) lie on the same straight line.

(Total for Question 14 is 3 marks)

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15 The points W(0, 0), X(4, 2), Y(6, -2) and Z(2, -4) are the vertices of quadrilateral WXYZ. Show that WXYZ is a rectangle. You must show gradient calculations for at least two pairs of sides as part of your reasoning.

(Total for Question 15 is 5 marks)

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Mark scheme · 6.6 Parallel and Perpendicular Lines: Test Pack

Question 1

5 cao **B1**

Answer: 5

Question 2

(a) correct substitution into the gradient formula, e.g. (11 - 3)/(6 - 2) (oe) **M1**

(a) 2 (cao) **A1**

(a) Answer: 2

(b) correct substitution into the gradient formula, e.g. (-3 - 5)/(3 - (-1)) (oe) **M1**

(b) -2 (cao) **A1**

(b) Answer: -2

Question 3

gradient of A = gradient of B (both = 4) identified **B1**

correct conclusion: parallel, with valid reason (dep on first mark) **B1**

Answer: Yes, A and B are parallel because they both have gradient 4.

Question 4

D selected (cao) **B1**

Answer: D (4/3)

Question 5

(a) correct first step, e.g. 2y = -3x + 12 (oe) **M1**

(a) y = -1.5x + 6 (oe, e.g. y = -(3/2)x + 6) (cao) **A1**

(a) Answer: y = -1.5x + 6

(b) gradient = -1.5 (oe -3/2), ft their part (a) **B1**

(b) y-intercept at (0, 6), ft their part (a) **B1**

(b) Answer: gradient = -3/2, y-intercept = (0, 6)

Question 6

rearranges l into the form y = mx + c and identifies its gradient as 5/2 **M1**

finds the perpendicular gradient as -2/5 **M1**

correct method using point A, e.g. y - (-3) = -(2/5)(x - 4) **M1**

y = -(2/5)x - 7/5 (oe, e.g. y = -0.4x - 1.4) (cao) **A1**

Answer: y = -(2/5)x - 7/5

Question 7

gradient of the line = -3/2 found **M1**

2/3 oe **A1**

Answer: 2/3

Question 8

gradient 3 identified **M1**

substitutes (0, 1) into y = 3x + c **M1**

y = 3x + 1 oe **A1**

Answer: y = 3x + 1

Question 9

gradient of L found **M1**

gradient of M found **M1**

Yes, the gradients -1/2 and 2 multiply to -1 **A1**

Answer: Yes, the gradients -1/2 and 2 multiply to -1

Question 10

gradient of the given line = 3/2 **M1**

perpendicular gradient -2/3 **M1**

substitutes (-9, 5) to find c **M1**

y = -2x/3 - 1 oe **A1**

Answer: y = -2x/3 - 1

Question 11

identifies the gradient as 3 (parallel lines have equal gradients) **M1**

correct method, e.g. y - 5 = 3(x - 2) **M1**

y = 3x - 1 (cao) **A1**

Answer: y = 3x - 1

Question 12

sets up the gradient of AB in terms of k, e.g. (11 - 3)/(5 - k), and equates to 4 **M1**

correct algebraic method to solve for k, e.g. 8 = 4(5 - k) **M1**

k = 3 (cao) **A1**

Answer: k = 3

Question 13

gradient of the line through the points = (9 - 1) / (4 - 0) oe **M1**

gradient = 2 **A1**

correct conclusion 'neither', supported by comparison (2 does not equal -1/4, and 2 x (-1/4) = -1/2, not -1) **B1**

Answer: Neither parallel nor perpendicular.

Question 14

correct gradient of AB, e.g. (7 - 1)/(4 - 1) = 2 (oe) **M1**

correct gradient of BC, e.g. (11 - 7)/(6 - 4) = 2 (oe) **M1**

correct conclusion with full reasoning: gradient AB = gradient BC and B is a common point, so A, B and C are collinear (cso) **C1**

Answer: A, B and C are collinear, since gradient AB = gradient BC = 2

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Question 15

gradient WX = (2 - 0) / (4 - 0) = 1/2 oe	**M1**
gradient XY = (-2 - 2) / (6 - 4) = -2 oe	**M1**
gradient YZ = 1/2 and gradient ZW = -2 both found, showing WX // YZ and XY // ZW	**B1**
(1/2) x (-2) = -1 identified, showing adjacent sides WX and XY are perpendicular	**M1**
correct conclusion: opposite sides parallel and adjacent sides meet at right angles, so WXYZ is a rectangle (dep on all previous marks)	**A1**

Answer: WXYZ is a rectangle: gradient WX = gradient YZ = 1/2 and gradient XY = gradient ZW = -2, so opposite sides are parallel; and (1/2) x (-2) = -1, so adjacent sides are perpendicular.

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