3.1 Coordinate Geometry: Straight Lines: Test Pack

AQA 8365 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Points A(1, 2) and B(5, 10) are two points on a coordinate grid.

(a) Calculate the gradient of the line AB. **(2)**

.....

(b) Find the coordinates of the midpoint of AB. **(2)**

.....

(c) Calculate the length of AB, giving your answer as a surd in its simplest form. **(2)**

.....

(Total for Question 1 is 6 marks)

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2 Line L1 has gradient 2/3.

(a) State the gradient of a line perpendicular to L1. **(1)**

(b) Line L2 is perpendicular to L1 and passes through the point (6, -4). Find the equation of L2, giving your answer in the form y = mx + c. **(3)**

.....

(Total for Question 2 is 4 marks)

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3 A line has equation $y = 4x - 5$.

(a) Write down the gradient of the line. **(1)**

.....

(b) Write down the y-intercept of the line. **(1)**

.....

(Total for Question 3 is 2 marks)

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4 Show that the points A(-3, -5), B(1, 3) and C(4, 9) are collinear.

(a) Show that A, B and C are collinear. **(3)**

(Total for Question 4 is 3 marks)

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5 A is the point (-1, 1) and B is the point (2, -3). Find the equation of the perpendicular bisector of AB, in the form $y = mx + c$.

(Total for Question 5 is 5 marks)

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6 Find the coordinates of the point where the lines $y = -3x + 9$ and $x + 2y = 8$ meet.

(Total for Question 6 is 4 marks)

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7 Find the coordinates of the point where the lines $y = 3x + 11$ and $x - 5y = 1$ meet.

(Total for Question 7 is 4 marks)

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8 A straight line l has equation $2x + 3y = 18$.

(a) Find the coordinates of the points where l crosses the x-axis and the y-axis. **(2)**

.....

(b) Find the area of the triangle enclosed by l and the two coordinate axes. **(2)**

.....

(Total for Question 8 is 4 marks)

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9 Find the midpoint and the length of the line segment joining (-2, -1) and (4, 7).

(a) Find the midpoint of the segment. **(1)**

.....

(b) Find the length of the segment. **(1)**

.....

(Total for Question 9 is 2 marks)

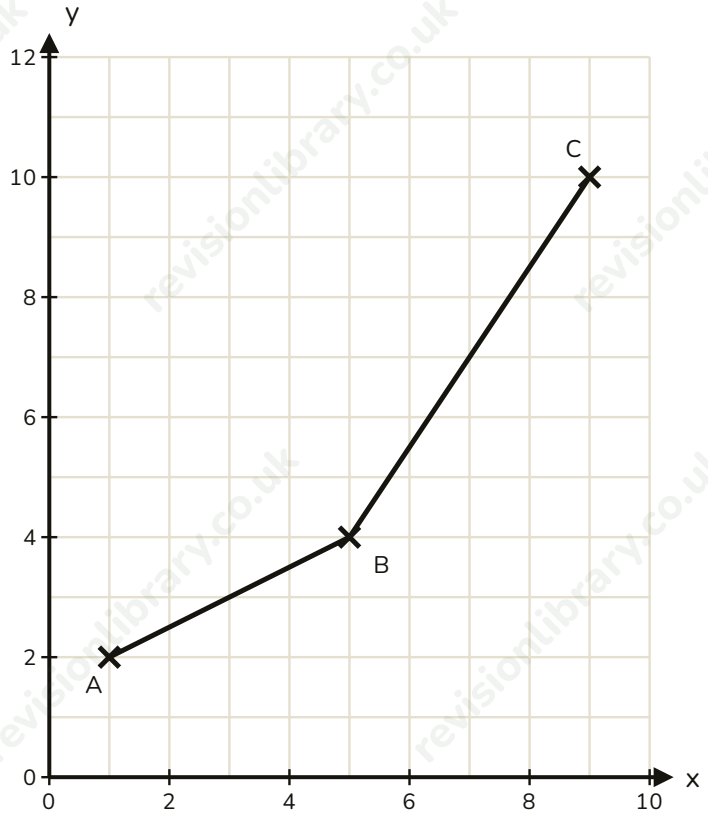
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10 Write the equation $2x + 3y = 12$ in the form $y = mx + c$.

(Total for Question 10 is 1 mark)

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11 ABCD is a parallelogram with vertices A(1, 2), B(5, 4) and C(9, 10), listed in order around the parallelogram.



(a) Find the coordinates of D. **(3)**

(b) Show that AB is parallel to, and the same length as, DC, confirming ABCD is a parallelogram. **(3)**

(Total for Question 11 is 6 marks)

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12 Determine whether the lines $y = 3x + 1$ and $y = -x/3 + 4$ are parallel, perpendicular, or neither.

(Total for Question 12 is 2 marks)

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13 The line L1 passes through the points A(-1, 2) and B(5, 20). Find the equation of L1 in the form $y = mx + c$.

(Total for Question 13 is 3 marks)

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14 Points C(2, 1), V(10, 7) and L(18, 14) are marked on a coordinate grid. Determine, showing your working, whether the three points lie on a single straight line.

(Total for Question 14 is 4 marks)

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Mark scheme · 3.1 Coordinate Geometry: Straight Lines: Test Pack

Question 1

(a) correct substitution, e.g. (10 - 2) / (5 - 1) **M1**

(a) gradient = 2 cao **A1**

(a) Answer: 2

(b) ((1+5)/2, (2+10)/2) oe **M1**

(b) (3, 6) cao **A1**

(b) Answer: (3, 6)

(c) $\sqrt{(5-1)^2 + (10-2)^2}$ oe **M1**

(c) $4\sqrt{5}$ cao (accept $\sqrt{80}$) **A1**

(c) Answer: $4\sqrt{5}$

Question 2

(a) -3/2 oe (accept -1.5) **B1**

(a) Answer: -3/2

(b) y - (-4) = -3/2(x - 6) oe, ft gradient from part (a) **M1**

(b) correct expansion, e.g. y + 4 = -1.5x + 9 **M1**

(b) y = -1.5x + 5 oe cao **A1**

(b) Answer: y = -1.5x + 5

Question 3

(a) 4 cao **B1**

(a) Answer: 4

(b) (0, -5) oe -5 cao **B1**

(b) Answer: (0, -5)

Question 4

(a) gradient AB = (3-(-5))/(1-(-3)) = 2 **M1**

(a) gradient BC = (9-3)/(4-1) = 2 **M1**

(a) gradient AB = gradient BC and B is a common point, so A, B, C lie on the same straight line cso **A1**

(a) Answer: A, B and C are collinear (both gradients equal 2)

Question 5

midpoint (1/2, -1) **M1**

gradient of AB = -4/3 **M1**

perpendicular gradient 3/4 **M1**

substitutes the midpoint to find c **M1**

y = 3x/4 - 11/8 cao **A1**

Answer: y = 3x/4 - 11/8

Question 6

substitutes y into the second equation **M1**

collects terms and solves for x **M1**

x = 2 **A1**

(2, 3) cao **A1**

Answer: (2, 3)

Question 7

substitutes y into the second equation **M1**

collects terms and solves for x **M1**

x = -4 **A1**

(-4, -1) cao **A1**

Answer: (-4, -1)

Question 8

(a) set y = 0 or x = 0 to find one intercept correctly **M1**

(a) (9, 0) and (0, 6) cao (both required) **A1**

(a) Answer: (9, 0) and (0, 6)

(b) Area = 1/2 x 9 x 6 oe, ft from part (a) **M1**

(b) 27 (units^2) cao **A1**

(b) Answer: 27 square units

Question 9

(a) (1, 3) cao **B1**

(a) Answer: (1, 3)

(b) 10 cao **B1**

(b) Answer: 10

Question 10

y = -(2/3)x + 4 oe cao **B1**

Answer: y = -(2/3)x + 4

Question 11

(a) midpoint of AC = midpoint of BD (diagonals of a parallelogram bisect each other) oe **M1**

(a) midpoint of AC = (5, 6) **M1**

(a) D = (5, 8) cao **A1**

(a) Answer: D = (5, 8)

(b) vector AB = (4, 2) **M1**

(b) vector DC = (9-5, 10-8) = (4, 2), ft from part (a) **M1**

(b) AB = DC, so AB is parallel to DC and equal in length cso **A1**

(b) Answer: AB = DC = (4, 2), confirming ABCD is a parallelogram

Question 12

identifies gradients 3 and -1/3 and computes their product = -1 **M1**

perpendicular cao **A1**

Answer: Perpendicular

Question 13

finds the gradient = (20-2)/(5-(-1)) = 3 **M1**

uses the gradient with either point in a point-gradient form **M1**

y = 3x + 5 oe cao **A1**

Answer: y = 3x + 5

Question 14

finds the gradient of CV = (7-1)/(10-2) = 3/4 **M1**

finds the gradient of VL = (14-7)/(18-10) = 7/8 **M1**

compares the two gradients and states that they are different (3/4 not equal to 7/8) **A1**

concludes that the three points do not lie on a single straight line (cso) **A1**

Answer: The points are not collinear (gradient CV = 3/4, gradient VL = 7/8, which are different)

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