5.14 Gradient of a Line: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Work out the gradient of the line that passes through the points (1, 3) and (4, 6).

(Total for Question 1 is 1 mark)

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2 Calculate the gradient of the line that goes through (0, -2) and (5, 3).

(Total for Question 2 is 2 marks)

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3 A line has gradient 2 and passes through the point (1, 4). Work out the coordinates of the point on this line when $x = 4$.

(Total for Question 3 is 3 marks)

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4 Points P(1, 2) and Q(4, -4) are connected by a straight line. Find the gradient and then give the equation of the line in the form $y = mx + c$.

(Total for Question 4 is 4 marks)

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5 Show that the line with equation $3y = 6x + 9$ is parallel to the line with equation $y = 2x - 1$.

(Total for Question 5 is 2 marks)

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6 Which of these lines is the steepest?

- ☐ A) $y = 2x + 1$
- ☐ B) $y = -5x + 3$
- ☐ C) $y = 0.5x - 2$
- ☐ D) $y = 3x$

(Total for Question 6 is 1 mark)

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7 Write down the gradient of the line with equation $y = 6 - x$.

(Total for Question 7 is 1 mark)

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8 Rearrange $3x + y = 11$ into the form $y = mx + c$ and state the gradient and the y-intercept.

(Total for Question 8 is 2 marks)

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9 This question has two parts.

(a) Find the gradient of the line perpendicular to $4x + 2y = 6$. **(2)**

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(b) Give the equation of the perpendicular line through (3, -2). **(2)**

(Total for Question 9 is 4 marks)

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10 Find the gradient of the straight line joining the points (-1, 6) and (3, -2).

(Total for Question 10 is 2 marks)

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11 Line p passes through the points (t, 4) and (3, t).

(a) Express the gradient of p in terms of t. **(2)**

(b) Given that p is horizontal, find t. **(2)**

(Total for Question 11 is 4 marks)

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12 The points P(2, 3), Q(5, 15) and R(9, k) lie on the same straight line. Find the value of k, showing your working.

(Total for Question 12 is 4 marks)

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13 A quadrilateral has vertices at A(0, 0), B(4, 2), C(6, -2) and D(2, -4). Show that AB is parallel to DC.

(Total for Question 13 is 3 marks)

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14 Show that the line joining the points (2, a) and (a, 8) has gradient 3 when a satisfies an equation. Find the possible values of a.

(a) Show that requiring the gradient to be 3 leads to the equation 8 - a = 3(a - 2). **(2)**

(b) Solve 8 - a = 3(a - 2) and state the possible values of a. Check validity (exclude any value that makes division by zero). **(2)**

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(Total for Question 14 is 4 marks)

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15 A line passes through (1, k) and (k, 4). The gradient of this line is equal to the gradient of the line joining (0, 2) and (3, 8).

(a) Find the gradient of the line joining (0,2) and (3,8). **(1)**

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(b) Hence find k (give exact value). **(3)**

.....

(c) For k = 2, write down the equation of the line through (1,k) and (k,4). Give your answer in the form y = mx + c. **(3)**

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(Total for Question 15 is 7 marks)

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Mark scheme · 5.14 Gradient of a Line: Test Pack

Question 1

gradient = (6 - 3)/(4 - 1) = 3/3 = 1 cao **B1**

Answer:1 (gradient = 1)

Working check: change in y = 6 - 3 = 3, change in x = 4 - 1 = 3 so gradient = 3/3 = 1.

Question 2

correct method: (3 - (-2))/(5 - 0) = 5/5 or equivalent **M1**

1 cao **A1**

Answer:1 (gradient = 1)

Working check: change in y = 3 - (-2) = 5, change in x = 5 - 0 = 5, gradient = 5/5 = 1.

Question 3

use y - 4 = 2(x - 1) or y = 2x + b and substitute to find b **M1**

substitute x = 4 to find y = 2*4 + b or use point-slope to get y = 10 **M1**

final coordinates (4, 10) cao **A1**

Answer:(4, 10)

Working check: equation y - 4 = 2(x - 1) => y - 4 = 2x - 2 => y = 2x + 2. For x = 4, y = 2*4 + 2 = 10.

Question 4

calculate gradient = (-4 - 2)/(4 - 1) = -6/3 = -2 **M1**

substitute a point to find c: 2 = -2*1 + c so c = 4 **M1**

y = -2x + 4 cao **A1**

final answer clearly shown as gradient -2 and equation y = -2x + 4 **B1**

Answer:Gradient = -2; equation y = -2x + 4

Working check: change in y = -6, change in x = 3 so gradient -2. Using point (1,2): 2 = -2(1) + c => c = 4.

Question 5

rearranges 3y = 6x + 9 to y = 2x + 3 oe **M1**

cso: states both lines have gradient 2, so they are parallel **A1**

Answer: Both lines have gradient 2, so they are parallel.

Question 6

B cao **B1**

Answer: B) y = -5x + 3

Question 7

-1 cao **B1**

Answer: -1

Question 8

subtracts 3x from both sides, oe **M1**

gradient -3 and y-intercept 11 both stated correctly, cao **A1**

Answer: Gradient = -3, y-intercept = 11

Question 9

(a) rearrange to y = mx + c to find gradient of given line: 2y = -4x + 6 so gradient = -2 **M1**

(a) 1/2 cao for perpendicular gradient **A1**

(a) Answer: 1/2

(b) use y = mx + c with m = 1/2 and substitute (3, -2) to find c (method) **M1**

(b) y = 1/2 x - 7/2 cao **A1**

(b) Answer: y = 1/2 x - 7/2

Question 10

(-2 - 6)/(3 - (-1)), oe substitution into the gradient formula with correct signs **M1**

-2 cao **A1**

Answer: -2

Question 11

(a) use (change in y)/(change in x): (t - 4)/(3 - t) or equivalent **M1**

(a) (t - 4)/(3 - t) cao **A1**

(a) Answer: (t - 4)/(3 - t)

(b) horizontal line has gradient 0 so set (t - 4)/(3 - t) = 0 and solve **M1**

(b) t = 4 cao **A1**

(b) Answer: 4

Question 12

states or uses that points on the same straight line have equal gradients between any pair of them **B1**

gradient of PQ = (15 - 3)/(5 - 2) = 4 **M1**

sets up (k - 15)/(9 - 5) = 4, oe (or the equivalent equation using PR), ft their gradient **M1**

k = 31 cao **A1**

Answer: k = 31

Question 13

gradient of AB = (2 - 0)/(4 - 0) = 1/2 **M1**

gradient of DC = (-2 - (-4))/(6 - 2) = 1/2 **M1**

correct conclusion with reason: gradients are equal (both 1/2), so AB is parallel to DC, cso **A1**

Answer: Gradient of AB = gradient of DC = 1/2, so AB is parallel to DC

Question 14

(a) form gradient (8 - a)/(a - 2) and equate to 3 or equivalent correct setup **M1**

(a) 8 - a = 3(a - 2) or equivalent rearranged form cao **A1**

(a) Answer: 8 - a = 3(a - 2)

(b) expand and collect terms correctly: 8 - a = 3a - 6 leads to correct rearrangement **M1**

(b) a = 7/2 cao and check a ≠ 2 so valid **A1**

(b) Answer: a = 7/2

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Question 15

(a) gradient = (8 - 2)/(3 - 0) = 2 cao **B1**

(a) Answer: 2

(b) set (4 - k)/(k - 1) = 2 and rearrange to form an equation **M1**

(b) solve 4 - k = 2(k - 1) leading to correct linear equation **M1**

(b) k = 2 cao **A1**

(b) Answer: 2

(c) find gradient using points (1,2) and (2,4): (4 - 2)/(2 - 1) = 2 (method) **M1**

(c) use y = mx + c and substitute a point to find c **M1**

(c) y = 2x (cao) **A1**

(c) Answer: y = 2x

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