HIGHER

4.10H Angles in Parallel Lines: Higher Tier Practice

Total Marks

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 70 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Two parallel lines l and m are cut by a transversal t. At one intersection, an acute angle is 58 degrees.
Work out the size of the corresponding angle at the other intersection on line m.

Figure (to be drawn): Two parallel horizontal lines with a slanted transversal. Angle of 58 degrees marked at top-left intersection; ask for corresponding angle at lower intersection on the same side of transversal.

(Total for Question 1 is 2 marks)

2 Line AB is parallel to line CD. A transversal meets them, creating interior angles on the same side of the transversal labelled 112 degrees and x degrees.
Work out x.

Figure (to be drawn): Parallel lines AB and CD with a transversal. Two interior angles on same side labelled 112 and x.

(Total for Question 2 is 3 marks)

3 A pair of parallel lines are cut by a transversal. Angles at one intersection are labelled (2x + 10) degrees and (3x - 5) degrees; these two are a pair of interior angles on the same side of the transversal.

Work out x and then find both angle sizes.

Figure (to be drawn): Parallel lines with transversal; two interior angles on same side labelled (2x + 10) and (3x - 5).

(Total for Question 3 is 4 marks)

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4 Two parallel lines are cut by a single transversal. At point P, where the transversal crosses the top line, the angle between the transversal and the top line is 47 degrees. At point Q, where the transversal crosses the bottom line, y degrees is the co-interior (allied) angle to the 47 degree angle, on the same side of the transversal.

Explain why y = 133 degrees, using properties of parallel lines cut by a transversal.

Figure (to be drawn): Two parallel lines with a single transversal; angle at P (where the transversal meets the top line) is 47 degrees; at Q (where the transversal meets the bottom line) angle y is the co-interior angle on the same side of the transversal.

(Total for Question 4 is 4 marks)

5 Show that for three parallel lines cut by a single transversal, the angle between the transversal and the top line plus the angle between the transversal and the bottom line equals twice the angle between the transversal and the middle line. Give a short proof using algebra: let the acute angle at the middle intersection be a degrees, and express the other two in terms of a.

Figure (to be drawn): Three parallel lines horizontal, single transversal slanted through all three giving three acute angles; label middle acute angle a.

(Total for Question 5 is 5 marks)

Mark scheme · 4.10H Angles in Parallel Lines: Higher Tier Practice

Question 1

- **B1** identify corresponding angles are equal oe
- **B1** 58 degrees cao
- **Answer: 58 degrees**

Question 2

- **M1** identify interior angles on same side sum to 180 degrees
- **M1** form and rearrange 112 + x = 180 to x = 180 - 112
- **A1** 68 degrees cao
- **Answer: 68 degrees**

Question 3

- **M1** equation 2x + 10 + 3x - 5 = 180 or equivalent
- **A1** x = 35 cao
- **M1** substitute x to find angles: 2x+10 = 80 and 3x-5 = 100 (or vice versa) oe
- **A1** angles 80 degrees and 100 degrees cao
- **Answer: x = 35; angles are 80 degrees and 100 degrees**

Question 4

- **M1** identify that the angles at P and Q are co-interior (allied) angles, lying between the parallel lines on the same side of the transversal
- **A1** state that co-interior (allied) angles between parallel lines sum to 180 degrees
- **M1** form the equation y + 47 = 180
- **A1** y = 133 degrees cao
- **Answer: 133 degrees; because the angle at P and y are co-interior (allied) angles between the parallel lines, so they sum to 180 degrees: y = 180 - 47 = 133**

Question 5

- **M1** recognise the top and middle lines are parallel and cut by the same transversal
- **A1** state top acute angle = a, since corresponding angles between the top and middle lines are equal
- **M1** recognise the middle and bottom lines are parallel and cut by the same transversal
- **A1** state bottom acute angle = a, since corresponding angles between the middle and bottom lines are equal
- **A1** conclude top + bottom = a + a = 2a = 2 x middle angle, as required cao
- **Answer: Top + bottom = 2 x middle angle, since the single transversal makes equal corresponding angles (each = a) with all three parallel lines**