4.10 Angles in Parallel Lines: Test Pack

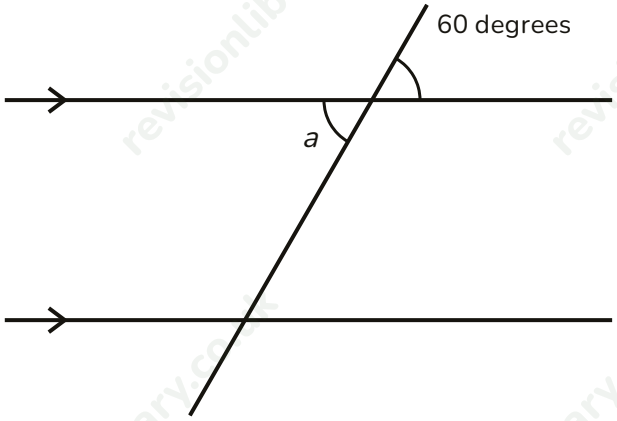
EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Two parallel lines are cut by a transversal. Angle a is vertically opposite to a given angle of 60 degrees.



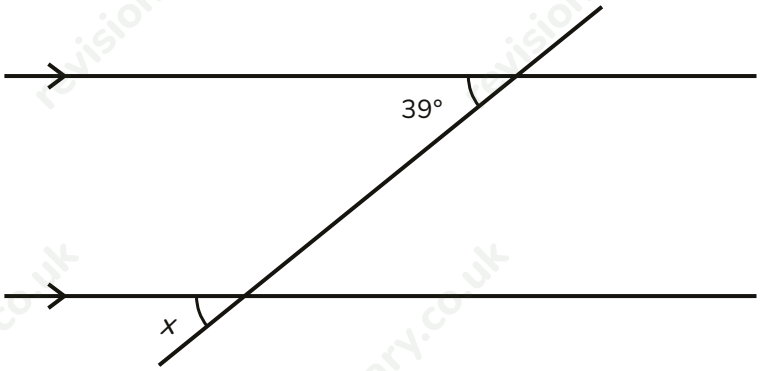
(a) Work out the size of angle a. **(2)**

.....

(Total for Question 1 is 2 marks)

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2 The diagram shows an F-shape formed by a transversal crossing two parallel lines: angle x and a 39 degree angle are corresponding angles. Write down the size of angle x.

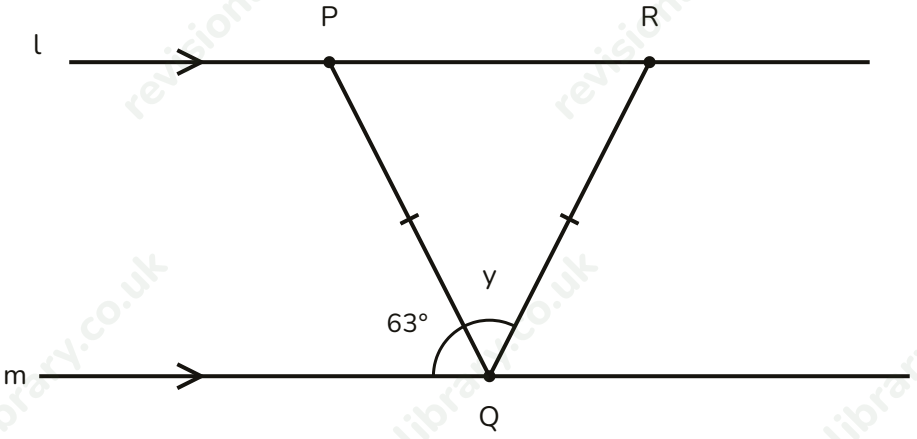


(Total for Question 2 is 1 mark)

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3 Lines l and m are parallel. Points P and R lie on l, and point Q lies on m, forming triangle PQR, with QP = QR. The angle between the transversal QP and line m, which is alternate to angle QPR, is marked 63 degrees. Work out the size of angle y.

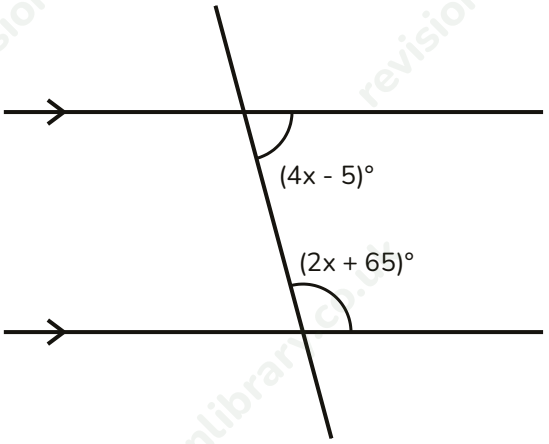
Diagram NOT accurately drawn



(Total for Question 3 is 3 marks)

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4 The diagram shows two parallel lines cut by a transversal. Two co-interior (allied) angles are (4x - 5) degrees and (2x + 65) degrees.



(a) Form and solve an equation to find the value of x. **(2)**

.....

(b) Hence work out the size of the smaller of the two angles. **(1)**

.....

(Total for Question 4 is 3 marks)

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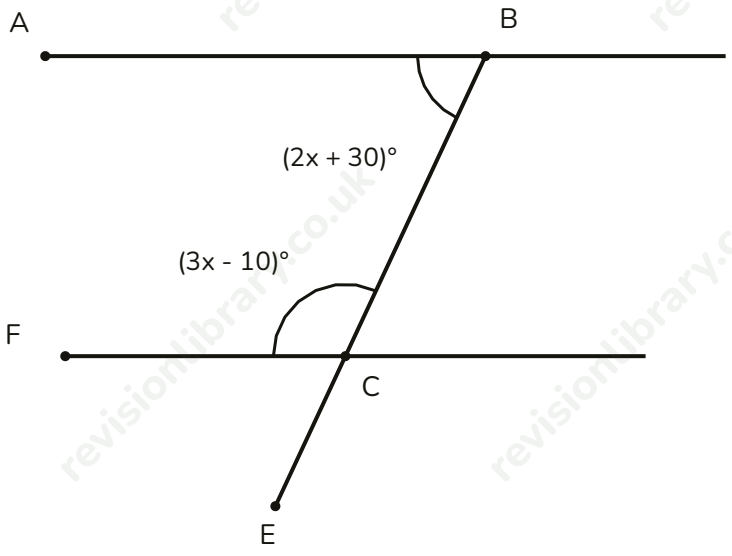
5 Two parallel lines are crossed by a straight line. Angle a is 49 degrees. Angle b is an alternate angle to angle a. Angle c is a co-interior angle with angle b.
Work out the size of angle c, giving reasons.

(Total for Question 5 is 2 marks)

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6 Angle ABE = (2x + 30) degrees and angle BCF = (3x - 10) degrees, where x = 32. Show that AB is parallel to CF.

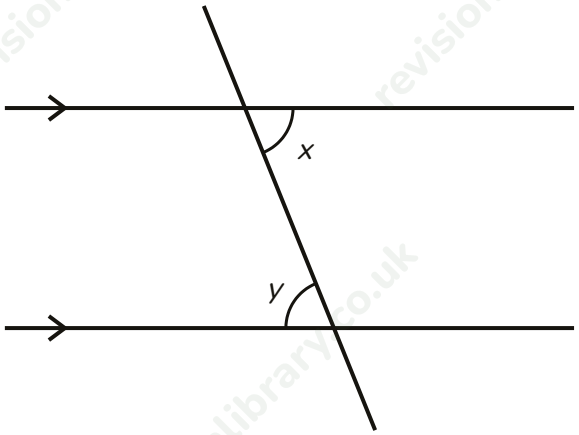
Diagram NOT accurately drawn



(Total for Question 6 is 3 marks)

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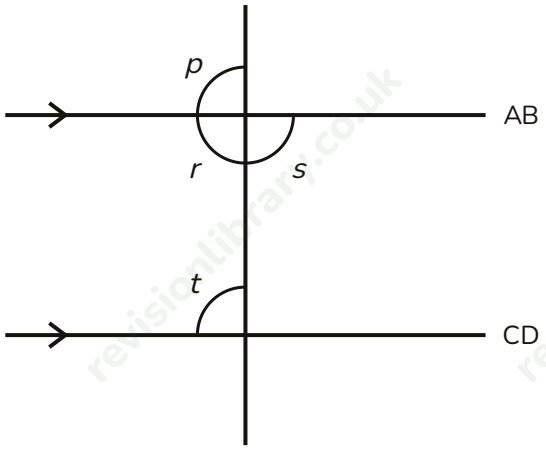
7 Two parallel lines are cut by a transversal. Angle x and angle y both lie between the two parallel lines, on opposite sides of the transversal. Explain why angle x = angle y.



(Total for Question 7 is 2 marks)

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8 Lines AB and CD are parallel and are crossed by a straight transversal. Angle t is marked between AB and CD, above CD and to the left of the transversal. Three further angles are also marked: angle p (above AB, to the left of the transversal), angle s (between AB and CD, below AB, to the right of the transversal) and angle r (between AB and CD, below AB, to the left of the transversal). For each pair below, state whether the angles are corresponding, alternate or co-interior (allied).



(a) State the relationship between angle p and angle t. **(1)**

(b) State the relationship between angle s and angle t. **(1)**

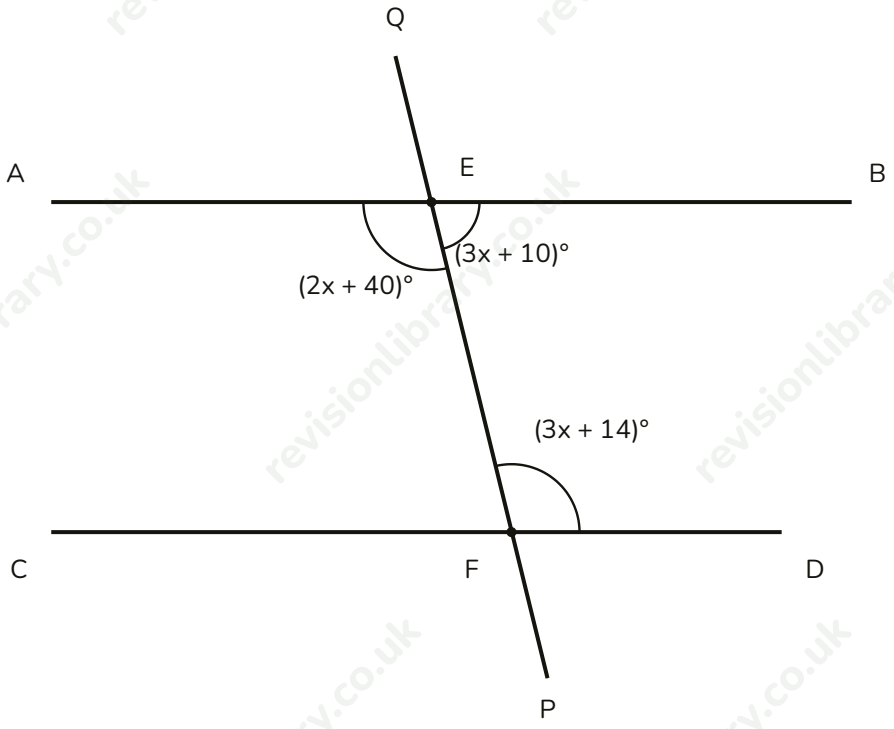
(c) State the relationship between angle r and angle t. **(1)**

(Total for Question 8 is 3 marks)

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9 Straight lines AB and CD are both crossed by a transversal PQ, meeting AB at E and CD at F. Angle AEP = (2x + 40) degrees and angle BEP = (3x + 10) degrees. Angle DFQ = (3x + 14) degrees, marked in the alternate position to angle AEP.

Diagram NOT accurately drawn



(a) Use angles on a straight line at E to find the value of x. **(2)**

.....

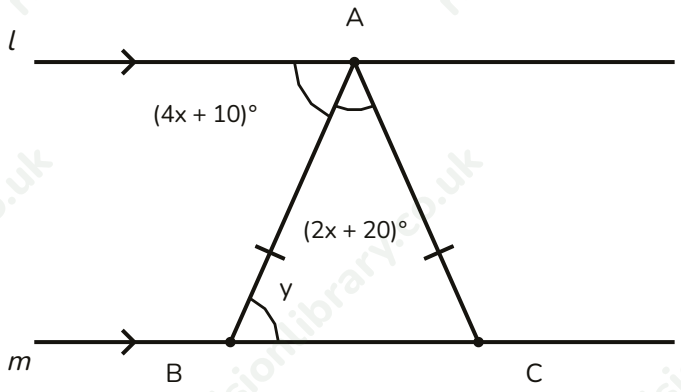
(b) Hence show that AB is parallel to CD. **(2)**

(Total for Question 9 is 4 marks)

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10 Triangle ABC is isosceles with AB = AC, and BC lies along straight line m. A straight line l passes through A and is parallel to m. The angle between l and AB, on the left of A, is (4x + 10) degrees. Angle BAC (the apex of the triangle) is (2x + 20) degrees.

Diagram NOT accurately drawn



(a) Explain why angle ABC = (4x + 10) degrees. **(1)**

(b) Use angles on a straight line at A, together with the fact that triangle ABC is isosceles, to form and solve an equation for x. **(2)**

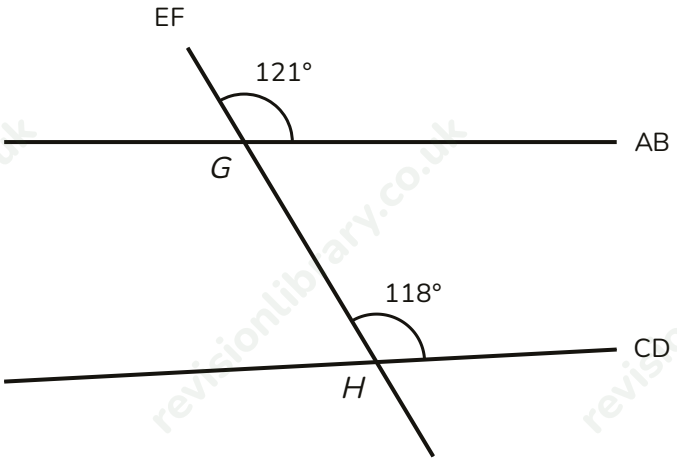
(c) Hence work out the size of angle ABC, marked y. **(2)**

(Total for Question 10 is 5 marks)

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11 A straight transversal crosses line AB at point G and line CD at point H. The angle between the transversal and AB at G, measured on the upper-right side, is 121 degrees. The angle between the transversal and CD at H, in the corresponding position (upper-right side), is 118 degrees. Ama claims that AB is parallel to CD. Determine, with full reasons, whether Ama is correct.

Diagram NOT accurately drawn

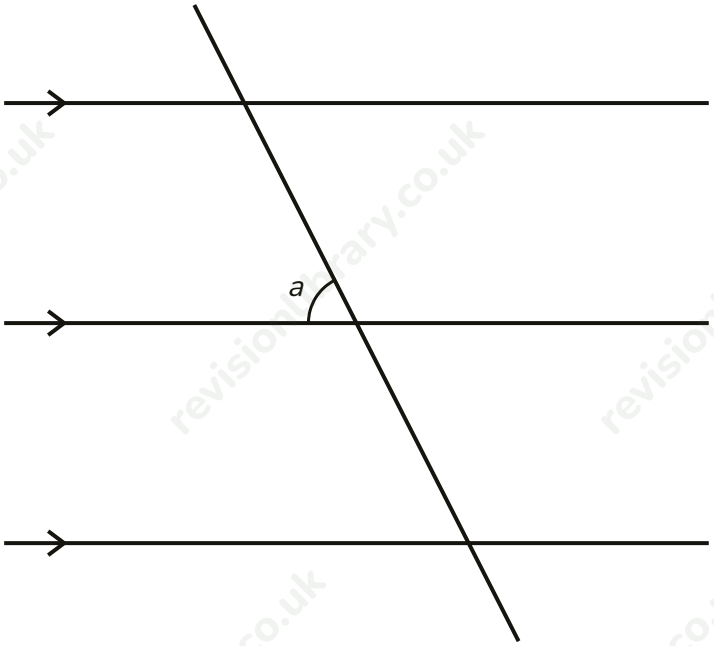


(Total for Question 11 is 5 marks)

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12 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.

Diagram NOT accurately drawn

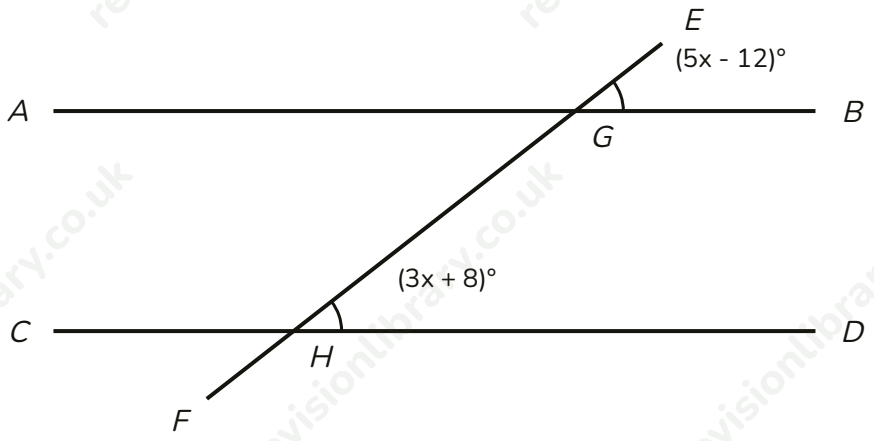


(Total for Question 12 is 5 marks)

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13 Lines AB and CD are crossed by a straight transversal EF at G (on AB) and H (on CD). Angle EGB = (5x - 12) degrees and angle GHD = (3x + 8) degrees; these two angles are corresponding.

Diagram NOT accurately drawn



(a) Find the value of x for which AB would be parallel to CD. **(3)**

.....

(b) Priya says that, in fact, x = 11, and that AB is parallel to CD. Determine, with full reasons, whether Priya is correct. **(3)**

(Total for Question 13 is 6 marks)

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Mark scheme · 4.10 Angles in Parallel Lines: Test Pack

Question 1

(a) identify vertically opposite angles are equal or state a = 60 degrees **B1**

(a) final answer 60 degrees cao **B1**

(a) Answer: 60 degrees

Question 2

x = 39 cao **B1**

Answer: x = 39 degrees

Question 3

angle QPR = 63 (alternate angles are equal, l parallel to m) **M1**

angle QRP = 63 (base angles of isosceles triangle PQR are equal, since QP = QR) **M1**

y = 180 - 63 - 63 = 54 cao **A1**

Answer: y = 54 degrees

Question 4

(a) (4x - 5) + (2x + 65) = 180 oe **M1**

(a) x = 20 cao **A1**

(a) Answer: x = 20

(b) 75 ft from their x **B1**

(b) Answer: 75 degrees

Question 5

b = 49 (alternate angles are equal) **B1**

c = 131 (co-interior angles add up to 180 degrees) **B1**

Answer: c = 131 degrees

Question 6

angle ABE = 2(32) + 30 = 94 **B1**

angle BCF = 3(32) - 10 = 86 **B1**

(dep on both values) 94 + 86 = 180, so co-interior angles sum to 180, therefore AB is parallel to CF (cso) **B1**

Answer: 94 + 86 = 180, so AB is parallel to CF

Question 7

correctly identifies x and y as alternate angles **B1**

states that alternate angles on parallel lines are equal **B1**

Answer: x = y because they are alternate angles, and alternate angles between parallel lines are equal

Question 8

(a) corresponding **B1**

(a) Answer: Corresponding angles

(b) alternate **B1**

(b) Answer: Alternate angles

(c) co-interior (allied) **B1**

(c) Answer: Co-interior (allied) angles

Question 9

(a) (2x + 40) + (3x + 10) = 180 oe **M1**

(a) x = 26 cao **A1**

(a) Answer: x = 26

(b) angle AEP = 2(26) + 40 = 92 and angle DFQ = 3(26) + 14 = 92 **B1**

(b) (dep) since angle AEP = angle DFQ, and these are alternate angles, AB is parallel to CD (cso) **B1**

(b) Answer: angle AEP = angle DFQ = 92, so AB is parallel to CD

Question 10

(a) alternate angles are equal (oe), since l is parallel to m (BC) and AB is a transversal **B1**

(a) Answer: Alternate angles are equal (l parallel to BC)

(b) 2(4x + 10) + (2x + 20) = 180 oe (straight line at A, using equal base angles from the isosceles triangle) **M1**

(b) x = 14 cao **A1**

(b) Answer: x = 14

(c) substitute x = 14 into 4x + 10 **M1**

(c) y = 66 cao **A1**

(c) Answer: y = 66 degrees

Question 11

identifies the two marked angles as being in corresponding positions **B1**

states the correct test: two lines are parallel if and only if a pair of corresponding angles is equal **M1**

121 is not equal to 118 (correct comparison of the two given values) **A1**

correct conclusion that AB is not parallel to CD **A1**

full explanation given, e.g. if AB were parallel to CD the corresponding angles at G and H would both be equal, but 121 and 118 differ by 3 degrees, so the lines are not parallel **B1**

Answer: Ama is incorrect; AB is not parallel to CD, since the corresponding angles (121 degrees and 118 degrees) are not equal

Question 12

recognise the top and middle lines are parallel and cut by the same transversal **M1**

state top acute angle = a, since corresponding angles between the top and middle lines are equal **A1**

recognise the middle and bottom lines are parallel and cut by the same transversal **M1**

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 **A1**

Answer: Top + bottom = 2 x middle angle, since the single transversal makes equal corresponding angles (each = a) with all three parallel lines

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Question 13

(a) (5x - 12) = (3x + 8) oe, using equal corresponding angles for parallel lines **M1**

(a) 2x = 20 (oe simplification) **M1**

(a) x = 10 cao **A1**

(a) Answer: x = 10

(b) substitutes x = 11 into both expressions: 5(11) - 12 = 43 and 3(11) + 8 = 41 **M1**

(b) 43 is not equal to 41, compared as corresponding angles **M1**

(b) correct conclusion: since 43 is not equal to 41, AB is not parallel to CD, so Priya is incorrect **A1**

(b) Answer: Priya is incorrect; when x = 11 the angles are 43 degrees and 41 degrees, so the corresponding angles are not equal and AB is not parallel to CD

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