4.10 Angles in Parallel Lines: 2-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Two parallel lines are crossed by a straight line. One of the angles made is 53 degrees.
Another angle, y, is an alternate angle to the 53 degree angle.
Work out the size of angle y and give a reason for your answer.

(Total for Question 1 is 2 marks)

---

2 In triangle ABC, the point D is on AB and the point E is on AC so that DE is parallel to BC.
Angle ADE = 57 degrees and angle ACB = 82 degrees.
Work out the size of angle BAC. Give reasons for your answer.

(Total for Question 2 is 3 marks)

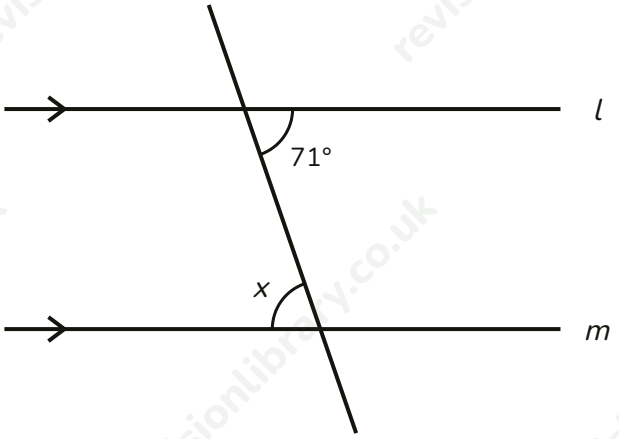
---

3 In triangle PQR, the point S is on PQ and the point T is on PR so that ST is parallel to QR.
Angle PST = 42 degrees and angle PRQ = 71 degrees.
Work out the size of angle QPR. Give reasons for your answer.

(Total for Question 3 is 3 marks)

© Revision Library | revisionlibrary.co.uk

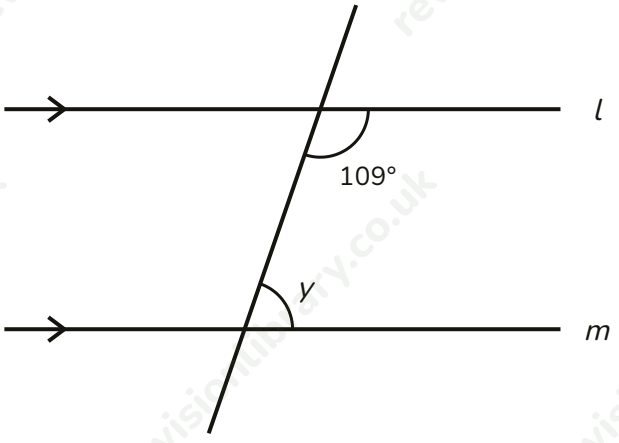
4 Lines l and m are parallel and are crossed by a transversal. One of the angles between the transversal and l is 71 degrees. Angle x, between the transversal and m, is in the alternate position to the 71 degree angle. Work out the size of angle x and give a reason for your answer.



(Total for Question 4 is 2 marks)

---

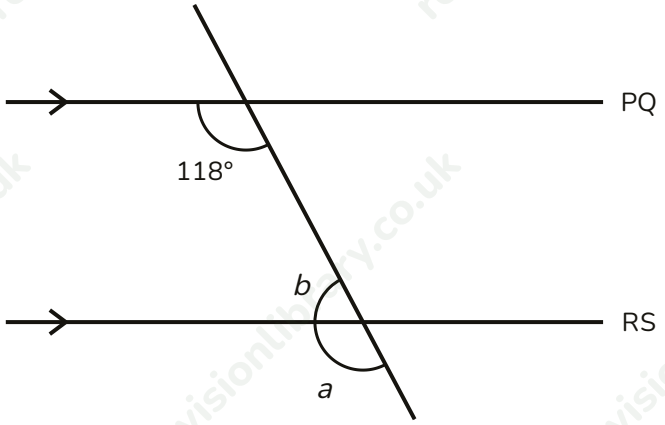
5 Lines l and m are parallel and are crossed by a transversal. One of the angles between the transversal and l is 109 degrees. Angle y, between the transversal and m, is in the co-interior position to the 109 degree angle. Work out the size of angle y.



(Total for Question 5 is 2 marks)

© Revision Library | revisionlibrary.co.uk

6 Lines PQ and RS are parallel and are crossed by a transversal. One of the angles between the transversal and PQ is 118 degrees. Angle a, between the transversal and RS, is in the corresponding position to the 118 degree angle. Angle b, between the transversal and RS, is in the co-interior position to the 118 degree angle.



(a) Work out the size of angle a. Give a reason for your answer. **(2)**

.....

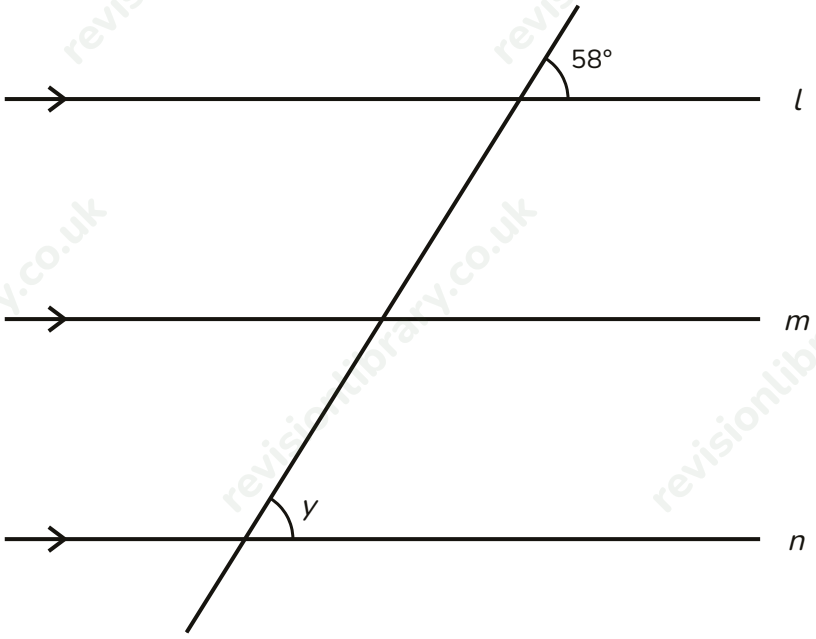
(b) Work out the size of angle b. Give a reason for your answer. **(2)**

.....

(Total for Question 6 is 4 marks)

© Revision Library | revisionlibrary.co.uk

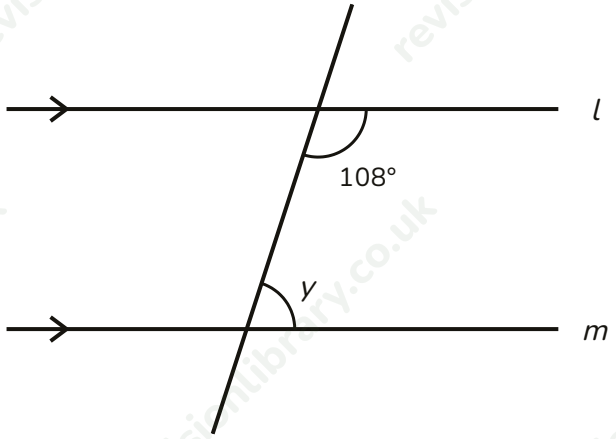
7 Three parallel lines, l, m and n, are all crossed by the same straight transversal. The angle between the transversal and l is 58 degrees. Angle y is in the corresponding position where the transversal crosses n. Work out y, giving a reason.



(Total for Question 7 is 2 marks)

© Revision Library | revisionlibrary.co.uk

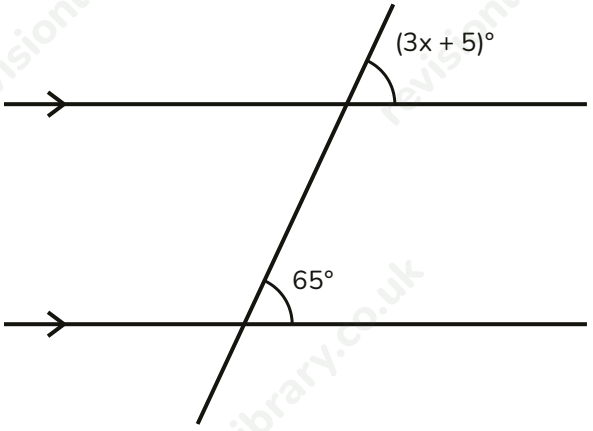
8 Lines l and m are parallel and are crossed by a straight transversal. Angle y is co-interior (allied) with the 108 degree angle marked between l and m. Work out the value of y. Give a reason for your answer.



(Total for Question 8 is 2 marks)

---

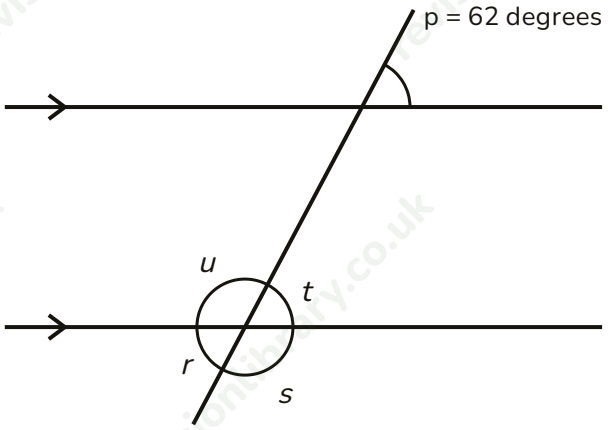
9 Work out the value of x.



(Total for Question 9 is 2 marks)

© Revision Library | revisionlibrary.co.uk

10 In the diagram two parallel lines are cut by a transversal. Angle p at the top right is 62 degrees. At the lower intersection there are four labelled angles: r (lower left), s (lower right), t (upper right) and u (upper left).



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

.....

(b) Work out the sizes of r and s. Show the steps. (4 marks) **(4)**

.....

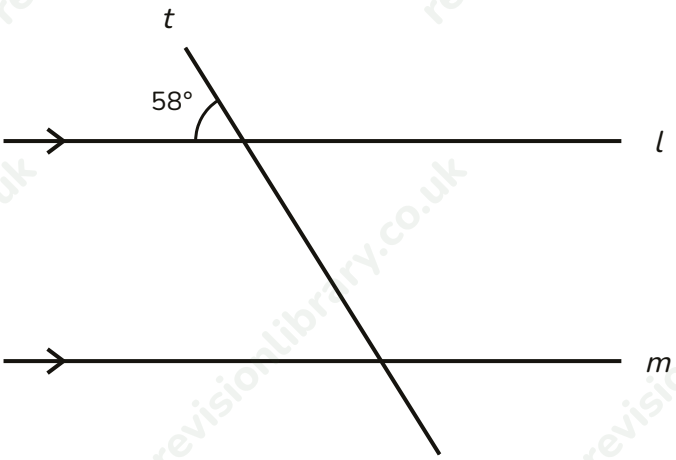
(Total for Question 10 is 6 marks)

© Revision Library | revisionlibrary.co.uk

11 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.

Diagram NOT accurately drawn

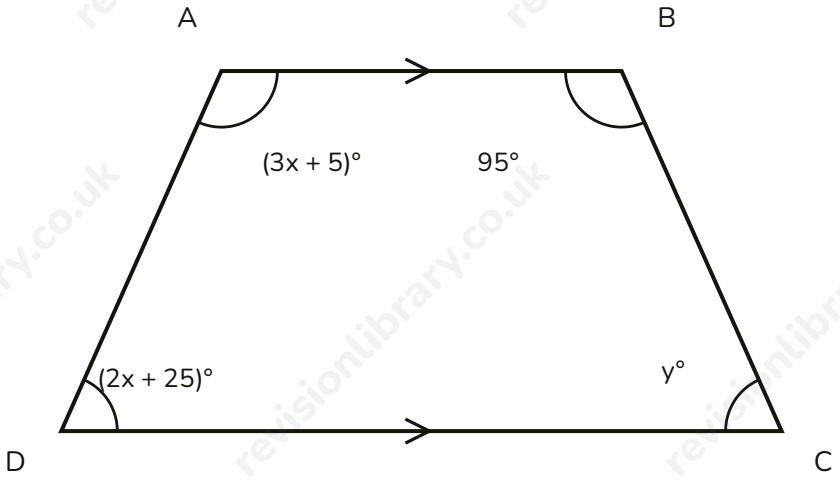


(Total for Question 11 is 2 marks)

© Revision Library | revisionlibrary.co.uk

12 ABCD is a trapezium with AB parallel to DC. Angle DAB = (3x + 5) degrees and angle ADC = (2x + 25) degrees. Angle ABC = 95 degrees and angle BCD = y degrees.

Diagram NOT accurately drawn



(a) Use co-interior angles to find the value of x. **(2)**

.....

(b) Work out the value of y. **(2)**

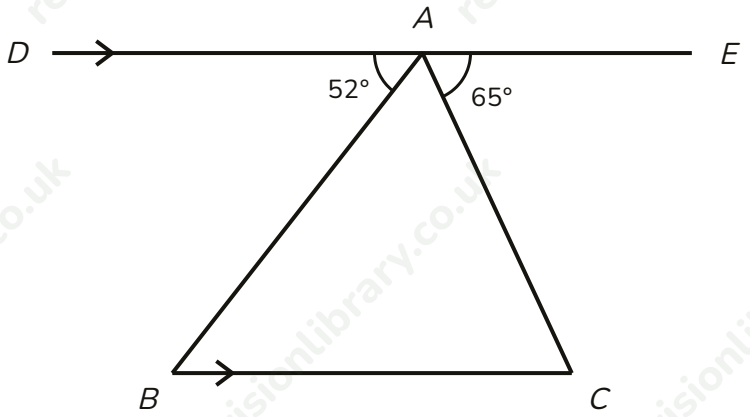
.....

(Total for Question 12 is 4 marks)

© Revision Library | revisionlibrary.co.uk

13 Triangle ABC has a straight line DAE through vertex A, parallel to side BC (D on the same side as B, E on the same side as C). The angle between DAE and AB is 52 degrees; the angle between DAE and AC is 65 degrees. Work out the size of angle BAC. Show your reasoning.

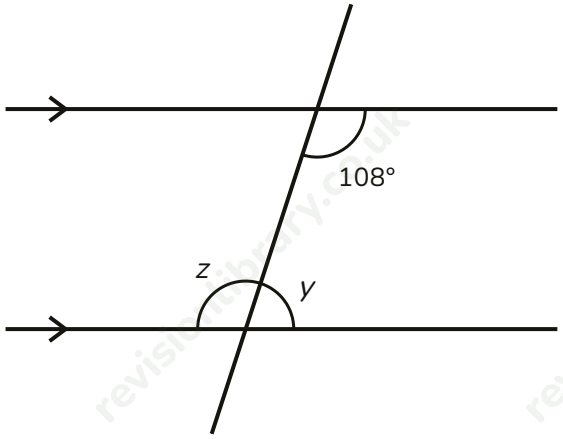
Diagram NOT accurately drawn



(Total for Question 13 is 3 marks)

© Revision Library | revisionlibrary.co.uk

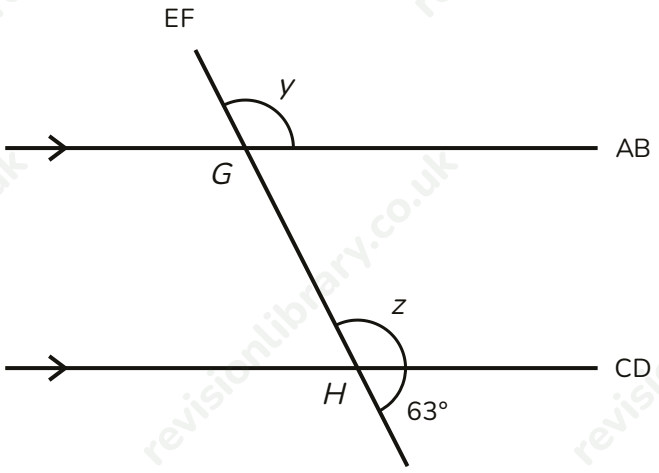
14 The diagram shows two parallel lines crossed by a straight transversal. The angle between the two lines, on the lower-right side of the upper intersection, is 108 degrees. Angle y is between the two lines, on the same (right) side at the lower intersection. Angle z is between the two lines, on the other side at the lower intersection. Work out the values of y and z. Give a reason for each answer.



(Total for Question 14 is 4 marks)

© Revision Library | revisionlibrary.co.uk

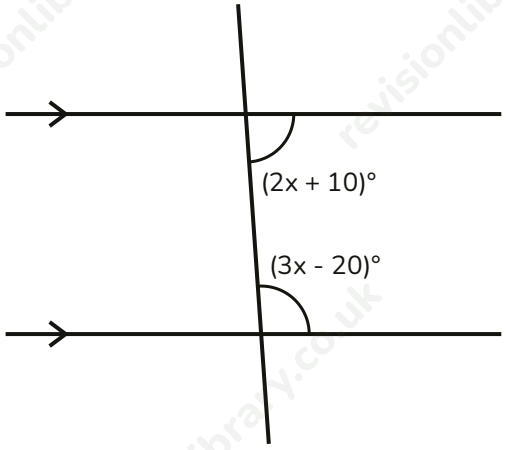
15 Lines AB and CD are parallel and are both crossed by a straight transversal EF, meeting AB at G and CD at H. Angle x, below CD on the right of the transversal, is 63 degrees. Angle z lies above CD, on the same (right) side of the transversal. Angle y lies above AB, on the right of the transversal, in the same relative position as angle z. Work out the value of y.



(Total for Question 15 is 3 marks)

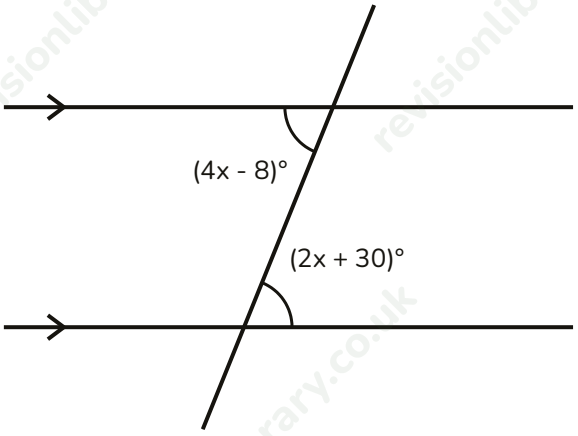
© Revision Library | revisionlibrary.co.uk

16 Work out the value of x, then find the size of the smaller of the two angles.



(Total for Question 16 is 3 marks)

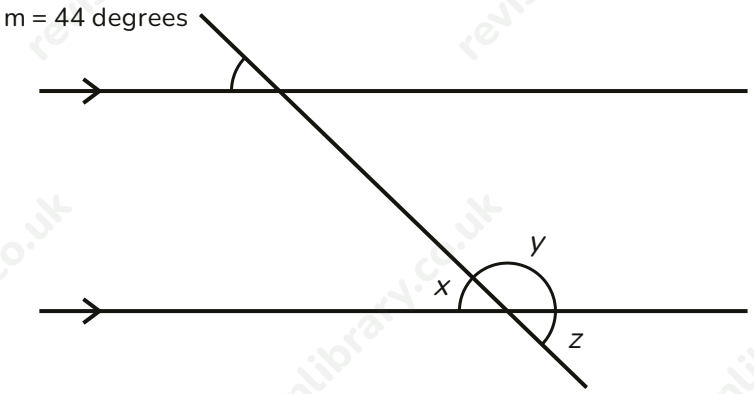
17 Work out the value of x, then find the size of each angle.



(Total for Question 17 is 3 marks)

© Revision Library | revisionlibrary.co.uk

18 A student is given the diagram of two parallel lines cut by a transversal. At the top intersection angle m is 44 degrees. At the lower intersection three angles are labelled: x (upper left), y (upper right) and z (lower right).



(a) Work out the size of x. Give a short reason. (6 marks) **(6)**

.....

(b) Work out the sizes of y and z. Show each step clearly. (7 marks) **(7)**

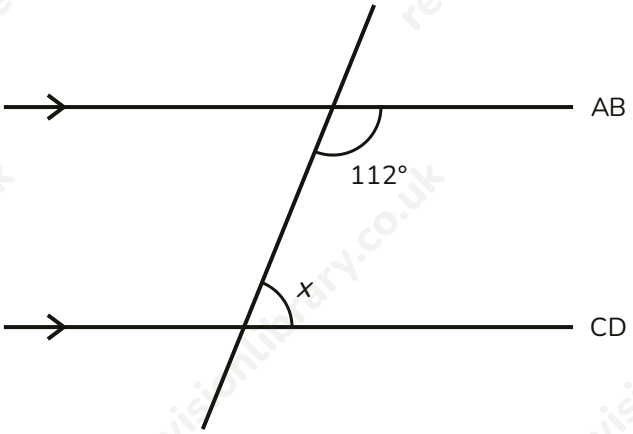
.....

(Total for Question 18 is 13 marks)

© Revision Library | revisionlibrary.co.uk

19 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.

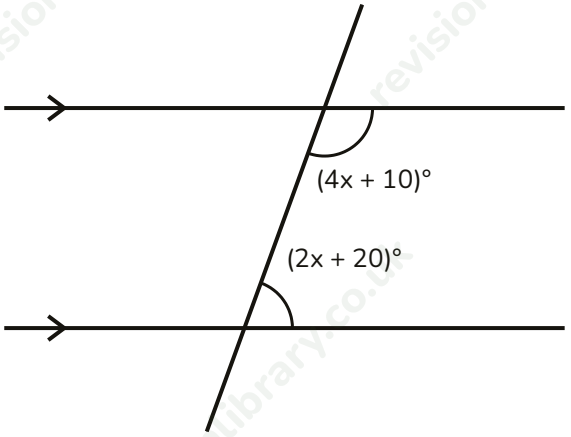
Diagram NOT accurately drawn



(Total for Question 19 is 3 marks)

© Revision Library | revisionlibrary.co.uk

20 Two parallel lines are cut by a transversal. Two co-interior angles between the lines are (4x + 10) degrees and (2x + 20) degrees. Work out the value of x, then find the size of each angle.



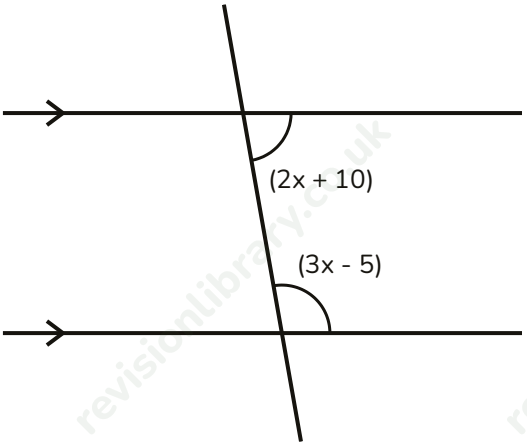
(Total for Question 20 is 4 marks)

© Revision Library | revisionlibrary.co.uk

21 A pair of parallel lines are cut by a transversal. The angles at the two intersections, inside the parallel lines and on the same side of the transversal, are labelled (2x + 10) degrees and (3x - 5) degrees.

Work out x and then find both angle sizes.

Diagram NOT accurately drawn

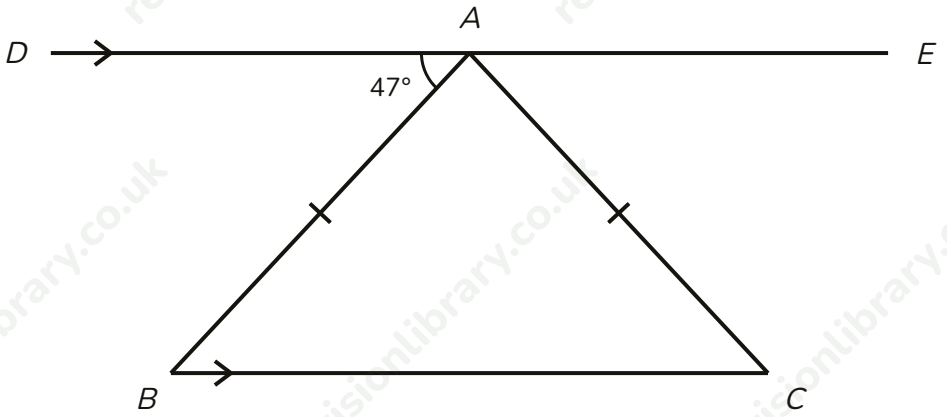


(Total for Question 21 is 4 marks)

© Revision Library | revisionlibrary.co.uk

22 Triangle ABC is isosceles with AB = AC. A straight line DAE passes through vertex A, parallel to BC (D on the same side as B, E on the same side as C). Angle DAB = 47 degrees. Work out the size of angle BAC. You must show your reasoning.

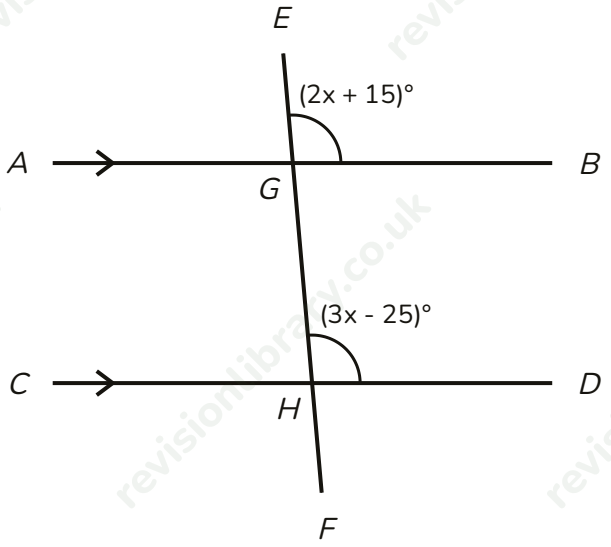
Diagram NOT accurately drawn



(Total for Question 22 is 4 marks)

© Revision Library | revisionlibrary.co.uk

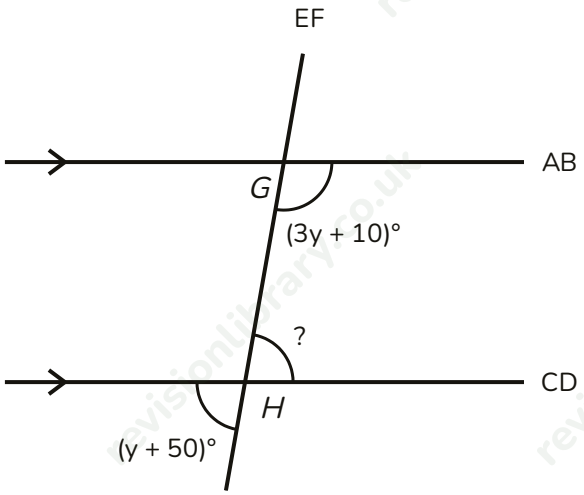
23 Two parallel lines AB and CD are joined by a straight support strut EF, crossing AB at G and CD at H. Angle EGB = (2x + 15) degrees and angle GHD = (3x - 25) degrees; these two angles are corresponding angles. Work out the value of x, then find the size of angle EGB.



(Total for Question 23 is 4 marks)

© Revision Library | revisionlibrary.co.uk

24 Lines AB and CD are parallel and are crossed by a straight transversal EF at G (on AB) and H (on CD). Angle BGH = (3y + 10) degrees. Angle GHD is co-interior with angle BGH. Angle CHF is vertically opposite angle GHD, and angle CHF = (y + 50) degrees. Work out the value of y, and hence find the size of angle GHD.

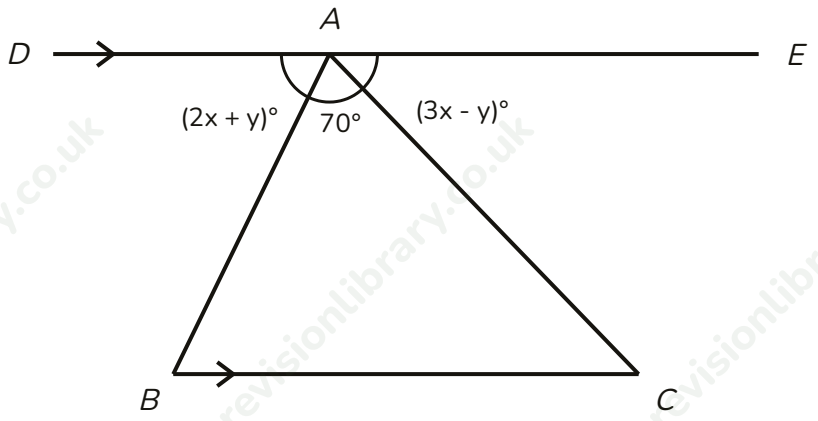


(Total for Question 24 is 4 marks)

© Revision Library | revisionlibrary.co.uk

25 Triangle ABC has angle BAC = 70 degrees. A straight line DAE passes through vertex A, parallel to BC (D on the same side as B, E on the same side as C). Angle DAB = (2x + y) degrees and angle EAC = (3x - y) degrees. Given that angle ABC is 18 degrees greater than angle ACB, work out the values of x and y.

Diagram NOT accurately drawn



(Total for Question 25 is 6 marks)

© Revision Library | revisionlibrary.co.uk

Mark scheme · 4.10 Angles in Parallel Lines: 2-hour Pack

Question 1

y = 53 **B1**

correct reason: alternate angles are equal **B1**

Answer: y = 53 degrees (alternate angles are equal)

Question 2

angle ABC = 57 (corresponding angles) **B1**

180 - 57 - 82 **M1**

41 degrees (angles in a triangle add up to 180 degrees) **A1**

Answer: 41 degrees

Question 3

angle PQR = 42 (corresponding angles) **B1**

180 - 42 - 71 **M1**

67 degrees (angles in a triangle add up to 180 degrees) **A1**

Answer: 67 degrees

Question 4

x = 71 cao **B1**

correct reason: alternate angles are equal (oe, l is parallel to m) **B1**

Answer: x = 71 degrees

Question 5

180 - 109 oe **M1**

y = 71 cao, with reason: co-interior (allied) angles sum to 180 degrees **A1**

Answer: y = 71 degrees

Question 6

(a) a = 118 cao **B1**

(a) correct reason: corresponding angles are equal (oe) **B1**

(a) Answer: a = 118 degrees

(b) 180 - 118 oe **M1**

(b) b = 62 cao, with reason: co-interior angles sum to 180 degrees **A1**

(b) Answer: b = 62 degrees

Question 7

y = 58 cao **B1**

correct reason: corresponding angles are equal, since l, m and n are all parallel **B1**

Answer: y = 58 degrees

Question 8

180 - 108 oe, using co-interior angles sum to 180 **M1**

y = 72 cao **A1**

Answer: y = 72 degrees

Question 9

3x + 5 = 65 oe (corresponding angles are equal) **M1**

x = 20 cao **A1**

Answer: x = 20

Question 10

(a) identify t corresponds to p or is equal to 62 degrees by corresponding/alternate reasoning **M1**

(a) 62 degrees cao **A1**

(a) Answer: 62 degrees

(b) identify r is vertically opposite t (equal) or use relation r + u = 180 depending on chosen route **M1**

(b) calculate u = 180 - t = 180 - 62 = 118 or state u = 118 **M1**

(b) r = 62 degrees cao **A1**

(b) s = u = 118 degrees cao (s is vertically opposite u) **A1**

(b) Answer: r = 62 degrees, s = 118 degrees

Question 11

identify corresponding angles are equal oe **B1**

58 degrees cao **B1**

Answer: 58 degrees

Question 12

(a) (3x + 5) + (2x + 25) = 180 oe (co-interior angles, AD transversal) **M1**

(a) x = 30 cao **A1**

(a) Answer: x = 30

(b) 95 + 95 + y + 85 = 360 oe, using their angle ADC (or 95 + y = 180, co-interior with BC transversal) **M1**

(b) y = 85 cao **A1**

(b) Answer: y = 85 degrees

Question 13

angle ABC = 52 (alternate angles, DAE parallel to BC) **M1**

angle ACB = 65 (alternate angles, DAE parallel to BC) **M1**

angle BAC = 180 - 52 - 65 = 63 cao (angle sum of a triangle) **A1**

Answer: angle BAC = 63 degrees

Question 14

y = 180 - 108, using co-interior (allied) angles sum to 180 **M1**

y = 72 **A1**

z = 108 (alternate angles are equal) or z = 180 - y (angles on a straight line) **M1**

z = 108 **A1**

Answer: y = 72 degrees; z = 108 degrees

Question 15

z = 180 - 63 = 117 (angles on a straight line EF at H) **M1**

y = z (corresponding angles are equal) **M1**

y = 117 cao **A1**

Answer: y = 117 degrees

Question 16

(2x + 10) + (3x - 20) = 180 oe, using co-interior angles sum to 180 **M1**

x = 38 cao **A1**

smaller angle = 86 degrees, ft from their x **A1**

Answer: x = 38; smaller angle = 86 degrees

© Revision Library | revisionlibrary.co.uk

Question 17

4x - 8 = 2x + 30 oe (alternate angles are equal)	**M1**
x = 19 cao	**A1**
each angle = 68 degrees, ft from their x	**A1**

Answer: x = 19; each angle = 68 degrees

Question 18

(a) identify that x is corresponding to m (or alternate depending on orientation) so equal to 44 degrees	**M1**
(a) state equality: x = 44	**M1**
(a) 44 degrees cao	**A1**
(a) give reason: corresponding angles are equal when lines are parallel	**B1**
(a) clarify link to the diagram (e.g. 'x is in the corresponding position to m')	**B1**
(a) final clear statement x = 44 degrees	**B1**

(a) Answer: 44 degrees

(b) identify that y is adjacent to x along the parallel line, so x and y are supplementary	**M1**
(b) compute y = 180 - 44 = 136 degrees	**M1**
(b) identify that z is vertically opposite to x on the straight line at the lower intersection	**M1**
(b) compute z = 44 degrees (equal to x, vertically opposite)	**M1**
(b) y = 136 degrees cao	**A1**
(b) z = 44 degrees cao	**A1**
(b) final statement linking steps clearly (e.g. 'x + y = 180 so y = 136, z is vertically opposite x so z = 44')	**B1**

(b) Answer: y = 136 degrees, z = 44 degrees

Question 19

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

Answer: 68 degrees

Question 20

(4x + 10) + (2x + 20) = 180 oe, using co-interior angles sum to 180	**M1**
6x + 30 = 180 (oe simplification)	**M1**
x = 25 cao	**A1**
angles = 110 degrees and 70 degrees, ft from their x	**A1**

Answer: x = 25; angles = 110 degrees and 70 degrees

Question 21

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

Answer: x = 35; angles are 80 degrees and 100 degrees

Question 22

angle ABC = 47 (alternate angles, DAE parallel to BC)	**M1**
angle ACB = angle ABC = 47 (base angles of an isosceles triangle with AB = AC are equal)	**M1**
angle BAC = 180 - 47 - 47 (angles in a triangle sum to 180)	**M1**
angle BAC = 86 cao	**A1**

Answer: angle BAC = 86 degrees

Question 23

2x + 15 = 3x - 25 oe (corresponding angles are equal)	**M1**
x = 40 cao	**A1**
substitutes x = 40 into 2x + 15	**M1**
angle EGB = 95 degrees, ft from their x	**A1**

Answer: x = 40; angle EGB = 95 degrees

Question 24

angle GHD = angle CHF = y + 50 (vertically opposite angles are equal)	**M1**
(3y + 10) + (y + 50) = 180 oe, using co-interior angles sum to 180	**M1**
correctly simplifies to 4y + 60 = 180	**M1**
y = 30 and angle GHD = 80 degrees	**A1**

Answer: y = 30; angle GHD = 80 degrees

Question 25

angle ABC = angle DAB and angle ACB = angle EAC (alternate angles, DAE parallel to BC)	**M1**
angle DAB + angle BAC + angle EAC = 180 (angles on a straight line DAE)	**M1**
(2x + y) + 70 + (3x - y) = 180 simplifies to 5x + 70 = 180 (the y-terms cancel)	**M1**
x = 22	**A1**
forms a second equation from the given angle difference: (2x + y) - (3x - y) = 18 oe	**M1**
y = 20	**A1**

Answer: x = 22, y = 20 (angle ABC = 64 degrees, angle ACB = 46 degrees)

© Revision Library | revisionlibrary.co.uk