



KS3.M-G9 Angles in Parallel Lines

AQA KS3.M-G9 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Two parallel lines are cut by a transversal. State whether alternate interior angles are equal, add to 180 degrees, or are complementary.

(1)

- 2** In the diagram two parallel lines l and m are cut by a transversal. Angle a on line l is 64 degrees as shown where a and b are alternate interior angles. Work out angle b .

Figure (to be drawn): Lines l and m are parallel. Transversal crosses them. Angle a (interior) = 64 degrees on upper intersection. Angle b is the alternate interior angle at lower intersection.

(2)

- 3** Lines p and q are parallel. A transversal meets them. Angle x and angle y are corresponding angles. If $x = 118$ degrees, find y .

Figure (to be drawn): Parallel lines p and q with a transversal. x is the exterior angle on the top left at the first intersection = 118. y is the corresponding angle at the second intersection.

(2)

- 4 On parallel lines r and s a transversal makes two interior angles on the same side of the transversal measured as 50 degrees and z degrees. These are co-interior angles. Work out z .

Figure (to be drawn): Parallel lines r and s , transversal; interior angles on same side are 50 degrees and z .

(2)

- 5 A pair of parallel lines is cut by a transversal. At the first (upper) intersection, the interior angle below the line, on the right of the transversal, is 42 degrees. At the second (lower) intersection, angle a is the interior angle, between the two parallel lines, on the same right-hand side of the transversal (the co-interior / allied angle to the 42-degree angle). Find a and give a short reason.

Figure (to be drawn): Two parallel lines with transversal. At the first (upper) intersection, the angle marked 42 degrees is below the line, on the right of the transversal, i.e. between the two parallel lines (interior). At the second (lower) intersection, angle a is below the transversal's crossing but above the lower line, i.e. between the two parallel lines, on the same (right) side of the transversal as the 42-degree angle - the co-interior angle to it.

(3)

- 6 State the name of the angle relationship: two angles are on the same side of the transversal inside the parallel lines and add to 180 degrees.

(1)

- 7** Two parallel lines are cut by a transversal. One interior angle is 73 degrees. Find the four angles at that intersection and state briefly why each equals or supplements 73 where appropriate.

Figure (to be drawn): At one intersection angles are labelled; one interior angle = 73. The other three at same point are requested.

(2)

- 8** In the diagram lines a and b are parallel. At the first intersection an acute angle is 35 degrees. At the second intersection on the same side of the transversal the angle is labelled c and is interior. At the corresponding position on the second intersection the exterior angle is d. Find c and d.

Figure (to be drawn): Parallel lines a and b with transversal. First intersection acute interior angle = 35. At second intersection interior angle on same side labelled c; exterior corresponding angle labelled d.

(3)

- 9** Two parallel lines are cut by a transversal. At the first intersection an obtuse angle is 122 degrees. At the second intersection the angle in the corresponding position is labelled e. Find e and give the reason.

Figure (to be drawn): Parallel lines with transversal; first intersection obtuse angle = 122; corresponding angle at second intersection labelled e.

(2)

- 10** A transversal cuts two parallel lines. At one intersection the four angles are 48, x , y and z in order around the point. Given one is 48, find x , y and z and give a one-line reason for each.

Figure (to be drawn): Four angles around an intersection: one is 48, others labelled x , y , z

(2)

- 11** Lines l and m are parallel. A transversal cuts them and creates an angle of 29 degrees inside at the top left of the first intersection. Find the angle vertically opposite to the corresponding angle at the second intersection that matches the 29 degree angle. Explain your steps.

Figure (to be drawn): Parallel lines l and m , transversal. Angle at first intersection top left = 29; consider corresponding and vertically opposite at second intersection.

(3)

- 12** A transversal meets two parallel lines. At the first intersection two adjacent angles are 67 degrees and t degrees. On the same side of the transversal at the second intersection the interior angle is u degrees and is co-interior with t . Find t and u .

Figure (to be drawn): First intersection adjacent angles 67 and t ; t is interior. At second intersection u is co-interior with t

(2)

- 13** Two parallel lines are cut by a transversal. One angle is labelled 54 degrees. A different angle at the lower intersection is labelled v and is alternate exterior to the 54 degree angle. Find v and state the property used.

Figure (to be drawn): Parallel lines and transversal; given angle 54, angle v is alternate exterior at other intersection.

(3)

- 14** A transversal intersects two parallel lines. At one intersection an angle is 96 degrees. At the other intersection, the angle adjacent to the corresponding angle is w . Find w .

Figure (to be drawn): Parallel lines and transversal; one intersection angle = 96; at second intersection the corresponding angle is 96 and adjacent to it is w .

(2)

- 15** Two parallel lines are cut by a transversal. Angles at one intersection are labelled $2x$ and $3x$ where they are adjacent. Find x and the four angles at that intersection.

Figure (to be drawn): At one intersection adjacent angles are $2x$ and $3x$; they share a straight line.

(3)

- 16** A transversal cuts two parallel lines. At one intersection an angle next to the transversal is 41 degrees. At the other intersection the corresponding angle is p and the interior on the same side is q . Find p and q .

Figure (to be drawn): Parallel lines and transversal; given angle 41 near transversal at first intersection; at second intersection corresponding angle p , co-interior q .

(2)

- 17** Stretch: Two parallel lines are cut by a transversal. At the top intersection the angles are a and b with $a = 3b$. At the bottom intersection the angle corresponding to a is 50 degrees. Find a and b , showing your steps.

Figure (to be drawn): Top intersection angles a and b are adjacent, with $a = 3b$. Corresponding angle to a at bottom intersection = 50 degrees.

(4)

- 18** Stretch: A transversal cuts two parallel lines. At one intersection the angles are labelled in order around the point as $6y$, z , $(2y + 10)$ and w . Given z is vertically opposite to $6y$ and w is supplementary to $(2y + 10)$, find y , z and w .

Figure (to be drawn): Four angles around an intersection labelled $6y$, z , $(2y + 10)$, w in clockwise order. z vertically opposite $6y$; w supplementary to $(2y + 10)$.

(5)

Mark scheme · KS3.M-G9 Angles in Parallel Lines

Question 1

- **B1** alternate interior angles are equal, oe
- Answer: **They are equal**

Question 2

- **M1** use of alternate angles with $64 = b$ or statement that alternate angles are equal
- **A1** $b = 64$ degrees cao
- Answer: **64 degrees**

Question 3

- **M1** use of corresponding angles equality or statement
- **A1** $y = 118$ degrees cao
- Answer: **118 degrees**

Question 4

- **M1** use that co-interior angles are supplementary so $50 + z = 180$ or equivalent
- **A1** $z = 130$ degrees cao
- Answer: **130 degrees**

Question 5

- **M1** identifies that angle a is co-interior (allied) to the 42 -degree angle (same side of the transversal, between the parallel lines)
- **M1** uses co-interior angles sum to 180 : $a = 180 - 42$
- **A1** $a = 138$ degrees with reason: co-interior (allied) angles are supplementary cao
- Answer: **138 degrees**

Question 6

- **B1** co-interior angles or interior supplementary angles, oe
- Answer: **Co-interior angles**

Question 7

- **M1** two correct angles found showing use of opposite or supplementary angles
- **A1** all four: $73, 107, 73, 107$ degrees with brief reason such as vertically opposite or supplementary cao
- Answer: **73, 107, 73, 107**

Question 8

- **M1** identify that c is co-interior to 35 so $c = 180 - 35$ or that d corresponds to 35
- **M1** calculation of $c = 145$ or $d = 35$ shown
- **A1** $c = 145$ degrees, $d = 35$ degrees with a brief reason cao
- Answer: **$c = 145$ degrees, $d = 35$ degrees**

Question 9

- **M1** use corresponding angles equality or state that corresponding angles are equal
- **A1** $e = 122$ degrees and reason: corresponding angles equal, cao
- Answer: **122 degrees**

Question 10

- **M1** use vertically opposite and supplementary to find at least two correct angles
- **A1** $x = 132, y = 48, z = 132$ with brief reasons cao
- Answer: **$x = 132$ degrees, $y = 48$ degrees, $z = 132$ degrees**

Question 11

- **M1** identify corresponding angle at second intersection equals 29
- **M1** identify vertical opposite to that corresponding angle equals same value
- **A1** final statement: the vertically opposite angle = 29 degrees with short explanation cao
- **Answer: 29 degrees**

Question 12

- **M1** use that adjacent angles on a line add to 180 to find t
- **A1** $t = 113$ degrees and $u = 67$ degrees with brief reason cao
- **Answer: $t = 113$ degrees, $u = 67$ degrees**

Question 13

- **M1** identify alternate exterior angles are equal
- **M1** state $v = 54$ or show equality
- **A1** $v = 54$ degrees and property: alternate exterior angles equal, cao
- **Answer: $v = 54$ degrees**

Question 14

- **M1** recognise adjacent angles are supplementary
- **A1** $w = 84$ degrees cao
- **Answer: 84 degrees**

Question 15

- **M1** set up equation $2x + 3x = 180$ or identify they are supplementary
- **M1** calculate $x = 36$
- **A1** angles: $2x=72$, $3x=108$, opposite angles equal so 72,108,72,108 cao
- **Answer: $x = 36$; angles 72, 108, 72, 108**

Question 16

- **M1** identify $p = 41$ by corresponding angles
- **A1** $p = 41$, $q = 139$ degrees with brief reason cao
- **Answer: $p = 41$ degrees, $q = 139$ degrees**

Question 17

- **M1** use correspondence to state $a = 50$ or relate bottom corresponding angle to a
- **M1** use $a = 3b$ to form equation $50 = 3b$ or substitute to find b
- **M1** calculate $b = 50/3$ and show if required or simplify to 16.666... but accept fraction $50/3$
- **A1** state final: $a = 50$ degrees, $b = 50/3$ degrees (or $16 \frac{2}{3}$ degrees) with reasoning cao
- **Answer: $a = 50$ degrees, $b = 50/3$ degrees**

Question 18

- **M1** use vertical opposite: $z = 6y$ or state equality
- **M1** use supplementary: $w + (2y+10) = 180$, so $w = 170 - 2y$
- **M1** use sum around point: $6y + z + (2y+10) + w = 360$, substitute $z = 6y$ to get $14y + 10 + w = 360$
- **M1** combine with $w = 170 - 2y$ to solve: $14y + 10 + (170 - 2y) = 360$, so $12y + 180 = 360$, giving $y = 15$
- **A1** final values $y = 15$, $z = 90$, $w = 140$ with clear working cao
- **Answer: $y = 15$, $z = 90$ degrees, $w = 140$ degrees**