Year 9 angles on parallel lines worksheet

Year 9 · 10 questions · www.tuterly.com.au

Name: _____ Date: _____

Question 1

Lines AB and CD are parallel and horizontal, with AB above CD, and A and C on the left. A transversal EF crosses AB at G and CD at H, with E above AB and F below CD. The angle angle EGB = 65°. Find each angle, giving a reason.

(a) angle GHD (b) angle AGH (c) angle BGH (d) angle CHG

Answer: _____

Question 2

Two parallel lines are cut by a transversal. A pair of co-interior angles measure (2x + 10)° and (3x - 5)°. Find x and the size of each angle.

Answer: _____

Question 3

Two parallel lines are cut by a transversal. A pair of alternate angles measure (4y - 20)° and (2y + 30)°. Find y and the size of the angles.

Answer: _____

Question 4

A transversal crosses two lines. A pair of co-interior angles between the lines measure 72° and 106°. Are the two lines parallel? Explain.

Answer: _____

Question 5

Lines AB and CD are parallel and horizontal, with AB above CD, A to the left of B and C to the left of D. A point P lies between the two lines, to the left of both B and D. Segments BP and DP are drawn, with angle ABP = 40° and angle CDP = 35°.

(a) Draw a line through P parallel to AB, with a point Q on it to the right of P. Find angle BPQ and angle QPD, giving reasons.

(b) Hence find angle BPD.

(c) Write a general rule for angle BPD in terms of angle ABP and angle CDP.

Answer: _____

Question 6

Two parallel lines are cut by a transversal. One angle between the parallel lines is 74°. Find the size of the angle that is co-interior to it.

Answer: _____

Question 7

Two parallel lines are cut by a transversal. A pair of corresponding angles measure (3x + 12)° and 78°. Find the value of x.

Answer: _____

Question 8

Two parallel lines are cut by a transversal. A pair of alternate angles measure (5a - 20)° and (3a + 16)°.

(a) Find the value of a.

(b) Find the size of each angle.

Answer: _____

Question 9

Two parallel lines are cut by a transversal. A pair of co-interior angles measure (2y + 15)° and (y + 45)°. Find the value of y.

Answer: _____

Question 10

A straight road crosses two parallel railway lines. The acute angle between the road and the first railway line is 63°.

(a) Find the obtuse angle between the road and the first railway line.

(b) Find the acute angle between the road and the second railway line.

Answer: _____

Year 9 angles on parallel lines: answers and worked solutions

Year 9 · 10 questions · www.tuterly.com.au

Question 1

Key idea: When a transversal crosses parallel lines, corresponding angles are equal, alternate angles are equal and co-interior angles add to 180°.

1. (a) angle GHD and angle EGB are corresponding angles (both above their line and to the right of the transversal), so angle GHD = 65° 2. (b) angle AGH and angle EGB are vertically opposite, so angle AGH = 65° 3. (c) angle BGH and angle EGB are on a straight line, so angle BGH = 180 - 65 = 115° 4. (d) angle CHG and angle BGH are alternate angles, so angle CHG = 115° (check: angle CHG and angle GHD make a straight line, 115 + 65 = 180)

Answer: (a) 65° (b) 65° (c) 115° (d) 115°

Question 2

Key idea: Co-interior angles on parallel lines add to 180°.

1. (2x + 10) + (3x - 5) = 180 2. 5x + 5 = 180, so 5x = 175 and x = 35 3. 2(35) + 10 = 80 and 3(35) - 5 = 100

Answer: x = 35; the angles are 80° and 100°

Question 3

Key idea: Alternate angles on parallel lines are equal.

1. 4y - 20 = 2y + 30 2. 2y = 50, so y = 25 3. 4(25) - 20 = 80 (check: 2(25) + 30 = 80 ✓)

Answer: y = 25; each angle is 80°

Question 4

Key idea: Two lines are parallel only if the co-interior angles add to exactly 180°.

1. 72 + 106 = 178 2. 178° ≠ 180°, so the lines are not parallel

Answer: No, because 72° + 106° = 178°, not 180°

Question 5

Key idea: A line through P parallel to both lines creates two pairs of alternate angles.

1. (a) PQ parallel AB, so angle BPQ = angle ABP = 40° (alternate angles, transversal BP) 2. (a) PQ parallel CD, so angle QPD = angle CDP = 35° (alternate angles, transversal DP) 3. (b) angle BPD = angle BPQ + angle QPD = 40 + 35 = 75° 4. (c) The same argument works for any angles, so angle BPD = angle ABP + angle CDP

Answer: (a) angle BPQ = 40°, angle QPD = 35° (alternate angles) (b) 75° (c) angle BPD = angle ABP + angle CDP

Question 6

Key idea: Co-interior angles on parallel lines add to 180°.

1. 180 - 74 = 106 2. The co-interior angle is 106°

Answer: 106°

Question 7

Key idea: Corresponding angles on parallel lines are equal.

1. 3x + 12 = 78 2. 3x = 66, so x = 22

Answer: x = 22

Question 8

Key idea: Alternate angles on parallel lines are equal.

1. 5a - 20 = 3a + 16 2. 2a = 36, so a = 18 3. 5(18) - 20 = 70, and 3(18) + 16 = 70, so each angle is 70°

Answer: (a) a = 18 (b) 70°

Question 9

Key idea: Co-interior angles on parallel lines add to 180°.

1. (2y + 15) + (y + 45) = 180 2. 3y + 60 = 180, so 3y = 120 and y = 40

Answer: y = 40

Question 10

Key idea: Angles on a straight line add to 180°, and corresponding angles on parallel lines are equal.

1. The acute and obtuse angles at the first line lie on a straight line: 180 - 63 = 117° 2. The acute angle at the second line corresponds to the acute angle at the first line, so it is also 63°

Answer: (a) 117° (b) 63°