

Angle Relationships in Triangles and Parallel Lines

Grade 8 math · Test Answer Key · Standards: 8.G.A.5

Award points as indicated in each scoring note. Accept any correct angle fact as a reason, and give credit for a correct method when only a final subtraction is wrong.

Standards: 8.G.A.5 · **Level:** Grade 8

Question 1 Triangle and exterior (2 points)

(a) $180 - 63 - 54 = \mathbf{63^\circ}$

(b) The exterior angle equals $63 + 54 = \mathbf{117^\circ}$. Check: $180 - 63 = 117$.

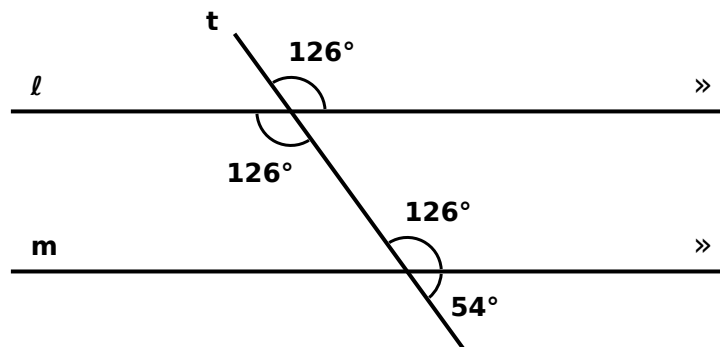
Scoring: 1 point per part.

Question 2 Find three angles (3 points)

(a) a is vertical to the 126° angle: $\mathbf{a = 126^\circ}$.

(b) b and the 126° angle are corresponding angles: $\mathbf{b = 126^\circ}$.

(c) c forms a linear pair with b : $180 - 126 = \mathbf{c = 54^\circ}$.



Answers: $a = 126^\circ$, $b = 126^\circ$, $c = 54^\circ$.

Scoring: 1 point for each correct angle with a valid reason.

Question 3 Equation with parallel lines (3 points)

Alternate interior angles are equal: $6x - 14 = 4x + 16$.

$$2x = 30, \text{ so } x = 15.$$

$$6 \cdot 15 - 14 = 76 \text{ and } 4 \cdot 15 + 16 = 76.$$

$x = 15$; each angle is 76°

Scoring: 1 point for the equation, 1 point for the value of x , 1 point for the angle measure.

Question 4 Triangle with unknowns (3 points)

$$(x + 8) + (2x - 4) + (3x + 2) = 180, \text{ so } 6x + 6 = 180 \text{ and } x = 29.$$

Angles: 37° , 54° , 89° . Check: $37 + 54 + 89 = 180$.

$x = 29$; angles 37° , 54° , 89°

Scoring: 1 point for the equation, 1 point for the value of x , 1 point for the three angles.

Question 5 Exterior angle problem (3 points)

(a) The exterior angle equals the sum of the remote interior angles: $138 = 49 + \angle R$, so **$\angle R = 89^\circ$** .

(b) $\angle PQR$ and the exterior angle form a linear pair: $180 - 138 = \mathbf{42^\circ}$. Check: $49 + 42 + 89 = 180$.

Scoring: part (a) 1 point for the equation, 1 point for the answer; part (b) 1 point.

Question 6 Similar triangles (2 points)

Third angle of triangle 1: $180 - 35 - 80 = 65^\circ$. Third angle of triangle 2: $180 - 80 - 65 = 35^\circ$.

Yes, both have angles 35° , 65° , and 80° , so they are similar by AA

Scoring: 1 point for both third angles, 1 point for the conclusion.

Question 7 Are the lines parallel? (2 points)

For parallel lines, same-side interior angles add to 180° . Here $112 + 78 = 190$.

No, the lines are not parallel

Scoring: 1 point for the sum, 1 point for the conclusion.

Question 8 Skate ramp (2 points)

Top angle: $180 - 90 - 18 = 72^\circ$.

The exterior angle at the top equals the sum of the remote angles: $90 + 18 = 108^\circ$, or $180 - 72 = 108^\circ$.

Top angle 72° ; exterior angle 108°

Scoring: 1 point per angle.