

Angle Relationships and Unknown Angles

Grade 7 math · Test Answer Key · Standards: 7.G.B.5

The answer key gives full solutions and a scoring guide. Give partial credit for a correct equation even if the arithmetic goes wrong afterward, and look for the relationship named: vertical angles equal, linear pairs and supplementary angles total 180° .

Standards: 7.G.B.5 · **Level:** Grade 7

Question 1 Complement and supplement (2 points)

- a. $90^\circ - 29^\circ = \mathbf{61^\circ}$
- b. $180^\circ - 29^\circ = \mathbf{151^\circ}$

Scoring: 1 point for each part.

Question 2 Crossing lines (3 points)

$\angle 2$ is adjacent and supplementary to $\angle 1$: $180^\circ - 118^\circ = 62^\circ$. $\angle 3$ is vertical to $\angle 1$: 118° . $\angle 4$ is vertical to $\angle 2$: 62° .

$\angle 2 = 62^\circ$, $\angle 3 = 118^\circ$, $\angle 4 = 62^\circ$

Scoring: 1 point for each angle with its relationship.

Question 3 Supplementary expressions (2 points)

$5x + 30 = 180$, so $x = 30$. Angles: $3(30) + 14 = 104^\circ$ and $2(30) + 16 = 76^\circ$.

$x = 30$; 104° and 76°

Scoring: 1 point for the equation and solution, 1 point for both angles.

Question 4 Vertical angle equation (3 points)

- a. $6x - 7 = 4x + 19$
- b. $2x = 26$, so **$x = 13$**
- c. $6(13) - 7 = 71$. The vertical angles are **71°** each and the other two are $180^\circ - 71^\circ = \mathbf{109^\circ}$ each.

Scoring: 1 point for each part.

Question 5 Classify and explain (2 points)

- a. $28 + 62 = 90$: **complementary**. $72 + 108 = 180$: **supplementary**.
b. Each obtuse angle is greater than 90° , so two of them add to more than 180° .

Scoring: 1 point for each part.

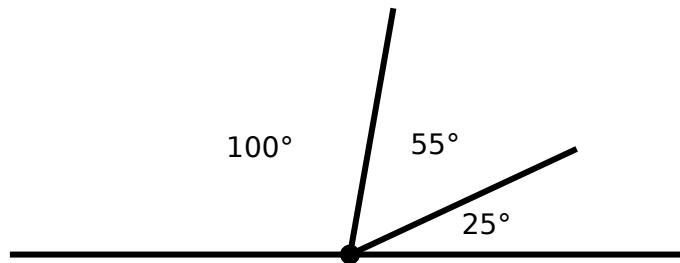
Question 6 Angles on a line (3 points)

$x + (2x + 5) + (3x + 25) = 180$, so $6x + 30 = 180$ and $x = 25$.

Angles: 25° , $2(25) + 5 = 55^\circ$, $3(25) + 25 = 100^\circ$. Check: $25 + 55 + 100 = 180$.

$x = 25$; 25° , 55° , 100°

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



Angles 25° , 55° , 100° total 180° .

Question 7 Comparing with its complement (3 points)

Let the angle be x . Complement: $90 - x$. Equation: $x = 5(90 - x) - 6$.

$x = 450 - 5x - 6$, so $6x = 444$ and $x = 74$. Complement: 16.

The angle is 74° and its complement is 16° .

Scoring: 1 point for the equation, 1 point for solving, 1 point for both angles.

Question 8 Split right angle (2 points)

$(2x + 3) + (x + 12) = 90$, so $3x + 15 = 90$ and $x = 25$.

Angles: $2(25) + 3 = 53^\circ$ and $25 + 12 = 37^\circ$.

$x = 25$; 53° and 37°

Scoring: 1 point for x , 1 point for both angles.