

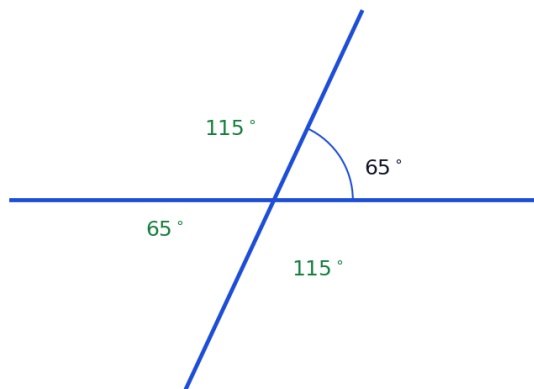
Solutions

2.1 Angle Relationships

2.1.1. Two lines intersect. One angle measures 65° . Find the other three.

Solution. The vertical angle is 65° . Each adjacent angle is $180^\circ - 65^\circ = 115^\circ$.

Vertical angles and linear pairs



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Vertical angles are 65 degrees; each adjacent angle is 115 degrees.

2.1.2. Complementary angles measure $2x$ and $3x$ degrees. Find them.

Solution. $5x = 90$, so $x = 18$. The angles are 36° and 54° .

2.1.3. An angle is 24° less than its supplement. Find the angle.

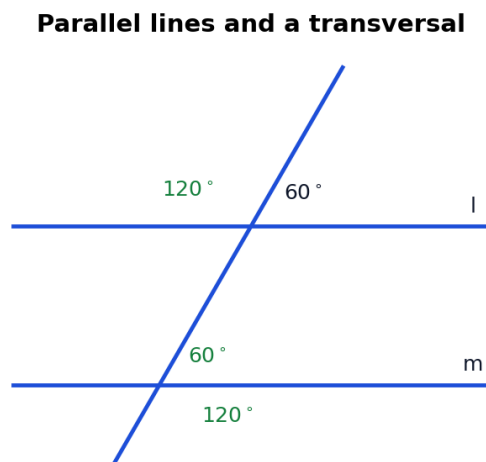
Solution. Let its measure be x . Then $x = (180 - x) - 24$, giving $2x = 156$ and $x = 78^\circ$.

Solutions

2.2 Parallel Lines and Transversals

2.2.1. Parallel lines are cut by a transversal. One acute angle is 60° . Find the other acute angles and the obtuse angles.

Solution. All acute angles are 60° by corresponding and vertical angle relationships. All obtuse angles are 120° by linear pairs.



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Corresponding acute angles are 60 degrees; supplementary obtuse angles are 120 degrees.

2.2.2. Alternate interior angles measure $(3x + 12)^\circ$ and $(5x - 28)^\circ$ on parallel lines. Find their measure.

Solution. Set $3x + 12 = 5x - 28$. Then $x = 20$ and each angle is 72° .

2.2.3. Can equal corresponding angles prove two lines parallel?

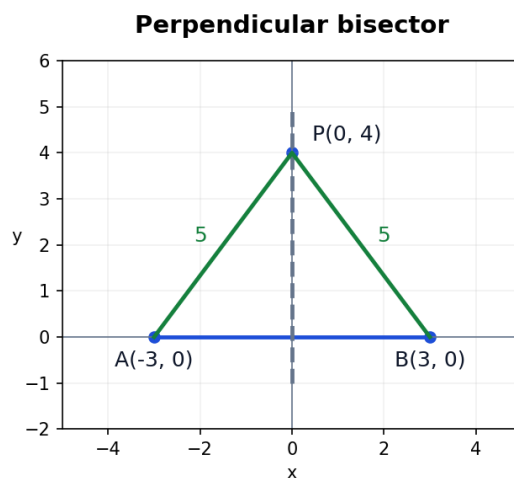
Solution. Yes. The converse of the corresponding angles theorem applies to two coplanar lines cut by a transversal.

Solutions

2.3 Constructions

2.3.1. For $A = (-3, 0)$ and $B = (3, 0)$, give the perpendicular bisector and verify that $P = (0, 4)$ lies on it.

Solution. The midpoint is $(0, 0)$, and the bisector is $x = 0$. Also $PA = PB = 5$.



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The two right triangles give $PA = PB = 5$.

2.3.2. Outline the construction of an angle bisector.

Solution. Draw an arc centered at the vertex meeting both rays. From those two intersection points draw equal-radius intersecting arcs inside the angle. Join the vertex to their intersection.

2.3.3. Why must the radius exceed half the segment length in the perpendicular-bisector construction?

Solution. Otherwise the two circles have fewer than two intersection points, so they do not determine the required line.