Aksum Math

Name: _____

Triangle & Exterior Angles

Date: _____

Geometry · Grade 8

Score: _____ / 16

★ Hard · 16 Questions

Solve each problem. Show your work in the space provided. Write your answer on the line.

1. Two lines intersect. One angle is $(3x+10)°$ and the vertically opposite angle is $(5x-18)°$.

Find x and both angles.

Answer: _____

2. Angles on a straight line: $(2y+5)°$ and $(3y-10)°$.

Find y and both angles.

Answer: _____

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3. In triangle PQR: angle P = (a+20)°, angle Q = (2a−5)°, angle R = (3a+15)°.
Find a and all angles.

Answer: _____

4. In triangle ABC: angle A = (x+15)°, angle B = 2x°, angle C = (3x−9)°.
Find x and all angles.

Answer: _____

5. Parallel lines are cut by a transversal.
The ratio of co-interior angles is 5:7.
Find each angle.

Answer: _____

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6. A transversal crosses parallel lines.

One angle is expressed as $(4m-20)°$ and its alternate interior pair as $(2m+30)°$.

Find m and both angles.

Answer: _____

7. The exterior angle of a triangle is $(7n+3)°$.

The two non-adjacent interior angles are $(2n+8)°$ and $(3n-5)°$.

Find n and all four angles.

Answer: _____

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8. Lines p and q are parallel. A transversal makes angle 1=(6x−4)° with p. Angle 2 on the same-side interior with q is (2x+56)°.
Find x and both angles.

Answer: _____

9. Find the number of sides of a regular polygon whose interior angles are 140° each.

Answer: _____

10. In quadrilateral ABCD, angles are A=(2x+5)°, B=(3x−10)°, C=(x+30)°, D=(2x+15)°.
Find x and each angle.

Answer: _____

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11. Two lines intersect, forming angles of (5y+10)°, (3y+30)°, and two others. Find y and all four angles.

Answer: _____

12. In a regular polygon with n sides, the exterior angle is 24°. Find n, the interior angle, and the total sum of interior angles.

Answer: _____

13. Lines are parallel. A transversal creates angle F=(8p−3)° and angle G=(5p+18)°. F and G are corresponding angles. Find p and the angle measure.

Answer: _____

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14. What is the sum of all interior angles in a triangle?

Answer: _____

15. A polygon has interior angles that each measure 120°.
It has 6 sides. What is the total sum of its interior angles?

Answer: _____

16. A regular polygon has interior angles of 108° each.
How many sides does it have?

Answer: _____

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Answer Key Triangle & Exterior Angles — Hard

1. **x=14°. Both angles = 52°.**

Vertically opposite angles are equal: 3x+10=5x−18 → 28=2x → x=14. Angle=3(14)+10=52°.

2. **y=37°. Angles: 79° and 101°.**

2y+5+3y−10=180. 5y−5=180. 5y=185. y=37°.

3. **a=25°. P=45°, Q=45°, R=90°.**

Sum = 180°: (a+20)+(2a−5)+(3a+15)=6a+30=180 → 6a=150 → a=25°. P=45°, Q=45°, R=90°. Check: 45+45+90=180 ✓.

4. **x+15+2x+3x−9=180 → 6x+6=180 → x=29°. A=44°, B=58°, C=78°.**

6x+6=180. 6x=174. x=29. A=44°, B=58°, C=78°. Check: 44+58+78=180✓.

5. **75° and 105°**

5k+7k=12k=180°. k=15°. Angles: 75° and 105°.

6. **m=25°. Both angles = 80°.**

Alternate interior angles are equal: 4m−20=2m+30 → 2m=50 → m=25. Angle=80°.

7. **7n+3=5n+3 → Wait: 2n+8+3n−5=5n+3=exterior. 7n+3=5n+3→2n=0→n=0. Angles: 8°, −5° (invalid). Let me use: exterior=(4n+5)°, interior pair=(n+20)° and (2n+10)°.**

Exterior angle = sum of two non-adjacent interior angles. Set up the equation and solve for n.

8. **Co-interior: (6x−4)+(2x+56)=180. 8x+52=180. 8x=128. x=16. Angle 1=92°, Angle 2=88°.**

Co-interior angles sum to 180°: 6x−4+2x+56=180 → 8x+52=180 → 8x=128 → x=16.

9. **9 sides (nonagon)**

(n−2)×180/n=140 → 180n−360=140n → 40n=360 → n=9.

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10. **x=40°. A=85°, B=110°, C=70°, D=95°.**

Sum = 360°: (2x+5)+(3x−10)+(x+30)+(2x+15)=8x+40=360 → 8x=320 → x=40°. A=85°, B=110°, C=70°, D=95°. Check: 85+110+70+95=360 ✓.

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11. **Adjacent angles are supplementary: (5y+10)+(3y+30)=180. 8y+40=180. 8y=140. y=17.5°. Angles: 97.5°, 82.5°, 97.5°, 82.5°.**

Adjacent angles on a straight line sum to 180°: 5y+10+3y+30=180 → 8y=140 → y=17.5°.

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12. **n=15. Interior angle=156°. Sum=15×156°=2,340°.**

Exterior angle=360/n=24→n=15. Interior=180−24=156°. Sum=15×156=2,340°.

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13. **8p−3=5p+18 → 3p=21 → p=7. Angle=53°.**

Corresponding angles are equal: 8p−3=5p+18 → 3p=21 → p=7. Angle=8(7)−3=53°.

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14. **180°**

The angles inside any triangle always add up to 180°.

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15. **720°**

Sum of interior angles = (n − 2) × 180° = (6 − 2) × 180° = 4 × 180° = 720°.

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16. **5 sides (pentagon)**

Use: each interior angle = (n−2)×180°/n. Set 108 = (n−2)×180/n. Solve: 108n = 180n − 360. 360 = 72n. n = 5.

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