

Name: \_\_\_\_\_

Due Date: \_\_\_\_\_

Teacher: \_\_\_\_\_

Parent Sign: \_\_\_\_\_

1. Prove that the interior angles of any triangle sum to  $180^\circ$ .
2. In triangle ABC, angle A =  $50^\circ$ , angle B =  $60^\circ$ . Find angle C.
3. In triangle PQR, angle P =  $2x^\circ$ , angle Q =  $3x^\circ$ . Find x and angle R.
4. Triangle ABC is isosceles with  $AB = AC$ . If angle B =  $55^\circ$ , find angles A and C.
5. Triangle XYZ is equilateral. Find each interior angle.
6. In isosceles triangle DEF,  $DE = DF$  and angle E =  $40^\circ$ . Find angle D and angle F.
7. In triangle ABC, angle A =  $x + 10^\circ$ , angle B =  $2x - 5^\circ$ , angle C =  $3x - 15^\circ$ . Find x and all three angles.
8. An exterior angle at vertex C of triangle ABC measures  $110^\circ$ . Find the sum of the two remote interior angles (angles A and B). Then if angle A =  $45^\circ$ , find angle B.
9. In triangle ABC, exterior angle at A equals  $120^\circ$ . If angle B =  $35^\circ$ , find angle C.
10. In triangle PQR, the exterior angle at Q is  $95^\circ$  and one remote interior angle P =  $30^\circ$ . Find angle R.
11. Triangle ABC has a straight-line extension at B producing exterior angle  $130^\circ$  (that is, exterior angle at B is  $130^\circ$ ). If angle C =  $40^\circ$ , find angle A.
12. In triangle MNO,  $MN = NO$  (isosceles). If angle M =  $70^\circ$ , find angle N and angle O.
13. Triangle ABC has  $AB = AC$  and angle A =  $20^\circ$ . Find angle B and angle C.
14. In triangle ABC, angle ACB =  $5x^\circ$ , angle BAC =  $3x^\circ$ . If triangle is isosceles with  $AB = AC$ , find x and all angles.
15. In triangle ABC, angle A =  $4x^\circ$ , angle B =  $(2x + 10)^\circ$ , angle C =  $110^\circ$ . Find x and angles A and B.
16. Triangle ABC is equilateral. A point D lies on side BC. If angle ABD =  $20^\circ$ , find angle ADC (interior at D on triangle side) — (assume D between B and C; answer: ADC is not an interior triangle angle). [This is a trick: identify invalid request or restate?] — Replace with: In equilateral triangle ABC, each angle; then find angle between median and side? (To keep numeracy, replace with simple:) In equilateral triangle ABC, a median from A is drawn to BC. Find angle between median and side AB.
17. In triangle ABC, a line through A is parallel to BC. If alternate interior angles at A are  $70^\circ$  and  $40^\circ$  with respect to sides AB and AC, find all interior angles of triangle ABC. (Interpret: angles between AB and the parallel line etc.) — (This is ambiguous; replace.) Replace with: In triangle ABC, angle between AB and a line through A parallel to BC equals  $60^\circ$ . If angle B =  $50^\circ$ , find angle C.
18. In triangle ABC,  $AB = AC$  and angle B =  $x^\circ$ , angle C =  $2x - 10^\circ$ . Find x.
19. In triangle PQR, angle P =  $90^\circ$ , angle Q =  $x^\circ$ . Find x if angle R =  $3x - 30^\circ$ .
20. Triangle ABC has angle A =  $2x^\circ$ , angle B =  $x + 20^\circ$ , angle C =  $3x - 10^\circ$ . Find x and the angles.
21. At vertex A of triangle ABC an exterior angle equals  $140^\circ$ . The adjacent interior angle B =  $30^\circ$ . Find angle C.
22. Triangle ABC has one exterior angle equal to  $150^\circ$ . If one interior remote angle is  $65^\circ$ , find the other remote interior angle and the interior adjacent angle.
23. In triangle ABC, a line through C meets AB at D making angle ACD =  $110^\circ$  (C exterior). If angle CAB =  $25^\circ$ , find angle ABC.
24. Triangle ABC: angles are in ratio 2:3:4. Find each angle.

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25. Triangle PQR: angles are  $x^\circ$ ,  $x + 20^\circ$ , and  $2x - 10^\circ$ . Find  $x$  and the three angles.
26. Triangle ABC has two equal angles. Angle  $A = 70^\circ$ . Find the other two angles if triangle is isosceles.
27. In isosceles triangle ABC with  $AB = AC$ , angle  $B = (x + 15)^\circ$ , angle  $C = (2x - 5)^\circ$ . Find  $x$  and all angles.
28. Triangle ABC has one angle of  $100^\circ$ . The exterior angle at the second vertex is  $130^\circ$ . Find the three interior angles.
29. In triangle ABC, a transversal through B makes angle between BA and the transversal equal to  $40^\circ$ , and angle between BC and the transversal equal to  $50^\circ$ . Find angle ABC.
30. Triangle ABC has angle  $A = 35^\circ$ , and an exterior angle at C equals  $140^\circ$ . Find angles B and C.
31. In triangle ABC,  $AB = BC$  (isosceles at B). If angle  $C = 40^\circ$ , find angles A and B.
32. Triangle ABC: angle  $A = 3x^\circ$ , angle  $B = 2x^\circ$ , angle  $C = x + 20^\circ$ . Find  $x$  and the angles.
33. At point A, two straight lines form a triangle ABC and a line through A parallel to BC forms an angle of  $120^\circ$  with AB. Find angle C if angle  $B = 30^\circ$ . (Simplify: If a line through A parallel to BC makes a  $120^\circ$  angle with AB, then interior angle at A is supplement  $60^\circ$ .) So: Replace with: In triangle ABC, a line through A parallel to BC makes a  $120^\circ$  angle with AB. If angle  $B = 30^\circ$ , find angle C.
34. Triangle ABC has angles  $4x^\circ$ ,  $5x^\circ$ , and  $6x^\circ$ . Find  $x$  and the angles.
35. In triangle ABC, angle  $A = 80^\circ$ . A point D on extension of BC produces exterior angle at C of  $140^\circ$ , find angle B.
36. In triangle ABC, angle  $B = 45^\circ$ , angle  $C = 55^\circ$ . A line through B meets AC at D forming angle  $CBD = 30^\circ$ . Find angle BAD (assume D on AC). (This is ambiguous; better replace.) Replace with: Triangle ABC: angles  $B = 45^\circ$ ,  $C = 55^\circ$ . Find A and then find angle between altitude from A and side AB? Too complex. Simpler replace with: Triangle ABC has angles  $B = 45^\circ$ ,  $C = 55^\circ$ . Find A.
37. In triangle ABC, angle  $A = x + 10^\circ$ , angle  $C = 2x - 20^\circ$ , and exterior angle at B equals  $150^\circ$ . Find  $x$  and all angles.
38. Triangle ABC: angle  $A = 30^\circ$ , angle  $B = 70^\circ$ . A line through B cuts AC at D such that angle  $CBD = 20^\circ$  (CBD is inside triangle at B). Find angle BDA (angle at D between BD and DA). (This is complex without diagram; avoid.) Replace with: Triangle ABC with  $A=30^\circ$ ,  $B=70^\circ$ . Find C.
39. In triangle ABC, angle  $A = 5x^\circ$ , angle  $B = 3x + 10^\circ$ , angle  $C = 2x + 20^\circ$ . Find  $x$  and all angles.
40. In isosceles triangle ABC with  $AB = AC$ , the exterior angle at B is  $120^\circ$ . Find the interior angles.
41. Triangle ABC has a straight line through B that makes an exterior angle of  $125^\circ$ . The interior adjacent angle at B is therefore  $55^\circ$ . If angle  $A = 40^\circ$ , find angle C.
42. Triangle ABC: angle  $A = 2x$ , angle  $B = 3x - 10$ , angle  $C = x + 20$  (degrees). Find  $x$  and the angles.
43. Triangle with angles in arithmetic progression; smallest angle is  $40^\circ$ . Find the other two angles.
44. Triangle ABC: angle  $A = 4x + 5^\circ$ , angle  $B = 3x - 10^\circ$ , angle  $C = 2x + 5^\circ$ . Find  $x$  and angles.
45. In triangle ABC,  $AB = AC$  and exterior angle at A equals  $140^\circ$ . Find each interior angle.
46. Challenge 1: In triangle ABC,  $AB = AC$ . Point D lies on BC so that angle  $ABD = 20^\circ$  and angle  $DBC = 10^\circ$ . If angle  $BAC = 40^\circ$ , find angle BDC. (Assume configuration consistent with classic geometry puzzle.)
47. Challenge 2: In triangle ABC, angle  $A = 20^\circ$ , angle  $B = 80^\circ$ , angle  $C = 80^\circ$  (isosceles at B and C). A point D is on side AC such that angle  $CBD = 30^\circ$ . Find angle BDC. (Classic geometry-style numeric challenge.)



## Math Worksheet for 8th Grade

### Triangle angles

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48. Challenge 3: In triangle ABC, angle A =  $30^\circ$ , angle B =  $70^\circ$ , angle C =  $80^\circ$ . A point D on AB satisfies angle DCB =  $30^\circ$ . Find angle CDB. (Another geometry challenge.)
49. Challenge 4: In triangle ABC, angle A =  $40^\circ$ , angle B =  $60^\circ$ , angle C =  $80^\circ$ . Points D on AB and E on AC are chosen so that AD = AE. Find angle DEC (angle at E between DE and EC). (This is advanced; assume DE is isosceles apex at A producing known angles.)
50. Triangle ABC has angle A =  $x^\circ$ , angle B =  $2x^\circ$ , angle C =  $180^\circ - 3x^\circ$ . If angle C =  $90^\circ$ , find x and the angles.