

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

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

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

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

- In triangle ABC,  $\angle A = 50^\circ$ ,  $\angle B = 60^\circ$ . Find  $\angle C$ .
- Triangle ABC is right-angled at B ( $\angle B = 90^\circ$ ). If  $\angle A = 30^\circ$ , find  $\angle C$ .
- In triangle PQR,  $\angle P = 2\angle Q$  and  $\angle R = 30^\circ$ . Find  $\angle P$  and  $\angle Q$ .
- Write a short proof (using a line through a vertex parallel to the opposite side) showing that the interior angles of any triangle add to  $180^\circ$ .

Isosceles & equilateral triangles problems

- In an isosceles triangle the two equal base angles measure  $40^\circ$ . What is the vertex angle?
- An isosceles triangle has vertex angle  $20^\circ$ . Find the two base angles.
- In triangle ABC,  $AB = AC$ . If  $\angle B = 55^\circ$ , find  $\angle C$  and  $\angle A$ .
- What is the measure of each angle in an equilateral triangle?
- In isosceles triangle ABC,  $\angle B = 3x + 5$  and  $\angle C = 2x + 20$ . If B and C are the equal angles, find x and all three angles.
- In isosceles triangle ABC,  $AB = AC$ . If  $\angle A = 4x - 10$  and  $\angle B = x + 20$ , find x and all angles.
- A large equilateral triangle is split into three congruent smaller equilateral triangles by connecting the midpoints of the sides. What is the measure of each interior angle of the small triangles?
- A triangle has two equal angles; they are  $3x$  and  $x + 10$ . Find x and all angles.
- A triangle has two equal angles each of measure x, the third angle is  $2x$ . Find all angles.
- In triangle ABC,  $AB = BC$ .  $\angle B = 2x + 10$  and  $\angle A = x + 5$ . Find x and all angles.

Triangle exterior angle example

- An exterior angle of a triangle measures  $120^\circ$ , and one of its remote interior angles measures  $45^\circ$ . Find the other remote interior angle.
- An exterior angle at vertex A measures  $4x + 10$ . The two remote interior angles measure  $x + 5$  and  $2x + 15$ . Find x.
- Give a short proof or explanation (using the triangle angle sum) why an exterior angle of a triangle equals the sum of the two remote interior angles.
- In triangle ABC, the exterior angle at B is  $130^\circ$ . If the two remote interior angles are  $2x$  and  $x + 10$ , find x.
- An exterior angle of a triangle (adjacent to an interior angle of measure  $x + 20$ ) is given as  $3x - 10$ . Solve for x (use the fact that the exterior and its adjacent interior are supplementary).

Worked example: Triangle angles (intersecting lines)

- Two straight lines intersect at O. Triangle AOC uses the rays OA and OC. If  $\angle AOC = 30^\circ$ ,  $\angle A = 2x + 5$ , and  $\angle C = x + 25$ , find x.
- In triangle ABC formed where two lines cross, the angles are:  $\angle A = 2x$ ,  $\angle B = x + 15$ ,  $\angle C = 3x - 15$ . Find x.
- Two lines intersect. Triangle formed by three rays has angles  $3x + 10$ ,  $2x + 5$ , and  $x + 15$ . Find x and each angle.
- At a point two lines cross. Triangle formed has one angle equal to a vertical angle measuring  $70^\circ$ . If another angle in the triangle is  $40^\circ$ , find the third angle.

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25. In triangle ABC,  $\angle A = 5x - 20$ ,  $\angle B = 3x + 10$ ,  $\angle C = 2x + 20$ . Find  $x$  and each angle.

Worked example: Triangle angles (diagram-style / simple descriptions)

26. In triangle ABC, point D is on the extension of BC such that exterior  $\angle ACD = 120$  deg. If  $\angle A = 30$  deg, find  $\angle B$ .

27.  $\angle A = x + 10$ ,  $\angle B = 2x - 5$ ,  $\angle C = 3x + 15$ . Find  $x$ .

28. Right triangle with one acute angle  $x$  and the other acute angle  $2x - 10$  (the third angle is 90 deg). Find  $x$ .

29. In triangle ABC,  $\angle A = \angle B = x + 20$  and  $\angle C = 3x - 10$ . Find  $x$  and the angles.

30. In triangle ABC, AP is an angle bisector of  $\angle A$ . If  $\angle B = 50$  deg and  $\angle C = 60$  deg, what is the measure of  $\angle BAP$  (the angle between AB and the bisector AP)?

Triangle angle challenge problem (multi-step reasoning)

31. In triangle ABC, a line through A meets BC at D (D is between B and C) such that  $\angle BAD = 40$  deg and  $\angle CAD = 30$  deg. Find  $\angle A$ ,  $\angle B$ , and  $\angle C$  if  $\angle B = 2\angle C$ .

32. Triangle ABC has  $\angle B = 3\angle A$  and  $\angle C = 2\angle A$ . Find all angles.

33. In triangle ABC, the exterior angle at C measures 140 deg. If  $\angle A = 3x$  and  $\angle B = x + 20$ , find  $x$ .

34. Points D and E are on AB and AC respectively so  $DE \parallel BC$ . If  $\angle A = 50$  deg and  $\angle D = 30$  deg (D is the angle at A formed with AD and DE), find  $\angle B$  and  $\angle C$ .

35. In triangle ABC,  $\angle A$  is three times  $\angle B$  and  $\angle C$  is 20 deg more than  $\angle B$ . Find the three angles.

36. Triangle ABC has  $\angle A = 4x + 5$ ,  $\angle B = 3x - 10$ ,  $\angle C = 2x + 15$ . Find  $x$ .

37. If the exterior angle at A is twice the interior angle at B, and the third interior angle is 10 deg, find all interior angles of the triangle.

38. In triangle ABC, the median from A splits  $\angle A$  into angles of measure  $x$  and  $2x$ . If  $\angle B = 3x + 5$ , find  $x$  and all angles. (Assume the median lies inside the angle and does not otherwise change relations.)

39. In  $\triangle ABC$ ,  $AB = AC$  and  $\angle B$  in degrees is 10 more than  $\angle A$ . Find the angles.

40. In triangle ABC, a point P inside the triangle has  $\angle APB = 120$  deg,  $\angle BPC = 30$  deg,  $\angle CPA = 30$  deg. Verify whether this information is possible (do these three angles sum to 360 deg at point P?) and deduce if triangle ABC is acute, right or obtuse.

Triangle angle challenge problem 2 (harder / word problems)

41. A triangular roof truss is isosceles with base angles 58 deg. A support beam from the apex down to the base splits the apex angle into two equal angles. Find each of the new angles formed at the apex and the angle between each support beam and the base (the base angles that are adjacent).

42. A triangular plot has interior angles in arithmetic progression. The smallest angle is 40 deg. Find the other two.

43. A triangle has interior angles in the ratio 2 : 3 : 4. Find the angles.

44. A triangle has angles  $(x + 20)$ ,  $(2x - 10)$ , and  $(3x + 5)$ . Solve for  $x$  and the angles.

45. In triangle ABC, a line through B is drawn parallel to AC meeting the extension of AB at D. If  $\angle DBC = 70$  deg and  $\angle C = 40$  deg, find  $\angle A$ .



## Math Worksheet for 8th Grade

### Triangle angles

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46. A gardener wants to create triangular beds. One bed has angles 35 deg, 55 deg, and 90 deg. If she places two of these right triangles together along the 90 deg side to get a larger triangle, what are the interior angles of the larger triangle formed? (Assume the triangles are joined along the legs forming a new triangle.)
47. Triangle ABC has  $\angle A = 2x + 10$ ,  $\angle B = 3x - 5$ . If  $AB = AC$ , find  $x$  and all angles.
48. One triangle has angles equal to 3 consecutive integers (in degrees). Find the three angles.
49. The measures of the angles of triangle ABC are in the ratio 5:6:7. Find the angles.
50. A triangle has two angles in the ratio 1:2 and the third angle is 30 deg more than the larger of the two. Find all three angles.