Two-column proofs: give the reason worksheet – Grade 10

Grade 10 · Mixed level · 20 questions · **Version X6062**

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1. In a proof, ∠A = 41° and ∠B = 37°, so ∠C = 102°. What is the reason?
   A. Angles of a triangle add to 180° **B.** Given **C.** Angles on a straight line
   D. Isosceles triangle

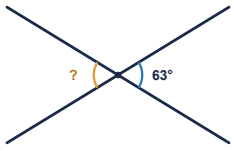
2. In a proof about △ABD and △CBD, the line "BD = BD" appears. What is the reason?
   A. Given **B.** Shared side **C.** Vertically opposite angles **D.** Midpoint

3. In △PQR, PQ = PR, so ∠Q = ∠R. What is the reason?
   A. Vertically opposite angles **B.** Parallel lines **C.** Shared side
   D. Base angles of an isosceles triangle

4. In a proof, "AM = MB" follows from "M is the midpoint of AB". What is the reason?
   A. Definition of a midpoint **B.** Shared side **C.** SSS **D.** Given

5. AB is a straight line and C lies on it. A ray makes angle 44° at C with CA. What is the angle it makes with CB, and why?
   A. 44°, vertically opposite angles **B.** 316°, angles around a point
   C. 44°, complementary angles **D.** 136°, angles on a straight line

6. Two lines cross. One angle is 63°. The angle across from it is also 63°. What is the reason?



   A. Vertically opposite angles are equal **B.** Corresponding angles **C.** Given
   D. Angles on a straight line add to 180°

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7. In a proof, $\angle A = 68°$ and $\angle B = 70°$, so $\angle C = 42°$. What is the reason?

   A. Given **B.** Angles of a triangle add to 180° **C.** Angles on a straight line

   D. Isosceles triangle

8. In two triangles, two pairs of angles and the sides between them are equal. Which reason shows they are congruent?

   A. ASA **B.** SSS **C.** SAS **D.** RHS

9. ABCD is a parallelogram. Prove $\triangle ABD \cong \triangle CDB$. What is the reason in the row marked "?"

Statement	Reason
AB = CD	Opposite sides of a parallelogram
AD = CB	Opposite sides of a parallelogram
BD = DB	Shared side
△ABD ≅ △CDB	?

   A. SSS **B.** Given **C.** Opposite sides of a parallelogram

   D. Subtract $\angle CEB$ from both equations

10. AB ∥ CD and a transversal cuts them. Prove that the alternate angles are equal. What is the reason in the row marked "?"

Statement	Reason
Angle 1 = angle 2	Corresponding angles on parallel lines
Angle 2 = angle 3	?
Angle 1 = angle 3	Both equal angle 2

    A. P and Q are midpoints **B.** Angles on a straight line **C.** Given

    D. Vertically opposite angles

11. In $\triangle ABC$, P and Q are the midpoints of AB and AC. Prove BC = 2PQ. What is the reason in the row marked "?"

Statement	Reason
AP/AB = AQ/AC = 1/2	P and Q are midpoints
$\angle PAQ = \angle BAC$	?
△APQ ~ △ABC	SAS similarity
BC = 2PQ	Corresponding sides are in the same ratio

    A. Opposite sides of a parallelogram **B.** Shared angle

    C. Subtract $\angle CEB$ from both equations **D.** Vertically opposite angles

12. Here is a proof. Lines AB and CD cross at E. Prove $\angle AEC = \angle BED$. Which reason belongs in the row marked "?"

Statement	Reason
$\angle AEC + \angle CEB = 180°$	Angles on a straight line
$\angle BED + \angle CEB = 180°$	Angles on a straight line
$\angle AEC = \angle BED$	?

    A. Shared side **B.** Subtract $\angle CEB$ from both equations **C.** Shared angle

    D. Angles on a straight line

13. In two triangles, all three pairs of sides are equal. Which reason shows they are congruent?

    A. RHS **B.** SSS **C.** SAS **D.** ASA

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14. In a proof about a parallelogram ABCD, "AB ∥ DC, so ∠ABD = ∠CDB". What is the reason?

    A. Vertically opposite angles **B.** Corresponding angles on parallel lines

    C. Alternate angles on parallel lines **D.** Shared angle

15. A proof says: AB = CD (given), and CD = EF (given). So AB = EF. What is the reason?

    A. Both equal CD **B.** SSS **C.** Shared side **D.** Definition of a midpoint

16. Prove the angles of a triangle add to 180°. Draw a line through A parallel to BC. Which statement should come last in this proof?

    A. ∠2 = ∠C **B.** ∠1 = ∠B **C.** ∠A + ∠B + ∠C = 180° **D.** ∠1 + ∠A + ∠2 = 180°

17. Lines AB and CD cross at E. Prove ∠AEC = ∠BED. Which reason goes in the "?" row?

Statement	Reason
∠AEC + ∠CEB = 180°	Angles on a straight line
∠BED + ∠CEB = 180°	?
∠AEC = ∠BED	Subtract ∠CEB from both equations

    A. M is a midpoint **B.** Corresponding angles on parallel lines

    C. Corresponding sides are in the same ratio **D.** Angles on a straight line

18. To prove two triangles similar, which is enough?

    A. One pair of equal angles **B.** One pair of equal sides **C.** Equal areas

    D. Two pairs of equal angles

19. In △ABC, AB = AC, and M is the midpoint of BC. Prove △ABM ≅ △ACM. Which reason goes in the "?" row?

Statement	Reason
AB = AC	?
BM = CM	M is a midpoint
AM = AM	Shared side
△ABM ≅ △ACM	SSS

    A. Vertically opposite angles **B.** Shared angle **C.** Given **D.** SSS

20. In △ABC, P and Q are the midpoints of AB and AC. Prove BC = 2PQ. Which reason goes in the "?" row?

Statement	Reason
AP/AB = AQ/AC = 1/2	?
∠PAQ = ∠BAC	Shared angle
△APQ ~ △ABC	SAS similarity
BC = 2PQ	Corresponding sides are in the same ratio

    A. P and Q are midpoints **B.** Both equal angle 2

    C. Corresponding sides are in the same ratio **D.** Corresponding angles on parallel lines

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Answer key · Version X6062

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1. **A (Angles of a triangle add to 180°)**
2. **B (Shared side)**
3. **D (Base angles of an isosceles triangle)**
4. **A (Definition of a midpoint)**
5. **D (136°, angles on a straight line)**
6. **A (Vertically opposite angles are equal)**
7. **B (Angles of a triangle add to 180°)**
8. **A (ASA)**
9. **A (SSS)**
10. **D (Vertically opposite angles)**
11. **B (Shared angle)**
12. **B (Subtract ∠CEB from both equations)**
13. **B (SSS)**
14. **C (Alternate angles on parallel lines)**
15. **A (Both equal CD)**
16. **C (∠A + ∠B + ∠C = 180°)**
17. **D (Angles on a straight line)**
18. **D (Two pairs of equal angles)**
19. **C (Given)**
20. **A (P and Q are midpoints)**

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