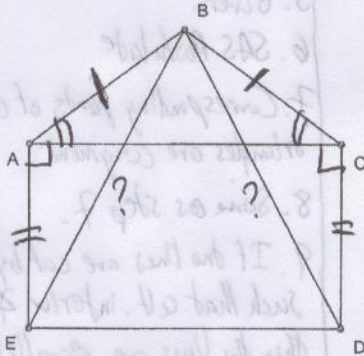


Quadrilateral Proofs Worksheet

Some of the following proofs were on old Regents examinations. These will be similar to the proofs that you will see on the Regents exam at the end of the year, so study carefully! Remember that a plan is almost always helpful before you dive right in.

1) (Source: August 2002 #41)

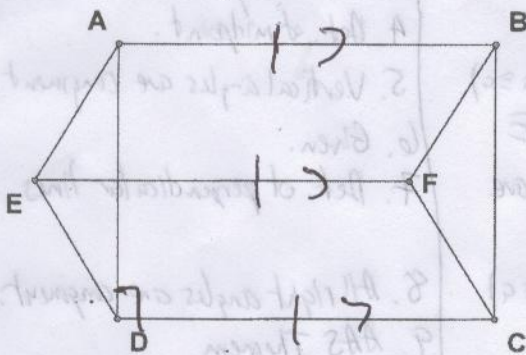


Given: $ACDE$ is a rectangle.
 $\overline{AB} \cong \overline{CB}$
 Prove: $\overline{BE} \cong \overline{BD}$

Plan: Show $\triangle BAE \cong \triangle BCD$ by SAS Postulate.

Statements	Reasons
1. $ACDE$ is a rectangle.	1. Given.
2. $\overline{AB} \cong \overline{CB}$ ($s \cong s$).	2. Given.
3. $\angle BAC \cong \angle BCA$	3. If two sides of a triangle are congruent, then the angles opposite them are congruent.
4. $\angle EAC$ and $\angle DCB$ are right angles.	4. All angles of a rectangle are right angles.
5. $\angle EAC \cong \angle DCB$	5. All right angles are congruent.
6. $\angle BAC + \angle EAC \cong \angle BCA + \angle DCB$ - or - $\angle BAE \cong \angle BCD$ ($a \cong a$)	6. Addition Postulate.
7. $\overline{AE} \cong \overline{CD}$ ($s \cong s$)	7. Opposite sides of a rectangle are congruent.
8. $\triangle BAE \cong \triangle BCD$	8. SAS Postulate.
9. $\overline{BE} \cong \overline{BD}$	9. Corresponding parts of congruent triangles are congruent.

2) (Source: August 1978 #33)



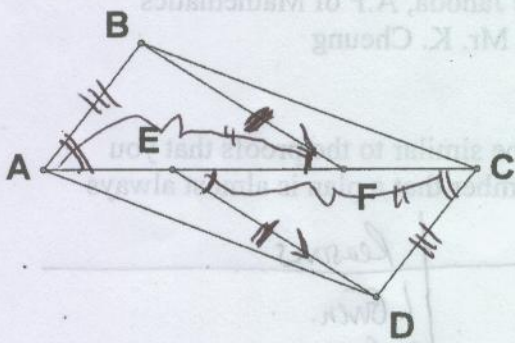
Given:
 $ABFE$ is a parallelogram
 $DCFE$ is a parallelogram
 $\overline{AD} \perp \overline{DC}$

Prove: $ABCD$ is a rectangle.

Plan: Show $ABCD$ is a parallelogram w/ one side of opp. parallel sides.

Statements	Reasons
1. $ABFE$ and $DCFE$ are parallelograms	1. Given.
2. $\overline{AB} \cong \overline{EF}$, $\overline{EF} \cong \overline{DC}$	2. Opposite sides of a parallelogram are congruent.
3. $\overline{AB} \cong \overline{DC}$	3. Transitive Property.
4. $\overline{AB} \parallel \overline{EF}$, $\overline{EF} \parallel \overline{DC}$	4. Opposite sides of a parallelogram are parallel.
5. $\overline{AB} \parallel \overline{DC}$	5. If two lines are parallel to the same line, then they are parallel.
6. $ABCD$ is a parallelogram	6. If a quadrilateral has one pair of opposite parallel and congruent sides, then it is a parallelogram.
7. $\overline{AD} \perp \overline{DC}$	7. Given.
8. $\angle ADC$ is a right angle.	8. Definition of perpendicular lines.
9. $ABCD$ is a rectangle.	9. If a parallelogram has a right angle, then it is a rectangle.

3) (Source: August 1972 #34)



Given:
Quadrilateral $ABCD$ with diagonal \overline{AEFC}

$$\overline{AF} \cong \overline{EC}$$

$$\overline{BF} \cong \overline{ED}$$

$$\angle BFA \cong \angle DEC$$

Prove: $ABCD$ is a parallelogram

Plan: Show $ABCD$ has a pair of opp. \parallel sides.

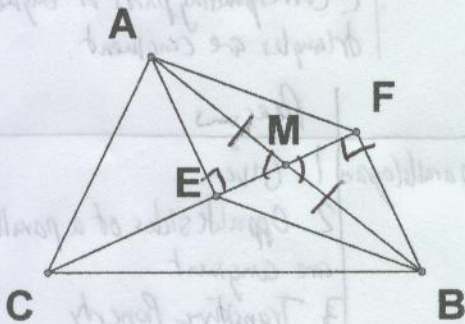
Statements

1. Quad $ABCD$ with diagonal \overline{AEFC} .
2. $\overline{AF} \cong \overline{EC}$ (s \cong s)
3. $\overline{BF} \parallel \overline{ED}$
4. $\angle BFA \cong \angle DEC$ (a \cong a)
5. $\overline{BF} \cong \overline{ED}$ (s \cong s)
6. $\triangle BFA \cong \triangle DEC$
7. $\overline{BA} \cong \overline{CD}$
8. $\angle BAC \cong \angle DCA$
9. $\overline{BA} \parallel \overline{CD}$
10. $ABCD$ is a parallelogram.

Reasons

1. Given.
2. Given.
3. Given.
4. If two parallel lines are cut by a transversal, then alt. int. \angle 's are congruent.
5. Given.
6. SAS Postulate
7. Corresponding parts of congruent triangles are congruent.
8. Same as step 7.
9. If two lines are cut by a transversal such that alt. interior \angle 's are \cong , then the lines are parallel.
10. If a quadrilateral has one pair of opp. parallel congruent sides, then it is a parallelogram.

4) (Source: June 1970 #32)



Given:
 \overline{CM} is a median to \overline{AB} in $\triangle ABC$
 $\overline{AE} \perp \overline{CF}$
 $\overline{BF} \perp \overline{CE}$

Prove: $AEBF$ is a parallelogram

Plan: Note: You can use something different - I am going to prove that the diagonals bisect each other.

Statements

1. \overline{CM} is a median to \overline{AB} in $\triangle ABC$
2. M is the midpt. of \overline{AB}
3. \overline{EF} bisects \overline{AB}
4. $\overline{AM} \cong \overline{MB}$ (s \cong s)
5. $\angle AEM \cong \angle BMF$ (v \cong v)
6. $\overline{AE} \perp \overline{CF}$, $\overline{BF} \perp \overline{CE}$
7. $\angle AEM$ and $\angle BFM$ are right angles.
8. $\angle AEM \cong \angle BFM$ (a \cong a)
9. $\triangle AEM \cong \triangle BFM$
10. $\overline{EM} \cong \overline{MF}$
11. M is the midpt. of \overline{EF}
12. \overline{AB} bisects \overline{EF}
13. $AEBF$ is a parallelogram.

Reasons

1. Given.
2. Def. of median.
3. Def. of segment bisector.
4. Def. of midpoint.
5. Vertical angles are congruent.
6. Given.
7. Def. of perpendicular lines.
8. All right angles are congruent.
9. AAS Theorem.
10. Corresponding parts of congruent triangles are congruent.
11. Def. of midpoint.
12. Def. of segment bisector.
13. If a quadrilateral has diagonals that bisect each other, then it is a parallelogram.