4 Lesson Practice Level B

LESSON 4.5

Practice B

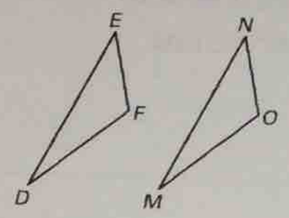
For use with pages 249–255

State the third congruence that is needed to prove that $\triangle DEF \cong \triangle MNO$ using the given postulate or theorem.

1. **GIVEN:** $\overline{DE} \cong \overline{MN}$, $\angle M \cong \angle D$, ___?___ $\cong$ ___?___
   Use the SAS Congruence Postulate. $\overline{DF} \cong \overline{MO}$

2. **GIVEN:** $\overline{FE} \cong \overline{ON}$, $\angle F \cong \angle O$, ___?___ $\cong$ ___?___
   Use the AAS Congruence Theorem. $\angle D \cong \angle M$

3. **GIVEN:** $\overline{DF} \cong \overline{MO}$, $\angle F \cong \angle O$, ___?___ $\cong$ ___?___
   Use the ASA Congruence Postulate. $\angle D \cong \angle M$

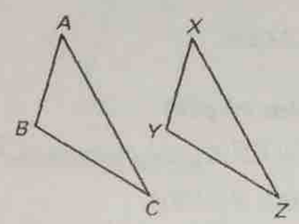


State the third congruence that is needed to prove that $\triangle ABC \cong \triangle XYZ$ using the given postulate or theorem.

4. **GIVEN:** $\angle A \cong \angle X$, $\angle B \cong \angle Y$, ___?___ $\cong$ ___?___ $\overline{BC} \cong \overline{YZ}$ or $\overline{AC} \cong \overline{XZ}$
   Use the AAS Congruence Theorem.

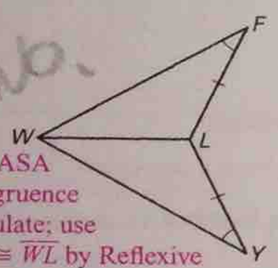
5. **GIVEN:** $\angle A \cong \angle X$, $\overline{AB} \cong \overline{XY}$, ___?___ $\cong$ ___?___
   Use the ASA Congruence Postulate. $\angle B \cong \angle Y$

6. **GIVEN:** $\overline{BC} \cong \overline{YZ}$, $\angle C \cong \angle Z$, ___?___ $\cong$ ___?___
   Use the AAS Congruence Theorem. $\angle A \cong \angle X$



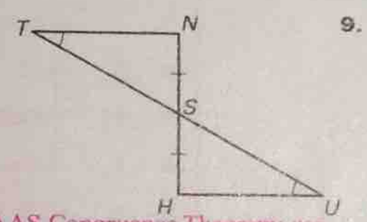
Is it possible to prove that the triangles are congruent? If so, state the postulate(s) or theorem(s) you would use.

7. No.



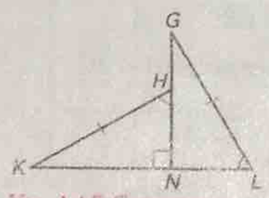
Yes, ASA Congruence Postulate; use $\overline{WL} \cong \overline{WL}$ by Reflexive Property of Congruence

8.



Yes, AAS Congruence Theorem; use $\angle TSN \cong \angle USH$ by Vertical Angles Theorem

9.



Yes, AAS Congruence Theorem

Tell whether you can use the given information to determine whether $\triangle JRM \cong \triangle XYZ$. *Explain* your reasoning. See below.

10. $\overline{JM} \cong \overline{XZ}$, $\angle M \cong \angle Z$, $\angle R \cong \angle Y$

11. $\overline{JM} \cong \overline{XZ}$, $\overline{JR} \cong \overline{XY}$, $\angle J \cong \angle X$

12. $\angle J \cong \angle X$, $\angle M \cong \angle Z$, $\angle R \cong \angle Y$

13. $\angle M \cong \angle Z$, $\angle R \cong \angle Y$, $\overline{JM} \cong \overline{XY}$

10. Yes, AAS Congruence Theorem

11. Yes, SAS Congruence Postulate

12. No; three pairs of congruent angles is insufficient to prove triangle congruence.

13. No; two angles and a non-included side are congruent, but the non-included sides are not corresponding parts.

LESSON 4.5

LESSON 4.5

Practice B *continued*

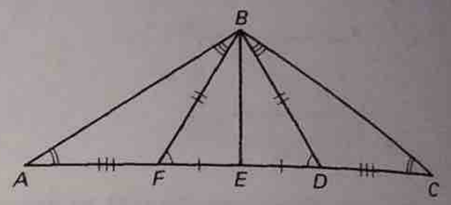
For use with pages 249–255

Explain how you can prove that the indicated triangles are congruent using the given postulate or theorem. See below.

14. $\triangle BEF \cong \triangle BED$ by SAS

15. $\triangle ADB \cong \triangle CFB$ by ASA

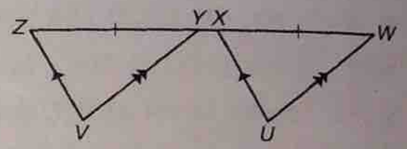
16. $\triangle AFB \cong \triangle CDB$ by AAS



17. **Proof** Complete the proof.

GIVEN: $\overline{WU} \parallel \overline{YV}$, $\overline{XU} \parallel \overline{ZV}$, $\overline{WX} \cong \overline{YZ}$

PROVE: $\triangle WXU \cong \triangle YZV$



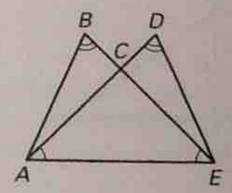
Statements	Reasons
1. $\overline{WU} \parallel \overline{YV}$	1. ___?___ Given
2. $\angle UWX \cong \angle VYZ$	2. ___?___ Corresponding Angles Postulate
3. $\overline{XU} \parallel \overline{ZV}$	3. ___?___ Given
4. $\angle UXW \cong \angle VZY$	4. ___?___ Corresponding Angles Postulate
5. $\overline{WX} \cong \overline{YZ}$	5. ___?___ Given
6. $\triangle WXU \cong \triangle YZV$	6. ___?___ ASA Congruence Postulate

18. **Proof** Write a proof.

GIVEN: $\angle B \cong \angle D$, $\angle DAE \cong \angle BEA$

PROVE: $\triangle ABC \cong \triangle EDC$

We are given that $\angle B \cong \angle D$. By the Converse of Base Angles Theorem, $\overline{AC} \cong \overline{EC}$. By the Vertical Angles Theorem, $\angle BCA \cong \angle DCE$. $\triangle ABC \cong \triangle EDC$ by the AAS Congruence Theorem.



14. Two pairs of corresponding sides ($\overline{BF} \cong \overline{BD}$, $\overline{EF} \cong \overline{ED}$) and the corresponding included angles ($\angle BFE \cong \angle BDE$) are congruent.

15. Two pairs of corresponding angles ($\angle ADB \cong \angle CFB$, $\angle BAD \cong \angle BCF$) and the corresponding included sides ($\overline{AD} \cong \overline{CF}$) are congruent.

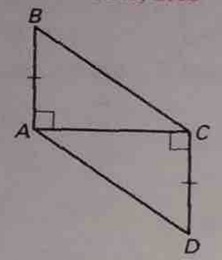
16. Two pairs of corresponding angles ($\angle ABF \cong \angle CBD$, $\angle BAF \cong \angle BCD$) and the corresponding non-included sides ($\overline{AF} \cong \overline{CD}$) are congruent.

Practice B

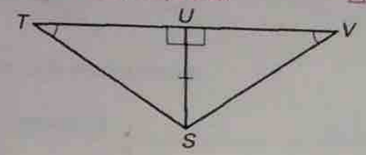
For use with pages 256–263

Tell which triangles you can show are congruent in order to prove the statement. What postulate or theorem would you use?

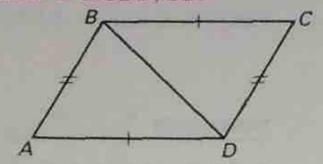
1. $\overline{BC} \cong \overline{AD}$
$\triangle ABC \cong \triangle CDA$; SAS



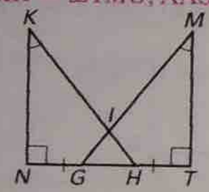
2. $\angle TSU \cong \angle VSU$
$\triangle TSU \cong \triangle VSU$; AAS



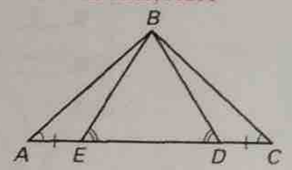
3. $\angle ADB \cong \angle CBD$
$\triangle ABD \cong \triangle CDB$; SSS



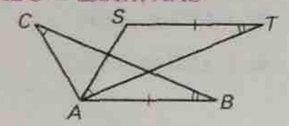
4. $\angle KHN \cong \angle MGT$
$\triangle NKH \cong \triangle TMG$; AAS



5. $\overline{BD} \cong \overline{BE}$
$\triangle ABD \cong \triangle CBE$; ASA

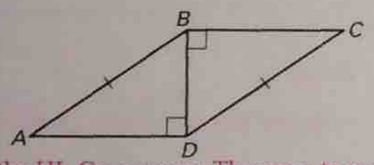


6. $\overline{BC} \cong \overline{AT}$
$\triangle ABC \cong \triangle STA$; AAS



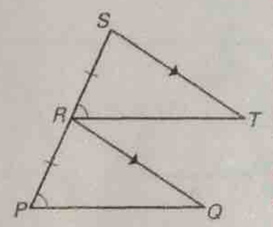
Use the diagram to write a plan for a proof.

7. PROVE: $\angle DAB \cong \angle BCD$



Use the HL Congruence Theorem to prove that $\triangle DAB \cong \triangle BCD$. Then use the fact that corresponding parts of congruent triangles are congruent to prove that $\angle DAB \cong \angle BCD$.

8. PROVE: $\overline{ST} \cong \overline{RQ}$



Because $\overline{ST} \parallel \overline{RQ}$, $\angle PRQ \cong \angle RST$ by the Corresponding Angles Postulate. Use the ASA Congruence Postulate to prove that $\triangle PRQ \cong \triangle RST$. Then use the fact that corresponding parts of congruent triangles are congruent to prove that $\overline{ST} \cong \overline{RQ}$.

Use the vertices of $\triangle ABC$ and $\triangle DEF$ to show that $\angle A \cong \angle D$. *Explain* your reasoning.

9. $A(1, 2)$, $B(4, -3)$, $C(2, 5)$, $D(4, 7)$, $E(7, 2)$, $F(5, 10)$

10. $A(2, 3)$, $B(2, 9)$, $C(6, 6)$, $D(8, 5)$, $E(8, 11)$, $F(12, 8)$

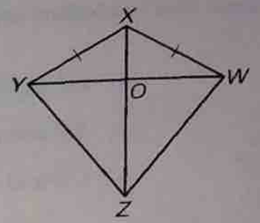
9. Use the Distance Formula to find the side lengths of the triangles. Use the SSS Congruence Postulate to show that $\triangle ABC \cong \triangle DEF$. Then use the fact that corresponding parts of congruent triangles are congruent to prove that $\angle A \cong \angle D$.

10. Use the Distance Formula to find the side lengths of the triangles. Use the SSS Congruence Postulate to show that $\triangle ABC \cong \triangle DEF$. Then use the fact that corresponding parts of congruent triangles are congruent to prove that $\angle A \cong \angle D$.

Practice B *continued*

For use with pages 256–263

11. Proof Complete the proof.



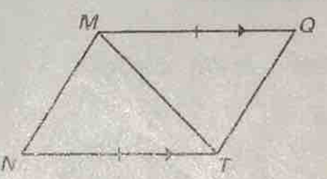
GIVEN: $\overline{YX} \cong \overline{WX}$
$\overline{ZX}$ bisects $\angle YXW$.

PROVE: $\overline{YZ} \cong \overline{WZ}$

Statements	Reasons
1. $\overline{YX} \cong \overline{WX}$	1. ? Given
2. $\overline{ZX}$ bisects $\angle YXW$.	2. ? Given
3. $\angle YXZ \cong \angle WXZ$	3. ? Definition of angle bisector
4. $\overline{XZ} \cong \overline{XZ}$	4. ? Reflexive Property of Congruence
5. $\triangle YXZ \cong \triangle WXZ$	5. ? SAS Congruence Postulate
6. $\overline{YZ} \cong \overline{WZ}$	6. ? Corresponding parts of congruent triangles are congruent.

Use the information given in the diagram to write a proof.

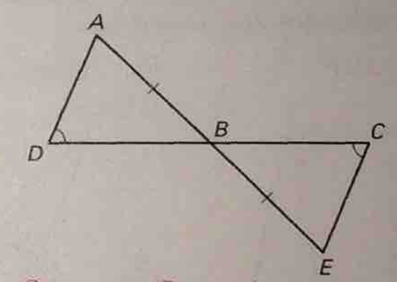
12. PROVE: $\overline{MN} \cong \overline{TQ}$



Statements (Reasons)

1. $\overline{MQ} \cong \overline{NT}$ (Given)
2. $\overline{MQ} \parallel \overline{NT}$ (Given)
3. $\angle NTM \cong \angle QMT$ (Alternate Interior Angles Theorem)
4. $\overline{MT} \cong \overline{MT}$ (Reflexive Property of Congruence)
5. $\triangle NTM \cong \triangle QMT$ (SAS Congruence Postulate)
6. $\overline{MN} \cong \overline{TQ}$ (Corresponding parts of congruent triangles are congruent.)

13. PROVE: $\overline{DB} \cong \overline{CB}$



Statements (Reasons)

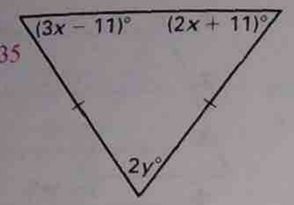
1. $\overline{AB} \cong \overline{BE}$ (Given)
2. $\angle ADB \cong \angle ECB$ (Given)
3. $\angle ABD \cong \angle EBC$ (Vertical Angles Theorem)
4. $\triangle ABD \cong \triangle EBC$ (AAS Congruence Theorem)
5. $\overline{DB} \cong \overline{CB}$ (Corresponding parts of congruent triangles are congruent.)

Practice B

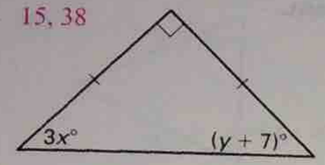
For use with pages 264–270

Find the values of *x* and *y*.

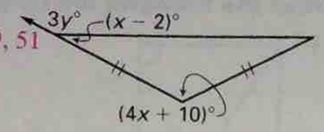
1. 22, 35



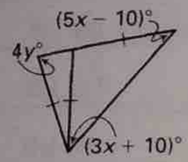
2. 15, 38



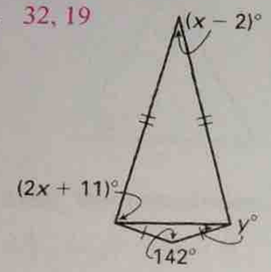
3. 29, 51



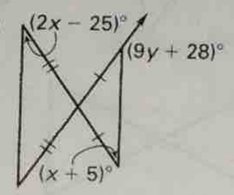
4. 10, 20



5. 32, 19

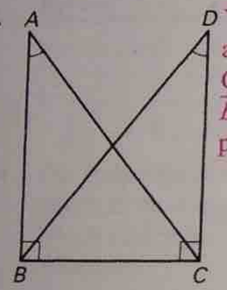


6. 30, 13



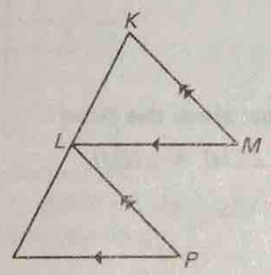
Decide whether enough information is given to prove that the triangles are congruent. *Explain* your answer.

7.



You can prove the triangles are congruent by AAS Congruence Theorem. Use $\overline{BC} \cong \overline{BC}$ by the reflexive property of congruence.

8.

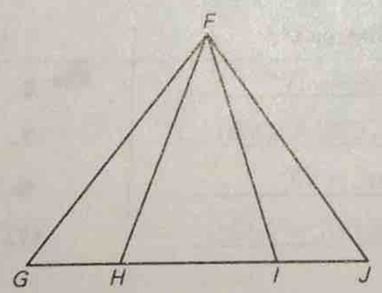


There is not enough information. You only know that $\angle M \cong \angle P$, because two sets of lines are parallel. You do not know the lengths of any of the sides.

In Exercises 9 and 10, complete the proof.

9. GIVEN: $\overline{FG} \cong \overline{FJ}$, $\overline{HG} \cong \overline{IJ}$

PROVE: $\overline{HF} \cong \overline{IF}$



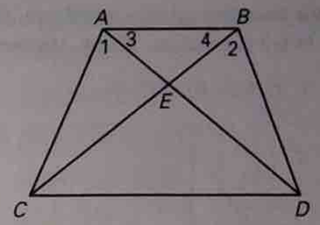
Statements	Reasons
1. $\overline{FG} \cong \overline{FJ}$	1. ? Given
2. ? $\angle G \cong \angle J$	2. Base Angles Theorem
3. $\overline{HG} \cong \overline{IJ}$	3. ? Given
4. ? $\triangle FGH \cong \triangle FJI$	4. SAS Congruence Postulate
5. $\overline{HF} \cong \overline{IF}$	5. ? Corresponding parts of congruent triangles are congruent.

Practice B *continued*

For use with pages 264–270

10. GIVEN: $\angle 1 \cong \angle 2$, $\overline{AC} \cong \overline{BD}$

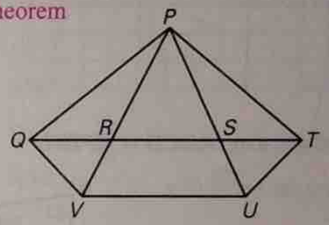
PROVE: $\angle 3 \cong \angle 4$



Statements	Reasons
1. $\angle 1 \cong \angle 2$	1. ? Given
2. $\overline{AC} \cong \overline{BD}$	2. ? Given
3. $\angle AEC \cong \angle BED$	3. ? Vertical Angles Theorem
4. ? $\triangle AEC \cong \triangle BED$	4. AAS Congruence Theorem
5. $\overline{AE} \cong \overline{BE}$	5. ? Corresponding parts of congruent triangles are congruent.
6. $\angle 3 \cong \angle 4$	6. ? Base Angles Theorem

In Exercises 11–16, use the diagram. Complete the statement. Tell what theorem you used.

$\angle PQR \cong \angle PTS$



11. If $\overline{PQ} \cong \overline{PT}$, then $\angle$? $\cong \angle$?. *Q, T*; Base Angles Theorem

12. If $\angle PQV \cong \angle PVQ$, then ? $\cong$?.
PQ, PV; Converse of Base Angles Theorem

13. If $\overline{RP} \cong \overline{SP}$, then $\angle$? $\cong \angle$?.
PRS, PSR; Base Angles Theorem

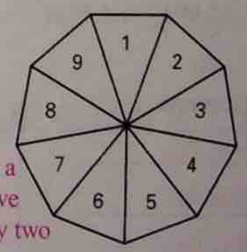
14. If $\overline{TP} \cong \overline{TR}$, then $\angle$? $\cong \angle$?.
PRT, RPT; Base Angles Theorem

15. If $\angle PSQ \cong \angle SPQ$, then ? $\cong$?.
QS, QP; Converse of Base Angles Theorem

16. If $\angle PUV \cong \angle PVU$, then ? $\cong$?. $\overline{PU}$, $\overline{PV}$; Converse of Base Angles Theorem

In Exercises 17–19, use the following information.

Prize Wheel A radio station sets up a prize wheel when they are out promoting their station. People spin the wheel and receive the prize that corresponds to the number the wheel stops on. The 9 triangles in the diagram are isosceles triangles with congruent vertex angles.



17. The measure of the vertex angle of triangle 1 is 40°. Find the measures of the base angles. 70°

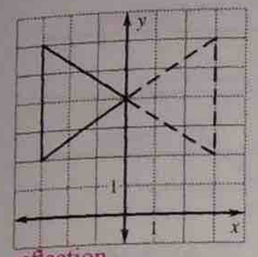
18. Explain how you know that triangle 1 is congruent to triangle 6.
Each of the triangles is isosceles and every pair of adjacent triangles have a common side, so the legs of all the triangles are congruent by the Transitive Property of Congruence. The common vertex angles are congruent, so any two of the triangles are congruent by the SAS Congruence Postulate.

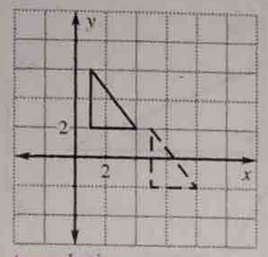
19. Trace the prize wheel. Then form a triangle whose vertices are the midpoints of the bases of the triangles 1, 4, and 7. What type of triangle is this? equilateral

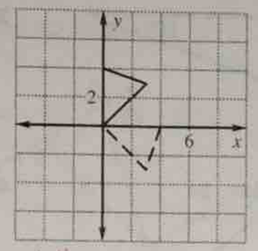
Practice B

For use with pages 271–279

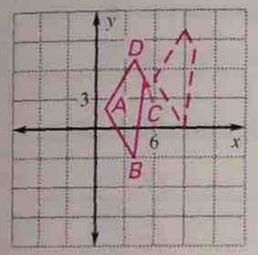
Name the type of transformation shown.

1. 
reflection

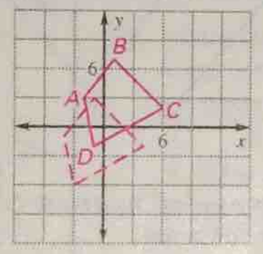
2. 
translation

3. 
rotation

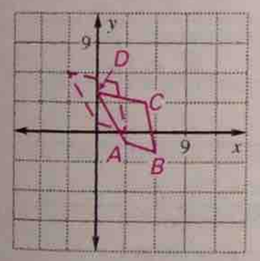
4. Figure $ABCD$ has vertices $A(1, 2)$, $B(4, -3)$, $C(5, 5)$, and $D(4, 7)$. Sketch $ABCD$ and draw its image after the translation $(x, y) \rightarrow (x + 5, y + 3)$.



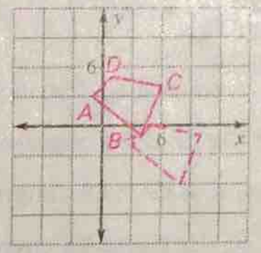
5. Figure $ABCD$ has vertices $A(-2, 3)$, $B(1, 7)$, $C(6, 2)$, and $D(-1, -2)$. Sketch $ABCD$ and draw its image after the translation $(x, y) \rightarrow (x - 2, y - 4)$.



6. Figure $ABCD$ has vertices $A(3, -1)$, $B(6, -2)$, $C(5, 3)$, and $D(0, 4)$. Sketch $ABCD$ and draw its image after the translation $(x, y) \rightarrow (x - 3, y + 2)$.



7. Figure $ABCD$ has vertices $A(-1, 3)$, $B(4, -1)$, $C(6, 4)$, and $D(1, 5)$. Sketch $ABCD$ and draw its image after the translation $(x, y) \rightarrow (x + 4, y - 5)$.



Use coordinate notation to describe the translation.

8. 3 units to the right, 5 units down
$(x, y) \rightarrow (x + 3, y - 5)$

9. 7 units to the left, 2 units down
$(x, y) \rightarrow (x - 7, y - 2)$

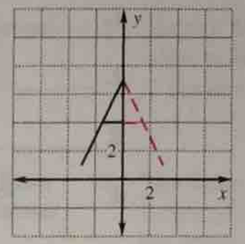
10. 4 units to the left, 6 units up
$(x, y) \rightarrow (x - 4, y + 6)$

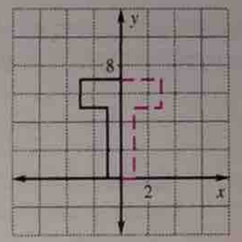
11. 1 unit to the right, 8 units up
$(x, y) \rightarrow (x + 1, y + 8)$

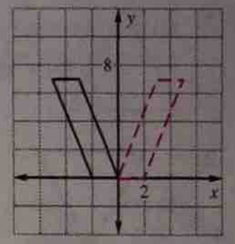
Practice B *continued*

For use with pages 271–279

Use a reflection in the *y*-axis to draw the other half of the figure.

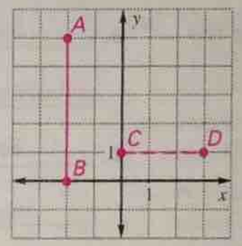
12. 

13. 

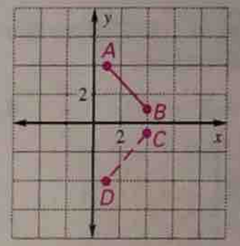
14. 

Use the coordinates to graph $\overline{AB}$ and $\overline{CD}$. Tell whether $\overline{CD}$ is a rotation of $\overline{AB}$ about the origin. If so, give the angle and direction of rotation.

15. $A(-2, 5)$, $B(-2, 0)$, $C(0, 1)$, $D(3, 1)$


not a rotation

16. $A(1, 4)$, $B(4, 1)$, $C(1, -4)$, $D(4, -1)$


rotation; 90° clockwise

Complete the statement using the description of the translation. In the description, points (2, 0) and (3, 4) are two vertices of a triangle.

17. If (2, 0) translates to (4, 1), then (3, 4) translates to __?__. (5, 5)

18. If (2, 0) translates to (−2, −1), then (3, 4) translates to __?__. (−1, 3)

A point on an image and the translation are given. Find the corresponding point on the original figure.

19. Point on image: (2, −4); translation: $(x, y) \rightarrow (x - 4, y + 3)$ (6, −7)

20. Point on image: (−5, −7); translation: $(x, y) \rightarrow (x, -y)$ (−5, 7)

21. **Verifying Congruence** Verify that $\triangle DEF$ is a congruence transformation of $\triangle ABC$. Explain your reasoning.
Use the Distance Formula to show that corresponding sides are congruent. $\triangle ABC \cong \triangle DEF$ by SSS Congruence Postulate.