Selected Response

1. $\triangle ABC \cong \triangle DEF$, $EF = x^2 - 7$, and $BC = 4x - 2$. Find the values of x.

- (A) -1 and 5
- (C) 1 and 5
- (B) -1 and 6
- (D) 2 and 3

2. For two lines and a transversal, $\angle 1$ and $\angle 2$ are same-side interior angles, $\angle 2$ and $\angle 3$ are vertical angles, and $\angle 3$ and $\angle 4$ are alternate exterior angles. Which classification best describes the angle pair $\angle 2$ and $\angle 4$?

- (F) Adjacent angles
- (G) Alternate interior angles
- (H) Corresponding angles
- (J) Vertical angles

3. If $\triangle ABC \cong \triangle PQR$ and $\triangle RPQ \cong \triangle XYZ$, which of the following angles is congruent to $\angle CAB$?

- (A) $\angle QRP$
- (C) $\angle YXZ$
- (B) $\angle XZY$
- (D) $\angle XYZ$

4. For $\triangle ABC$ and $\triangle DEF$, $\angle A \cong \angle F$, and $\overline{AC} \cong \overline{EF}$. Which of the following would allow you to conclude that these triangles are congruent by AAS?

- (F) $\angle ABC \cong \angle EDF$
- (G) $\angle ACB \cong \angle EDF$
- (H) $\angle BAC \cong \angle FDE$
- (J) $\angle CBA \cong \angle FED$

5. The measure of $\angle 1$ is 4 times the measure of its supplement. What is the measure, in degrees, of $\angle 1$?

- (A) 36
- (C) 135
- (B) 45
- (D) 144

6. R has coordinates $(-4, 9)$. S has coordinates $(4, -6)$. What is RS?

- (F) 8
- (H) 17
- (G) 15
- (J) 23

**Use the figure below for Items 7 and 8.**
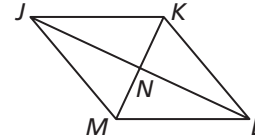
7. If $\overline{JK} \parallel \overline{ML}$, what additional information do you need to prove that quadrilateral $JKLM$ is a parallelogram?

- (A) $\overline{JM} \cong \overline{KL}$
- (B) $\overline{MN} \cong \overline{LN}$
- (C) $\angle MLK$ and $\angle LKJ$ are right angles.
- (D) $\angle JML$ and $\angle KLM$ are supplementary.

8. Given that $JKLM$ is a parallelogram and that $m\angle KLN = 25°$, $m\angle JMN = 65°$, and $m\angle JML = 130°$, which term best describes quadrilateral $JKLM$?

- (F) Rectangle
- (G) Rhombus
- (H) Square
- (J) Trapezoid

9. The vertices of $\square ABCD$ are $A(1, 4)$, $B(4, y)$, $C(3, -2)$, and $D(0, -3)$. What is the value of y?

- (A) 3
- (C) 5
- (B) 4
- (D) 6

10. Quadrilateral $RSTU$ is a kite. What is the length of $\overline{RV}$?
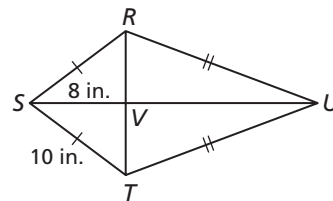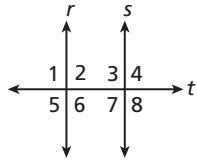

- (F) 4 inches
- (H) 6 inches
- (G) 5 inches
- (J) 13 inches

11. Which of the following is NOT valid for proving that triangles are congruent?

(A) AAA   (C) SAS

(B) ASA   (D) HL

12. Which condition guarantees that $r \parallel s$?

(F) $\angle 1 \cong \angle 2$ (H) $\angle 2 \cong \angle 3$

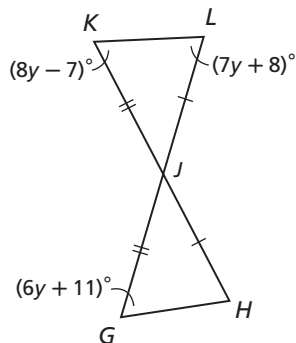(G) $\angle 2 \cong \angle 7$ (J) $\angle 1 \cong \angle 4$

13. Two lines a and b are cut by a transversal so that $\angle 1$ and $\angle 2$ are same-side interior angles. If $m\angle 1 = (2x + 30)^\circ$ and $m\angle 2 = (4x - 75)^\circ$, what value of x proves that $a \parallel b$?

(A) 22.5   (C) 45

(B) 37.5   (D) 67.5

14. Heather is 1.6 m tall and casts a shadow of 3.5 m. At the same time, a barn casts a shadow of 17.5 m. Find the height of the barn in meters.

(F) 5   (H) 14

(G) 8   (J) 38

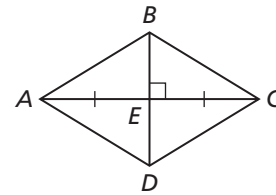**15.** What is the measure, in degrees, of $\angle H$?

(A) 17   (C) 65

(B) 44   (D) 71

16. $\triangle JKL \cong \triangle XYZ$, and $JK = 10 - 2n$. $XY = 2$, and $YZ = n^2$. What is KL?

(F) 2   (H) 8

(G) 4   (J) 16

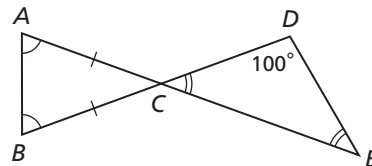**Use the diagram for Items 17 and 18.**

17. Which of these congruence statements can be proved from the information given in the figure?

(A) $\triangle AEB \cong \triangle CED$

(B) $\triangle BAC \cong \triangle DAC$

(C) $\triangle ABD \cong \triangle BCA$

(D) $\triangle DEC \cong \triangle DEA$

18. What other information is needed to prove that $\triangle CEB \cong \triangle AED$ by the HL Congruence Theorem?

(F) $\overline{AD} \cong \overline{AB}$

(G) $\overline{BE} \cong \overline{AE}$

(H) $\overline{CB} \cong \overline{AD}$

(J) $\overline{DE} \cong \overline{CE}$
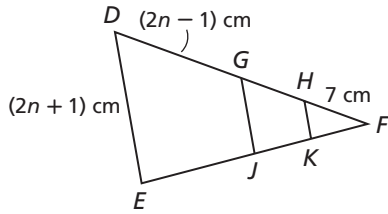
19. What is the measure of $\angle ACD$?

(A) 40°   (C) 100°

(B) 80°   (D) 140°

20. Congruent segments have equal measures. A segment bisector divides a segment into two congruent segments. $\overrightarrow{XY}$ intersects $\overline{DE}$ at X and bisects $\overline{DE}$. Which conjecture is valid?

(F) $m\angle YXD = m\angle YXE$

(G) Y is between D and E.

(H) $DX = XE$

(J) $DE = YE$

21. $\overline{GJ}$ is a midsegment of $\triangle DEF$, and $\overline{HK}$ is a midsegment of $\triangle GFJ$. What is the length of $\overline{HK}$?

D (2n − 1) cm
G
H 7 cm
(2n + 1) cm
F
K
J
E

    (A) 2.25 centimeters

    (B) 4 centimeters

    (C) 7.5 centimeters

    (D) 9 centimeters

22. In $\triangle ABC$ and $\triangle DEF$, $\overline{AC} \cong \overline{DE}$, and $\angle A \cong \angle E$. Which of the following would allow you to conclude by SAS that these triangles are congruent?

    (F) $\overline{AB} \cong \overline{DF}$

    (G) $\overline{AC} \cong \overline{EF}$

    (H) $\overline{BA} \cong \overline{FE}$

    (J) $\overline{CB} \cong \overline{DF}$

23. The coordinates of the vertices of quadrilateral $RSTU$ are $R(1, 3)$, $S(2, 7)$, $T(10, 5)$, and $U(9, 1)$. Which term best describes quadrilateral $RSTU$?

    (A) Parallelogram   (C) Rhombus

    (B) Rectangle   (D) Trapezoid

24. If quadrilateral $MNPQ$ is a parallelogram, what is the value of x?

M
N
$(3x + 3)°$
$3y°$
$(2y − 5)°$
Q
P
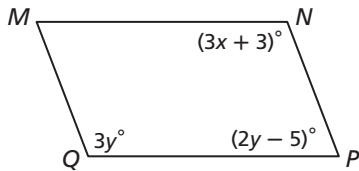
    (F) 36   (H) 38

    (G) 37   (J) 72

25. Quadrilateral $RSTU$ is a rectangle with diagonals $\overline{RT}$ and $\overline{SU}$. If $RT = 4a + 2$ and $SU = 6a − 25$, what is the value of a?

    (A) 2.7   (C) 13.5

    (B) 11.5   (D) 20.5

Use the diagram for Items 26 and 27.

A
2 B
1
E
3
C
D
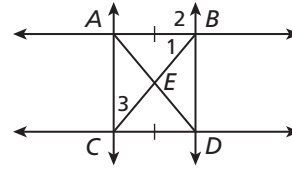
26. Given that $\overline{AB} \cong \overline{CD}$, which additional information would be sufficient to prove that $ABCD$ is a parallelogram?

    (F) $\overline{AB} \parallel \overline{CD}$

    (G) $\overline{AC} \parallel \overline{BD}$

    (H) $\angle CAB \cong \angle CDB$

    (J) E is the midpoint of $\overline{AD}$.

27. If $\overleftrightarrow{AC}$ is parallel to $\overleftrightarrow{BD}$ and $m\angle 1 + m\angle 2 = 140°$, what is the measure of $\angle 3$?

    (A) 20°   (C) 50°

    (B) 40°   (D) 70°

Mini-Tasks

28. $\triangle ABC$ has vertices $A(-2, 0)$, $B(2, 2)$, and $C(2, -2)$. $\triangle DEC$ has vertices $D(0, -1)$, $E(2, 0)$, and $C(2, -2)$. Prove that $\triangle ABC \sim \triangle DEC$.

29. $\triangle ABC$ and $\triangle ABD$ share side $\overline{AB}$. Given that $\triangle ABC \sim \triangle ABD$, use AAS to explain why these two triangles must also be congruent.

30. Given $\ell \parallel m$ with transversal t, explain why $\angle 1$ and $\angle 8$ are supplementary.

ℓ
m
2 3
8 7
1 4
5 6
t
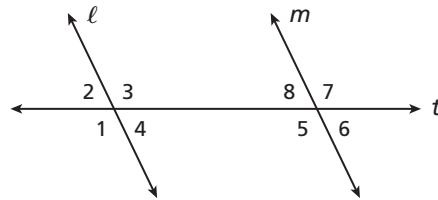
31. In $\triangle RST$, S is on the perpendicular bisector of $\overline{RT}$, $m\angle S = (4n + 16)°$, and $m\angle R = (3n - 18)°$. Find $m\angle R$. Show your work and explain how you determined your answer.

32. Use the given two-column proof to write a flowchart proof.

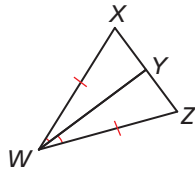**Given:** $\overline{DE} \cong \overline{FH}$
Prove: $DE = FG + GH$

Two-column proof:

Statements	Reasons
1. $\overline{DE} \cong \overline{FH}$	**1.** Given
2. $DE = FH$	**2.** Def. of $\cong$ segs.
3. $FG + GH = FH$	**3.** Seg. Add. Post.
4. $DE = FG + GH$	**4.** Subst.

Performance Tasks

33. a. Complete the following proof by filling in the missing statements and reasons.

Given: $\overline{WY}$ bisects $\angle XWZ$,
$\overline{WX} \cong \overline{WZ}$
Prove: $\overline{WY}$ bisects $\overline{XZ}$

Statements	Reasons
1. ___?___	**1.** Given
2. $\overline{WX} \cong \overline{WZ}$	**2.** ___?___
3. $\overline{WY} \cong \overline{WY}$	**3.** ___?___
4. $\angle XWY \cong \angle ZWY$	**4.** Def. of angle bisector
5. ___?___	**5.** SAS
6. $\overline{XY} \cong \overline{ZY}$	**6.** ___?___
7. ___?___	**7.** ___?___

b. Another student claims that you don't need SAS to prove this result. Is the student correct? Which congruence theorem could you use? Rewrite the proof using that theorem.

34. Abstract Furnishings is a company that specializes in designing and making unusual furniture. The diagram shows one of their bookshelf designs.
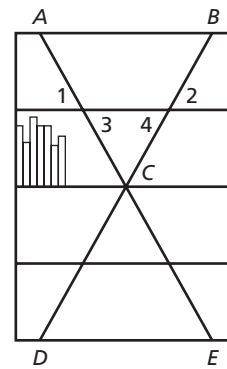
a. Complete the two-column proof.

Given: $\angle 1 \cong \angle 2$
Prove: $\angle 3 \cong \angle 4$

Statements	Reasons
1. $\angle 1 \cong \angle 2$	**1.** Given
2. $m\angle 1 = m\angle 2$	**2.** Def. of $\cong$ $\angle$s
3. $\angle 1 \cong$ ___?___	**3.** Vert. $\angle$s Thm.
4. $m\angle 1 = m\angle 3$	**4.** Def. of $\cong$ $\angle$s
5. $\angle 2 \cong \angle 4$	**5.** ___?___
6. $m\angle 2 = m\angle 4$	**6.** Def. of $\cong$ $\angle$s
7. $m\angle 1 = m\angle 4$	**7.** ___?___
8. $m\angle 3 = $ ___?___	**8.** Substitution
9. $\angle 3 \cong \angle 4$	**9.** Def. of $\cong$ $\angle$s

b. The designer wants to change the design so that AB is smaller, while keeping C fixed in place. How will this affect the numbered angle measures? Include a sketch with your answer.

c. If $\angle 1 \cong \angle 2$ is still true in the new design, can you still conclude $\angle 3 \cong \angle 4$? Explain why or why not.