1. Which figure has $90°$ rotational symmetry?

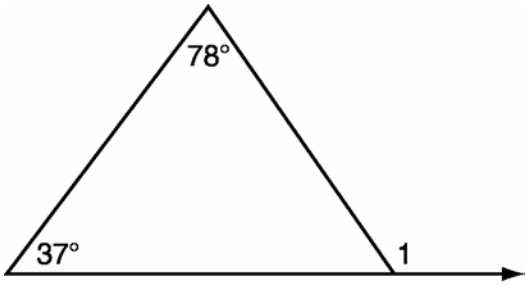
   A. square

   B. regular hexagon

   C. regular pentagon

   D. equilateral triangle

2. What is the measure of $\angle 1$ in the figure below?



(Not drawn to scale)

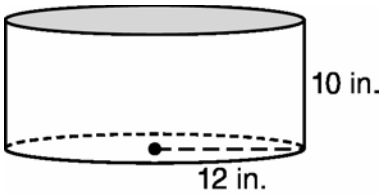
   A. $41°$

   B. $65°$

   C. $102°$

   D. $115°$

3. What is the volume of the right cylinder below, in terms of π ?



   A. 120π cubic inches

   B. 240π cubic inches

   C. $1{,}200\pi$ cubic inches

   D. **$1{,}440\ \pi$** cubic inches

4. Two students started at the coordinate (0, 0). Student A walked 7 units east and 5 units south. Student B walked 4 units west and 1 unit south. How many units apart are the students?

A. 11

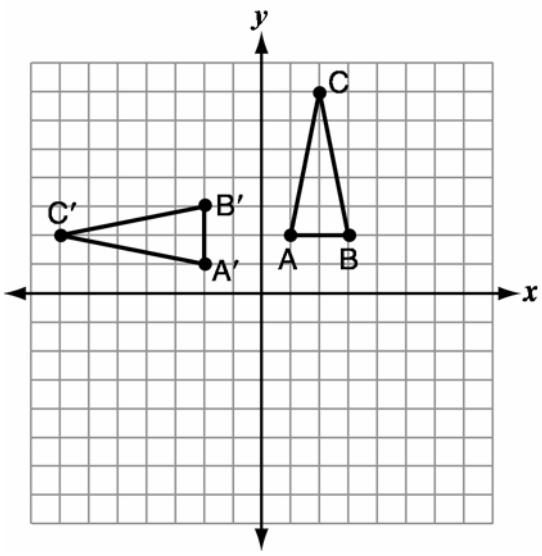
B. $\sqrt{137}$

C. $\sqrt{153}$

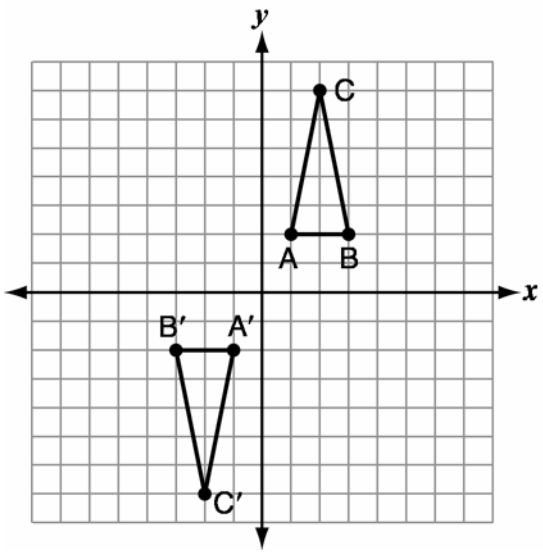
D. $\sqrt{157}$

5. Triangle ABC is rotated 90 degrees clockwise about the origin onto triangle A'B'C'. Which illustration represents the correct position of triangle A'B'C' ?

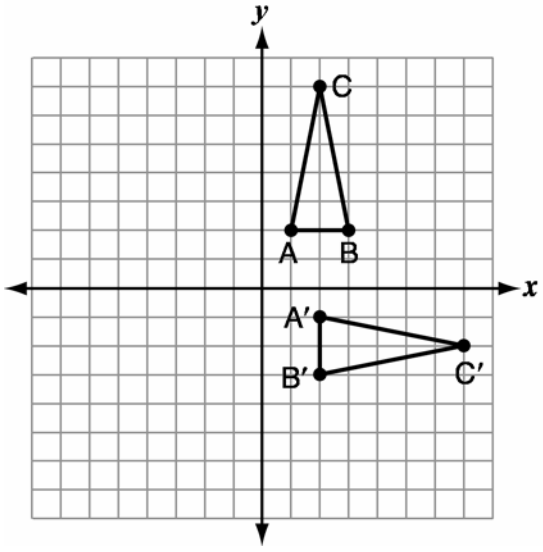
A.



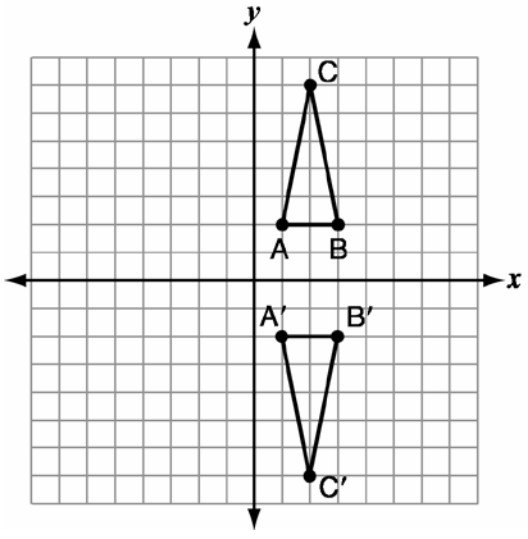
B.



C.



D.



6. The vertices of square ABCD are A $(3, 1)$, B $(3,-1)$, C $(5,-1)$, and D $(5, 1)$. This square is dilated so that A' is at $(3, 1)$ and C' is at $(8,-4)$. What are the coordinates of D' ?

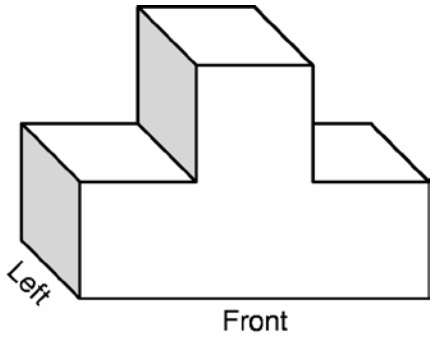
A. $(6,-4)$

B. $(6,-2)$

C. $(8, 1)$

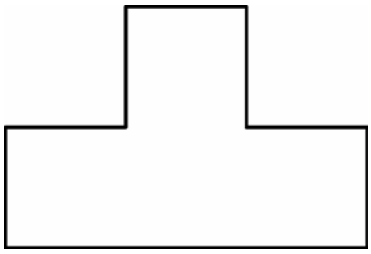
D. $(8, 4)$

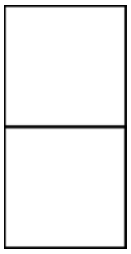
7. Which diagram shows the top view of the solid below?



A. 

B. 

C. 

D. 

8. Which classification describes $\triangle MNO$ with vertices **M(-2,3) , N(3,1)** and $O(-3,\ 1)$

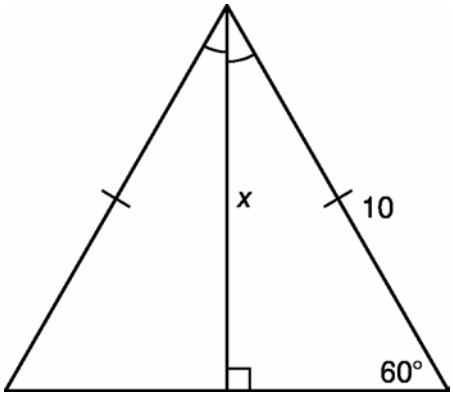
A. equilateral

B. isosceles

C. right

D. scalene

9. What is the value of *x* ?



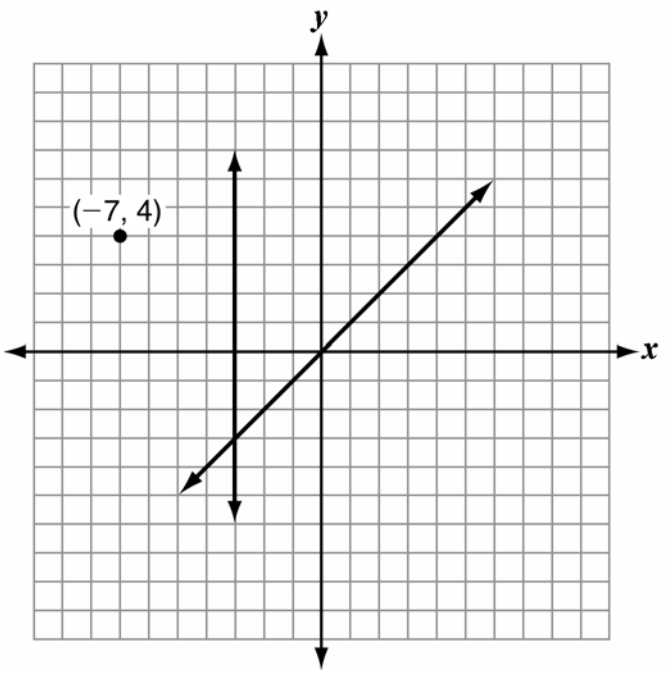
A. 5

B. $5\sqrt{3}$

C. 10

D. $10\sqrt{3}$

10. The point $(-7, 4)$ is reflected over the line $x = -3$. Then, the resulting point is reflected over the line $y = x$. Where is the point located after both reflections?



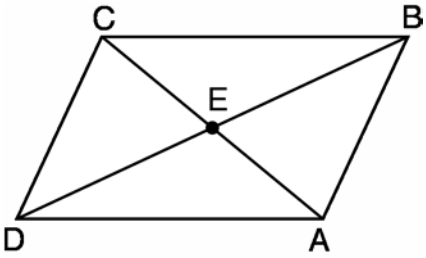
A. $(-10, -7)$

B. $(1, 4)$

C. $(4, -7)$

D. $(4, 1)$

11. Given: E is the midpoint of $\overline{AC}$; $\overline{DE} \cong \overline{EB}$



Which of these can *not* be proven?

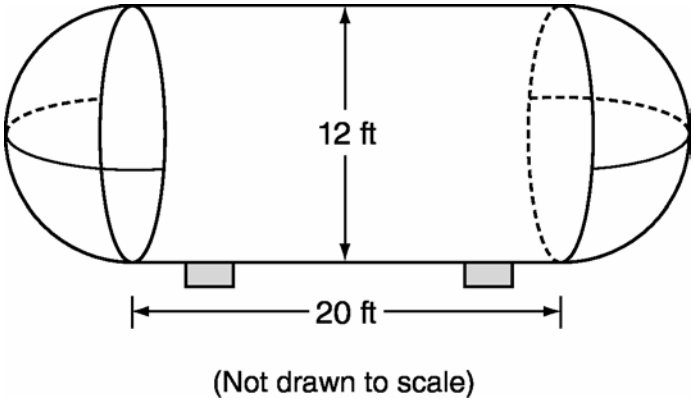
A. $\triangle CEB \cong \triangle AED$

B. $\triangle CED \cong \triangle AEB$

C. $\triangle DAB \cong \triangle BCD$

D. $\triangle DBA \cong \triangle ACD$

12. A tank has been designed in the shape shown below.



What is the volume of the tank, in terms of π ?

A. $288\ \pi\ ft^3$

B. $720\pi\ ft^3$

C. $1{,}008\pi\ ft^3$

D. $5{,}184\pi\ ft^3$

13. Given the coordinates of A $(\mathbf{3,\ 6})$, B $(\mathbf{5,\ 2})$, and C $(\mathbf{9,\ 4})$, which coordinates for D make ABCD a square?

A. $(6,\ 7)$

B. $(7,\ 8)$

C. $(7,\ 9)$

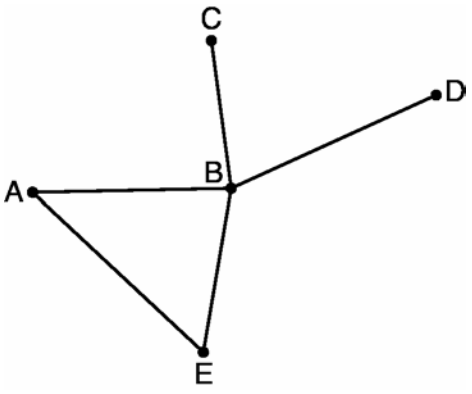
D. $(8,\ 7)$

14. The numbers in the chart below represent the number of edges that directly join each pair of vertices.

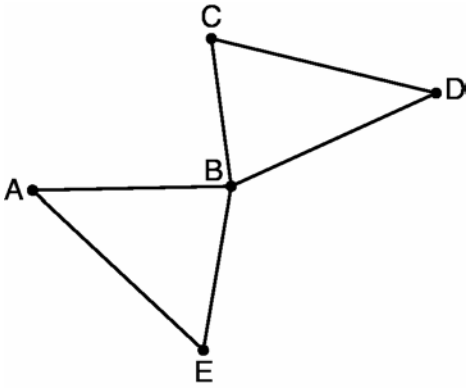
	A	B	C	D	E
A	0	1	0	0	1
B	1	0	1	1	1
C	0	1	0	1	0
D	0	1	1	0	0
E	1	1	0	0	0

Which vertex-edge graph matches the chart?

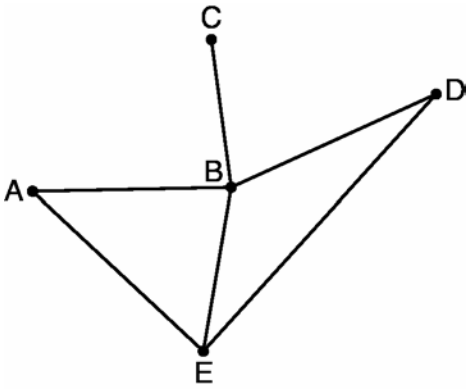
A.



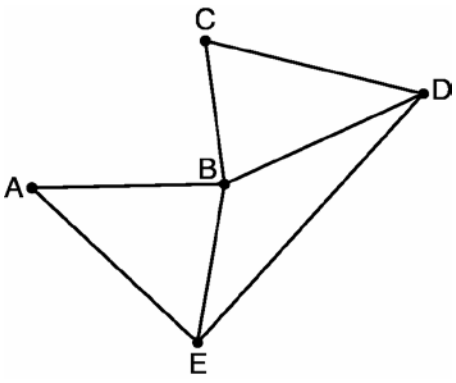
B.



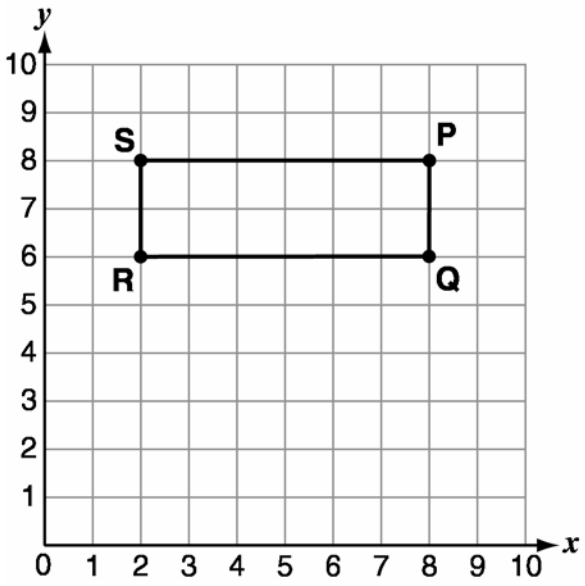
C.



D.



15. Rectangle PQRS with vertices P(8, 8), Q(8, 6), R(2, 6), and S(2, 8) is shown below. An image is drawn using a scale factor of $\frac{1}{2}$.



What is the area of the image of PQRS after the dilation?

A. 3 square units

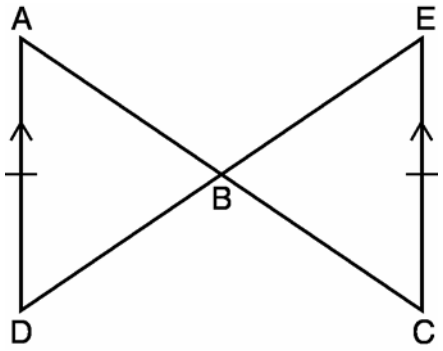
B. 4 square units

C. 6 square units

D. 12 square units

16. Given: $\overline{AD} \parallel \overline{EC}, \overline{AD} \cong \overline{EC}$

Prove: $\overline{AB} \cong \overline{CB}$



Shown below are the statements and reasons for the proof. They are not in the correct order.

Statement	Reason
I. $\triangle ABD \cong \triangle CBE$	I. AAS
II. $\angle ABD \cong \angle EBC$	II. Vertical angles are congruent.
III. $\overline{AD} \parallel \overline{EC}, \overline{AD} \cong \overline{EC}$	III. Given
IV. $\overline{AB} \cong \overline{CB}$	IV. Corresponding parts of congruent triangles are congruent.
V. $\angle DAB \cong \angle ECB$	V. If two parallel lines are cut by a transversal, the alternate interior angles are congruent.

Which of these is the most logical order for the statements and reasons?

A. I, II, III, IV, V

B. III, II, V, I, IV

C. III, II, V, IV, I

D. II, V, III, IV, I

17. Given: $\overline{AB}$ with coordinates of A (-3,-1) and B (2, 1) $\overline{A'B'}$ with coordinates of A' (-1, 2) and B' (4,4).

Which translation was used?

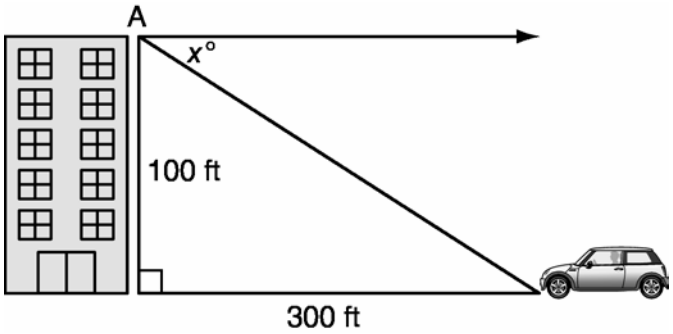
A. $(x, y) \rightarrow (x + 2, y + 3)$

B. $(x, y) \rightarrow (x + 2, y - 3)$

C. $(x, y) \rightarrow (x - 2, y + 3)$

D. $(x, y) \rightarrow (x - 2, y - 3)$

18. Consider the diagram below.



Which expression represents the value of *x* ?

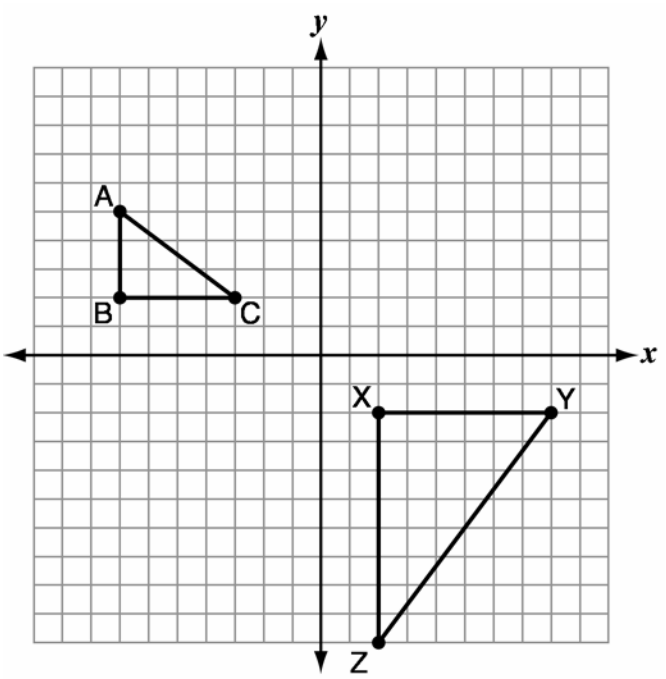
A. $\tan\left(\frac{100}{300}\right)$

B. $\tan\left(\frac{300}{100}\right)$

C. $\tan^{-1}\left(\frac{100}{300}\right)$

D. $\tan^{-1}\left(\frac{300}{100}\right)$

19. Two similar triangles are graphed below.



Which statement is correct?

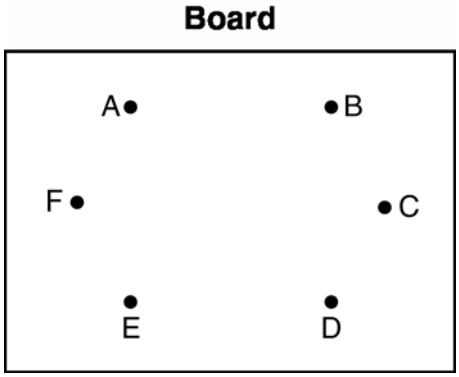
A. $\Delta ABC \sim \Delta YXZ$

B. $\Delta ABC \sim \Delta XZY$

C. $\Delta BCA \sim \Delta ZYX$

D. $\Delta CBA \sim \Delta ZYX$

20. A network of electrical wires will be constructed so that each of the six points on the board is directly connected to each other point by a piece of wire. The diagram shows the board with points A, B, C, D, E, and F.



How many pieces of wire are needed to make the network?

A. 6

B. 10

C. 15

D. 30

21. On a coordinate plane, a shape is plotted with vertices of (3, 1), (0, 4), (3, 7), and (6, 4). What is the area of the shape if each grid unit equals one centimeter?

A. 18 cm^2

B. 24 cm^2

C. $36\ cm^2$

D. $42\ cm^2$

22. Ken stacked 2 number cubes. Each cube was numbered so that opposite faces have a sum of 7.

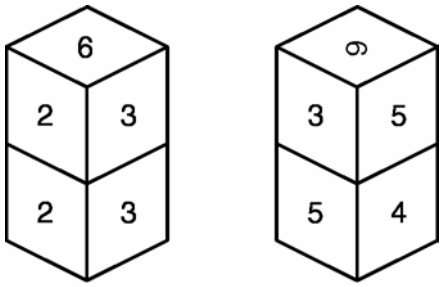


Figure P Figure Q

Which transformation did Ken use to reposition the cubes from figure P to figure Q ?

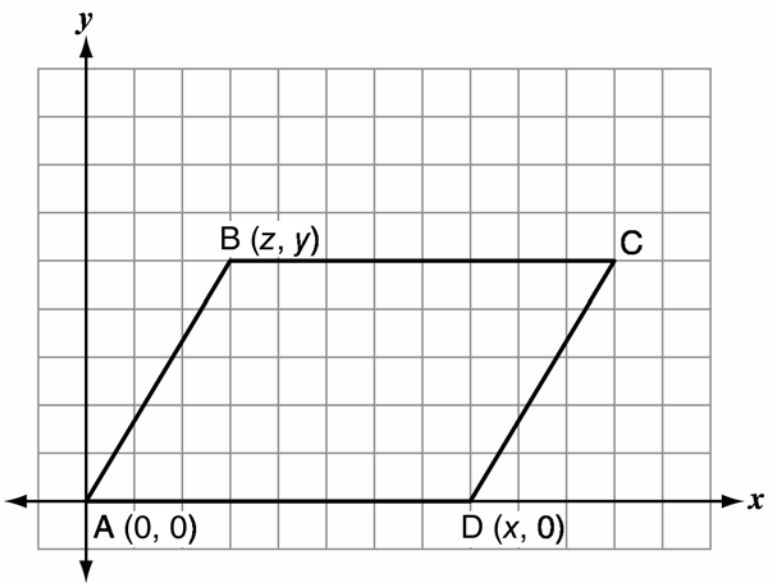
A. Rotate the top cube $180°$, and rotate the bottom cube $180°$.

B. Rotate the top cube $90°$ clockwise, and rotate the bottom cube $180°$.

C. Rotate the top cube $90°$ counterclockwise, and rotate the bottom cube $180°$.

D. Rotate the top cube $90°$ counterclockwise, and rotate the bottom cube $90°$ clockwise.

23. Parallelogram ABCD is graphed on the coordinate plane shown below.



What are the coordinates of point C ?

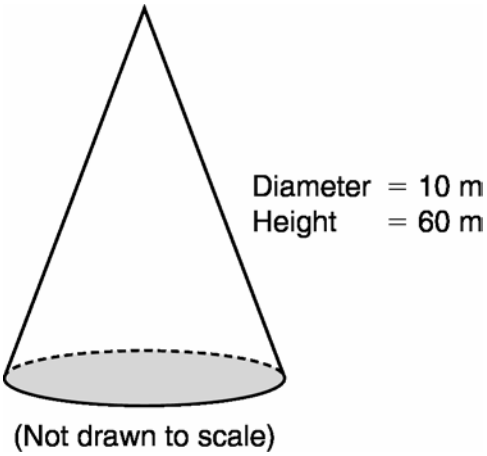
A. (x, y)

B. $(y, x+z)$

C. $(x+z, y)$

D. $(x-z, y)$

24. What is the volume of the cone shown below?



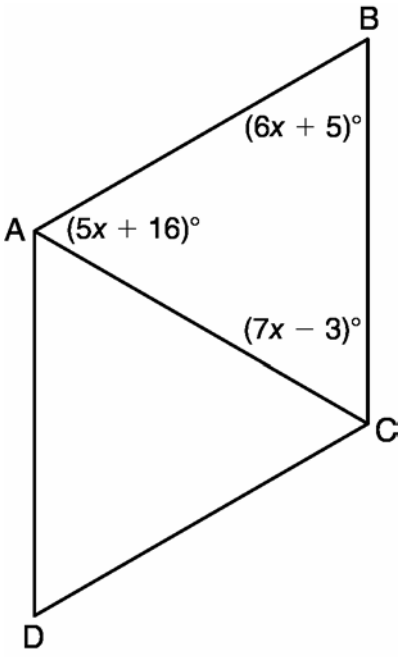
A. $500\pi\ m^3$

B. $1{,}500\pi\ m^3$

C. $2{,}000\pi\ m^3$

D. $3{,}000\ \pi\ m^3$

25. ABCD is a parallelogram.



(Not drawn to scale)

What is the measure of $\angle ACD$?

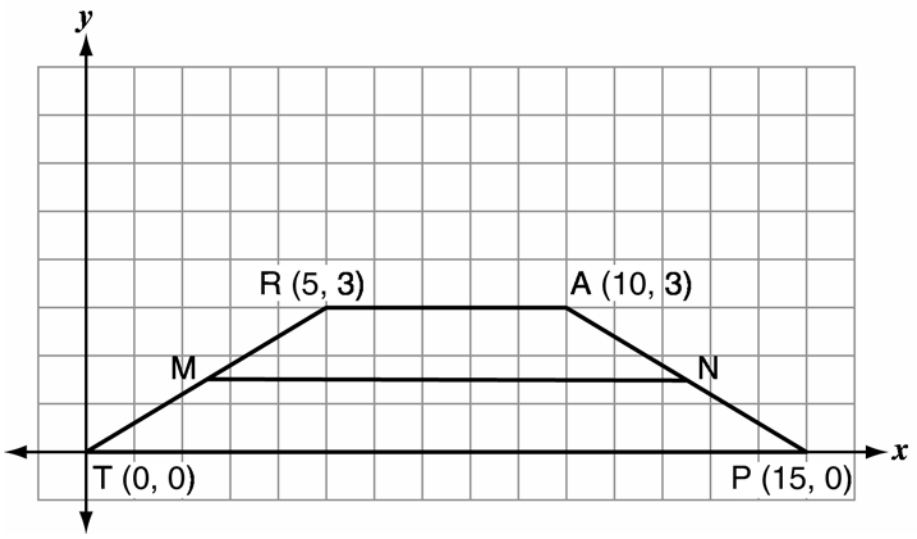
A. 59^{o}

B. 60^{o}

C. 61^{o}

D. 71^{o}

26. Trapezoid TRAP is shown below.



What is the length of midsegment $\overline{\mathbf{MN}}$?

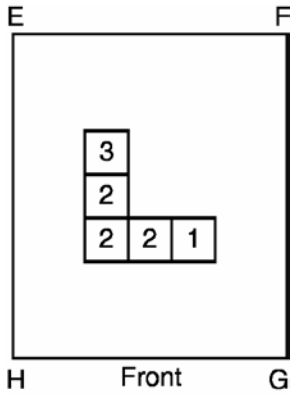
A. 10

B. $\frac{25}{2}$

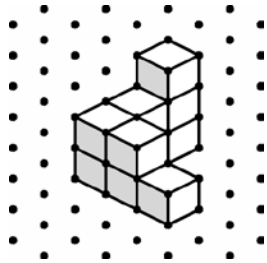
C. $\sqrt{234}$

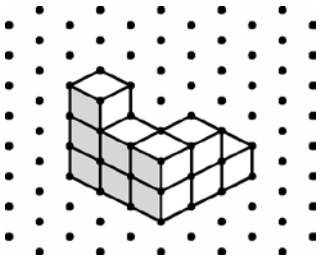
D. 100

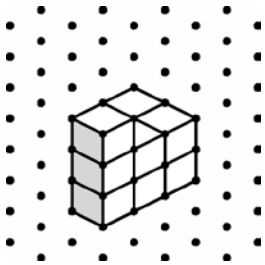
27. A mat plan is shown below.

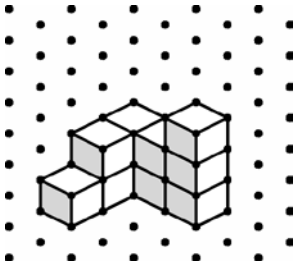


Which drawing represents the view from corner G ?

A. 

B. 

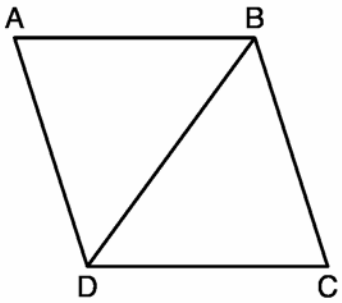
C. 

D. 

28. Ms. Davis gave her students all the steps of the proof below. One step is not needed.

Given: $\square ABCD$ is a parallelogram

Prove that $\triangle ABD \cong \triangle CDB$



Statements	Reasons
1. $\square ABCD$ is a parallelogram.	1. Given
2. $\overline{AB} \cong \overline{DC}$ $\overline{AD} \cong \overline{BC}$	2. Opposite sides of a parallelogram are $\cong$.
3. $\angle A \cong \angle C$	3. Opposite angles of a parallelogram are $\cong$.
4. $\overline{BD} \cong \overline{BD}$	4. Reflexive property of congruence
5. $\triangle ABD \cong \triangle CDB$	5. SSS

Which step is ***not*** necessary to complete this proof?

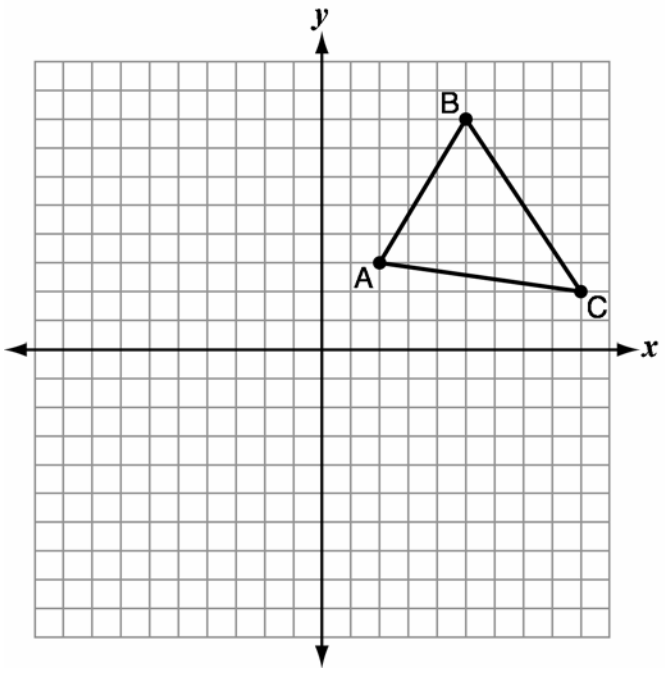
A. Step 1

B. Step 2

C. Step 3

D. Step 4

29. $\triangle ABC$ with vertices of A(2, 3), B(5, 8), and C(9, 2) is graphed on the coordinate plane below.



Which equation represents the altitude of $\triangle ABC$ from vertex B ?

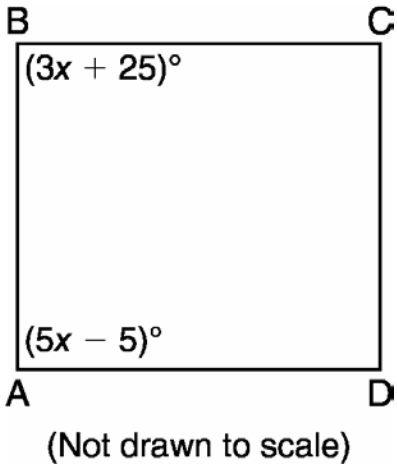
A. $y = -11x + 55$

B. $y = -11x + 63$

C. $y = 7x - 36$

D. $y = 7x - 27$

30. Parallelogram ABCD is shown below.



What is the measure of $\angle ABC$?

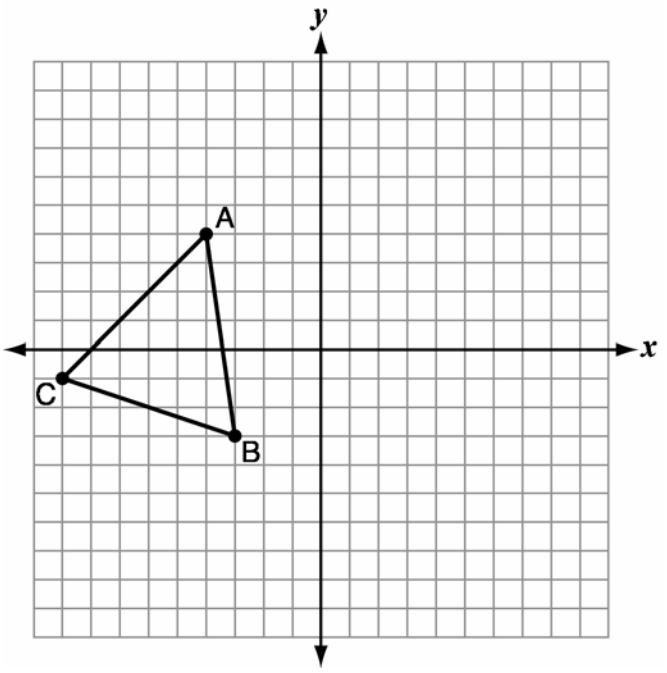
A. $85°$

B. $90°$

C. $95°$

D. $100°$

31. $\triangle ABC$ with vertices at **A(-4,4), B(-3,-3),** and **C(-9,-1) is rotated** $180°$ counterclockwise about the origin.



What are the vertices of the image, $\triangle A'B'C'$?

A. $A'(-4, 4),\ B'(-3,-3),\ C'(-9,-1)$

B. $A'(4,-4),\ B'(-3,-3),\ C'(-1,-9)$

C. $A'(4,-4),\ B'(3, 3),\ C'(9, 1)$

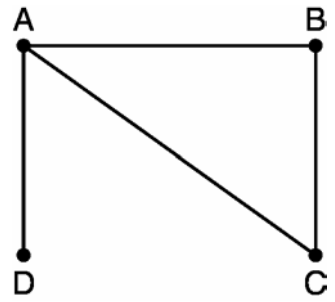
D. $A'(4, 4),\ B'(3,-3),\ C'(9,-1)$

32. A school district has the following high school committee officers.

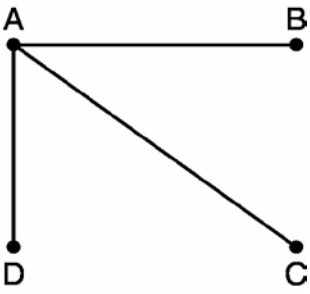
- **Committee A: Amber, Calipso, Juan**
- **Committee B: Megan, Amber, Sam**
- **Committee C: Calipso, Sam, Amanda**
- **Committee D: Jerrad, Roberto, Danielle, Juan**

The committees are represented with vertices. If two committees share a person, connect the vertices with an edge. Which graph will allow all committee members to attend the meetings to which they are assigned?

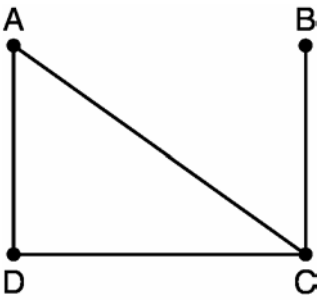
A.

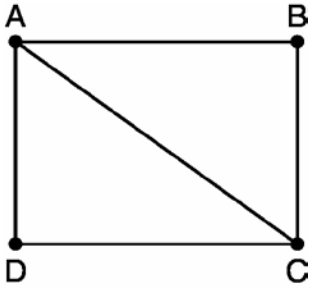


B.



C.





D.

33. A triangle has vertices at A $(-5,-4)$, B $(-1,\ 3)$, and C $(6,-2)$. If $\triangle ABC \sim \triangle DEF$, with D $(-12,-8)$ and E $(-4,\ 6)$, what are the coordinates of point F ?

A. $(-1,-6)$

B. (3, 9)

C. $(9,-3)$

D. $(10,-4)$

34. Kristina plots a triangle with vertices $(-2,\ 3)$, $(0,\ 0)$, and $(6,\ 4)$ on a coordinate plane. If each unit on the coordinate plane represents one meter (m), what is the perimeter of her triangle, to the nearest tenth of a meter?

A. 11.6 m

B. 15.3 m

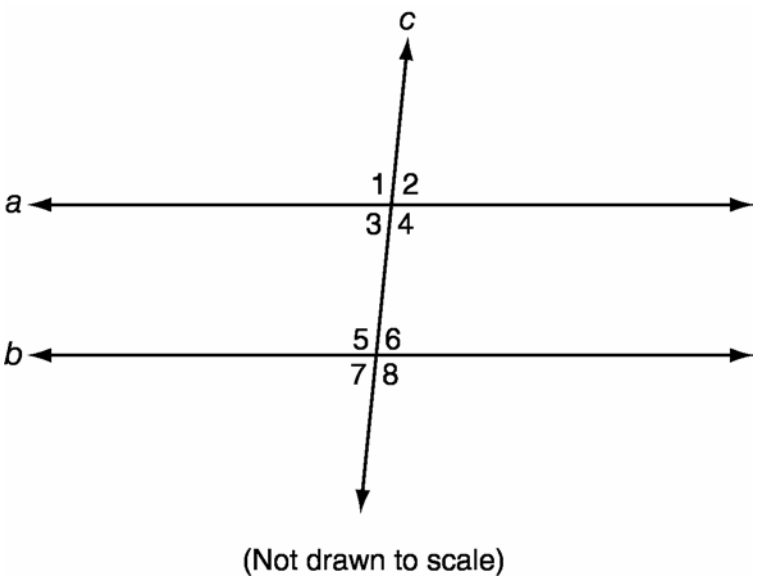
C. 18.9 m

D. 22.8 m

35. Amy is asked to determine whether the following statement can be proven.

Given: $a \parallel b$

Prove: $\angle 1 \cong \angle 6$



(Not drawn to scale)

Amy shows that $\angle 1 \cong \angle 4$, $\angle 4 \cong \angle 6$, and therefore $\angle 1 \cong \angle 6$. Is Amy's reasoning correct? Why?

A. yes, because $\angle 1 \cong \angle 6$

B. no, because $\angle 1$ is not congruent to $\angle 4$

C. no, because $\angle 4$ is not congruent to $\angle 6$

D. yes, because $\angle 1$ is supplementary to $\angle 6$

36. Given: $\overleftrightarrow{XY}$ and $\overleftrightarrow{ZW}$ intersect at point A.

Which conjecture is ***always*** true about the given statement?

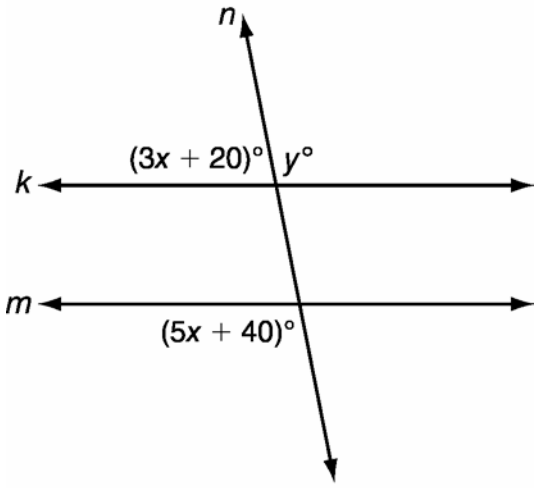
A. XA = AY

B. $\angle XAZ$ is acute.

C. $\overleftrightarrow{XY}$ is perpendicular to $\overleftrightarrow{ZW}$

D. X, Y, Z, and W are noncollinear.

37. In the figure below, $k \parallel m$



(Not drawn to scale)

What is the value of *y* ?

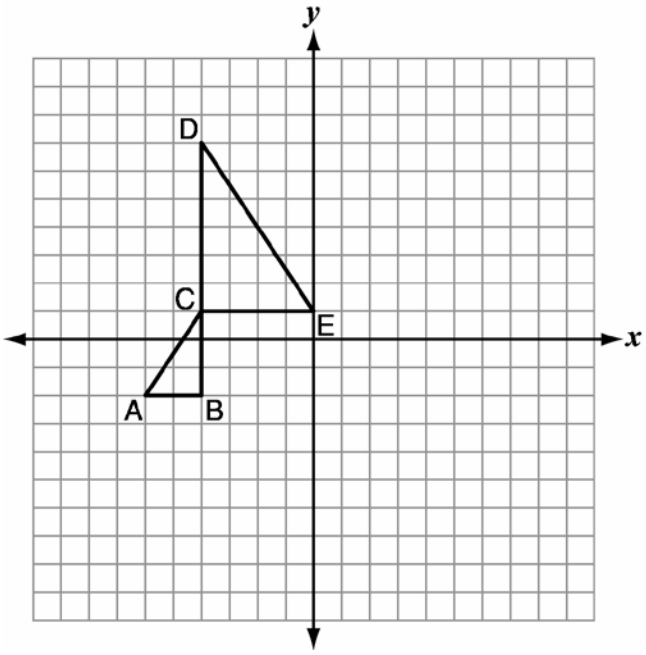
A. *y* = 15

B. $y = 70$

C. $y = 115$

D. $y = 120$

38. Which statement describes the relationship between ΔABC and ΔECD ?



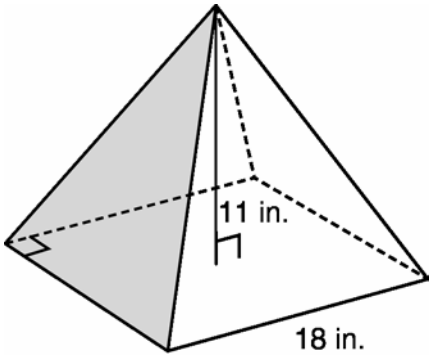
A. The triangles are equilateral.

B. The triangles are congruent.

C. The triangles are isosceles.

D. The triangles are similar.

39. What is the volume of the square-based pyramid shown below?



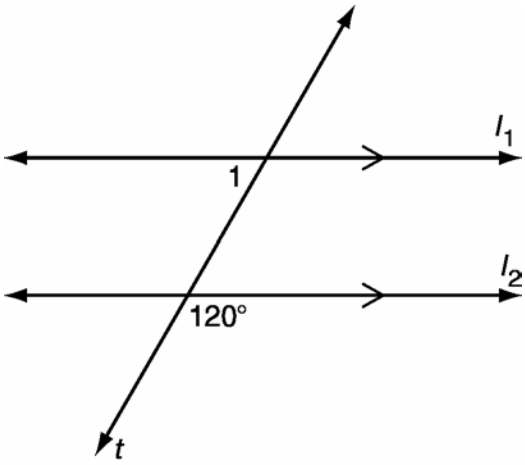
A. 1,188 cubic inches

B. 1,782 cubic inches

C. 1,944 cubic inches

D. 3,564 cubic inches

40. Given: $l_1 \| l_2$



What is the measure of $\angle 1$?

A. $60°$

B. $120°$

C. $180°$

D. $240°$

Item Position	Answer Key	DOK	Standards Key
1	A	DOK 1	Mathematics-HSG|CO|A|3
2	D	DOK 2	Mathematics-HSG|CO|C|10
3	D	DOK 2	Mathematics-HSG|GMD|A|3
4	B	DOK 2	Mathematics-HSG|GPE|B|4
5	C	DOK 2	Mathematics-HSG|CO|B|6
6	C	DOK 2	Mathematics-HSG|SRT|A|1|a
7	A	DOK 2	Mathematics-HSG|GMD|B|4
8	D	DOK 2	Mathematics-HSG|GPE|B|7

9	B	DOK 2	Mathematics-HSG|SRT|C|8
10	D	DOK 2	Mathematics-HSG|CO|A|2
11	D	DOK 3	Mathematics-HSG|CO|C|11
12	C	DOK 2	Mathematics-HSG|GMD|A|3
13	B	DOK 2	Mathematics-HSG|GPE|B|4
14	B	DOK 3	Mathematics-HSG|MG|A|3
15	A	DOK 2	Mathematics-HSG|SRT|A|1|b
16	B	DOK 3	Mathematics-HSG|CO|C|10
17	A	DOK 1	Mathematics-HSG|CO|A|2
18	C	DOK 2	Mathematics-HSG|SRT|C|8
19	A	DOK 2	Mathematics-HSG|SRT|A|2
20	C	DOK 2	Mathematics-HSG|MG|A|3
21	A	DOK 3	Mathematics-HSG|GPE|B|7
22	B	DOK 2	Mathematics-HSG|CO|A|5
23	C	DOK 2	Mathematics-HSG|GPE|B|4
24	A	DOK	Mathematics-HSG|GMD|A|3

		2	
25	C	DOK 2	Mathematics-HSG|SRT|B|5
26	A	DOK 2	Mathematics-HSG|GPE|B|6
27	A	DOK 3	Mathematics-HSG|GMD|B|4
28	C	DOK 3	Mathematics-HSG|CO|C|11
29	D	DOK 3	Mathematics-HSG|GPE|B|5
30	A	DOK 2	Mathematics-HSG|CO|C|11
31	C	DOK 2	Mathematics-HSG|CO|B|6
32	A	DOK 3	Mathematics-HSG|MG|A|3
33	D	DOK 3	Mathematics-HSG|SRT|B|5
34	C	DOK 2	Mathematics-HSG|GPE|B|7
35	C	DOK 2	Mathematics-HSG|CO|C|9
36	D	DOK 3	Mathematics-HSG|CO|A|1
37	C	DOK 2	Mathematics-HSG|CO|C|9
38	D	DOK 1	Mathematics-HSG|SRT|B|5
39	A	DOK 2	Mathematics-HSG|GMD|A|3

40	A	DOK 1	Mathematics-HSG|CO|C|9