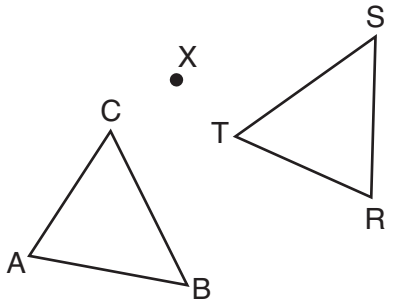
Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

1 After a counterclockwise rotation about point X, scalene triangle ABC maps onto $\triangle RST$, as shown in the diagram below.



Which statement must be true?

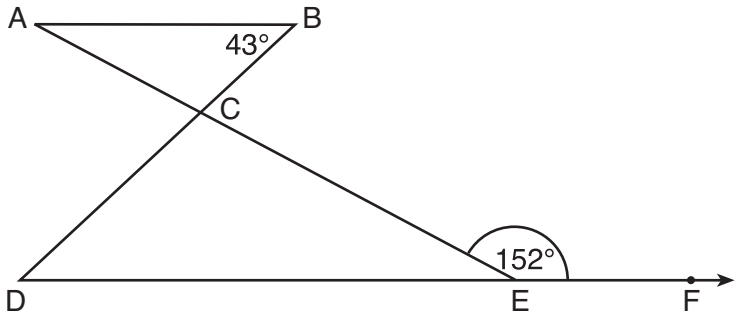
(1) $\angle A \cong \angle R$

(2) $\angle A \cong \angle S$

(3) $\overline{CB} \cong \overline{TR}$

(4) $\overline{CA} \cong \overline{TS}$

2 In the diagram below, $\overline{AB} \parallel \overrightarrow{DEF}$, $\overline{AE}$ and $\overline{BD}$ intersect at C, $m\angle B = 43°$, and $m\angle CEF = 152°$.



Which statement is true?

(1) $m\angle D = 28°$

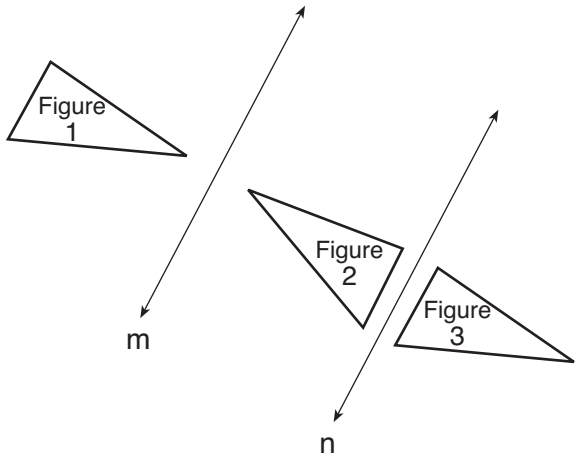
(2) $m\angle A = 43°$

(3) $m\angle ACD = 71°$

(4) $m\angle BCE = 109°$

Use this space for computations.

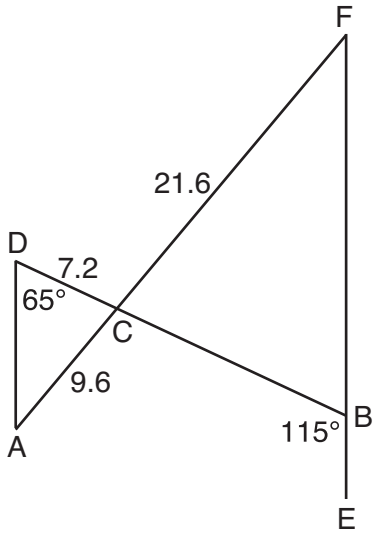
3 In the diagram below, line m is parallel to line n. Figure 2 is the image of Figure 1 after a reflection over line m. Figure 3 is the image of Figure 2 after a reflection over line n.



Which single transformation would carry Figure 1 onto Figure 3?

(1) a dilation
(2) a rotation
(3) a reflection
(4) a translation

4 In the diagram below, $\overline{AF}$ and $\overline{DB}$ intersect at C, and $\overline{AD}$ and $\overline{FBE}$ are drawn such that $m\angle D = 65°$, $m\angle CBE = 115°$, $DC = 7.2$, $AC = 9.6$, and $FC = 21.6$.



What is the length of $\overline{CB}$?

(1) 3.2
(2) 4.8
(3) 16.2
(4) 19.2

Use this space for computations.

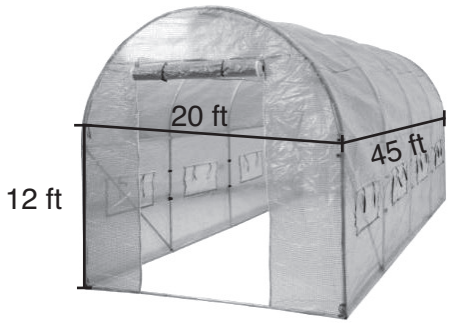
5 Given square $RSTV$, where $RS = 9$ cm. If square $RSTV$ is dilated by a scale factor of 3 about a given center, what is the perimeter, in centimeters, of the image of $RSTV$ after the dilation?

(1) 12
(2) 27
(3) 36
(4) 108

6 In right triangle ABC, hypotenuse $\overline{AB}$ has a length of 26 cm, and side $\overline{BC}$ has a length of 17.6 cm. What is the measure of angle B, to the *nearest degree*?

(1) 48°
(2) 47°
(3) 43°
(4) 34°

7 The greenhouse pictured below can be modeled as a rectangular prism with a half-cylinder on top. The rectangular prism is 20 feet wide, 12 feet high, and 45 feet long. The half-cylinder has a diameter of 20 feet.



To the *nearest cubic foot*, what is the volume of the greenhouse?

(1) 17,869
(2) 24,937
(3) 39,074
(4) 67,349

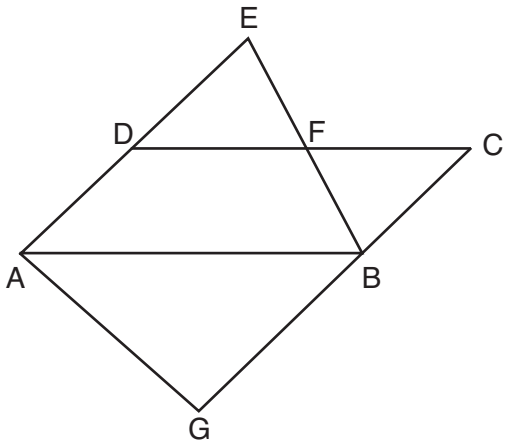
Use this space for computations.

8 In a right triangle, the acute angles have the relationship $\sin(2x + 4) = \cos(46)$.

What is the value of x?

(1) 20
(2) 21
(3) 24
(4) 25

9 In the diagram below, $\overline{AB} \parallel \overline{DFC}$, $\overline{EDA} \parallel \overline{CBG}$, and $\overline{EFB}$ and $\overline{AG}$ are drawn.



Which statement is always true?

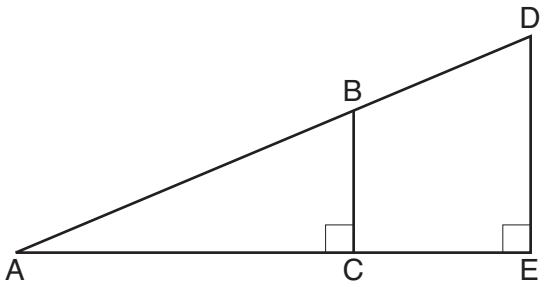
(1) $\triangle DEF \cong \triangle CBF$
(2) $\triangle BAG \cong \triangle BAE$
(3) $\triangle BAG \sim \triangle AEB$
(4) $\triangle DEF \sim \triangle AEB$

10 The base of a pyramid is a rectangle with a width of 4.6 cm and a length of 9 cm. What is the height, in centimeters, of the pyramid if its volume is 82.8 cm^3?

(1) 6
(2) 2
(3) 9
(4) 18

Use this space for computations.

11 In the diagram below of right triangle AED, $\overline{BC} \parallel \overline{DE}$.



Which statement is always true?

(1) $\frac{AC}{BC} = \frac{DE}{AE}$

(2) $\frac{AB}{AD} = \frac{BC}{DE}$

(3) $\frac{AC}{CE} = \frac{BC}{DE}$

(4) $\frac{DE}{BC} = \frac{DB}{AB}$

12 What is an equation of the line that passes through the point (6,8) and is perpendicular to a line with equation $y = \frac{3}{2}x + 5$?

(1) $y - 8 = \frac{3}{2}(x - 6)$

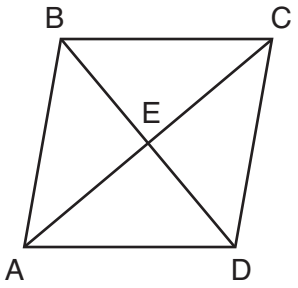
(2) $y - 8 = -\frac{2}{3}(x - 6)$

(3) $y + 8 = \frac{3}{2}(x + 6)$

(4) $y + 8 = -\frac{2}{3}(x + 6)$

Use this space for computations.

13 The diagram below shows parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E.



What additional information is sufficient to prove that parallelogram $ABCD$ is also a rhombus?

(1) $\overline{BD}$ bisects $\overline{AC}$.

(2) $\overline{AB}$ is parallel to $\overline{CD}$.

(3) $\overline{AC}$ is congruent to $\overline{BD}$.

(4) $\overline{AC}$ is perpendicular to $\overline{BD}$.

14 Directed line segment DE has endpoints $D(-4,-2)$ and $E(1,8)$. Point F divides $\overline{DE}$ such that $DF:FE$ is 2:3. What are the coordinates of F?

(1) $(-3,0)$

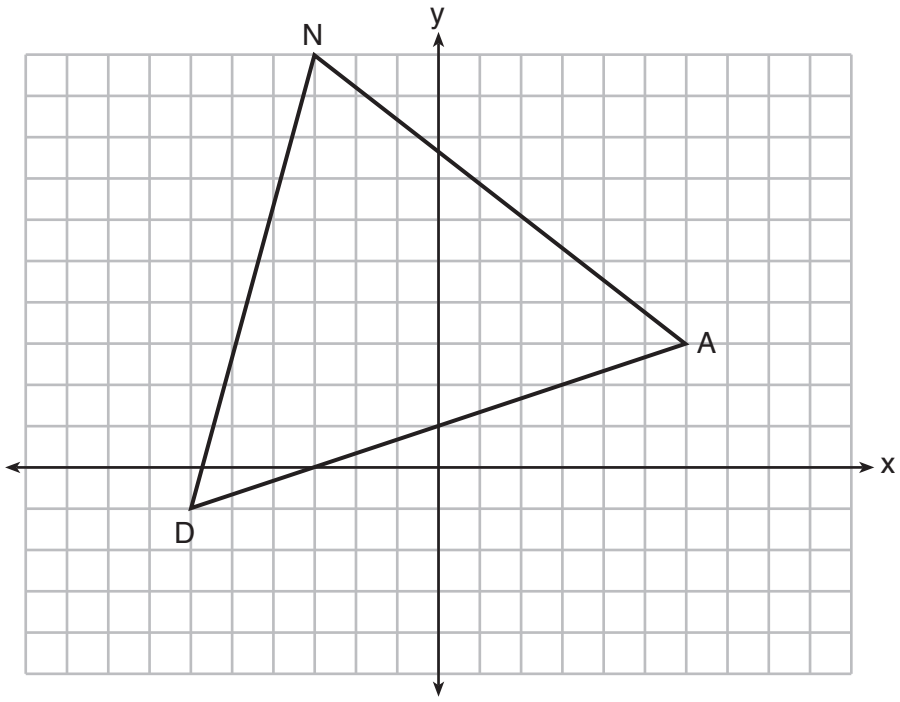
(2) $(-2,2)$

(3) $(-1,4)$

(4) $(2,4)$

Use this space for computations.

15 Triangle DAN is graphed on the set of axes below. The vertices of $\triangle DAN$ have coordinates $D(-6,-1)$, $A(6,3)$, and $N(-3,10)$.



What is the area of $\triangle DAN$?

(1) 60

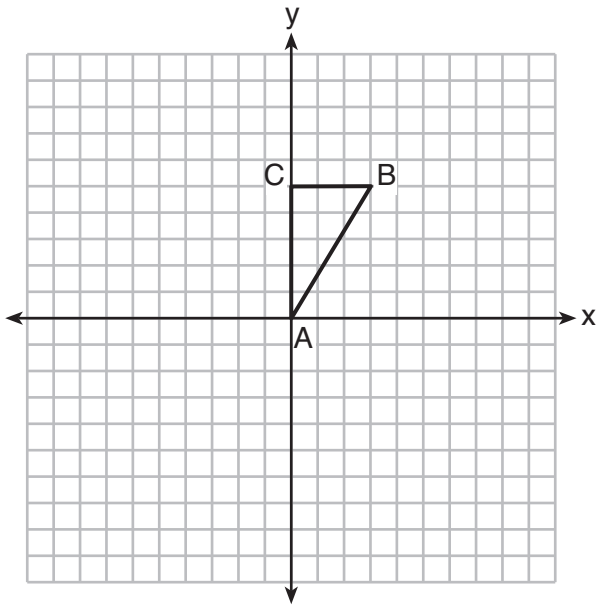
(2) 120

(3) $20\sqrt{13}$

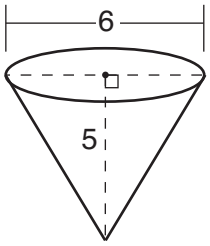
(4) $40\sqrt{13}$

Use this space for computations.

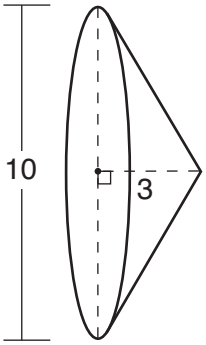
16 Triangle ABC, with vertices at $A(0,0)$, $B(3,5)$, and $C(0,5)$, is graphed on the set of axes shown below.



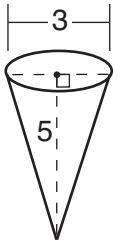
Which figure is formed when $\triangle ABC$ is rotated continuously about $\overline{BC}$?



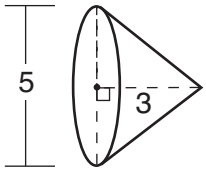
(1)



(3)



(2)



(4)