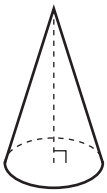
Part I

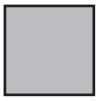
Answer all 24 questions in this part. Each correct answer will receive 2 credits. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. [48]

Use this space for computations.

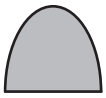
1 William is drawing pictures of cross sections of the right circular cone below.

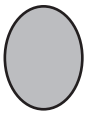


Which drawing can *not* be a cross section of a cone?

(1) 

(2) 

(3) 

(4) 

2 An equation of a line perpendicular to the line represented by the equation $y = -\frac{1}{2}x - 5$ and passing through $(6,-4)$ is

(1) $y = -\frac{1}{2}x + 4$

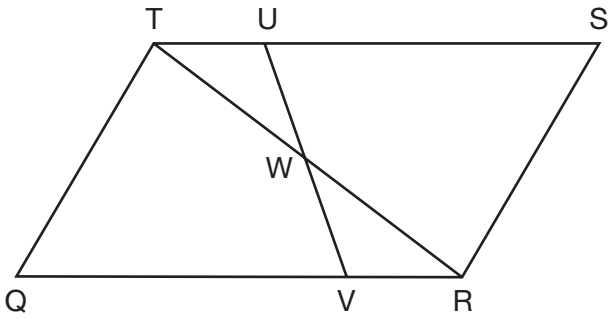
(2) $y = -\frac{1}{2}x - 1$

(3) $y = 2x + 14$

(4) $y = 2x - 16$

Use this space for computations.

3 In parallelogram $QRST$ shown below, diagonal $\overline{TR}$ is drawn, U and V are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at W.



If $m\angle S = 60°$, $m\angle SRT = 83°$, and $m\angle TWU = 35°$, what is $m\angle WVQ$?

(1) 37°
(2) 60°
(3) 72°
(4) 83°

4 A fish tank in the shape of a rectangular prism has dimensions of 14 inches, 16 inches, and 10 inches. The tank contains 1680 cubic inches of water. What percent of the fish tank is empty?

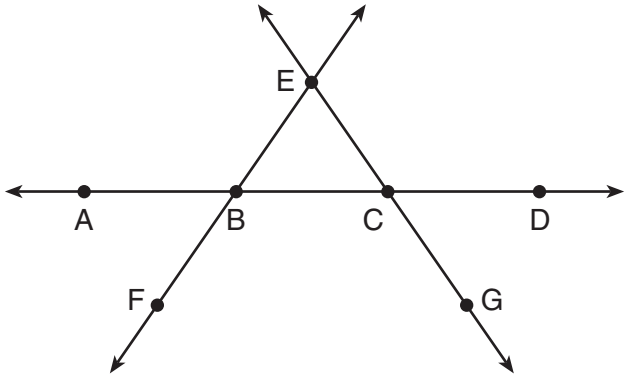
(1) 10
(2) 25
(3) 50
(4) 75

5 Which transformation would result in the perimeter of a triangle being different from the perimeter of its image?

(1) $(x,y) \rightarrow (y,x)$
(2) $(x,y) \rightarrow (x,-y)$
(3) $(x,y) \rightarrow (4x,4y)$
(4) $(x,y) \rightarrow (x + 2,y - 5)$

Use this space for computations.

6 In the diagram below, $\overleftrightarrow{FE}$ bisects $\overline{AC}$ at B, and $\overleftrightarrow{GE}$ bisects $\overline{BD}$ at C.



Which statement is always true?

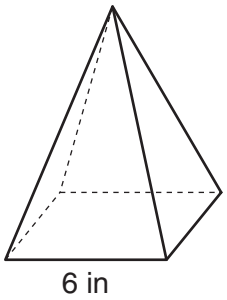
(1) $\overline{AB} \cong \overline{DC}$

(2) $\overline{FB} \cong \overline{EB}$

(3) $\overleftrightarrow{BD}$ bisects $\overline{GE}$ at C.

(4) $\overleftrightarrow{AC}$ bisects $\overline{FE}$ at B.

7 As shown in the diagram below, a regular pyramid has a square base whose side measures 6 inches.



If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is

(1) 72

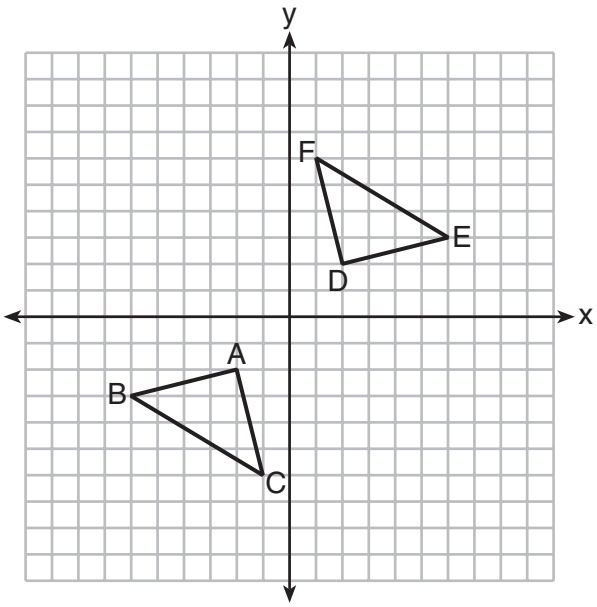
(2) 144

(3) 288

(4) 432

Use this space for computations.

8 Triangle *ABC* and triangle *DEF* are graphed on the set of axes below.



Which sequence of transformations maps triangle *ABC* onto triangle *DEF*?

(1) a reflection over the x-axis followed by a reflection over the y-axis

(2) a 180° rotation about the origin followed by a reflection over the line $y = x$

(3) a 90° clockwise rotation about the origin followed by a reflection over the y-axis

(4) a translation 8 units to the right and 1 unit up followed by a 90° counterclockwise rotation about the origin

Use this space for computations.

9 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?

(1) $\tan \angle A = \tan \angle B$

(2) $\sin \angle A = \sin \angle B$

(3) $\cos \angle A = \tan \angle B$

(4) $\sin \angle A = \cos \angle B$

10 A line that passes through the points whose coordinates are (1,1) and (5,7) is dilated by a scale factor of 3 and centered at the origin. The image of the line

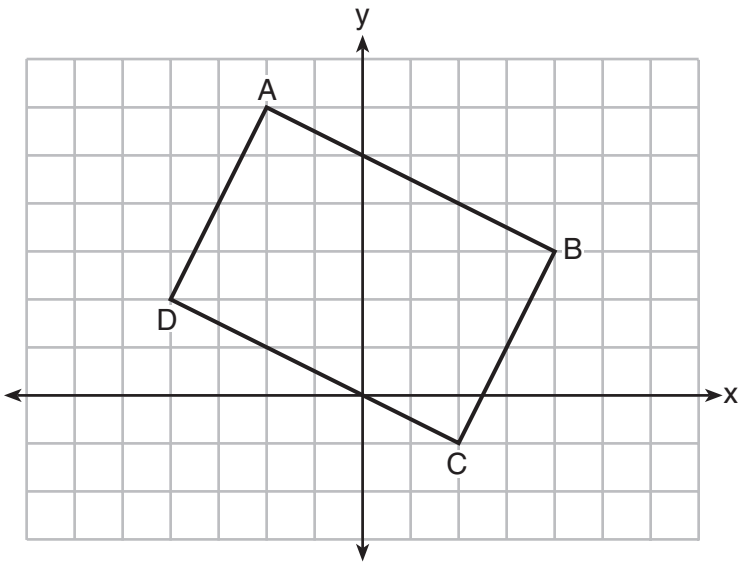
(1) is perpendicular to the original line

(2) is parallel to the original line

(3) passes through the origin

(4) is the original line

11 Quadrilateral *ABCD* is graphed on the set of axes below.



When *ABCD* is rotated 90° in a counterclockwise direction about the origin, its image is quadrilateral $A'B'C'D'$. Is distance preserved under this rotation, and which coordinates are correct for the given vertex?

(1) no and $C'(1,2)$

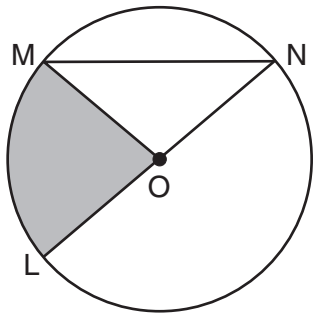
(2) no and $D'(2,4)$

(3) yes and $A'(6,2)$

(4) yes and $B'(-3,4)$

Use this space for computations.

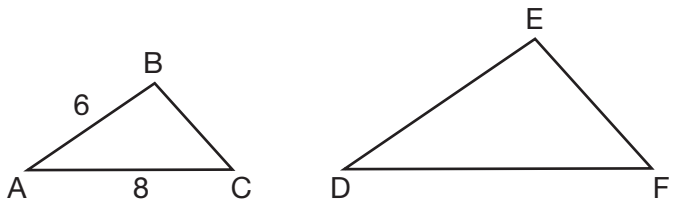
12 In the diagram below of circle O, the area of the shaded sector LOM is 2π cm^2.



If the length of $\overline{NL}$ is 6 cm, what is m$\angle N$?

(1) 10°
(2) 20°
(3) 40°
(4) 80°

13 In the diagram below, $\triangle ABC \sim \triangle DEF$.



If $AB = 6$ and $AC = 8$, which statement will justify similarity by SAS?

(1) $DE = 9$, $DF = 12$, and $\angle A \cong \angle D$
(2) $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$
(3) $DE = 36$, $DF = 64$, and $\angle C \cong \angle F$
(4) $DE = 15$, $DF = 20$, and $\angle C \cong \angle F$

14 The diameter of a basketball is approximately 9.5 inches and the diameter of a tennis ball is approximately 2.5 inches. The volume of the basketball is about how many times greater than the volume of the tennis ball?

(1) 3591
(2) 65
(3) 55
(4) 4