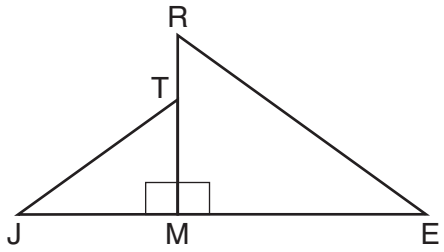
Use this space for computations.

15 In the diagram below, $\triangle ERM \sim \triangle JTM$.



Which statement is always true?

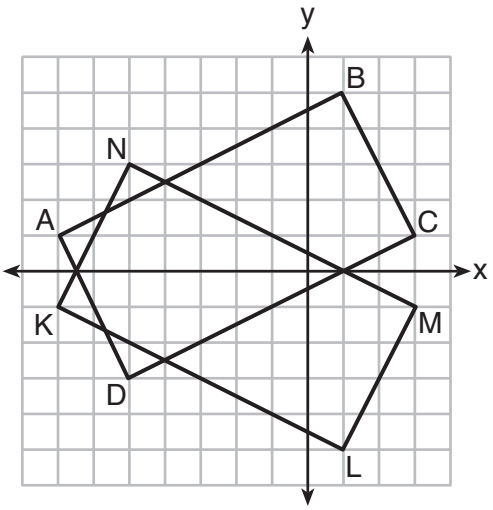
(1) $\cos J = \frac{RM}{RE}$

(2) $\cos R = \frac{JM}{JT}$

(3) $\tan T = \frac{RM}{EM}$

(4) $\tan E = \frac{TM}{JM}$

16 On the set of axes below, rectangle *ABCD* can be proven congruent to rectangle *KLMN* using which transformation?



(1) rotation

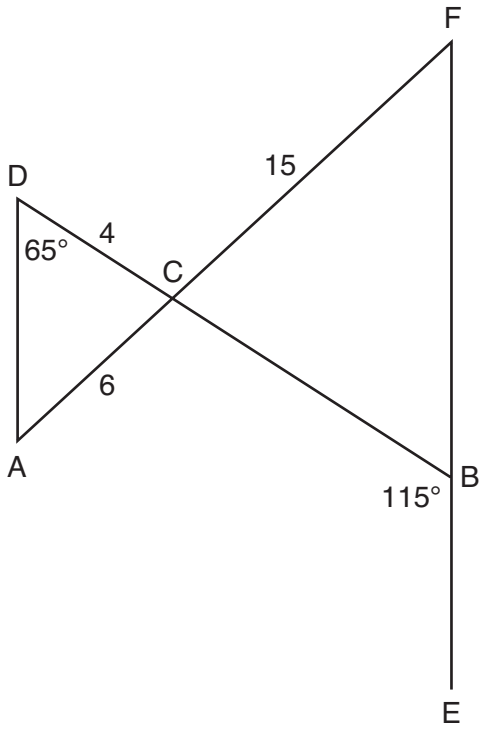
(2) translation

(3) reflection over the x-axis

(4) reflection over the y-axis

Use this space for computations.

17 In the diagram below, $\overline{DB}$ and $\overline{AF}$ intersect at point C, and $\overline{AD}$ and $\overline{FBE}$ are drawn.



If $AC = 6$, $DC = 4$, $FC = 15$, $m\angle D = 65°$, and $m\angle CBE = 115°$, what is the length of $\overline{CB}$?

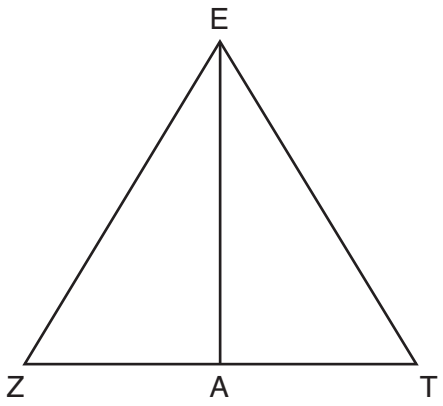
(1) 10
(2) 12
(3) 17
(4) 22.5

18 Seawater contains approximately 1.2 ounces of salt per liter on average. How many gallons of seawater, to the *nearest tenth of a gallon*, would contain 1 pound of salt?

(1) 3.3
(2) 3.5
(3) 4.7
(4) 13.3

Use this space for computations.

19 Line segment EA is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.



Which conclusion can *not* be proven?

(1) $\overline{EA}$ bisects angle ZET.

(2) Triangle EZT is equilateral.

(3) $\overline{EA}$ is a median of triangle EZT.

(4) Angle Z is congruent to angle T.

20 A hemispherical water tank has an inside diameter of 10 feet. If water has a density of 62.4 pounds per cubic foot, what is the weight of the water in a full tank, to the *nearest pound*?

(1) 16,336

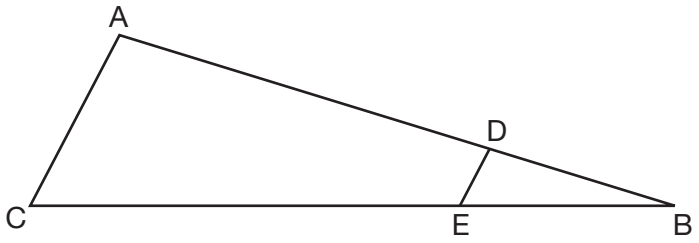
(2) 32,673

(3) 130,690

(4) 261,381

Use this space for computations.

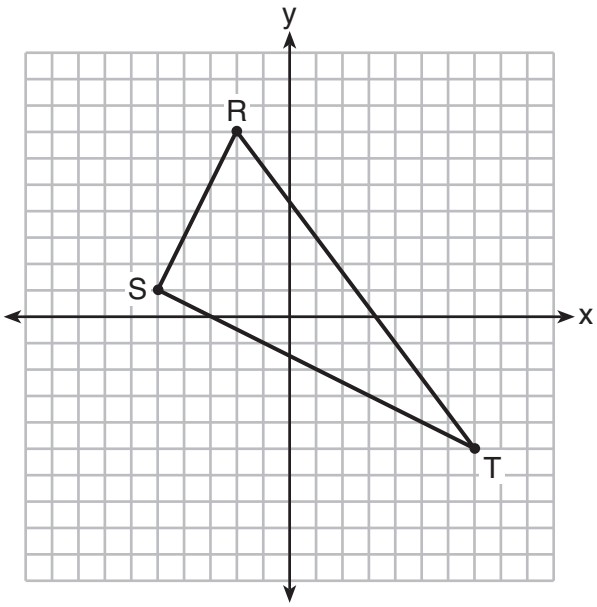
21 In the diagram of $\triangle ABC$, points D and E are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{AC} \parallel \overline{DE}$.



If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of $\overline{AC}$?

(1) 8
(2) 12
(3) 16
(4) 72

22 Triangle RST is graphed on the set of axes below.

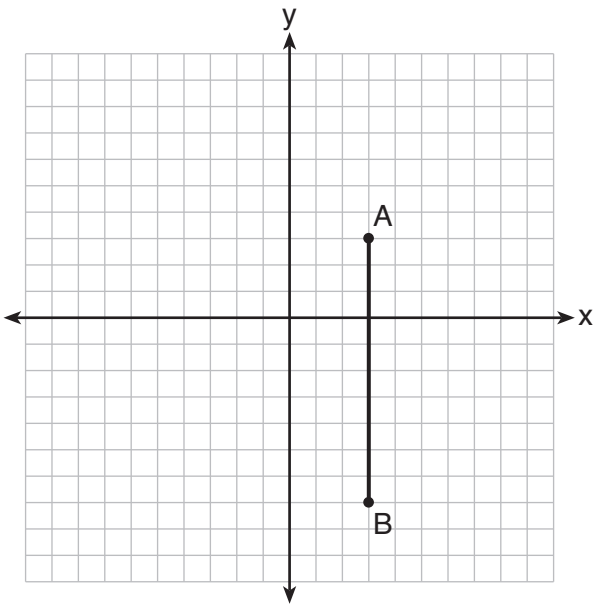


How many square units are in the area of $\triangle RST$?

(1) $9\sqrt{3} + 15$
(2) $9\sqrt{5} + 15$
(3) 45
(4) 90

Use this space for computations.

23 The graph below shows $\overline{AB}$, which is a chord of circle O. The coordinates of the endpoints of $\overline{AB}$ are $A(3,3)$ and $B(3,-7)$. The distance from the midpoint of $\overline{AB}$ to the center of circle O is 2 units.



What could be a correct equation for circle O?

(1) $(x - 1)^2 + (y + 2)^2 = 29$

(2) $(x + 5)^2 + (y - 2)^2 = 29$

(3) $(x - 1)^2 + (y - 2)^2 = 25$

(4) $(x - 5)^2 + (y + 2)^2 = 25$

24 What is the area of a sector of a circle with a radius of 8 inches and formed by a central angle that measures 60°?

(1) $\frac{8\pi}{3}$

(2) $\frac{16\pi}{3}$

(3) $\frac{32\pi}{3}$

(4) $\frac{64\pi}{3}$

Part II

Answer all 7 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [14]

25 Describe a sequence of transformations that will map $\triangle ABC$ onto $\triangle DEF$ as shown below.