The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

GEOMETRY

Wednesday, January 21, 2026 — 9:15 a.m. to 12:15 p.m., only

Student Name: Mr. Sibol

School Name: JMAP

The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Print your name and the name of your school on the lines above.

A separate answer sheet for **Part I** has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.

This examination has four parts, with a total of 35 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in **Parts II**, **III**, and **IV** directly in this booklet. All work should be written in pen, except graphs and drawings, which should be done in pencil. 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.

The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

Notice ...

A graphing calculator, a straightedge (ruler), and a compass must be available for you to use while taking this examination.

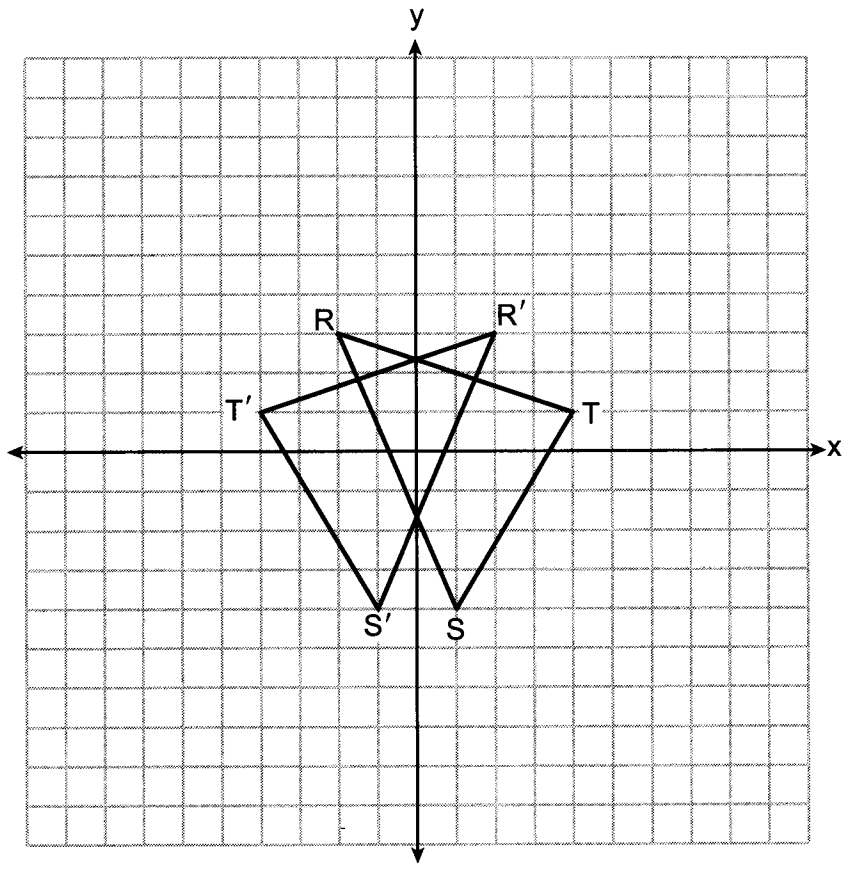
DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

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 On the set of axes below, $\triangle RST$ and its image, $\triangle R'S'T'$, are graphed.



Which rigid motion is sufficient to prove $\triangle RST \cong \triangle R'S'T'$?

(1) a rotation of 90° clockwise about the origin

(2) a translation 4 units to the right

(3) a reflection over the x-axis

(4) a reflection over the y-axis

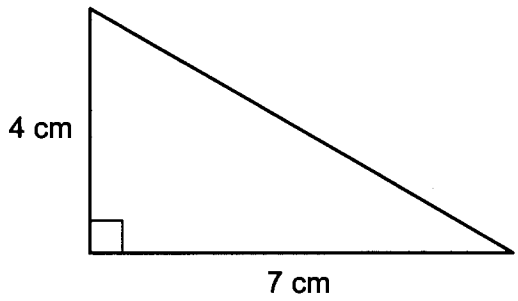
2 Which regular polygon would carry onto itself after a rotation of 60° about its center?

(1) pentagon
(2) hexagon
(3) octagon
(4) decagon

Use this space for computations.

$\frac{360}{6} = 60$

3 The right triangle below is continuously rotated about the 4 cm side.

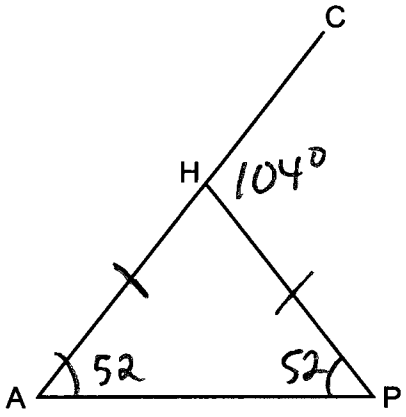


The solid formed is

(1) a cone with a height of 4 cm and a radius of 7 cm
(2) a cone with a height of 4 cm and a radius of 14 cm
(3) a pyramid with a height of 4 cm and a base length of 7 cm
(4) a pyramid with a height of 4 cm and a base length of 14 cm

4 In isosceles triangle AHP below, $\overline{AH} \cong \overline{PH}$, and $\overline{AH}$ is extended through H to C.

$2x + 12 = 3x - 8$
$20 = x$

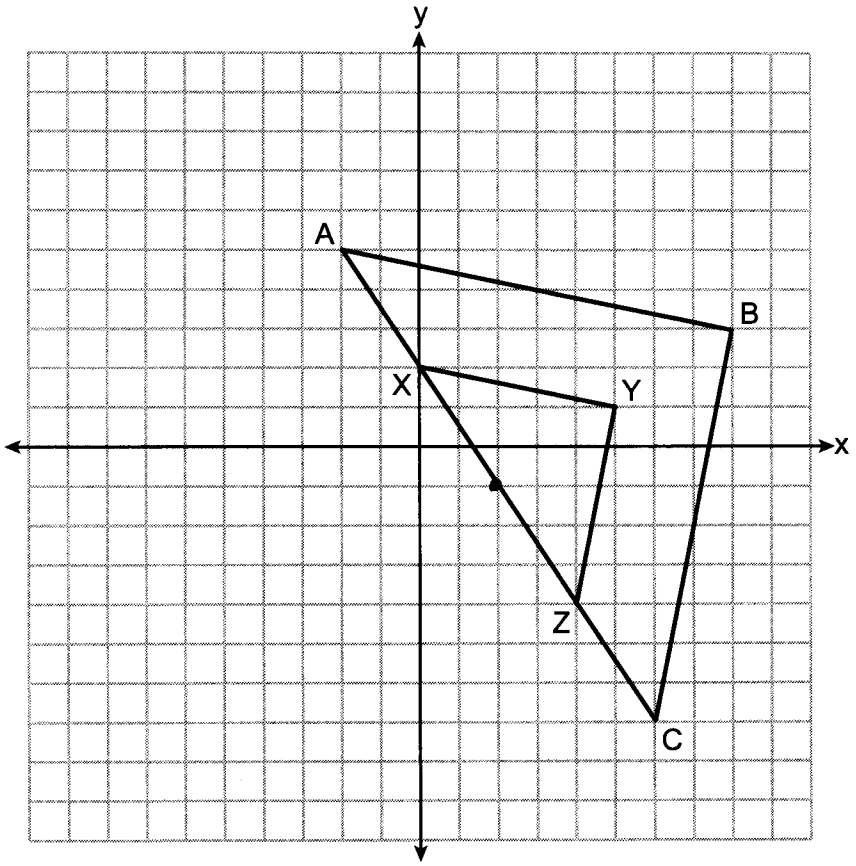


If $m\angle A = (2x + 12)°$ and $m\angle P = (3x - 8)°$, what is the measure of $\angle CHP$?

(1) 52°
(2) 76°
(3) 104°
(4) 128°

Use this space for computations.

5 In the diagram below, $\triangle XYZ$ is the image of $\triangle ABC$ after a dilation of scale factor $\frac{1}{2}$.



Which point must be the center of dilation?

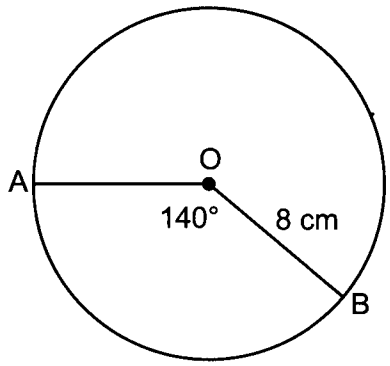
(1) (2, −1)
(2) (8, 3)
(3) (5, 1)
(4) (0, 0)

6 In a right triangle, the acute angles have the relationship $\cos(5x + 7)° = \sin(3x + 3)°$. Which equation is always true?

(1) $5x + 7 = 3x + 3$
(2) $5x + 7 + 3x + 3 = 90$
(3) $5x + 7 + 3x + 3 = 180$
(4) $5x + 7 + 3x + 3 + x = 180$

Use this space for computations.

7 In the diagram below, circle O has a radius of 8 cm and a central angle that measures 140°.

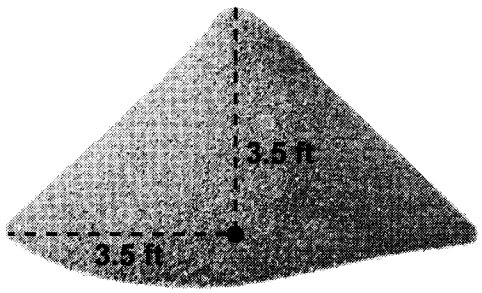


$\frac{140}{360} \cdot 16\pi \approx 20$

What is the length of $\overset{\frown}{AB}$, to the *nearest centimeter*?

(1) 10
(2) 20
(3) 25
(4) 78

8 Lucy wants to use a wagon to move a pile of sand in as few trips as possible. The pile of sand can be modeled by a cone, as shown below. The height and radius of the sandpile are both 3.5 feet.



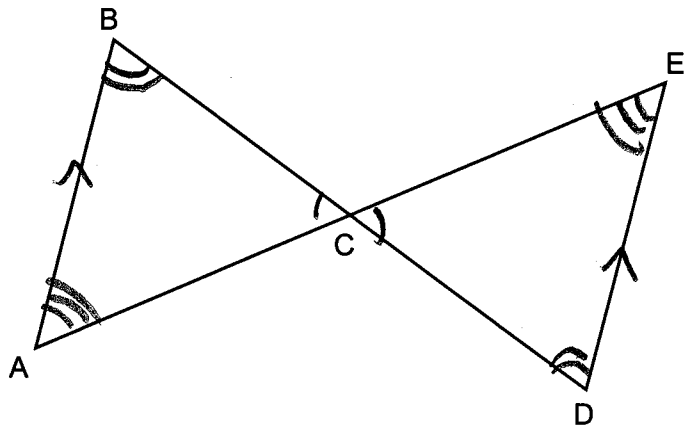
$\frac{\frac{1}{3}\pi(3.5)^2(3.5)}{5} \approx 9$

If the wagon holds 5 cubic feet of sand, what is the fewest number of trips Lucy needs to make to move the entire pile of sand?

(1) 27
(2) 14
(3) 3
(4) 9

Use this space for computations.

9 In the diagram below, $\overline{BD}$ and $\overline{AE}$ intersect at C, and $\overline{AB}$ and $\overline{DE}$ are drawn.



If $\overline{AB} \parallel \overline{DE}$, which statement is *not* always true?

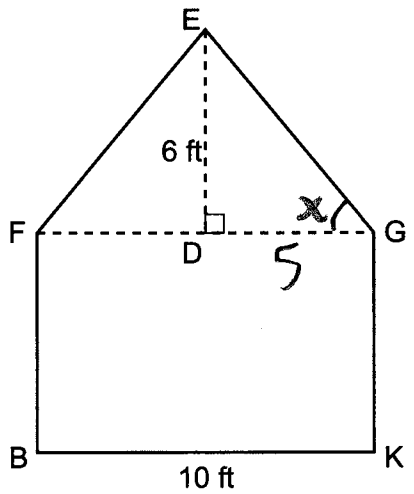
(1) $\angle ABC \cong \angle EDC$

(2) $\angle ACB \cong \angle ECD$

(3) $\triangle ABC \sim \triangle EDC$

(4) $\triangle ABC \cong \triangle EDC$

10 The face of a shed is modeled below. The rectangular section of the face, *BFGK*, is 10 feet wide. The triangular section of the face, *FEG*, is an isosceles triangle with vertex angle *FEG* and a height of 6 feet.



$\tan x = \frac{6}{5}$

$x \approx 50$

What is $m\angle EGD$, to the *nearest degree*?

(1) 34°

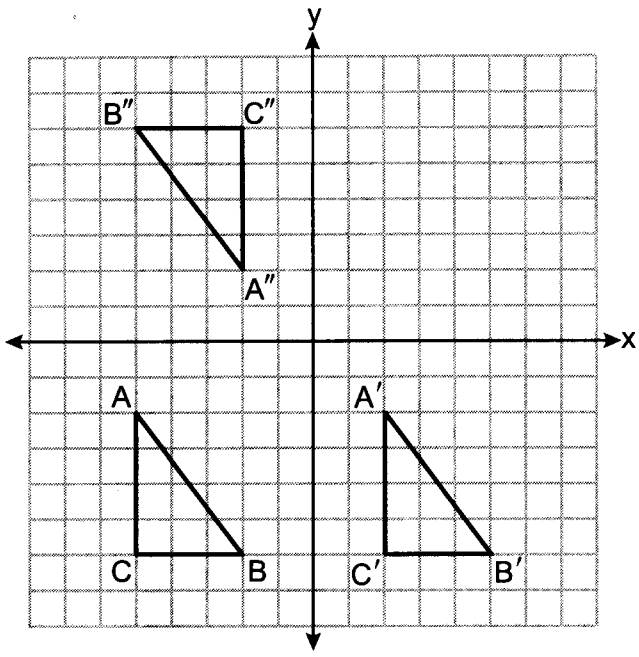
(2) 40°

(3) 50°

(4) 56°

Use this space for computations.

11 Triangles ABC, $A'B'C'$, and $A''B''C''$ are graphed on the set of axes below.



Which sequence of transformations maps $\triangle ABC$ onto $\triangle A'B'C'$, and then maps $\triangle A'B'C'$ onto $\triangle A''B''C''$?

(1) a translation followed by a rotation

(2) a rotation followed by a translation

(3) a line reflection followed by a rotation

(4) a translation followed by a line reflection

12 A line contains the points $(-1, -4)$ and $(3, -1)$. An equation of a line perpendicular to this line is

(1) $y + 4 = \frac{3}{4}(x + 1)$

(2) $y - 4 = \frac{4}{3}(x - 1)$

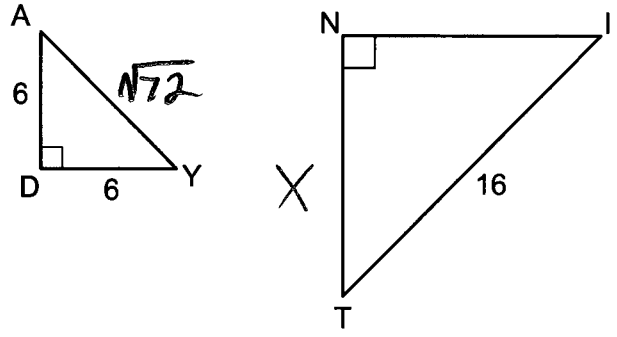
(3) $y - 1 = -\frac{3}{4}(x + 3)$

(4) $y + 1 = -\frac{4}{3}(x - 3)$

$m = \frac{-4 - -1}{-1 - 3} = \frac{-3}{-4} = \frac{3}{4}$ $\quad m_{\perp} = -\frac{4}{3}$

Use this space for computations.

13 In the diagram below of right triangles DAY and NIT, $AD = 6$, $DY = 6$, $IT = 16$, and $\triangle DAY \sim \triangle NIT$.



$\frac{16}{x} = \frac{\sqrt{72}}{6}$

$\frac{6\sqrt{2}x}{6\sqrt{2}} = \frac{96}{6\sqrt{2}}$

$x = \frac{16}{\sqrt{2}} \frac{\sqrt{2}}{\sqrt{2}} = \frac{16\sqrt{2}}{2}$

The length of $\overline{TN}$ is

(1) 8
(2) $8\sqrt{2}$
(3) $8\sqrt{3}$
(4) $16\sqrt{2}$

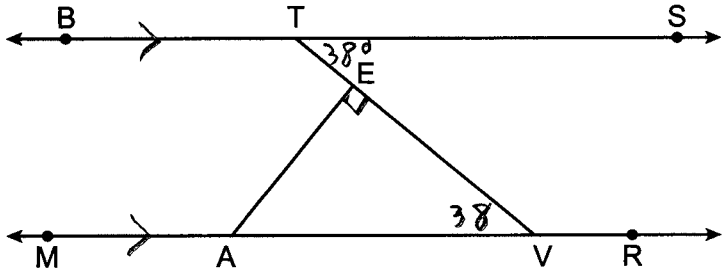
14 The volume of a sphere is 333 cm^3. To the *nearest tenth of a centimeter*, the diameter of the sphere is

(1) 4.3
(3) 8.6
(2) 5.2
(4) 10.4

$333 = \frac{4}{3}\pi r^3$

$4.3 \approx r$

15 Line BTS is parallel to line $MAVR$, as shown in the diagram below, and $\overline{AE} \perp \overline{TV}$.



If $m\angle STE = 38°$, what is the measure of $\angle VAE$?

$180 - (90 + 38)$

(1) 38°
(2) 52°
(3) 128°
(4) 142°

Use this space for computations.

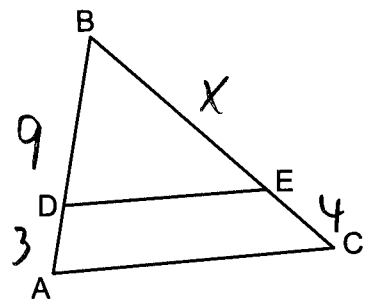
16 Segment RAZ has endpoints with coordinates $R(6, 6)$ and $Z(-12, -3)$. If A divides $\overline{RZ}$ such that $RA{:}AZ = 5{:}4$, then the coordinates of A are

(1) $(-6, 0)$
(2) $(-2, 2)$
(3) $(0, 3)$
(4) $(-4, 1)$

$6 + \frac{5}{9}(-12-6) = 6-10 = -4$

$6 + \frac{5}{9}(-3-6) = 6-5 = 1$

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



$\frac{x}{9} = \frac{x+4}{12}$

$12x = 9x + 36$

$3x = 36$

$x = 12$

$12 + 4 = 16$

If $BD = 9$, $DA = 3$, and $EC = 4$, what is the length of $\overline{BC}$?

(1) 10
(2) 12
(3) 14
(4) 16

18 Triangle ABC is mapped onto $\triangle A'B'C'$ after a sequence of rigid motions. Which statement is always true?

(1) Segment AB is parallel to segment $A'B'$.
(2) Segment AB is congruent to segment $A'B'$.
(3) The measure of angle A is the same as the measure of angle B'.
(4) The orientation of $\triangle ABC$ is the same as the orientation of $\triangle A'B'C'$.

Use this space for computations.

19 What are the coordinates of the center and the length of the radius of the circle whose equation is $x^2 - 16x + y^2 + 20y = -155$?

(1) center (8, −10) and radius 9

(2) center (−8, 10) and radius 9

(3) center (8, −10) and radius 3

(4) center (−8, 10) and radius 3

$x^2-16x+64+y^2+20y+100=-155+64+100$

$(x-8)^2+(y+10)^2=9$

20 State populations and land areas from the 2020 US Census are shown in the table below.

2020 State Population and Land Area			
State	Population	Land Area (mi^2)	
Connecticut	3,605,944	4,842	≈ 745
New Jersey	9,288,994	7,354	≈ 1263
New York	20,201,249	47,126	≈ 429
Pennsylvania	13,002,700	44,743	≈ 291

Which list shows the state population densities, in order from smallest to largest?

(1) Pennsylvania, New York, Connecticut, New Jersey

(2) Connecticut, New Jersey, Pennsylvania, New York

(3) New York, Pennsylvania, New Jersey, Connecticut

(4) New Jersey, Connecticut, New York, Pennsylvania

21 Line t is represented by the equation $y = 2x - 1$. If the line is dilated by a scale factor of 3 centered at the origin, which equation represents the image of line t after the dilation?

(1) $y = 2x - 3$

(2) $y = 6x - 3$

(3) $y = 2x - 1$

(4) $y = 6x - 1$

Use this space for computations.

22 Quadrilateral $ABCD$ is a parallelogram. Which additional statement is sufficient to prove $ABCD$ is a rhombus?

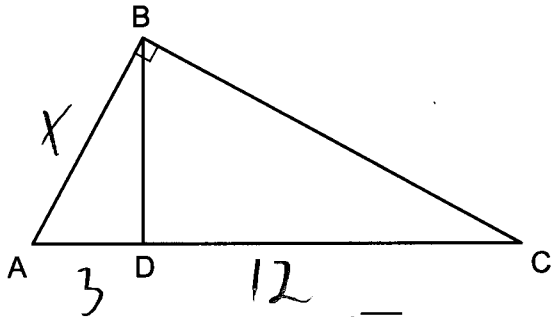
(1) $\overline{AB} \cong \overline{CD}$

(3) $\overline{AD} \cong \overline{DC}$ Adjacent sides congruent

(2) $\overline{AD} \parallel \overline{BC}$

(4) $\angle ADC \cong \angle ABC$

23 In right triangle ABC below, $m\angle ABC = 90°$, and $\overline{BD} \perp \overline{ADC}$.



$X^2 = 3 \cdot 15$

$X = \sqrt{45} = \sqrt{9}\sqrt{5}$

If $AD = 3$ and $CD = 12$, the length of $\overline{AB}$ is

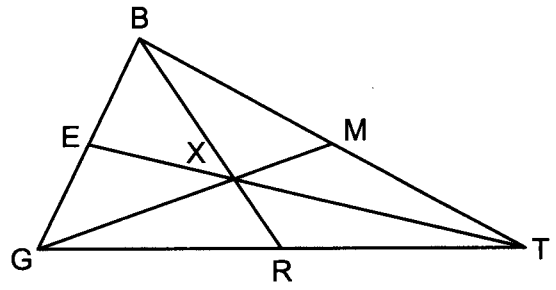
(1) 6

(3) $3\sqrt{5}$

(2) 9

(4) $5\sqrt{3}$

24 In $\triangle GBT$ shown below, $\overline{GXM}$, $\overline{BXR}$, and $\overline{TXE}$ are drawn such that point X is the centroid.



Which statement is always true?

(1) $\frac{MX}{GX} = \frac{1}{3}$

(3) $\overline{BX} \cong \overline{RX}$

(2) $\frac{TX}{EX} = \frac{2}{1}$

(4) $\overline{TM} \cong \overline{TR}$

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]

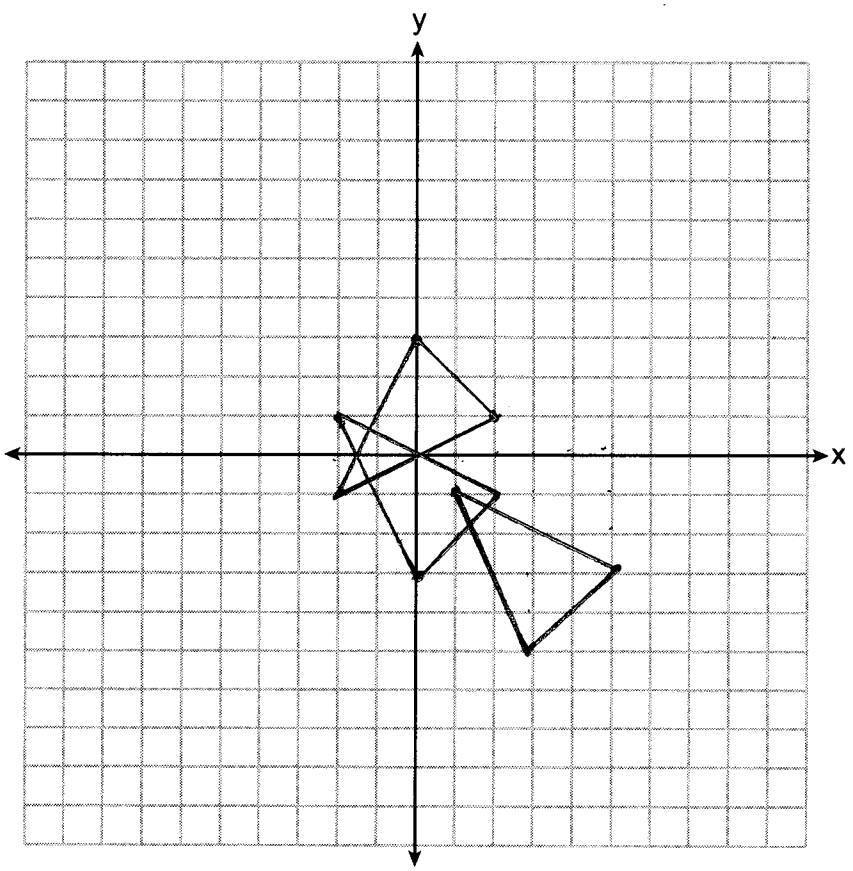
25 A triangle has vertices with coordinates (2, 1), (0, 3), and (−2, −1).

Determine and state the coordinates of the vertices of the image of the triangle after a reflection over the x-axis followed by a translation of 3 units to the right and 2 units down.

[The use of the set of axes below is optional.]

$r_{x\text{-axis}}$ (2, -1), (0, -3), (-2, 1)

$T_{3,-2}$ (5, -3) (3, -5) (1, -1)



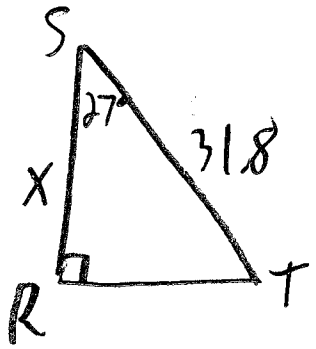
26 A cylindrical bucket is being used to transport topsoil. The bucket has an inside diameter of 10 inches and a height of 15 inches.

If the topsoil weighs 0.0231 pound per cubic inch, determine and state the weight of the topsoil in the bucket when the bucket is full, to the *nearest pound*.

$\pi\left(\frac{10}{2}\right)^2(15)\cdot .0231 \approx 27$

27 In right triangle SRT, $m\angle R = 90°$, $m\angle S = 27°$, and $ST = 31.8$.

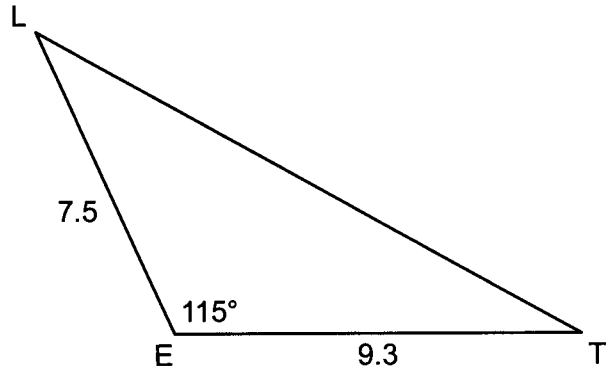
Determine and state the length of $\overline{SR}$, to the *nearest tenth*.



$\cos 27° = \frac{X}{31.8}$

$X \approx 28.3$

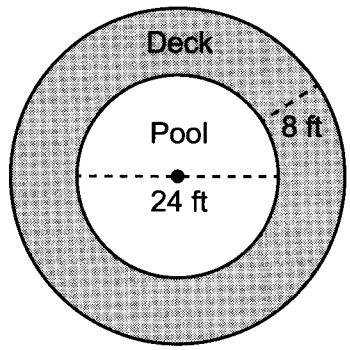
28 In $\triangle LET$ below, $LE = 7.5$, $ET = 9.3$, and $m\angle LET = 115°$.



Determine and state the area of $\triangle LET$, to the *nearest tenth*.

$\frac{1}{2}(7.5)(9.3)\sin 115 \approx 31.6$

29 A pool owner has a circular deck that surrounds her circular pool, as modeled in the diagram below. The pool has a diameter of 24 feet. The distance from the edge of the pool to the outer edge of the deck is 8 feet.

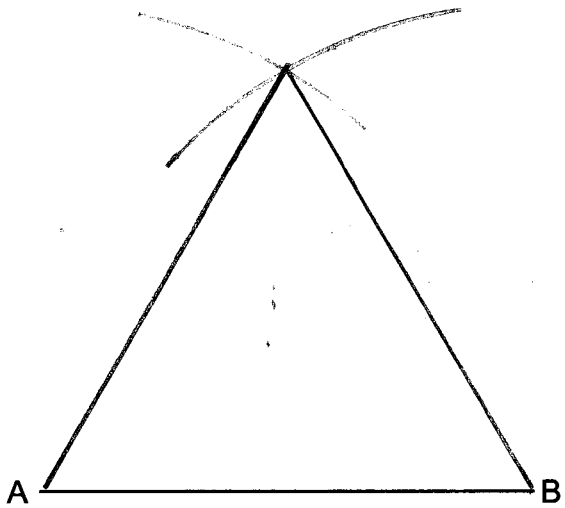


Determine and state the number of square feet of the deck, to the *nearest square foot*.

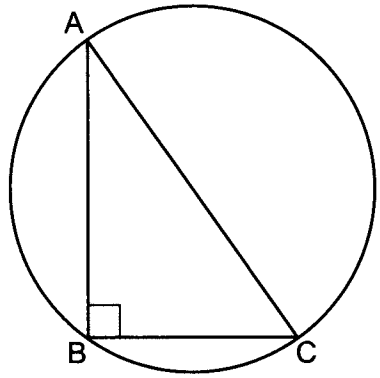
$20^2\pi - 12^2\pi \approx 804$

30 Use a compass and straightedge to construct an equilateral triangle with $\overline{AB}$, shown below, as one of the sides.

[Leave all construction marks.]



31 In the diagram below, right triangle ABC is inscribed in the circle with right angle ABC.



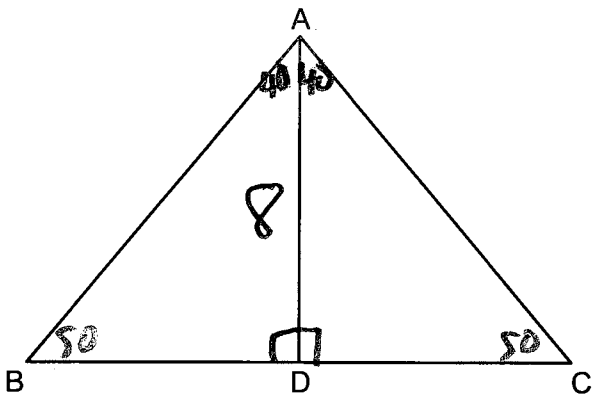
Explain why $\overline{AC}$ must be a diameter of the circle.

Since $\angle B$ is a right angle, $\overset{\frown}{AC}$ is subtended by $\angle B$ & measures $180°$ ($90° \times 2$). A diameter has an angle of $180°$.

Part III

Answer all 3 questions in this part. Each correct answer will receive 4 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. [12]

32 In isosceles triangle ABC below, $\overline{AD}$ is an altitude drawn to base $\overline{BC}$.



If $m\angle BAC = 80°$ and $AD = 8$, determine and state the perimeter of $\triangle ABC$, to the *nearest tenth*.

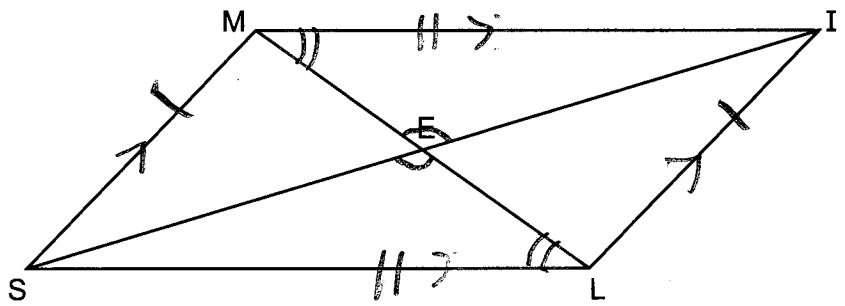
$\tan 40 = \frac{x}{8}$

$x \approx 6.713$

$\sqrt{8^2 + 6.713^2} \approx 10.4434$

$13.426 + 20.8868 \approx 34.3$

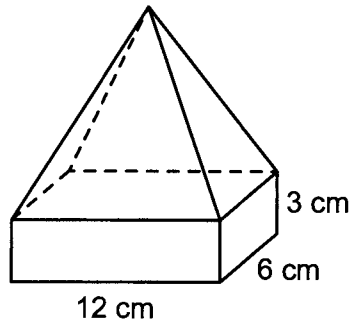
33 In quadrilateral $SMIL$ below, diagonals $\overline{IS}$ and $\overline{ML}$ intersect at point E, $\overline{MS} \parallel \overline{IL}$, and $\overline{MS} \cong \overline{IL}$.



Prove: $\triangle MIE \cong \triangle LSE$

STATEMENT	REASON
(1) Quad SMIL, diagonals $\overline{IS}$ & $\overline{ML}$ intersect at E, $\overline{MS} \parallel \overline{IL}$ & $\overline{MS} \cong \overline{IL}$	(1) Given
(2) SMIL is a parallelogram	(2) A quadrilateral with parallel & congruent opposite sides is a parallelgram
(3) $\overline{MI} \parallel \overline{LS}$ & $\overline{MI} \cong \overline{LS}$	(3) Opposite sides of a parallelogram are $\parallel$ & $\cong$
(4) $\angle IMS \cong \angle SLE$	(4) Alternative interior angles formed by a transversal & parallel lines are congruent
(5) $\angle MEI \cong \angle LES$	(5) Vertical angles are $\cong$
(6) $\triangle MIE \cong \triangle LSE$	(6) AAS

34 A solid glass trophy is composed of a rectangular prism and a rectangular pyramid, as modeled below. The rectangular prism has a length of 12 centimeters, a width of 6 centimeters, and a height of 3 centimeters.



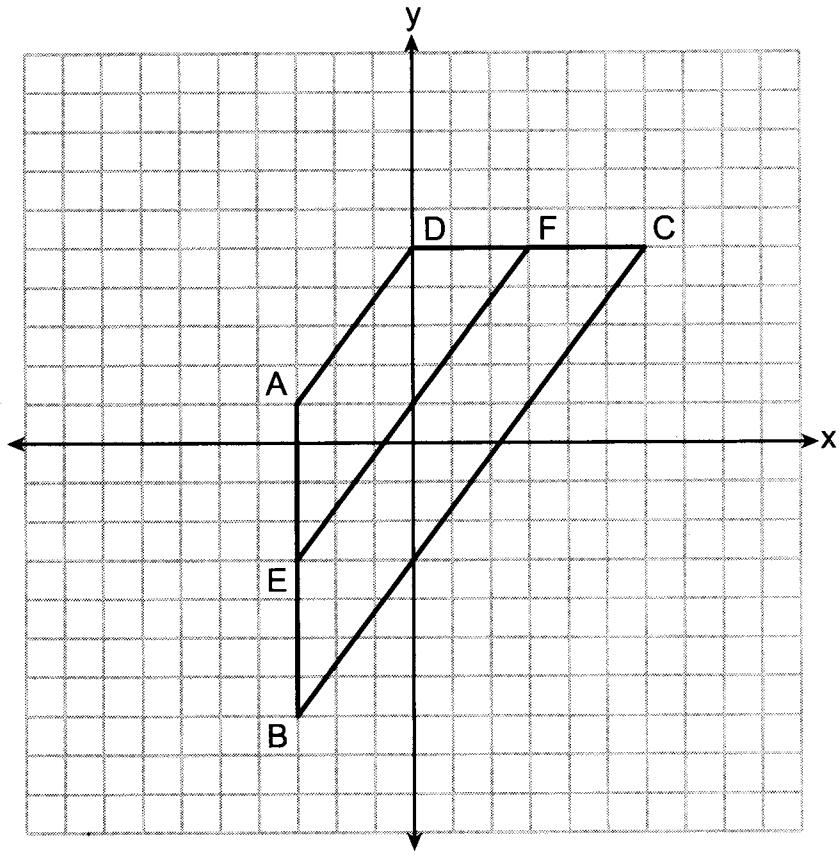
The height of the pyramid is 10 centimeters. If the density of glass is 2.5 grams per cubic centimeter, determine and state the mass of the trophy, in grams.

$\left((12)(6)(3) + \frac{1}{3}(12)(6)(10)\right) \times 2.5 = 1140$

Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. 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. [6]

35 Quadrilateral *ABCD* is graphed on the set of axes below, with vertices at coordinates $A(-3, 1)$, $B(-3, -7)$, $C(6, 5)$, and $D(0, 5)$. Segment *EF* is graphed with endpoints at coordinates $E(-3, -3)$ and $F(3, 5)$.



Prove *ABCD* is a trapezoid.

$m_{\overline{AD}} = \frac{5-1}{0--3} = \frac{4}{3}$ $m_{\overline{BC}} = \frac{5--7}{6--3} = \frac{12}{9} = \frac{4}{3}$

Since Quadrilateral ABCD has a pair of parallel opposite sides, it is a trapezoid.

Question 35 is continued on the next page.

Question 35 continued

Use coordinate geometry to prove $\overline{EF}$ is parallel to $\overline{AD}$ and $\overline{BC}$.

$m_{\overline{EF}} = \frac{5--3}{3--3} = \frac{8}{6} = \frac{4}{3}$

Since $\overline{EF}$, $\overline{AD}$ & $\overline{BC}$ have the same slope, they are parallel.

Is $EF = \frac{1}{2}(AD + BC)$? Use coordinate geometry to justify your answer.

$EF = \sqrt{(-3-3)^2+(-3-5)^2} = \sqrt{36+64} = 10$

$\overline{AD} = \sqrt{(-3-0)^2+(1-5)^2} = \sqrt{9+16} = 5$

$\overline{BC} = \sqrt{(6--3)^2+(5--7)^2} = \sqrt{81+144} = 15$

$10 = \frac{1}{2}(5+15)$