Name_____

Period: _____ Date:_____

GEOMETRY HONORS

ISLO EXAM REVIEW – Part 2

School Policy mandates a penalty for cheating on an exam to be a grade of ZERO "0" for that exam. The term cheating includes "intent to cheat." NO CELL PHONES. All cell phones must be kept out of sight. If a cell phone is seen during an exam, you will receive a grade of ZERO.

All calculators may be checked for inclusion of extraneous material. No papers should be placed in calculators, nor should any information be written on the front/back of calculators. The program portion of the graphing calculator will be checked. Any information entered there can be considered intent of cheating. All calculators will have their memory cleared prior to starting the exam.

The following pages provide a comprehensive review of materials to be studied for this exam. However, this is only a guide and you should look back over all notes, test, quizzes and worksheets for a complete review. **Problems on the exam may be different than the ones on the review.**

Name_____

Final Exam Topics:

1) Quadrilaterals: Parallelograms

   Rectangles – special properties
   Rhombus – special properties
   Squares – special properties
   Trapezoids – medians, area ratios and similarity

2) Inequalities: Triangle Inequality theorem

3) Similar Polygons: SSS, SAS, AA Similarity
   Proportionality Theorem
   Angle Bisector Theorem
   Ratios of Similar Figures – Sides, Perimeters, and Areas

4) Right Triangles: Pythagorean Theorem and Converse
   Three dimensional applications
   Pythagorean Triples
   30-60-90 and 45-45-90 triangles
   Geometric Mean theorems

5) Trigonometry: Sine, Cosine, Tangent Ratios
   Applications to Word Problems (Headings, angle of elevation & depression)
   Law of Sines
   Law of Cosines
   Applications to a wide variety of word problems

6) Circles: Arcs and Angles
   Inscribed angles, central angles and angles formed by secants, chords, and tangents
   Common tangent segments
   Lengths of chords, secants, and special segments
   Equation of circles
   Inscribed and circumscribed circles
   Inscribed and circumscribed quadrilaterals and triangles

7) Area: Regular Polygons – angles, apothem, radius, and area
   Incorporated throughout all the topics

8) Volume: Volume, Lateral area, and total surface area of prisms, cylinders, pyramids, and cones.

Name_____

1) Two externally tangent circles intersect at point A with radii of 8cm and 2cm. $\overline{CD}$ is an external tangent segment and $\overline{AB}$ is an internal tangent segment with B on $\overline{CD}$.

A. What is the length of $\overline{CD}$? _____

B. What is the length of $\overline{AB}$? _____

2) A circle has a center at (4, 1) and contains the point (2, 2).

A. What is the area of the circle? _____
B. What is the perimeter of the circle? _____
C. What is the equation of the line tangent to the circle at the point (2, 2)? _____

3) Mr. Memory is 5' 10" tall. At 10:00 am he casts a shadow of 3'4". What is the angle of elevation to the sun at that moment? _____

4) Give a single sentence answer to each of the following.

A) How can you tell if a given quadrilateral would be able to have a circle circumscribed around it?
B) How can you tell if a given quadrilateral could be circumscribed around a circle?

5) A ball is floating on a lake. As it floats on top of the lake it intersects the water in a circle whose circumference is 24π cm. If the lowest part of the ball under the lake is 8cm below the water's surface, what is the radius of the ball?

6) What is the area of the region between the circles which can be inscribed and circumscribed about a right triangle with sides of 6", 8", and 10"?

7) What is the length of the smallest altitude of a right triangle whose legs are 5 and 10? (Answer in simplest radical form)

8) The altitude to the hypotenuse of a right triangle separates the hypotenuse into segments whose lengths are 4" and 5".

A) What are the lengths of the legs of the right triangle?
B) What is the area of the triangle?
C) How much longer is the median to the hypotenuse than the altitude to the hypotenuse?
D) What is the smallest acute angle of the triangle (to the nearest degree)?

9) The line y = ½ x intersects the origin. What is the angle that the line makes with the x-axis?

10) What is the area of a regular hexagon whose apothem is 6cm?

11) What is the sum of the angles of a convex decagon?

12) What is the total number of diagonals that can be drawn in a nonagon?

Name_____

13) What is the cos 30° in simplest radial form?

14) Which of the following is not a property of a rectangle?

A) Diagonals are congruent
B) Diagonals are perpendicular
C) Diagonals bisect each other
D) Diagonals form 4 isosceles non-overlapping triangles.

15) What is the definition of π?

16) A regular hexagon is inscribed in a circle. What percent of the area of the circle is the area of the hexagon?

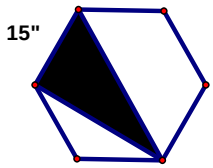
17) A rectangle and a non-right parallelogram have the same base and height. Which has the larger perimeter?

18) A circle of radius 8" is inscribed in quadrilateral ABCD with AB = 7 ½ ", BC = 9", CD = 12 ½".

Find AD = _____

Find the areas of the shaded regions below:

19) **Regular hexagon: Each side - 15"**



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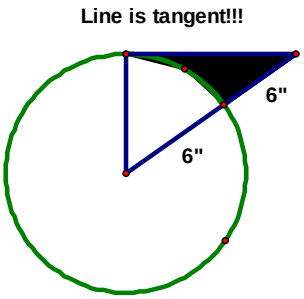

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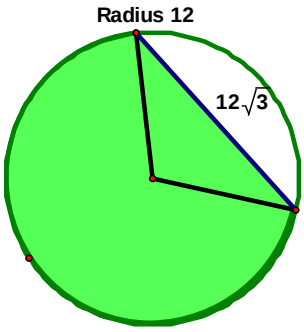
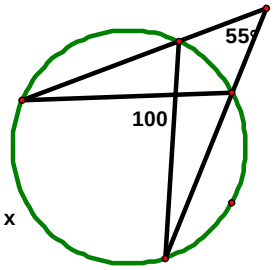


22) A quadrilateral has side lengths 4, 9, 15 and 2x – 4. Find the possible values of x.

Name_____

Find the value(s) of the variables in the circle problems below:

23)



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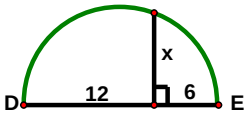
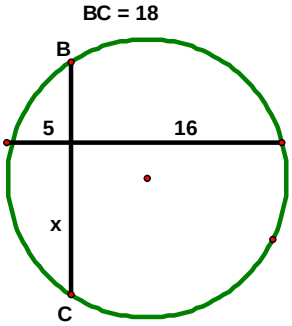


DE is a diameter

Find the value(s) of the variables in the circle problems below:

25)



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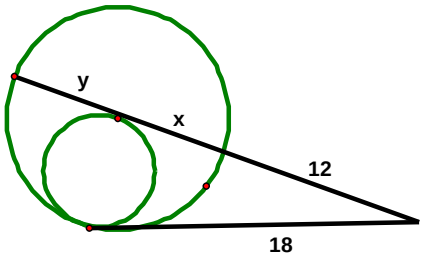

Assume lines and circles that appear to be tangent are tangent

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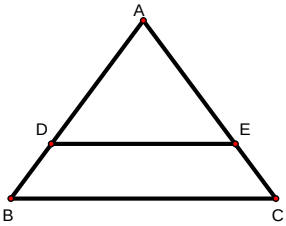
27) Complete the following statement:

The leg of a right triangle is the geometric mean between the _____ and the _____.

28) The largest angle of a rhombus is 135°. If the perimeter is equal to 48cm, what is the area?

29) Isosceles triangle ABC has base BC = 18 and leg AB = 15. A segment $\overline{DE}$ with D on $\overline{AB}$ is parallel to $\overline{BC}$.

How long is DE if BD = 5?



30) Using question #29, what is the area of trapezoid BCED?

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31) Referring to question #29, if a point is randomly selected from inside triangle ABC, is it more likely to be in the triangle ADE or the trapezoid BCED? Explain your answer.

32) The bases of a trapezoid are 8' and 12'. If the diagonals intersect at point E, what is the ratio of the areas of the two similar triangles with vertex E?

33) Given a square, the midpoints of the sides of the square are joined to form a second square. The midpoints of the second square are joined to form a third square. The process is repeated over and over. How many squares will be created until one of them has an area less than 10% of the area of the original square?

34) A rectangular prism has six rectangular sides. The top and bottom each have an area of 48 $in.^2$, the front and back each have an area of 80$in.^2$, and the sides each have an area of 60$in.^2$. What is the volume of the box? What is the length of the longest straight segment that could be contained in the box?

35) What is the area of a circle that can be inscribed in a triangle with sides of 17cm, 17cm, and 16cm?

36) What are the 5 ways to prove a quadrilateral is a parallelogram?

37) What is the area of an orange peel, if the orange fell off the tree and left an impression in the soft soil that was 1 cm deep and 6cm across?

38) Four congruent spheres are tangent to each other. Each has a radius of 6". Three spheres are on a flat table and the remaining sphere is placed on top of these.

A) How high is the top of the uppermost sphere from the table top?

B) What is the volume of the region created by the solid which is created by the centers of the spheres?

39) Two circles have equations $(x + 10)^2 + y^2 = 400$ and $(x - 11)^2 + y^2 = 169$.

A) What are the radii of the two circles?

B) What is the distance between the centers?

C) What is the length of their common chord?

D) What are the points of intersection of the circles?

40) The x intercepts of a circle are -3 and 10. One of the y intercepts is 5. What is the other y intercept? What is the area of the circle?

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41) A circle has an equation $(x-2)^2 + (y-1)^2 = 25$. The point (-1, 5) is on the circle.

A) What is the area of the circle?

B) What is the length of the arc between the points (2, 6) and (7, 1)?

C) What is the equation of the line tangent to the circle at the point (-1, 5)?

42) The bases of an isosceles trapezoid are 11 and 21. The legs are each 13. If a circle is circumscribed around the trapezoid, find the area between the trapezoid and the circle. (The center of the circle is inside the trapezoid.)

43) Two circles are externally tangent. Their radii are 24 and 8. Find the length of the common external tangent segment. Find the area of the region between this segment and the two circles.

44) The coordinates of the vertices of a rhombus are (0, 0), (10, 0), (6, 8), and (16, 8). Write the equation of the circle which can be inscribed in the rhombus.

45) Two similar rectangular pyramids have heights in a ratio of 3:2. What is the ratio of their:

A. Lateral areas
B. Surface areas
C. Volumes
D. Slant heights

46) In a right triangle, the legs are 12 and 9. If the median intersects the hypotenuse at A and the angle bisector of the right angle intersects the hypotenuse at B, find AB.

47) A building 25 feet tall casts a shadow of 13 feet. What is the angle of elevation to the sun? (nearest degree)

48) The adjacent sides of a square are 4x – 7 and 3x + 2. Find the area of the square.

49) The lateral area of a cube is 48cm. Find the volume.

50) The apothem of an equilateral triangle is $4\sqrt{3}$ cm. Find its area.

51) The length of an arc is 6π and its measure is 135 degrees. What is the radius of the circle?

52) In a circle of radius 3 two tangent segments from the same outside point form a 60 degree angle. Find the area of the region between the circle and the two tangents.

53) Two circles have radii 8cm and 4cm. The distance between their centers is 8cm. Find the area of the region between the two circles.

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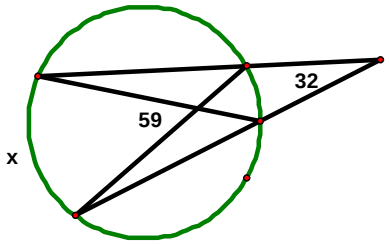
54) A triangle has side lengths of x, x + 4 and 3x + 1. What are the possible values of x?

55) Find the value of x in the diagram at right.

A) 59
B) 91
C) 108
D) 64
E) None of these



56) Which of the following can be used to find the area of a rhombus whose smallest angle is 60, whose side is b, and diagonals are d_1 and d_2, and whose altitude is h?

I. A = bh
II. A = $(d_1 \, x \, d_2)/2$
III. A = $(b\sqrt{3})/2$

(A) I only (B) I and II (C) II only (D) I, II, and III (E) None of these

57) Two vertical poles are 18 feet and 30 feet tall and are on level ground. Two wires join the top of each pole to the bottom of the other. If the wires cross at point P, how far off the ground is P?

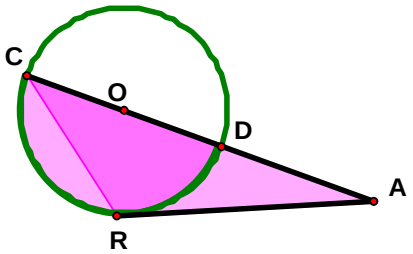
A) 12 B) 10 C) 9 D) Can't be determined E) None of these

58) Find the equation of the line tangent to the circle whose equation is $(x + 5)^2 + y^2 = 13$, at the point on the circle with coordinates (-3, 3).

A) 3x + 2y = -3 B) 2x + 3y = 3 C) 3x – 2y = - 3 D) -2x + 3y = 15 E) None of these

59) AR is tangent to circle O at R. AC is a secant segment and intersects the circle at C and D while passing through the center. If m< RAC = 30 degrees and AR = 18, find the area of the shaded region.

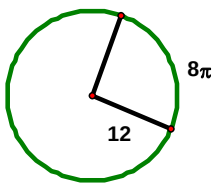
A) $36\pi + 54\sqrt{3}$ B) $54(\pi + \sqrt{3})$ C) $27\pi + 54\sqrt{3}$ D) $54\sqrt{3} - 18\pi$ E) None of These



60) An arc has a length of 8π on a circle with radius 12.

A) What is the measure of the arc?

B) What is the area of the sector?



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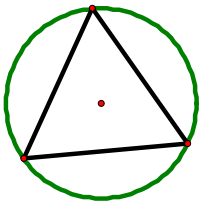
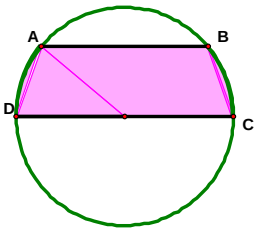
61) An equilateral triangle is inscribed in a circle of radius 9".



A) What is the area of the region between the circle and the triangle?

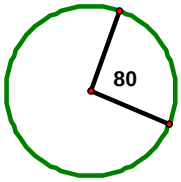
B) What is the radius of the circle that can be inscribed in the equilateral triangle?

62) Find the area of the region at right.



AB = 9, diameter CD = 18, and $\overline{AB}$ parallel to $\overline{CD}$.

63) The central angle of a sector is 80 degrees and the arc length of the sector is 18π.



A) What is the radius of the circle?

B) What is the area of the sector?

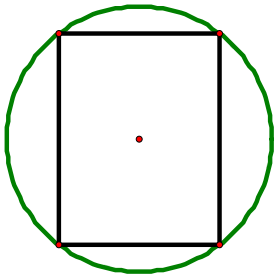
64) The vertex angle of an isosceles triangle is 120 degrees. The longest side of the triangle is 24 cm.

A. What is the area of the triangle?

B. What is the radius of the circle that can be

Circumscribed around the rectangle?

65) A rectangle whose area is $36\sqrt{2}$ is inscribed in a circle. The center of the circle is 3 units from the longer side of the rectangle.



A) What are the lengths of the two sides of the rectangle?

B) What is the area of the circle circumscribed around the rectangle?

66) A diagonal of a rectangle is 12cm in length and the two diagonals of the rectangle intersect to form a 60 degree angle. Find the area of the rectangle.

67) The base angles of an isosceles trapezoid are 135°. If the legs are ≅ to the shorter base, which is 18cm, what is the length of the longer base? _____ Area of the trapezoid? _____

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68) In an isosceles trapezoid, the longer base is three times the shorter base and the median is 24cm. The legs are each 20cm. Find the following:

A. The length of each base. _____ _____

B. The height of the diagonal. _____

C. The length of the diagonal. _____

D. The ratio of the similar triangles formed by the two bases and the diagonals. _____

E. The areas of those two triangles. Smaller: _____ Larger: _____

F. The length of the portion of the median cut off by the diagonals.

69) Solve each proportion below.

A) $\frac{x+5}{2x-1} = \frac{3}{5}$ B) $\frac{w-4}{w-1} = \frac{w+5}{w+1}$

70) Two tangent circles meeting at point A have radii of 15cm and 5cm. A common external tangent segment is BD with B on the larger circle. Find the following:

A) BD = _____ B) measure of $\overset{\frown}{BA}$ = _____ and measure of $\overset{\frown}{AD}$_____

C) Area of the circle containing A, B, and D _____

D) The area of ΔABD _____

E) What is the area of the region which is bounded by the tangent segment and the two arcs $\overset{\frown}{BA}$ and $\overset{\frown}{AD}$?

_____

71) The sides of a rhombus are each 25. The shorter diagonal is 30cm. Find the following:

A) The longer diagonal. _____

B) The area of the rhombus_____

C) The radius of the inscribed circle._____

D) The area of the region between the circle and the rhombus_____

E) Find the measure of the largest angle of the rhombus using the Law of Cosines. _____

F) Find the measure of the smallest angle of the rhombus using the Law of Sines. _____

72) A) A right triangle has legs of 18cm and 24 cm. What is the area of the triangle. _____

B) What is the area of the circumscribed circle? _____

C) What is the area of the inscribed circle? _____

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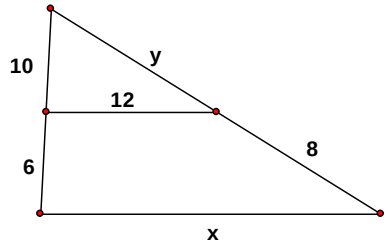
D) How long is the median to the hypotenuse? _____ The altitude to the hypotenuse? _____

E) The bisector of the smallest angle of the triangle separates the smallest side into two pieces. What is the length of the smaller piece?

73) A. x = _____ y = _____

B) If the smaller triangle has an area of $50cm^2$.

What is the area of the trapezoid? _____



74) What is the area of the triangle with coordinates A(-2, 1), B(2, 5) and C (5, 3)?

75) Three sides of a quadrilateral are 12in., 14in., and 20in. A similar quadrilateral has a perimeter of 96 in. and its smallest side is 18in.

A) What are the lengths of the remaining sides of the larger quadrilateral? ___, ___, ___, ___

B) What is the remaining side of the smaller quadrilateral? _____

C) What is the area of each quadrilateral if the sum of their areas is 780 $in.^2$? _____ _____

76) An altitude to the hypotenuse of a right triangle separates the hypotenuse into segments with lengths of 8cm and 16cm.

A) How long is the altitude? _____

B) What are the lengths of the legs of the right triangle? _____, _____

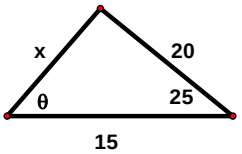
C) How long is the median to the hypotenuse? _____

D) How long is the median to the shortest side of the triangle? _____

77) Find the missing parts of the triangles below:

A) x = _____

θ = _____



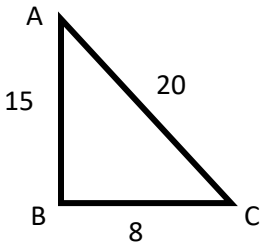
Name_____

B) ABC is not a right triangle;

Angle A = ___

Angle B = _____

Angle C = _____

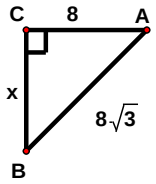


C)

Angle A = ____

Angle B = ____

x = _____



78) A pyramid has a square base and equilateral triangle faces. If the slant height is $6\sqrt{6}\,cm$, find the following:

A) Area of the base, B = _____

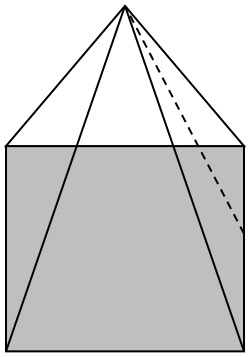
B) Height of the pyramid = _____

C) Perimeter of the base = _____

D) Volume = _____

E) Lateral Area = _____

F) Surface Area = _____

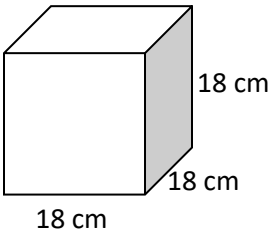


For Problems #79-85, find the Lateral Area, Surface Area & Volume of each solid to the nearest tenth.

79) L.A.=_____

S.A. =_____

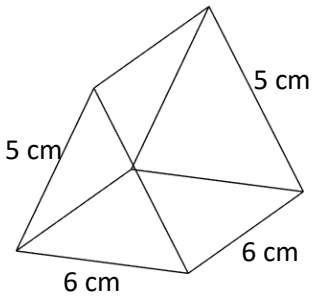
V = _____



80)L.A.=_____

S.A. =_____

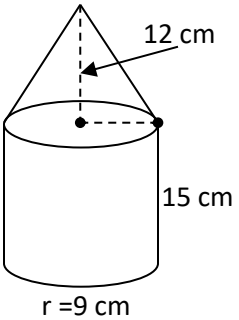
V = _____



81) L.A.=_____

S.A. =_____

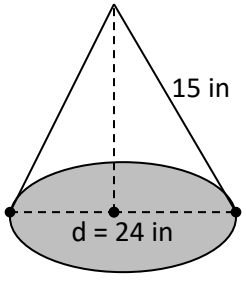
V = _____



82)L.A.=_____

S.A. =_____

V = _____



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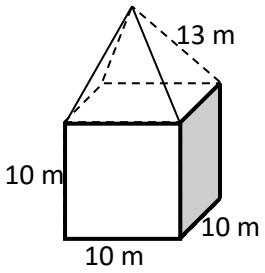
83) L.A.=_____

S.A. =_____

V = _____



84)L.A.=_____

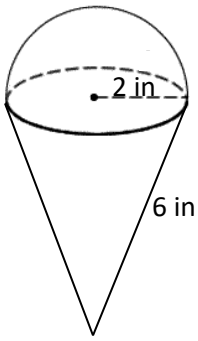
S.A. =_____

V = _____

85) L.A.=_____

S.A. =_____

V = _____



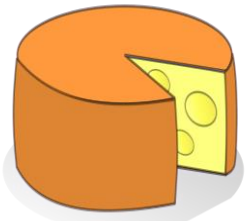
86) A 60° sector is sliced from a cylinder of cheese whose radius is 6 cm and height is 15 cm. Find:

(a) Volume of the cheese remaining?_____

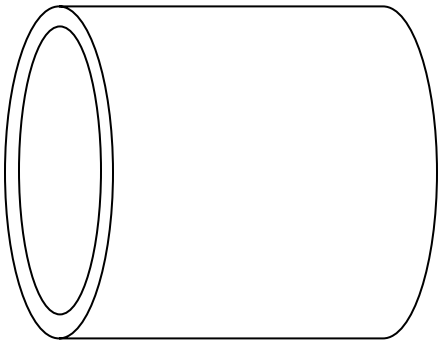
(b) Lateral Area of cheese remaining?_____

(c) Volume of the wedge removed? _____

(d) Surface Area of wedge removed? _____



87) If a solid metal ball is melted and recast to form a hollow pipe, whose inner diameter is 5.8 cm and whose outer diameter is 6 cm, how long of a pipe can be made if the ball has a radius of 12 cm?



Name_____

Geometry Honors ISLO Exam

Final Exam Review Answer Key

(1) a. 8 b. 4

(2) a. 5π b. $2\pi\sqrt{5}$ c. y = 2x – 2

(3) 60.3

(4) a. opposite angles are supp. b. sum of opposite sides equal sum of opposite sides

(5) 13 cm

(6) 21π

(7) $2\sqrt{5}$

(8) a. 6, $3\sqrt{5}$ b. $9\sqrt{5}$ c. $4.5 - 2\sqrt{5}$ d. 41.81 degrees

(9) 26.6 degrees

(10) $72\sqrt{3}$

(11) 1440 degrees

(12) 27

(13) $\frac{\sqrt{3}}{2}$

(14) B

(15) $\pi = \frac{Circumfere\,nce}{diameter}$

(16) 82.7%

(17) parallelogram

(18) AD = 11

(19) $112.5\sqrt{3}$

(20) $18\sqrt{3} - 6\pi$

(21) $96\pi + 36\sqrt{3}$

(22) $3 < x < 16$

(23) 155

Name_____

(24) $6\sqrt{2}$

(25) 8 or 10

(26) x = 6, y = 9

(27) hypotenuse and segment of the hypotenuse adjacent to that leg.

(28) $72\sqrt{2}$ cm^2

(29) DE = 12

(30) 60

(31) trapezoid ($\frac{5}{9}$)

(32) 4:9

(33) 4^{th} (5^{th} if original is included)

(34) 480 ; $10\sqrt{2}$

(35) 23.04π

(36) 1) Show both pair of opposite sides congruent 2) Show both pair of opposite sides parallel

3) Show both pair of opposite angles congruent 4) Show one pair of opposite sides are both congruent and parallel

5) Show that both diagonals bisect each other

(37) 100π

(38) a. $4\sqrt{6}$ +12 b. tetrahedron side = 12 V = $144\sqrt{2}$ m^3

(39) a. 20, 13 b. 21 c. 24 d. (6, 12) (6, -12)

(40) (0, -6); A = 42.5π

(41) a. 25π b. 2.5π c. 3x – 4y = -23

(42) $117\frac{13}{36}\pi - 192$

(43) $256\sqrt{3}$ - 117 1/3 π , $16\sqrt{3}$ = common tangent

(44) $(x-8)^2 + (y-4)^2 = 16$

(45) a. 9:4 b. 9:4 c. 27:8 d. 3:2

(46) $\frac{15}{14}$

(47) 63 degrees

Name_____

(48) 841

(49) $24\sqrt{3}$ cm^3

(50) $144\sqrt{3}$ cm^2

(51) r = 8

(52) $9\sqrt{3}$ - 3π

(53) Approx. 22.45 cm^2

(54) 1 < x < 3

(55) B

(56) B

(57) E (11.25)

(58) B

(59) A

(60) 120, 48π

(61) a. $81\pi - 60.75\sqrt{3}$ b. 4.5

(62) $27\pi + 20.25\sqrt{3}$

(63) a. 40.5 b. 364.5π

(64) a. $48\sqrt{3}$ b. $8\sqrt{3}$

(65) a. 6, $6\sqrt{2}$ b. 27π

(66) $36\sqrt{3}$

(67) $18 + 18\sqrt{2}$ cm, $162 + 162\sqrt{2}$ cm^2

(68) a. 12, 36 b. 16 c. $8\sqrt{13}$ d. 1:3 e. 24, 216 f. 12

(69) a. 28 b. $\frac{1}{7}$

(70) a. $10\sqrt{3}$ b. 60, 120 c. 75π d. $37.5\sqrt{3}$ e. $100\sqrt{3} - \frac{275}{6}\pi$

(71) a. 40 b. 600 c. 12 d. $600 - 144\pi$ e. 106.26 degrees f. 73.74 degrees

(72) a. 216 b. 225π c. 36π d. 15, 14.4 e. 8

(73) a. 19.2, 13 1/3 b. 78

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(74) 10

(75) a. 21, 30, 27, 18 b. 18 c. 240, 540

(76) a. $8\sqrt{2}$ b. $8\sqrt{3}$, $8\sqrt{6}$ c. 12 d. $12\sqrt{3}$

(77) a. x = 9.01 $\vartheta = 110.30$ b. m$\angle$ A = 20.77, m$\angle$ B = 117.55 m$\angle$ C = 41.68 c. m$\angle$ A= 54.79 m$\angle$ B = 35.20 x = $8\sqrt{2}$

(78) a. 288 b. 12 c. $48\sqrt{2}$ d. 1152 e. $288\sqrt{3}$ f. $288\sqrt{3}$ +288

(79) LA = 1296cm^2 SA = 1944cm^2 V = 5832cm^3

(80) LA = 96 cm^2 SA = 120 cm^2 V = 72 cm^3

(81) LA = 405π cm^2 SA = 486π cm^2 V = 1539π cm^3

(82) LA = 180π in^2 SA = 324π in^2 V = 432π in^3

(83) LA = 640 m^2 SA = 740 m^2 V = $1000 + 33\frac{1}{3}\sqrt{119}$ m^3

(84) LA = 50π in^2 SA = 75π in^2 V = $83\frac{1}{3}\pi$ in^3

(85) LA = 20π in^2 SA = 20π in^2 V = $\frac{16}{3}\pi\sqrt{2} + \frac{16}{3}\pi$ in^3

(86) a. 450π b. 150π +180 c. 90π d. $180 + 42\pi$

(87) V = 2304π h= 3, 905cm