

Honors Geometry

Final Exam Review Packet

Name: Key

Name _____
Final Exam Prep

HONORS
Geometry Handout
Right Triangles CHAP 8

Date _____

Theorems

If an altitude is drawn to the hypotenuse, then

- the altitude to the hypotenuse is the mean proportional between the segments of the hypotenuse
- either leg is the mean proportional between the hypotenuse and the projection of that leg.

The Pythagorean Theorem (be able to prove this)

Pythagorean Triples 3,4,5 5,12,13 8,15,17 7,24,25

In a right triangle, the side opposite the 30 degree angle is $\frac{1}{2}$ the hypotenuse

the side opposite the 60 degree angle is $\frac{\sqrt{3}}{2}$ the hypotenuse times radical three

the side opposite the 45 degree angle is $\frac{1}{2}$ the hypotenuse times radical two.

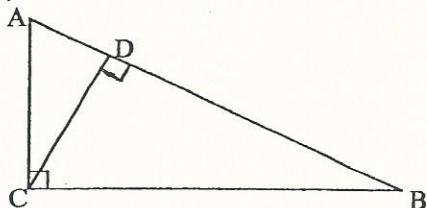
The diagonal of a rectangular solid is calculated by finding the square root of $(a^2 + b^2 + c^2)$

1. Simplify the $\sqrt{200}$, $\sqrt{128}$,

2. Multiply $(4\sqrt{5})(5\sqrt{5})$

3. $(4\sqrt{7})^2$

4.



- If $AD = 4$ and $BD = 9$, find CD
- If $AD = 4$ and $AB = 16$, find AC
- If $BD = 6$ and $AB = 8$, find BC
- If $CD = 8$ and $BD = 16$, find AD
- If $AD = 3$ and $BD = 24$, find AC

- $10\sqrt{2}$, $8\sqrt{2}$
- 100
- 112

- 6
- 8
- $4\sqrt{3}$
- 4
- 9

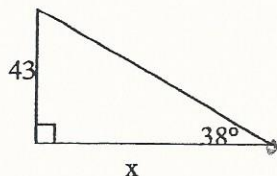
5. Find the perimeter of a rectangle whose side is 5 and diagonal is 13.

6. Find the perimeter of a rhombus with diagonals 6 and 10.

7. Find the altitude of an isosceles trapezoid whose sides are 10 and bases are 20 and 30

8. Find the diagonal of a rectangular solid whose edges are 3, 5 and 7.

9. Solve for x:



$$\tan 38^\circ = \frac{43}{x}$$

10. If the altitude of an equilateral triangle is $8\sqrt{3}$, find the perimeter.

- 34
- $4\sqrt{34}$
- $5\sqrt{3}$
- $\sqrt{83}$

- 55
- 48

Theorems

If a radius is perpendicular to a chord, then it bisects the chord.

If two chords of a circle are equidistant from the center, then they are congruent.

Congruent central angles intercept congruent arcs.

Congruent central angles form congruent chords.

Congruent chords form congruent arcs.

(All the above, of course, are in the same circle or congruent circles and the converses are true.)

A tangent line is perpendicular to the radius drawn to the point of contact.

Two tangents drawn to a circle from a point are congruent.

The measure of an inscribed angle or a tangent-chord angle is $\frac{1}{2}$ the measure of its intercepted arc.

The measure of a chord-chord angle is $\frac{1}{2}$ the sum of the arcs.

The measure of a secant-secant angle, a secant-tangent angle or a tangent-tangent angle is $\frac{1}{2}$ the difference of its intercepted arcs.

Inscribed angles that intercept the same or congruent arcs are congruent.

An angle inscribed in a semicircle is a right angle.

The angle formed by two tangents is supplementary to the measure of its minor arc.

If a quadrilateral is inscribed in a circle, its opposite angles are supplementary.

Power Theorems

If two chords intersect inside of a circle, the products of the segments of one chord equals the product of the segments of the other chord.

If a tangent and a secant are drawn to a circle from a point the square of the tangent equals the product of the secant and its external segment.

If two secants are drawn to a circle from a point, the product of one secant and its external segment equals the product of the other secant and its external segment.

1. If a chord of a circle has a length of 12mm and the radius of the circle is 10mm. Find the distance the chord is from the center of the circle.

1. 8

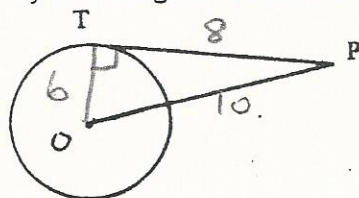
2. Find the length of a chord that is 15 cm from the center of a circle with a radius of 17 cm.

2. 16

3. A 16 by 12 rectangle is inscribed in a circle. Find the radius.

3. 10

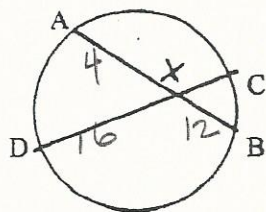
4.



Tangent TP is 8 cm, the radius is 6 cm, find the length of OP.

4. 10

5.



If $AX = 4$ and $BX = 12$, find XC if $DX = 16$

5. 3

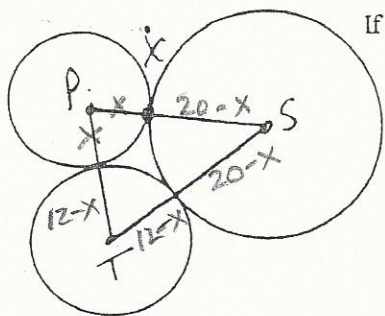
$$4 \cdot 12 = 16 \cdot x$$

$$48 = 16x$$

$$\frac{48}{16} = \frac{16x}{16}$$

$$x = 3$$

6.

If $PS = 20$, $TS = 16$ and $PT = 12$, find PX

$$20 - x + 12 - x = 16$$

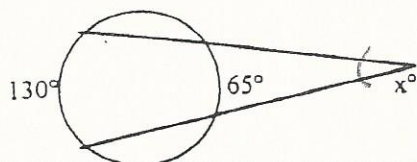
$$32 - 2x = 16$$

$$-2x = -16$$

$$x = 8$$

6. 8

7.

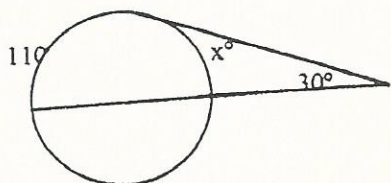


$$x^\circ = \frac{1}{2}(130 - 65)$$

$$x^\circ = \frac{1}{2}(65)$$

$$7. \underline{32.5^\circ}$$

8.



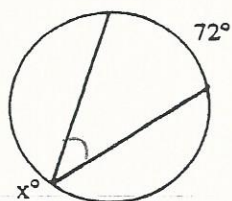
$$30^\circ = \frac{1}{2}(110^\circ - x^\circ)$$

$$60^\circ = 110^\circ - x^\circ$$

$$50^\circ = x^\circ$$

$$8. \underline{50^\circ}$$

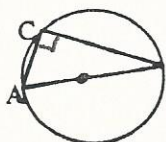
9.



$$x^\circ = \frac{1}{2}(72^\circ)$$

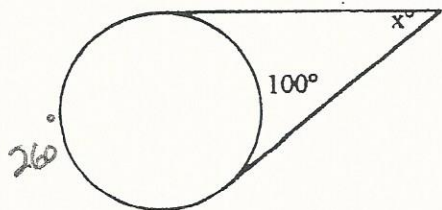
$$9. \underline{36^\circ}$$

10.

If AB is a diameter, find the number of degrees in $\angle ACB$.

$$10. \underline{90^\circ}$$

11.



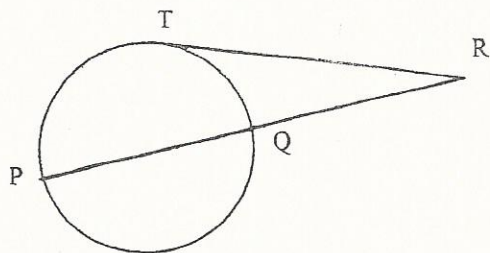
$$x^\circ = \frac{1}{2}(260^\circ - 100^\circ)$$

$$x^\circ = \frac{1}{2}(160^\circ)$$

$$x^\circ = 80^\circ$$

$$11. \underline{80^\circ}$$

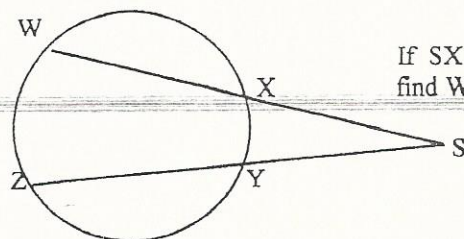
12.



- a) If $TR = 10$ and $QR = 5$, find PR
 b) If $TR = 10$ and $QR = 4$, find PQ
 c) If $TR = 10$ and $PR = 50$, find PQ

12 a) $\underline{20}$
 b) $\underline{21}$
 c) $\underline{48}$

13.



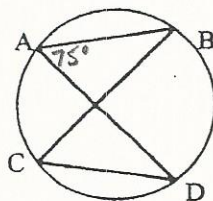
If $SX = 5$, $SY = 3$ and $YZ = 12$,
 find WX .

13. $\underline{4}$

14. If a quadrilateral is inscribed in a circle. Its vertices divide the circle into four arcs
 In the ratio of $1:2:5:4$. Find the angles of the quadrilateral.

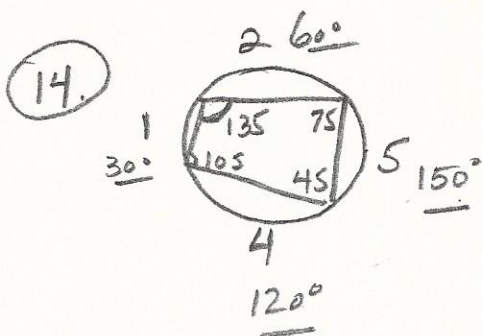
14. $\underline{45^\circ, 105^\circ, 135^\circ, 75^\circ}$

15.



If $\angle A = 75^\circ$, find the number of degrees in $\angle C$

15. $\underline{75^\circ}$



$$1x + 2x + 5x + 4x = 360^\circ$$

$$12x = 360^\circ$$

$$x = 30$$

Theorems and Postulates

Area of Rectangle = bh Area of a Square = s^2 Area of a Parallelogram = bh
Area of a triangle = $\frac{1}{2}bh$ Area of a Trapezoid = $\frac{1}{2}h(b_1 + b_2)$ Median of a trapezoid joins the midpoints of the legs.
Median of a Trapezoid = $\frac{1}{2}(b_1 + b_2)$ Area of a Trapezoid = hM
Area of a Kite = $\frac{1}{2}d_1d_2$ Area of an Equilateral Triangle = $s^2\sqrt{3}/4$
Area of an Equilateral Polygon = $\frac{1}{2}ap$ Area of a Circle = πr^2 Area of a Sector = Fractional Part of a Circle
Area of a Segment = Area of a Sector - area of the Triangle In general the ratio of areas of Similar Polygons follow the following rule $A_1/A_2 = (part_1)^2/(part_2)^2$

Hero's Formula $A = \sqrt{s(s-a)(s-b)(s-c)}$

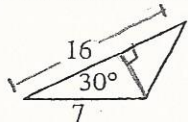
1. Find the base of a triangle with an altitude 15 and area 60.

1. 8

2. Find the area of a parallelogram whose sides are 14 and 6 and whose acute angle is 45° .

2. $42\sqrt{2}$

3.



Find the area. $h = 3.5$ $A = \frac{1}{2}(16)(3.5)$

3. 28

4. Find the area of an equilateral triangle whose perimeter is 60.

4. $100\sqrt{3}$

5. Find the side of an equilateral triangle whose area is $9\sqrt{3}$.

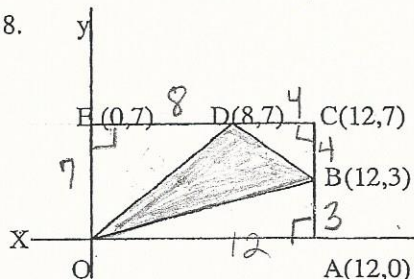
5. 6

6. N/A

7. Find the lower base of a trapezoid whose upper base is 10 and whose median is 17.

7. 24

8.



Find the area of triangle ODB

8. 10

9. Find the area of a regular polygon whose perimeter is 40 and an apothem of 5.

9. 100

10. The radius of a regular hexagon is 12, find the area.

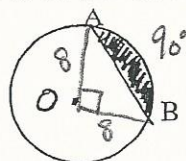
10. $216\sqrt{3}$

11. Find the area of a square if the radius of its inscribed circle is 9.



11. 324

12. Find the area of the shaded portion of the following circle, if the radius is 8 and the measure of arc AB is 90 degrees.



$32\pi - 32$

12. $32(\pi - 1)$

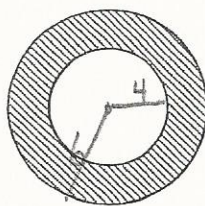
13. Find the circumference of a circle whose area is 49π .

13. 14π

14. Find the area of the shaded section, if the diameter of the smaller circle is 8 and the diameter of the larger is 12. What is the ratio of the radii? What is the ratio of the areas?

14a $\frac{20\pi}{3}$
 b $\frac{2}{3}$
 c $\frac{4}{9}$

Shaded Area = 20π



b) $\frac{4}{6} = \frac{2}{3}$

c) $\frac{4}{9}$

15. Find area of a triangle whose sides are 5, 8 and 9.

$P=22$ $S=11$

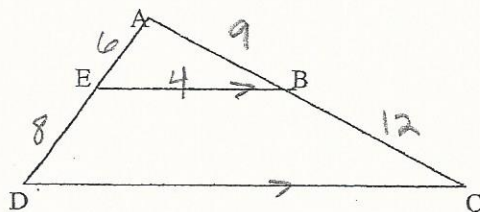
15. $6\sqrt{11}$

$A = \sqrt{11(11-5)(11-8)(11-9)} = \sqrt{11(2)(3)(6)}$

16. If the ratio of the areas of two similar triangles are 9:16, what is the ratio of their perimeters? 16.

$\frac{3}{4}$

1. Find the value of DC if $EB \parallel DC$, $AE = 6$, $EB = 4$, $ED = 8$.



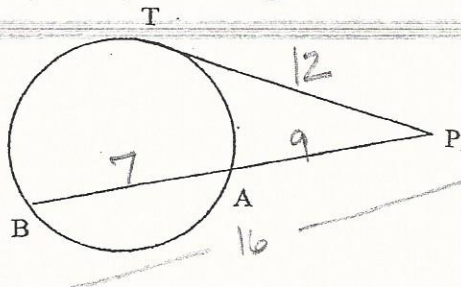
$$\frac{6}{4} = \frac{14}{x}$$

$$6x = 56$$

$$x = 9\frac{1}{3}$$

2. Using the above information and letting $AB = 9$, find BC.

3. If $PB = 16$, $BA = 7$, find the length of TP.



$$9 \cdot 16 = t^2$$

$$144 = t^2$$

$$t = 12$$

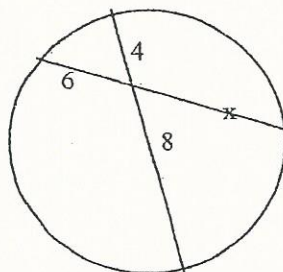
$$\frac{6}{14} = \frac{9}{x}$$

$$6x = 126$$

$$x = 21$$

$$21 - 9 = 12$$

4. Find the value of x.

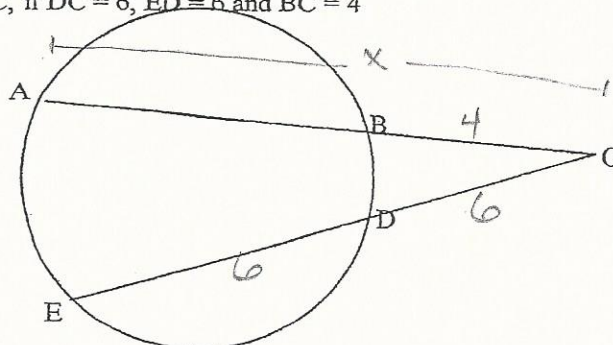


$$4 \cdot 8 = 6 \cdot x$$

$$32 = 6x$$

$$5\frac{1}{3} = x$$

5. Find the value of AC, if $DC = 6$, $ED = 6$ and $BC = 4$



$$4 \cdot x = 6 \cdot 12$$

$$4x = 72$$

$$x = 18$$

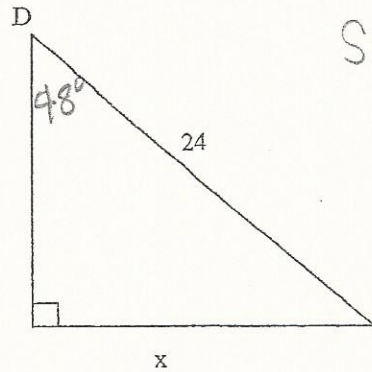
6. Find the volume of a sphere with a radius of 8.

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

$$V = \frac{4}{3} \pi 512$$

$$V = 682\frac{2}{3}$$

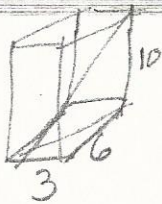
7. If $\angle D = 48^\circ$, find the value of x .



$$\sin 48^\circ = \frac{x}{24}$$

$$x = 18$$

8. Find the total surface area of a rectangular prism with length 6, width 3 and height 10. Also find the length of the diagonal.



$$LA = ph = 18(10) = 180$$

$$TA = 180 + 2(18) = \boxed{216}$$

$$3^2 + 6^2 = c^2$$

$$9 + 36 = c^2$$

$$c = \sqrt{45}$$

$$\sqrt{45^2 + 10^2} = d^2$$

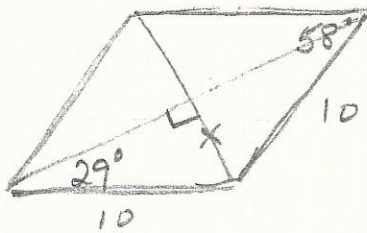
$$45 + 100 = d^2 \quad d = \sqrt{145}$$

9. Find the area of a circle whose circumference is 14π . Find the length of an arc of this circle if the arc has a measure of 45 degrees.

$$r = 7 \quad A = 49\pi$$

$$\frac{45}{360}(14\pi) = \frac{14}{8}\pi = \frac{7}{4}\pi$$

10. Find the area of a rhombus whose acute angle is 58 degrees and has sides of 10.



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

$$\text{AREA Rhombus} = 4(A\Delta)$$

$$\sin 29^\circ = \frac{x}{10}$$

$$\cos 29^\circ = \frac{y}{10}$$

1. Find the sum of the angles of a decagon.

$$(n-2)(180^\circ) \\ 8(180^\circ)$$

1. 1440

2. Find one interior angle of a regular polygon that has 14 sides.

$$\frac{360^\circ}{14} = 25.7 \quad 180 - 25.7$$

2. 154.3

3. If $7x = 13y$, find the ratio of $x:y$

$$\frac{x}{y} = \frac{13}{7}$$

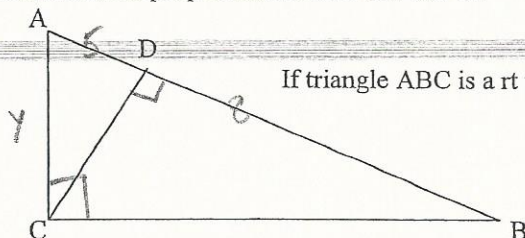
3. 13/7

4. Find the mean proportional between 5 and 12

$$\frac{5}{x} = \frac{x}{12} \quad x^2 = 60 \\ x = \sqrt{60}$$

4. $2\sqrt{15}$

5. If triangle ABC is a rt triangle and CD is an altitude.



$$\frac{5}{y} = \frac{y}{13} \quad y^2 = 65$$

- a) Find AC if AD = 5 and DB = 8

$$\frac{5}{x} = \frac{x}{11} \quad x^2 = 55 \\ x = \sqrt{55}$$

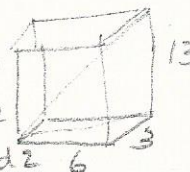
5a) $\sqrt{65}$

- b) Find CD if AD = 5 and DB = 11

b) $\sqrt{55}$

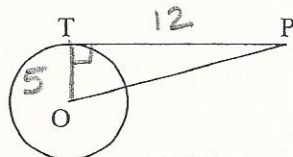
6. Find the diagonal of a rectangular solid whose edges are 6, 3 and 13

$$3^2 + 6^2 = 9 + 36 = 45 \\ 45 + 13^2 = d^2 \\ 45 + 169 = d^2 \\ 214 = d^2 \\ d = \sqrt{214}$$



6. $\sqrt{214}$

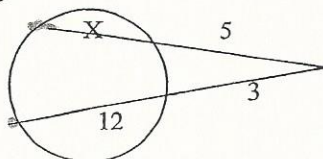
- 7.



TP = 12 and the radius is 5, find OP

7. 13

- 8.



Find x

$$5(5+x) = 3(15)$$

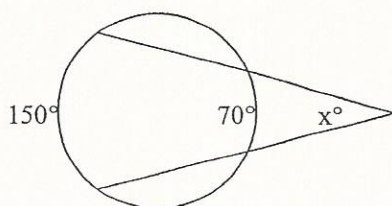
$$25 + 5x = 45$$

$$5x = 20$$

$$x = 4$$

8. 4

- 9.



$$x^\circ = \frac{1}{2}(150^\circ - 70^\circ)$$

$$x^\circ = \frac{1}{2}(80^\circ)$$

$$x^\circ = 40^\circ$$

9. 40

NAME _____

FINAL EXAM REVIEW

Review

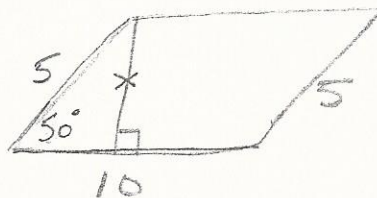
- 1) One side of a parallelogram is 5, the other is 10, one base angle is 50 degrees.

Find the perimeter _____,

area, _____,

other base angles. 130°

$$\sin 50^\circ = \frac{x}{5}$$



- 2) A square prism has a base 6 units long and a height of 10. Find the lateral area

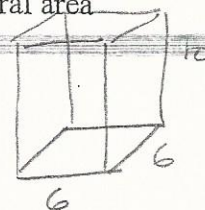
240, total surface area 312, and

volume 360.

$$LA = 24(10) = 240$$

$$TA = 240 + 2(36) = 312$$

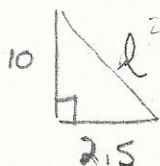
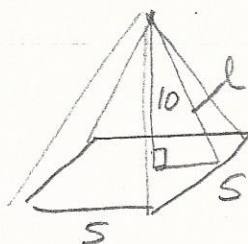
$$V = 36(10) = 360$$



- 3) A square pyramid has a base 5 units long and a height of 10. Find the lateral area

103, total surface area 128, and

volume. 83.3



$$LA = \frac{1}{2} 20(10.3) \quad LA = 103$$

$$TA = 103 + 25 = 128$$

$$V = \frac{1}{3} (25) 10 = 83.3$$

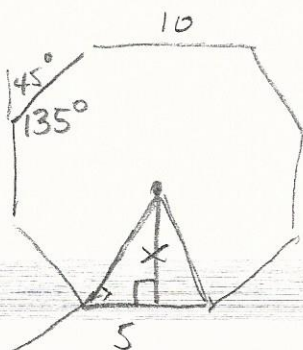
$$(2.5)^2 + (10)^2 = l^2$$

$$6.25 + 100 = l^2 \quad l = 10.3$$

- 4) A regular octagon has a side 10 units long. Find the perimeter

80 and the area _____. Also find the size of one

interior angle 135° and one exterior angle 45°.



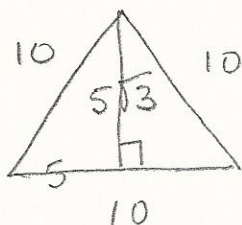
$$\tan 67.5^\circ = \frac{x}{5}$$

$$A = \frac{1}{2} \times (80)$$

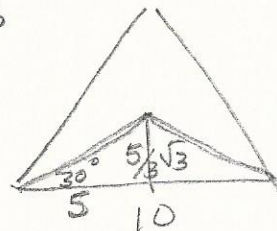
$$\frac{360^\circ}{8} = 45^\circ$$

67.5°

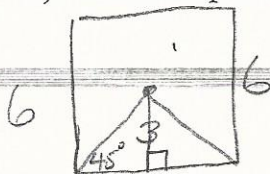
- 5) An equilateral triangle has a side of 10. Find the area $25\sqrt{3}$, the perimeter 30 , one interior angle 60° , and one exterior angle 120° , and the apothem $\frac{5\sqrt{3}}{3}$.



$$A = \frac{1}{2}(10)5\sqrt{3}$$



- 6) Find the apothem of a square with sides 6 units long 3 .

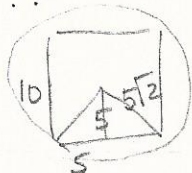


- 7) A sphere has a radius of 5. Find the volume 166.6 .



$$V = \frac{4}{3}\pi r^3 \quad V = \frac{4}{3}\pi(5)^3$$

- 8) A square is inscribed in a circle. It has sides that are 10 units long. Find the area of the circle 50π .

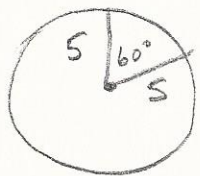


$$r = 5\sqrt{2}$$

$$A = \pi(5\sqrt{2})^2$$

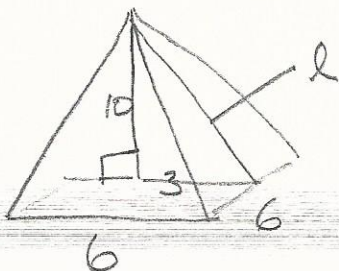
$$A = 50\pi$$

- 9) A circle has a radius of 5. What is the area of a sector whose central angle is 60 degrees $\frac{25}{6}\pi$? What is the length of the arc? $\frac{5}{3}\pi$.



$$A = \frac{60^\circ}{360^\circ} \pi(5)^2 = \frac{1}{6}(25)\pi \quad \text{Length} = \frac{1}{6} 2\pi(5) = \frac{10}{6}\pi = \frac{5}{3}\pi$$

- 10) The height of a pyramid is 10, each side of the base is 6. Find the slant height $\sqrt{109}$.



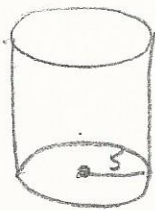
$$3^2 + 10^2 = l^2$$

$$9 + 100 = l^2$$

$$l = \sqrt{109}$$

11) A cylinder has a height of 10 and a radius of 5. Find the surface

area 150π , lateral area 100π , and volume 250π .



$$LA = 2\pi(5)10 = 100\pi$$

10

$$TA = 100\pi + 2(\pi(5)^2)$$

$$100\pi + 50\pi = 150\pi$$

$$V = 25\pi(10)$$

12) If a triangle has side 3, 4, and 6; use Hero's formula to find the area . Identify whether that triangle is right, acute, or obtuse OBTUSE

$$P = 13 \quad S = 6.5$$

$$6^2 \stackrel{?}{=} 3^2 + 4^2$$

$$36 \stackrel{?}{=} 9 + 16$$

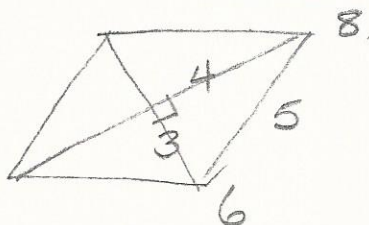
$$36 > 25$$

OBTUSE

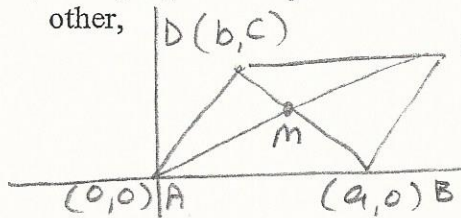
$$\sqrt{(6.5)(6.5-6)(6.5-4)(6.5-3)}$$

$$\sqrt{(6.5)(.5)(2.5)(3.5)}$$

13) If the diagonals of a rhombus are 6 and 8, what is the perimeter? 20



14) Set up a parallelogram on the coordinate plane. Prove the diagonals bisect each other.



the opposite sides are parallel,

use slope

$$\text{Slope } AD = \frac{c-0}{b-0} = \frac{c}{b}$$

$$\text{Slope } AB = 0$$

$$DC = 0$$

$$BC = \frac{c-0}{a+b-a} = \frac{c}{b}$$

Find midpoints

$$\text{Mid } AC = \left(\frac{a+b}{2}, \frac{c}{2}\right)$$

$$\text{Mid } DB = \left(\frac{a+b}{2}, \frac{c}{2}\right) \rightarrow \text{same}$$

And prove one pair of opposite sides are congruent (same length).

use

distance

$$AB = \sqrt{a^2 + 0^2} = \sqrt{a^2} = a$$

$$DC = \sqrt{((a+b)-b)^2 + (c-c)^2}$$

$$\sqrt{a^2 + 0^2} = \sqrt{a^2} = a$$

$$AB \cong DC$$

- 15) Give the components of the vector that goes from (0,1) to (6,-2) $\langle 6, -3 \rangle$
Find the magnitude of the vector $3\sqrt{5}$.

$$\sqrt{6^2 + (-3)^2}$$

$$\sqrt{36 + 9}$$

$$\sqrt{45} = 3\sqrt{5}$$

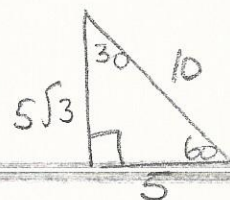
- 16) The second angle of a triangle is twice the first. The third is three times the first. If the side between the first and second angles is 10, how long is the side between the first and third? 5 and $5\sqrt{3}$



$$X + 2X + 3X = 180^\circ$$

$$6X = 180^\circ$$

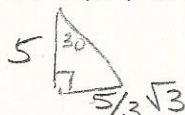
$$X = 30^\circ$$



- 17) Two similar triangles have a scale factor of 2 : 3. If the area of the smaller one is 10, what is the area of the larger one? 22.5

$$SF = \frac{2}{3} \quad \text{Area ratio} \quad \frac{4}{9} \quad \frac{4}{9} = \frac{10}{X} \quad 4X = 90 \quad X = 22.5$$

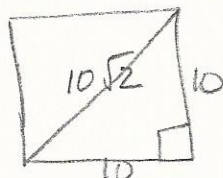
- 18) In a 30, 60, 90 triangle, if the long leg is 5, what is the hypotenuse? $\frac{10}{3}\sqrt{3}$



- 19) In a 45, 45, 90 triangle, if the hypotenuse is 12, what are the legs? $6\sqrt{2}$



- 20) In a square with sides of 10 units long, how long is the diagonal? $10\sqrt{2}$

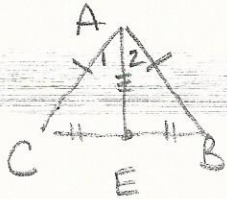


- 21) In triangle ABC, DE is drawn parallel to BC, prove $(AD)(EC) = (AE)(DB)$



$$\frac{AD}{DB} = \frac{AE}{EC} \quad \therefore (AD)(EC) = (AE)(DB)$$

- 22) In triangle ABC, if E is between B and C, and AB is congruent to AC, and BE is congruent to EC, prove AE is an angle bisector.



① $AC \cong AB$ ① Given
 $CE \cong EB$

② $AE \cong AE$ ② Reflexive

③ $\triangle AEC \cong \triangle AEB$ ③ SSS

④ $\angle 1 \cong \angle 2$ ④ CPCTC ⑤ AE is an \angle bisector

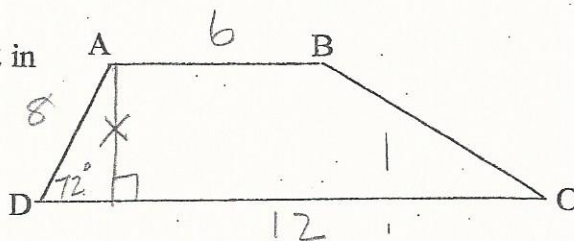
Final Exam Review – Open Ended Questions

1. Trapezoid ABCD, AB = 6 in, DC = 12 in
AD = 8 in and $\angle D = 72^\circ$

Find the area.

$$\sin 72^\circ = \frac{x}{8}$$

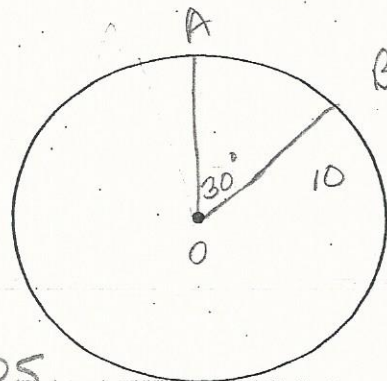
$$A = \frac{1}{2}(x)(6+12)$$



2. A circle has radii AO and BO. The measure of the radius is 10 ft and the measure of central angle AOB is 30 degrees.

- a) find the exact length of arc AB
b) find the exact area of sector AOB

$$a) \widehat{AB} = \frac{30^\circ}{360^\circ} 2\pi(10) = \frac{1}{12}(20\pi) = \frac{5}{3}\pi$$



$$b) \text{area } AB = \frac{30^\circ}{360^\circ} \pi (10)^2 = \frac{1}{12}(100\pi) = \frac{25}{3}\pi$$

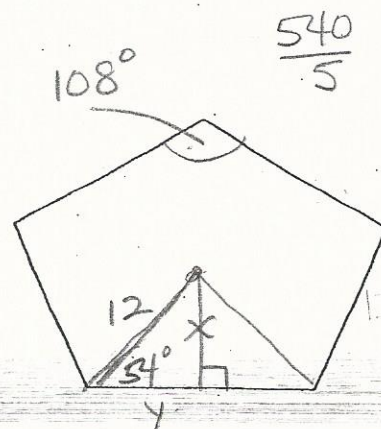
3. A regular pentagon has a radius of 12 inches.

- a) find the apothem to the nearest tenth.
b) find the area to the nearest tenth

$$a) \sin 54^\circ = \frac{x}{12}$$

$$\cos 54^\circ = \frac{y}{12}$$

$$b) A = \frac{1}{2}(x)(10y)$$



Final Exam Review – Open Ended Questions

1. Prove: $AB \times CE = AC \times BD$?

$$\frac{AB}{AC} = \frac{BD}{CE}$$

2. If the base of a square pyramid is 20 and the height is 8.

- Find the lateral area.
- Find the total area
- Find the volume

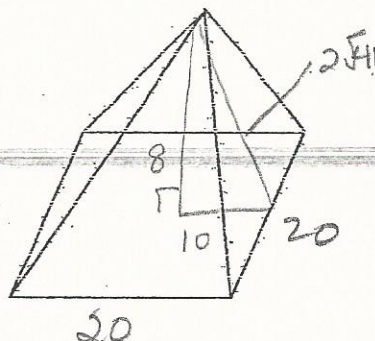
$$LA = \frac{1}{2} (80) 2\sqrt{41}$$

$$8\sqrt{41}$$

$$TA = 8\sqrt{41} + 400$$

$$V = \frac{1}{3} (400)(8)$$

$$V = 1066.\bar{6}$$



$$l^2 = 8^2 + 10^2$$

$$l = \sqrt{164}$$

$$\sqrt{4 \cdot 41}$$

$$l = 2\sqrt{41}$$

3. Triangle DEF has vertices D (-5,1), E (-2,-3), and F (6,3)

- Show that the triangle is a right triangle.
- Find the area of the triangle
- Find the midpoint of the hypotenuse

$$\overline{DE} = \sqrt{(-3)^2 + (-4)^2} = \sqrt{25} = 5$$

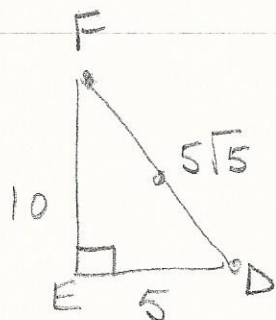
$$\overline{EF} = \sqrt{(8)^2 + (6)^2} = \sqrt{64+36} = 10$$

$$\overline{DF} = \sqrt{11^2 + 2^2} = \sqrt{121+4} = \sqrt{125} = 5\sqrt{5}$$

$$a) \quad 5^2 + 10^2 = (5\sqrt{5})^2$$

$$25 + 100 = 25 \cdot 5$$

$$125 = 125 \quad \text{is a RIGHT } \Delta$$



$$b) \quad \frac{1}{2} (5)(10) = 25$$

$$c) \quad \text{Mid } FD = \left(\frac{6+(-5)}{2}, \frac{3-1}{2} \right) = \left(\frac{1}{2}, 1 \right)$$