Geometry Individual Solutions
Vero Beach March 19, 2005

1. B $\triangle$ is isosceles right, Legs are 4, $A = \frac{1}{2} \cdot 4 \cdot 4 = 8$

2. B $60h - 11m < 90$

$m > 32.7$

3. D $\sqrt{(3-4)^2 + (1-6)^2 + (0-2)^2}$

$1 + 25 + 4$

$\sqrt{30}$

4. D $\triangle$s are $\sim$ by SSS
ratio of sides $\frac{1}{2}$
ratio of areas $\frac{1}{4}$
so (4) will fit

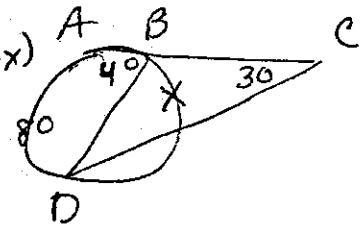
5. D $m\angle C = \frac{1}{2}(m\overset{\frown}{AC} - \overset{\frown}{x})$

$m\overset{\frown}{AD} = 80$

$30 = \frac{1}{2}(80 - x)$

$x = 20$

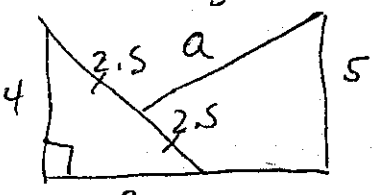
$m\angle D = 10$



6. E. Let orig $r = 10$. $V = \frac{4000}{3}\pi$. when r decreased by 20%, new radius = 8.
$V = \frac{2048}{3}\pi$. Decreases $\frac{1952}{3}\pi$.

$\frac{\frac{1952}{3}\pi}{\frac{4000}{3}\pi} = 48.8\%$

7. D



$P = 16.5 + a$

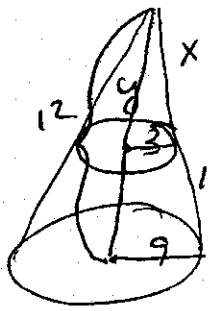
$r = \frac{16.5 + a}{2}$

$C = 2\left(\frac{16.5 + a}{2}\right)\pi$

$= (16.5 + a)\pi$

8. D $\frac{AC \cdot DB}{AC + DB} = \frac{30 \cdot 20}{50} = 12$

9. C



$\frac{1}{3} = \frac{x}{x+10}$

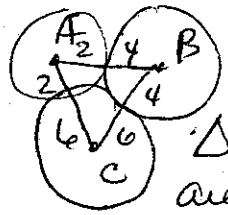
$x = 5$

Use Pythags to find ht is 12

$\frac{y}{12} = \frac{1}{3}$, $y = 4$

ht of frustrum is $12 - 4 = 8$

10. D

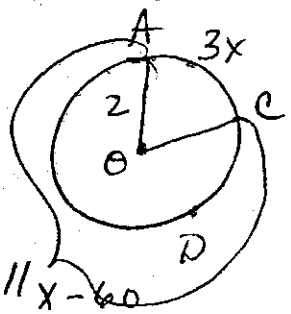


Sides of $\triangle$ are 6, 8, 10.

$\triangle$ is right

area $= \frac{1}{2} \cdot 6 \cdot 8 = 24$

11. C



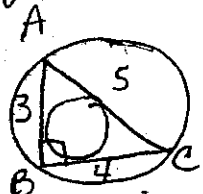
$11x - 60 + 3x = 360$

$x = 30$

$m\overset{\frown}{AC} = 90$, $m\angle AOC = 90$

area of secto $= \frac{1}{4} \cdot 4\pi = \pi$

12. D



$AC = 5$ is dia of ⓐ since $m\angle B = 90$.

$r = \frac{5}{2}$, radius of inscribed ⓐ is $\frac{\text{Area of } \triangle}{\text{semiperimeter } \triangle} = \frac{\frac{1}{2} \cdot 3 \cdot 4}{6} = 1$

$\frac{5}{2} - 1 = \frac{3}{2}$

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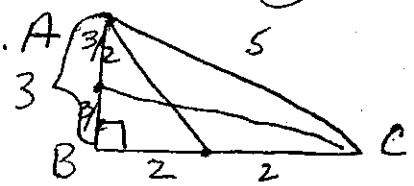
13. C Find V of outer ⊙, subtract inner ⊙, then subtract V of 3 holes.
$\frac{1}{3}(81\pi - 36\pi) - 3\left(\frac{1}{3}\pi \cdot \frac{1}{16}\right) = \frac{239}{16}\pi$.
Set = to V of sphere to find r. $\frac{239}{16}\pi = \frac{4}{3}\pi r^3$
$r = \frac{\sqrt[3]{717}}{4}$

14. B

Circumference C
has a radius of $\frac{C}{2\pi}$.
In the △, side opp 60 is $\frac{1}{2} \cdot \frac{C}{2\pi}\sqrt{3} = \frac{C\sqrt{3}}{4\pi}$
$\frac{C\sqrt{3}}{4\pi}, 2$ = side of △
$\left(\frac{C\sqrt{3}}{2\pi}\right)3$ = perimeter

15. C $a = \frac{kc^2}{b}$, $k = \frac{ab}{c^2}$,
$\frac{10.5}{25} = \frac{a \cdot 12}{64}$, $a = \frac{32}{3}$
$p = 20 + \frac{32}{3} = \frac{92}{3}$
$S = \frac{92}{3} \cdot \frac{1}{2} = \frac{46}{3}$

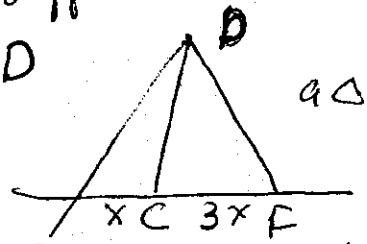
16. A



med to hypo = $\frac{5}{2}$
med to BC = $\sqrt{3^2+2^2} = \sqrt{13}$
med to AB = $\sqrt{\left(\frac{3}{2}\right)^2+4^2} = \frac{\sqrt{73}}{2}$
$\left(\frac{5}{2}\right)^2 + \left(\sqrt{13}\right)^2 + \left(\frac{\sqrt{73}}{2}\right)^2 = 37.5$

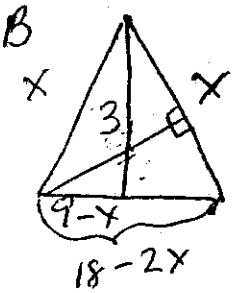
17. E In a quadrilateral inscribed in a ⊙, opposite ∠s are supplementary, so difference is 0.

18. D



a△DCF = 6
Since alts are the same, ratio of areas is the ratio of the bases. Bases are $\frac{1}{2} = \frac{x}{6}$,
Area DEF = 2. a△DEC = 2+6 = 8.

19. B

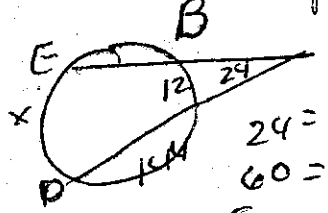


p = 18
$9 + (9-x)^2 = x^2$
x = 5
9 − x = 4
$A = \frac{1}{2} \cdot 3 \cdot 8 = 12$

20. C $A = 11 - 2 = 9$
$A = \frac{1}{2} \cdot 6 \cdot 9 = 27$

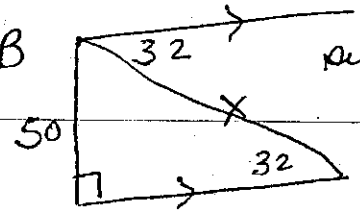
21. B Area of $\triangle = 36\sqrt{3}$. $36\sqrt{3} = \frac{6a^2\sqrt{3}}{4}$
makes side of hex 2√6. Apothem would be alt to △ formed by drawing diags. Apothem opp 60°∠, $3\sqrt{2}$.

22. C



$24 = \frac{1}{2}(x - 12)$
60 = x
BE = 360 − (60 + 144 + 12)

23. B



$\sin 32 = \frac{50}{x}$
x = 94.35

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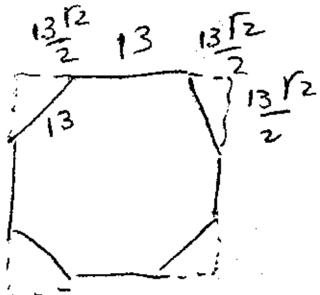
24. B Platonic Solids

hexahedron, octahedron
tetrahedra, dodecahedron
icosahedron

25. C Since diags in a rhombus are ⊥, use Pythag to find other diag = 40. $A=\frac{1}{2}d_1d_2=600$. alt of rhombus is diameter of circle. use area backwards, $600=25\cdot h$, $h=24$. $A⊙=144\pi$, area bounded region is $600-144\pi$.

26. D



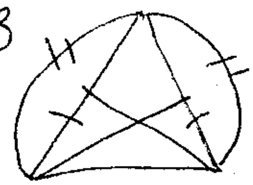
area of □ − 4 △s

$(13+13\sqrt{2})^2-4\cdot\frac{1}{2}\cdot\frac{13\sqrt{2}}{2}\cdot\frac{13\sqrt{2}}{2}$

$169+338\sqrt{2}+338-169$

$338+338\sqrt{2}$

27. B



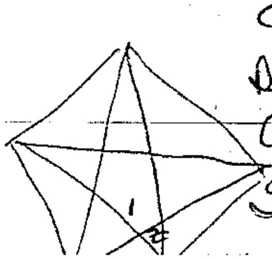
∠ACB ≅ ∠ABC   △, △

BC = CB   reflexive

△CDB ≅ △BEC   SAS

DF = EC   def of ≅ △s or CPCTC

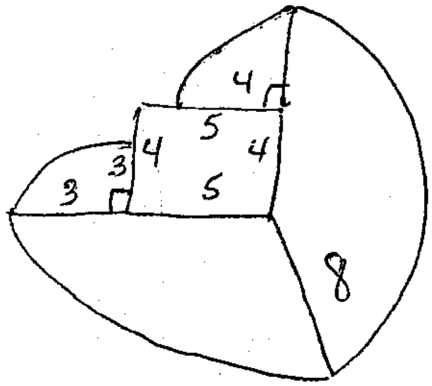
28. C



Draw all diagonals

Inner pentagon has interior ∠ of 108. so m∠2 = 72.

29. B



$\frac{3}{4}\cdot 64\pi+\frac{1}{4}\cdot 9\pi+\frac{1}{4}\cdot 16\pi$

$\frac{217}{4}\pi$

30. B

$\frac{1}{3}Bh=\frac{4}{3}\pi r^3$

$\frac{1}{3}\pi r^2h=\frac{4}{3}\pi r^3$

$h=\dfrac{\frac{4}{3}\pi r^3}{\frac{1}{3}\pi r^2}$

$=4r$