1. $2\cdot12+2\cdot107=238$ C

2. $\sqrt{(8-3)^2+(-1-4)^2}=\sqrt{25+25}=5\sqrt{2}$ D

3. $x+\frac{7}{2}x=180$

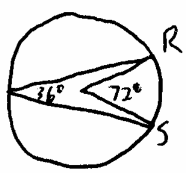
$\frac{9}{2}x=180 \Rightarrow x=40$

$c=90-x=90-40=50$ D

4. $\cancel{0}$ O=D, H=I $\Rightarrow$ 2 C

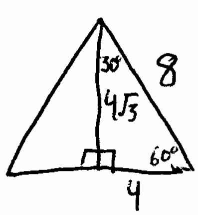
5. $h=\sqrt{10^2+24^2}=\sqrt{100+576}=\sqrt{676}$

$=26$ C

6. 

$RS=2\pi\cdot15\cdot\frac{72}{360}$

$=\frac{30\pi}{5}=6\pi$ C

7. 

$A=\frac{1}{2}\cdot8\cdot4\sqrt{3}$

$=16\sqrt{3}$ B

8. $6s^2=294 \Rightarrow s^2=49 \Rightarrow s=7$

$V=s^3=7^3=7\cdot49=343$ D

9. $\frac{n}{n-4}=\frac{112}{100}$

$100n=112n-448$

$448=12n$

$n=\frac{448}{12}=\frac{112}{3}$ A

10. $75\cdot25\cdot d=150{,}000$

$d=\frac{150000}{3\cdot5^4}=\frac{15\cdot2^4}{3}=5\cdot16=80$ C

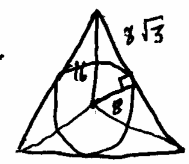
11. $V=\frac{1}{3}\pi r^2h$

$14\cancel{56}\cancel{\pi}=\frac{1}{\cancel{3}}\cancel{\pi}r^2\cdot\cancel{12}\,4$

$r^2=14 \quad r=\sqrt{14}$ A

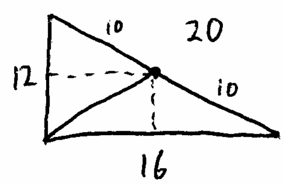
12. $\frac{\cancel{360}\,20}{3600}=\frac{x}{2025}$

$x=\frac{\cancel{2\cdot2025}\,\cancel{405}\,45}{\cancel{360}\,\cancel{180}\,\cancel{36}\,4}=11.25$ C

13. 

$A=3\cdot\frac{1}{2}\cdot16\sqrt{3}\cdot8$

$=192\sqrt{3}$ A

14. 

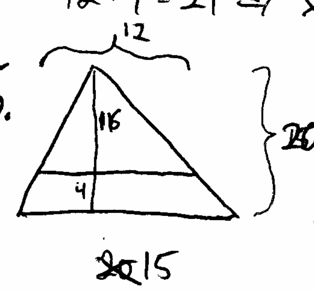
All small triangles are congruent.

$\Rightarrow 10$ A

15. $12-9=3 \Rightarrow 4\le x$

$12+9=21 \Rightarrow x\le20$

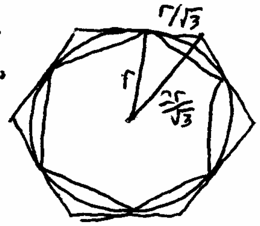
$\Rightarrow 17$ B

16. 

~~$A_T=(1-(\frac{16}{20})^2)20\cdot15$~~

$A_1=\frac{1}{2}20\cdot15-\frac{1}{2}12\cdot16$

$=150-96=54$ A

17. 

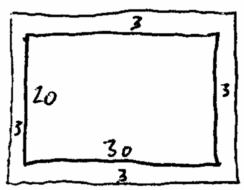
$$\frac{A_o}{A_i} = \left(\frac{\frac{2\cancel{r}}{\sqrt{3}}}{\cancel{r}}\right)^2 = \frac{4}{3}$$ D

18. $r, h \to R, H$

$$\cancel{\pi} R^2 (4k) = 3\cancel{\pi} r^2 k$$

$$R^2 = \frac{3}{4} r^2$$

$$R = \frac{\sqrt{3}}{2} r$$ B

19. 

$$A_f = 26\cdot36 - 20\cdot30 = 936 - 600 = 336$$ C

20. $2x + 9x + x = 180$

$12x = 180$

$x = 15 \Rightarrow 15, 30, 135$ C

21. $4\cdot(4+8) = 3(3+x)$

$48 = 9 + 3x$

$39 = 3x$

$13 = x$ C

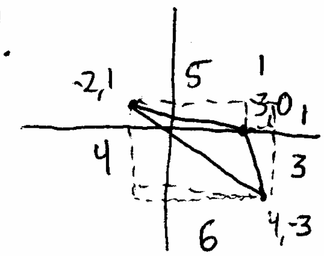
22. at 8:00, the angle is 120°. then minute hand moves 6°/minute, hour $\frac{1}{2}^\circ$/minute. In 10 minutes, the minute hand adds $6\cdot10 = 60^\circ$, but the hour hand subtracts $\frac{1}{2}\cdot10 = 5^\circ$.

$120 + 60 - 5 = 175^\circ$ C

23. $35 - 2x = 30 + (20 + 3x)$

$-15 = 5x$

$-3 = x$ B

24. 

$$A = 4\cdot6 - 1\cdot1 - \tfrac{1}{2}(5\cdot1 + 4\cdot6 + 3\cdot1)$$

$$= 23 - \tfrac{1}{2}(32) = 7$$ C

25. $e = 30 \Rightarrow$ diagonal $= 30\sqrt{3}$

$\Rightarrow$ radius $= 15\sqrt{3}$

$$V = \frac{4}{3}\pi r^3 = \frac{4\pi\, 3375\cdot\cancel{3}\sqrt{3}}{\cancel{3}}$$

$$= 13500\pi\sqrt{3}$$ C

26. $168 = 180 - \frac{360}{n}$

$\frac{360}{n} = 12 \Rightarrow n = 30$

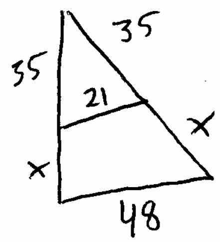
$30\cdot4 = 120$ D

27. $SA=2(3\cdot6+6\cdot9+3\cdot9)$

$\cancel{2\cdot126=252}$

$=2\cdot99=198$ C

28.



$\frac{35+x}{35}=\frac{48}{21}=\frac{16}{7}$

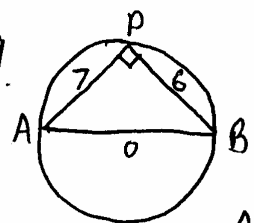
$245+7x=560$

$7x=315$

$x=45$

$45+45+35=125$ B

29.

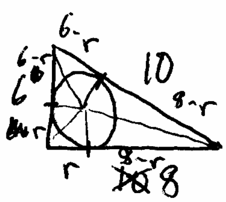


$2r=\sqrt{36+49}$

$r=\frac{\sqrt{85}}{2}$

$A=\pi r^2=\frac{85\pi}{4}$ D

30.



$(6-r)+(8-r)=10$

$14-2r=10$

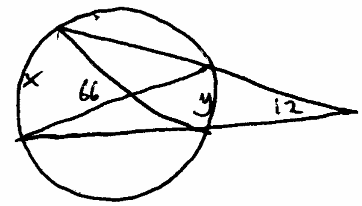
$r=2$ A

31. $V=bh=8b$

$b=\sqrt{9\cdot4\cdot3\cdot2}=6\sqrt{6}$ Heron's Formula

$V=8\cdot6\sqrt{6}=48\sqrt{6}$ C

32.



$\frac{x+y}{2}=66\Rightarrow x+y=132$

$\frac{x-y}{2}=12\Rightarrow x-y=24$

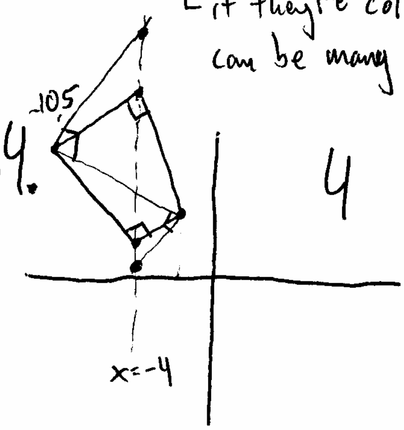
$2x=156$

$x=78$ D

3~~4~~3. I ✓ II ✗ III ✓

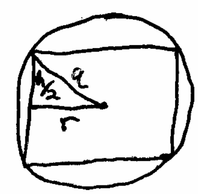
↳ if they're collinear, there can be many planes. C

34.



4 D

35. side view:

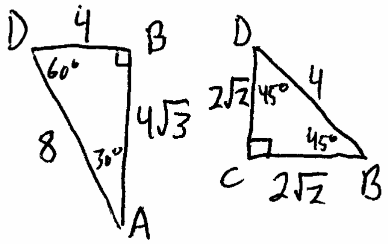


$r=\sqrt{q^2-\left(\frac{h}{2}\right)^2}$

$V=\pi r^2h$

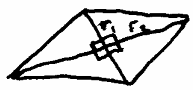
$=\pi h\left(\frac{4q^2-h^2}{4}\right)$ D

36.



$V = 4\sqrt{3} \cdot 2\sqrt{2} \cdot 2\sqrt{2} = 32\sqrt{3}$ C

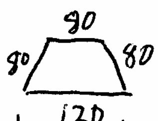
37.



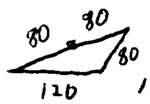
$A = 2r_1r_2 = 2\left(\frac{d_1}{2}\right)\left(\frac{d_2}{2}\right)$

$= \frac{d_1d_2}{2} = \frac{65}{2}$ D

38. Pretend the vertices are hinges. You can make any shape from



to



, so it's not a well-defined quadrilateral. E

39. axis of symmetry: $x = \frac{-b}{2a} = \frac{-4}{-2} = 2$

$f(2) = -4 + 8 + 16 = 20$ D

40. D is midpoint of ~~AC~~ $\overline{BC} = \left(\frac{3}{2}, \frac{7}{2}\right)$

$m = \frac{\frac{11}{2}}{-\frac{3}{2}} = -\frac{11}{3}$

$y = -\frac{11}{3}x + b$

$-2 = -\frac{11}{3} \cdot 3 + b \Rightarrow b = 9$ B