1. D
2. C
3. C
4. D
5. A
6. D
7. A
8. B
9. D
10. C
11. B
12. B
13. B
14. C
15. D
16. B
17. C
18. E
19. D
20. A
21. B
22. B
23. B
24. C
25. D
26. D
27. D
28. E
29. A
30. D

1. **D** $x^2-12x+36+y^2+8y+16=-7+36+16 \Rightarrow (x-6)^2+(y+4)^2=45$

$(6,-4),(3,2) \rightarrow m=\dfrac{-4-2}{6-3}=-2 \rightarrow m_{\perp}=\dfrac{1}{2} \rightarrow x-2y=-1$

2. **C** $y^2-6y+9=-8x-25+9 \rightarrow (y-3)^2=-8(x+2)$. $4p=-8 \rightarrow p=-2$ which makes the directrix $x=0$.

3. **C** III and IV

4. **D** ${}_{10}C_4\left(x^2\right)^6\left(-\dfrac{3}{x^3}\right)^4=17,010$

5. **A** $200-21+1=180$: $\dfrac{180}{2}(35+393)=90(428)=38,520$

6. **D** $\dfrac{(x+3)(x+2)!8(x-1)(0.5)^{n+1}(x+1)^{n+1}2^n}{(x+2)!(x-1)(1+x)^n}$

$\Rightarrow 4(x+3)$

7. **A** Since every term other than the last term, $(1-i)^{2009}$ has an x^n term, $n>0$, the remainder is $(-i)^{2009}=-i$.

8. **B**

$2P=Pe^{t\ln 3}$

$2=3$

$\log 2=t\log 3$

$t=\dfrac{\log 2}{\log 3}=\log_3 2$

9. **D**

$$\frac{(\log 2)(\log 3)(\log 4)\cdots(\log 2007)(\log 2008)(\log 2009)}{(\ln 3)(\ln 4)(\ln 5)\cdots(\ln 2007)(\ln 2008)(\ln 2009)}$$

$$\Rightarrow \frac{\dfrac{(\ln 2)(\ln 3)(\ln 4)\cdots(\ln 2007)(\ln 2008)(\ln 2009)}{(\ln 10)(\ln 10)(\ln 10)\cdots(\ln 10)(\ln 10)(\ln 10)}}{(\ln 3)(\ln 4)(\ln 5)\cdots(\ln 2007)(\ln 2008)(\ln 2009)}$$

$$\Rightarrow \frac{\ln 2}{(\ln 10)^{2008}}=\frac{\ln 2}{(\ln 10)(\ln 10)^{2007}}=\frac{\log 2}{(\ln 10)^{2007}}$$

10. **C**
$$A_{Trap} = 4(.5)(8+10) = 36$$
$$A_{shot} = (.5)(2)(4) = 4$$
$$\frac{A_T}{A_S} = \frac{4}{36} = \frac{1}{9}$$

11. **B**—Let K = the area of the sector, then K = ½ $r \cdot s$ (r = radius & s = arc length). Using given info, we get $2r + s = 12 \rightarrow s = 12 - 2r \rightarrow K =$½ $r(12 - 2r) = 6r - r^2$. Completing the square and factoring gives, $K = 9 - (3 - r)^2$, and K is a max when $r = 3$.

12. **B**—Using the given info, we get $a + c < 600$ (auditorium NOT filled) and $\frac{3}{4}a + \frac{1}{4}c = 330$. Solving gives $\frac{1}{2}a > 180 \rightarrow a > 360$, so the minimum value is 361.

13. **B**—Temptation is for the avg. speed to be ½ (160+240)=200. This is INCORRECT b/c the flying times are not the same for ea. leg. So, $T_1 = \frac{L}{160}$ and $T_2 = \frac{L}{240}$ and Tot T= $\frac{L}{160} + \frac{L}{240} = \frac{1}{96}L$. Since the total distance is $2L$, the avg. speed is $\frac{2L}{\frac{1}{96}L} = 192$, which is also the harmonic mean of the 2 velocities$\rightarrow HM = \frac{2(160)(240)}{160+240} = 192$.

14. **C**—If 5 is a root, then we get 25k – 25 = 10k or k=$\frac{5}{3}$. Since the sum of the roots is $\frac{-5}{k} = -3$ and 1 root is -5, then the other root is 2.

15. **D**—Simplification gives $\frac{35x-8}{22x-5}$ and the only zero is $\frac{8}{35}$.

16.**B-**Draw a number line and call YZ "W".
$$15 = \frac{5}{8}(15+W) \rightarrow 120 = 75 + 5W \rightarrow 45 = 5W \rightarrow W = 9$$

17.**C-**Call the angle X, the supplement 180-x, the compliment 90-x and the supplement of the compliment 90+x. $180 - x + 60 = 2(90 + x) \rightarrow 240 - x = 180 + 2x \rightarrow 60 = 3x \rightarrow x = 20$. 90 – 20 =70

18.**E-**Call the interior angle x and the exterior angle 180-x.
$x - 150 = 180 - x \rightarrow 2x = 330 \rightarrow x = 165$. The exterior angle is therefore 15. Since the sum of the exterior angle is 360, the number of sides equals 24. Use the diagonal formula:
$$\frac{n(n-3)}{2} = \frac{(24)(21)}{2} = 252$$

19.**D-**Since the exterior angle at Z is 130, the interior angle is 50.
$$5k + 50 = 180 \rightarrow 5k = 130 \rightarrow k = 26 \rightarrow 4k = 104$$

20.**A-**Since triangle DEC equals 180 and angle D is 4x+12, the sum of the other two is 168 – 4x and since it is isosceles each of these angles equals 84 -2x. $84-2x=5x-7 \rightarrow 91=7x \rightarrow x=13$

21. **B** Set the discriminate of the function equal to zero and solve. $b^2-4ac=4b^2-4(6)\left(\frac{3}{4}\right)=0$. $b^2=\frac{18}{4}=\frac{9}{2}$. $b=\frac{3\sqrt{2}}{2}$

22. **B** The rhombus is made up of four right 20-21-29 triangles, each of area $\frac{1}{2}(20)(21)$. $A=4*\frac{1}{2}(20)(21)=840$.

23. **B** The area of an ellipse follows the formula πab where a and b are the lengths of the major and minor axis respectively. $16(x-2)^2+9(y+3)^2=81+64-73=72$. $\frac{(x-2)^2}{9/2}+\frac{(y+3)^2}{8}=1$. $a=\frac{3\sqrt{2}}{2}, b=2\sqrt{2}$. $\pi ab=\pi(6)=6\pi$

24. **C** The equation factors to $(x-1)(x^2+9)$. 1

25. **D** The sum of cubes of the first n integers follows the formula $\frac{(n(n+1))^2}{4}$. To find the sum $\sum_{k=9}^{17}k^3$, we can subtract the sum of the first 8 cubes from the sum of the first 17. $\frac{(17(18))^2}{4}-\frac{(8(9))^2}{4}=22{,}113$.

26.**D-**By definition

27.**D-**Since it is a parallelogram angles I and E must be congruent.

$$4x+15=6x-2 \rightarrow 17=2x \rightarrow= \frac{17}{2} \rightarrow 6\left(\frac{17}{2}\right)-2=49 \rightarrow 180-49=131$$

28.**E-**Could be a kite

29. **A-** $2x+x+30=180 \rightarrow 3x=150 \rightarrow x=50$

30.**D-**The altitude to the hypotenuse in an isosceles right triangle creates 3 congruent segments all equal to 8. The original hypotenuse is therefore 2 times 8 equals 16.