1. B

$$N + 2 = P$$

$7.5N = 30$

$N = 4$

$4 + 2 = P, P = 6$

2. B

$f(x) = 5x + 7$

$f(3) = 5(3) + 7 = 22$

3.D

$2009(2009^{2008}) = 2009^{2008+1} = 2009^{2009}$

4. B

$|x + 3| = 7$

$x + 3 = 7$

$x + 3 = -7$

$x = 4, -10$

5. B

$Sathwik = \frac{1}{4}k, where\ k\ is\ the\ seconds\ it\ takes\ to\ eat\ a\ whole\ pizza$

$Ian\ = \frac{1}{6}k$

$Parth = \frac{1}{12}k$

$Sathwik + Ian + Parth = 1$

$\frac{1}{4}k + \frac{1}{6}k + \frac{1}{12}k = 1$

$K = 2\ seconds$

6. A

$Sum\ of\ infinite\ series = \frac{First\ term}{1 - common\ ratio}$

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

7. A

$(x - 8)^2 + (y - 4)^2 + (z - 2)^2 = 0$

$When\ x = 8, y = 4, z = 2,$

$then\ the\ above\ equation\ is\ true, therefore$

$x + y + z = 8 + 4 + 2 = 14$

8. D

$Using\ the\ Remainder\ Theorem$

$(-2)^4 - (-2)^3 + (-2)^2 + (-2) - 3 = 23$

9. A

$$\frac{(56 + 50 + 52 + x)}{4} = 50$$

$158 + x = 200$

$X = 42$

10. B

$$\frac{x^2 - 6x + 9}{x^2 - 9} = \frac{(x - 3)^2}{(x + 3)(x - 3)} = \frac{(x - 3)}{(x + 3)}$$

11. C

$Binomial\ Theorem$:

$$(x + a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k}$$

For constant term

$$\left(3x + \frac{1}{x}\right)^8 = \binom{8}{4} (3x)^4 \frac{1}{x}^{8-4} = 5670$$

12. C

$Probability\ that\ she\ will\ get\ it\ in\ the\ first\ attempt$: $\frac{1}{10}$

$Probability\ she\ will\ get\ it\ in\ two\ attempts$: $\frac{9}{10} \times \frac{1}{9} = \frac{1}{10}$

$P_1 + P_2 = \frac{1}{5}$

13. B

$$\frac{x^2}{9} + \frac{y^2}{16} = 1$$

Area of ellipse of equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 144$ is $ab\pi$

$A = 12\pi$

14. C

$\sqrt{2+\sqrt{x}} = 11$

$2+\sqrt{x} = 121$

$X = 119\text{^}2 = 14161$

15. C

$4x\text{^}3 - 12x\text{^}2 + 11x - 3 = (x-1)(2x-3)(2x-1)$

$Sum\ of\ integral\ roots = 1$

16. C

$42\text{^}2 = 1764, the\ only\ square\ in\ the\ 1700s.$

$1786 - 1764 = 22$

$42 + 22 = 64\ years\ old$

17. B

$|A^{-1}| = |A|^{-1}$

$|A| = -3$

$|A|^{-1} = -\frac{1}{3}$

18. D

$2(625)^5 + 3(625)^5 = 5^k$

$5(5^4)^5 = 5^k$

$5^{21} = 5^k$

19. B

$a^2 + ab + b^2 = (a+b)^2 - ab,$

$because\ a\ and\ b\ are\ the\ roots, by\ Vieta's$

$(-1)^2 - 12 = -11$

20. C

$If\ x - a\ is\ a\ factor, then\ a^2 + 2a(a) - 3 = 0$

$3(a^2 - 1) = 0$

$Sum\ of\ all\ values\ for\ a = 0$

21. D

$I^{4^4} = i^{256} = 1$

22. B

$x = -\frac{b}{2a}$

$x = -\frac{4}{2} = -2$

$(-2)^\wedge 2 + 4(-2) + 4 = 0 = y$
$x + y = -2$

23. C
$(2x + 3i)(5 + 2i) = 10x - 6 + 4xi + 15i = 9 + 21i$
$10x - 6 = 9, 4xi + 15i = 21i$
$x = \frac{3}{2}$

24. B
$1hr\ 15\ min\ actually\ elapses\ when\ the\ watch\ elapses\ 1hr$
$1.25\ hours\ \times 12 = 15\ hrs\ actual\ elapsed\ time$

25. C
$\left(\frac{log3}{log2} + \frac{log3^2}{log2^2}\right)\left(\frac{log2^2}{log3} + \frac{log2}{log3^2}\right)$
$= \left(2\frac{log3}{log2}\right)\left(\frac{5log2}{2log3}\right) = 5$

26. C
$Set\ the\ middle\ (9th)\ term\ as\ x.$
$The\ 8th\ term\ is\ x - d, the\ 10th\ term\ is\ x + d, where\ d\ is\ the\ common\ difference$
$The\ common\ differences\ cancel\ out$
$19 \times 17 = 323$

27. B
Center= (-2,-1)
Distance from center to a line formula, where Ax+By+C=0 and (m,n)
$d = \frac{|Am + Bn + C|}{\sqrt{A^2 + B^2}}$
$d = \frac{|1(-2) + 1(-1) - 5|}{\sqrt{1^2 + 1^2}} = 4\sqrt{2}$

28. A

$$11^2 = 121$$
$$11^3 = 1331$$
$$11^4 = 14441$$
$$\vdots$$
$$11^{12} = \cdots 21$$
$$11^{12} - 1 = \cdots 20$$

29. D
Completing the square,
$4(x+2)^2 - 16 + 9(y+3)^2 - 81 + 97 = 0$
$= 4(x+2)^2 + 9(y+3)^2 = 0$
Thus, this is a degenerate ellipse, or a point.

30. B
Sqrt(log(sqrt(3x))/logx)=-log3/logx
Squaring both sides:
0.5((log(3)+log(x))/logx)=(log3/logx)^2
(log3/logx+1)=2(log3/logx)^2
Let log3/logx=a.
2a^2-a-1=0.
2a^2-2a+a-1=0
2a(a-1)+1(a-1)=0
(2a+1)(a-1)=0 → a=-1/2, 1
Notice that logx=log3/a, so this gives x=3^(1/a) = 1/9 or 3
However, the square root must be positive, so logx must be negative, so x must be less than x<1.
Therefore, the only solution is x=1/9.