ANSWERS

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

SOLUTIONS

1. D. If 14 is the fourth term then $-4+3(d)=14$ gives d=6. So the means are 2 and 8 and the sum is 10.

2. E. All contain 34. For A, $2+(n-1)4=34$ can be solved for an integral n, and so can all the other choices.

3. D. $S=\frac{n}{2}(2a_1+(n-1)d)$ gives 4(2a+7(6))=440 so a1=34 and the third term will be 34+12 = 46.

4. D. -3+ -2 + … +4 + 5, and each term from -3 to 3 adds to 0, so we have remaining 4+5 = 9.

5. C. $\frac{101}{2}(8+100(6))=101(608)/2=$ 101 (304)= 30704.

6. B. In a 4X4 grid there are 16 small squares and 9 2X2 squares, and 4 3X3 squares, and 1 4X4 square. Sum is $\sum_{n=1}^{4} n^2$.

7. A. $\frac{2}{\frac{1}{5}+\frac{1}{x}}=8$ solves to x=20. Sum of the digits is 2.

8. C. Square both sides and substitute: $ab+5=25$ gives ab=20 and a=20/b.

9. A. Let the terms be a, a+d, a+2d.

$\frac{a}{a+2d}=\frac{5}{4}$ and get a= -10d. So terms are now -10d, -9d, -8d. The ratio of the first two is 10/9.

10. A. Multiply the original series by 2.

2S= $3+\frac{5}{2}+\frac{7}{4}+\ldots$ and subtract the original equation from the new one $S=\frac{3}{2}+\frac{5}{4}+\frac{7}{8}+\ldots+\frac{2n+1}{2^n}+\ldots$

to get $S=3+1+\frac{1}{2}+\frac{1}{4}+\ldots$ and from the 2nd term on, this is an infinite geometric series, so S=

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

11. B. $\frac{2}{1-\frac{1}{x}}=8$ which solves to x= 4/3.

12. D. The terms are $i,-2,-4i,8,16i,-32,-64i,128,256i,-512$ with a sum of 205i-410. |205-410|=205

13. C. Since the sum of the roots (-B/A) =0, we know the roots may be opposites, so let the roots be –a-d, -a, a, a+d. By the middle two terms, we see d= 2a, so now the roots are -3a, -a, a, 3a. The sum taken two at a time will be -10 so $3a^2 - 3a^2 - 9a^2 - a^2 - 3a^2 + 3a^2$ = 10, so $a^2 = 1$ and two roots are 1, -1. Since we need h+k, let x=1 in f(x) , set =0 to get h+k= 9.

14. B. The difference is 1+2k – (-2) = 2k+3, and $5(-4+9(2k+3)) = 90k+115$ and 115-90=25.

15. B. $\dfrac{a+b\sqrt{6}}{a+b\sqrt{3}} = \dfrac{a+b\sqrt{3}}{a}$ which solves to

$3b^2 = ab(\sqrt{6} - 2\sqrt{3})$ and since $b \neq 0$,

a/b = $\dfrac{3}{\sqrt{6}-2\sqrt{3}} = \dfrac{-\sqrt{3}}{2}(\sqrt{2}+2)$ so

m+n =4.

16. C. Let AB=x and AC=3x/2 and AD=9x/4.
Triangle CDE = 1/2(h)(9x/4-3x/2)=
1/2h(3x/4). Triangle ABE = 1/2 h(x) and
the ratio is 3/4.

17. D. The common ratio is 100% plus 40% which is 1.40.

18. A. $4r^3 = 64\sqrt{2}$ so $r^3 = 16\sqrt{2} = 2^{\frac{9}{2}}$ and so $r = 2^{\frac{3}{2}}$ and a= 4r = $8\sqrt{2}$.

19. A. $6 - \sqrt{x+\dfrac{49}{4}} = \sqrt{x+\dfrac{49}{4}} - \sqrt{x+1}$ and

$2\sqrt{x+\dfrac{49}{4}} = 6 + \sqrt{x+1}$. Square: $4x + 49 = 36 + 12\sqrt{x+1} + x + 1$ gives

$x^2 - 8x = 0$ and the sum of the roots is 8.

20. A. Let n=3: $8 = \left(a_3\right)^{1/2}$ gives $a_3 = 64$.

Let n=4 to get $a_5 = 8^{2/3} = 4$. After that,

we get n=5: $a_6 = 4^{3/4} = 2^{3/2}$, $n = 6:\ a_7 = 2^{(3/2)(4/5)} = 2^{6/5}$

n=7: $2^{6/5*5/6} = 2$. All others are not integers.
The integers are 2+4+8+64= 78.

21. B. The sixth divided by fifth is $\dfrac{a_1 r^5}{a_1 r^3} = r^2$ so the difference between the 6th and 5th would be the square root of 1:2 which is $1:\sqrt{2}$
which is $\sqrt{2}:2$.

22. B. $\dfrac{120}{360}(2\pi 10) = 20\pi/3$ and the infinite sum is $\dfrac{20\pi/3}{1-4/5} = 100\pi/3$.

23. C. 1+2+3 = 6 and the outer summation gives 6+6+6 = 18.

24. C. The first perimeter is 9 and the second 4.5 and the sum of this infinite series is $\dfrac{9}{1-\frac{1}{2}}=18$.

25. D. The sequence is $1+\dfrac{2}{10}+\dfrac{20}{100}+...=1.22$ to the hundredth.

26. C. $8=a_1+3d, 32=a_1+11d$ subtracts to d=3 and so $a_1=-1$ and the 2nd term is 2.

27. A. $\dfrac{4(1-(-2)^{16})}{1-(-2)}=\dfrac{4}{3}(1-2^{16})=\dfrac{1}{3}(4-2^{18})$

28.E $\dfrac{1}{2},\dfrac{1}{3},\dfrac{5}{6},\dfrac{7}{6},...$get the next terms by adding the previous two terms. 2, 19/6, 31/6, 25/3 and the 5th + 8th is 25/3+2=31/3.

29. C. The terms are z=2/5, y=6/5 and z=18/5.
So the next term is 54/5.

30.A Case 1: all are positive: then $4x-12-(3x+9)=3x+9-(1-3x)$ which solves to x= -29/5.
This gives terms 92/5, 42/5, 176/5 which are not an arith. sequence.
Case 2: Neg, Neg, Positive:
(4x-12)-(-3x-9)=(-3x-9)-(-1+3x) which solves to **x= -5/13.** This gives terms 28/13, 102/13, 176/13 which gives an arith. sequence.
Case 3: Neg, pos, pos:
(4x-12)-(3x+9)=(3x+9)-(-4x+12) which gives
x= 31. Terms 92, 102, 112.
Case 4: all negative: x=-29/5, which is the same as case 1.