IB Mathematics – Sequences and Series Worksheet

1. For each of the following sequences, write the next three terms and find the general term:
   a) 4, 7, 10, 13, ...
   b) 20, 16, 12, 8, ...
   c) 2, 6, 18, 54, ...
   d) 1/3, 1/5, 1/7, 1/9, ...
   e) 3/2, 3/4, 3/8, 3/16, ...

2. Write down the first five terms of each sequence:
   a) $u_r = 5 - 3r$
   b) $u_r = r / (r + 2)$
   c) $u_r = 4r + (-1)^r$
   d) $u_r = 3(-1)^{r-1}$
   e) $u_r = 2^{1-r}$

3. Write each of the following sequences using the general term:
   a) 6, 12, 18, 24, ...
   b) 9, 15, 21, 27, ...
   c) 1/3, 1/9, 1/27, 1/81, ...
   d) –2, 4, –8, 16, ...
   e) 5, 8, 11, 14, ...

4. Write each of the following series in full:
   a) $\Sigma_{r=1}^{4} (3r - 2)$
   b) $\Sigma_{r=0}^{5} (-1)^r(r + 1)$
   c) $\Sigma_{r=1}^{6} r / (2r - 1)$
   d) $\Sigma_{r=2}^{6} 4$
   e) $\Sigma_{r=0}^{3} (r^2 - r)$

5. For each sigma series, write the first five terms:
   a) $\Sigma_{r=1}^{\infty} (2r + 1)$
   b) $\Sigma_{r=1}^{\infty} (-1)^r / r$
   c) $\Sigma_{r=1}^{20} r(3r - 2)$
   d) $\Sigma_{r=0}^{\infty} (5 - r)$
   e) $\Sigma_{r=1}^{\infty} 2^r$

6. Write each of the following series in sigma notation:
   a) 10 + 14 + 18 + 22 + 26
   b) 2 + 6 + 18 + 54 + 162
   c) 1 + 1/2 + 1/4 + 1/8 + ...
   d) –3 + 6 – 12 + 24 – 48
   e) 4 + 12 + 20 + 28 + 36

Answer Key – Sequences and Series Worksheet

1. Next terms & general term:
  a) 16, 19, 22 ; $u_r = 3r + 1$
  b) 4, 0, –4 ; $u_r = 24 – 4r$
  c) 162, 486, 1458 ; $u_r = 2 \cdot 3^{r-1}$
  d) 1/11, 1/13, 1/15 ; $u_r = 1/(2r + 1)$
  e) 3/32, 3/64, 3/128 ; $u_r = 3 / 2^r$

2. First five terms:
  a) 2, –1, –4, –7, –10
  b) 1/3, 1/2, 3/5, 2/3, 5/7
  c) 3, 7, 11, 15, 19
  d) 3, –3, 3, –3, 3
  e) 2, 1, 1/2, 1/4, 1/8

3. General terms:
  a) $u_r = 6r$
  b) $u_r = 6r + 3$
  c) $u_r = 1 / 3^r$
  d) $u_r = (–2)^r$
  e) $u_r = 3r + 2$

4. Series in full:
  a) 1 + 4 + 7 + 10
  b) 1 – 2 + 3 – 4 + 5 – 6
  c) 1 + 3/5 + 1/3 + 5/9 + 1/2 + 6/11
  d) 4 + 4 + 4 + 4 + 4
  e) 0 + 0 + 2 + 6

5. First five terms:
  a) 3 + 5 + 7 + 9 + 11
  b) –1 + 1/2 – 1/3 + 1/4 – 1/5
  c) 1 + 8 + 21 + 40 + 65
  d) 5 + 4 + 3 + 2 + 1
  e) 2 + 4 + 8 + 16 + 32

6. Sigma notation:
  a) $\sum_{r=1}^{5} (4r + 6)$
  b) $\sum_{r=0}^{4} 2 \cdot 3^r$
  c) $\sum_{r=0}^{\infty} 1 / 2^r$
  d) $\sum_{r=1}^{5} (–1)^r \cdot 3 \cdot 2^{r-1}$
  e) $\sum_{r=1}^{5} (8r – 4)$