

Pure 2 Summer - SOLUTIONS

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1 a) $2, 6, 18$ $r=3$ ✓

b) $54, 162$ ✓

③ c) $u_{13} = 2 \times 3^{12} = 1,062,882$ ✓

2 a) $8, 16, 32, 64$ ✓

④ b) $u_n = 8 \times 2^{n-1}$ ✓ (or $2^3 \times 2^{n-1} = 2^{n+2}$)

c) $S_{12} = \frac{8(1-2^{12})}{1-2} = -8(1-2^{12}) = 32760$ ✓

3 a) $r = \frac{1}{4}$ ✓ b) $u_4 = \frac{3}{16}$ ✓

④ c) $S_{\infty} = \frac{12}{(1-\frac{1}{4})} = 16$ ✓

4 a) $r = -\frac{1}{2}$ ✓ b) $u_6 = 8(-\frac{1}{2})^5 = -\frac{1}{4}$ ✓

④ c) $S_{\infty} = \frac{8}{1-(-\frac{1}{2})} = 5\frac{1}{3}$ ✓

5 a) $u_2 = ar = 9$ $u_5 = ar^4 = 1.125$ } $\Rightarrow r^3 = \frac{1.125}{9} = 0.125$ ✓
 $u_2 = ar = 9$ ✓

$r = 0.5$ ✓

⑦ b) $a(0.5) = 9$ ✓ $\Rightarrow a = 18$ ✓

c) $S_{\infty} = \frac{18}{1-0.5} = 36$ ✓

6 a) $ar = 7.2$ } Divide \uparrow $r^2 = \frac{5.832}{7.2} = 0.81 \Rightarrow r = 0.9$ ✓
 $ar^3 = 5.832$ }

⑧ b) $a = \frac{7.2}{0.9} = 8$ ✓

c) $S_{50} = \frac{8(1-0.9^{50})}{(1-0.9)} = 79.588$ ✓ (3dp)

d) $S_{\infty} = \frac{8}{1-0.9} = 80$ ✓ Difference = 0.412 (3dp)

$$7. a) S_n = a + ar + ar^2 + ar^3 + \dots + ar^{n-1}$$

$$rS_n = ar + ar^2 + ar^3 + \dots + ar^n$$

subtracting gives

$$S_n - rS_n = a - ar^n = a(1 - r^n)$$

$$(1 - r)S_n = a(1 - r^n) \Rightarrow S_n = \frac{a(1 - r^n)}{(1 - r)}$$

b) 2005 £35000

2006 £35000 × 1.04

2007 £35000 × 1.04²

2008 £35000 × 1.04³ = £39400 (to nearest £100)

c) 2005 is year 1, 2024 is year 20 (not 19)

$a = £35000$

$r = 1.04$

$n = 20$

$$S_{20} = \frac{35000(1 - 1.04^{20})}{(1 - 1.04)} = 1042232.75$$

= £1040000 (3sf)

or £1042200 (to nearest £100)

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