

# Algebra Test Paper 1 KEY

1. (a)  $r = \frac{16}{32} \left( = \frac{1}{2} \right)$  A1 N1
- (b) correct calculation or listing terms (A1)  
*e.g.*  $32 \times \left( \frac{1}{2} \right)^{6-1}, 8 \times \left( \frac{1}{2} \right)^3, 32, \dots, 4, 2, 1$   
 $u_6 = 1$  A1 N2
- (c) evidence of correct substitution in  $S_\infty$  A1  
*e.g.*  $\frac{32}{1 - \frac{1}{2}}, \frac{32}{\frac{1}{2}}$   
 $S_\infty = 64$  A1 N1
2. (a)  $d = 3$  (A1)  
 evidence of substitution into  $u_n = a + (n - 1) d$  (M1)  
*e.g.*  $u_{101} = 2 + 100 \times 3$   
 $u_{101} = 302$  A1 N3
- (b) correct approach (M1)  
*e.g.*  $152 = 2 + (n - 1) \times 3$   
 correct simplification (A1)  
*e.g.*  $150 = (n - 1) \times 3, 50 = n - 1, 152 = -1 + 3n$   
 $n = 51$  A1 N2
3. (a) Recognizing an AP (M1)  
 $u_1 = 15 \quad d = 2 \quad n = 20$  (A1) 4  
 substituting into  $u_{20} = 15 + (20 - 1) \times 2$  M1  
 $= 53$  (that is, 53 seats in the 20th row) A1
- (b) Substituting into  $S_{20} = \frac{20}{2} (2(15) + (20-1)2)$  (or into  $\frac{20}{2} (15 + 53)$ ) M1  
 $= 680$  (that is, 680 seats in total) A1 2
4. (a)  $u_1 = S_1 = 7$  (A1) (C1)
- (b)  $u_2 = S_2 - u_1 = 18 - 7$   
 $= 11$  (A1)  
 $d = 11 - 7$  (M1)  
 $= 4$  (A1) (C3)
- (c)  $u_4 = u_1 + (n - 1)d = 7 + 3(4)$  (M1)  
 $u_4 = 19$  (A1) (C2)

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5. (a) (i) Neither  
 (ii) Geometric series  
 (iii) Arithmetic series  
 (iv) Neither (C3)

*Note: Award (A1) for geometric correct, (A1) for arithmetic correct and (A1) for both "neither". These may be implied by blanks **only** if GP and AP correct.*

- (b) (Series (ii) is a GP with a sum to infinity)

Common ratio  $\frac{3}{4}$  (A1)

$$S_{\infty} = \frac{a}{1-r} \left( = \frac{1}{1-\frac{3}{4}} \right) \quad \text{(M1)}$$

= 4 (A1) (C3)

*Note: Do **not** allow ft from an incorrect series.*

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6.  $17 + 27 + 37 + \dots + 417$   
 $17 + (n-1)10 = 417$   
 $10(n-1) = 400$   
 $n = 41$

(M1)

(A1)

$$S_{41} = \frac{41}{2}(2(17) + 40(10))$$

(M1)

$$= 41(17 + 200)$$

$$= 8897$$

(A1)

**OR**

$$S_{41} = \frac{41}{2}(17 + 417)$$

(M1)

$$= \frac{41}{2}(434)$$

$$= 8897$$

(A1) (C4)

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7. Term involving  $x^3$  is  $\binom{5}{3} (2)^2 (-x)^3$

(A1)(A1)(A1)

$$\binom{5}{3} = 10$$

(A1)

Therefore, term =  $-40x^3$

(A1)

$\Rightarrow$  The coefficient is  $-40$

(A1) (C6)

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