1.4 Pure: Sequences and Series (incl. Binomial Expansion)

Total Marks

EDEXCEL 9MA0 · Calculator allowed · about 230 minutes · Write-in edition

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 An arithmetic sequence has first term 5 and common difference 3. Find the 10th term.

(Total for Question 1 is 1 mark)

2 An arithmetic sequence has first term 40 and common difference -3. Find the 6th term.

(Total for Question 2 is 1 mark)

3 Consider the expansion of $(3 + 3x)^4$ in ascending powers of x.

(a) Find the first four terms in the expansion of $(3 + 3x)^4$, giving each coefficient as an integer. **(4)**

(b) Hence find the coefficient of x^3 in the expansion of $(2 - x)(3 + 3x)^4$. **(3)**

(Total for Question 3 is 7 marks)

4 The terms of a geometric sequence satisfy $u_4 = 81$ and $u_6 = 729/4$. The common ratio is positive.

(a) Find the common ratio, showing your method clearly. **(2)**

(b) Find the first term and the sum of the first 6 terms. **(4)**

(Total for Question 4 is 6 marks)

5 The terms of a geometric sequence satisfy $u_3 = 21$ and $u_5 = 7/3$. The common ratio is positive.

(a) Find the common ratio, showing your method clearly. **(2)**

(b) Find the first term and the sum of the first 6 terms. **(4)**

(c) Find the sum to infinity of the series. **(3)**

(Total for Question 5 is 9 marks)

6 The sequence u_r is defined by $u_r = 7r - 4$, $r = 1, 2, 3, ...$

(a) Write down u_1 and the common difference, and state the type of sequence. **(2)**

(b) Evaluate the sum from $r = 1$ to $r = 17$ of $(7r - 4)$. **(3)**

(c) Find the least value of n for which the sum from $r = 1$ to $r = n$ of $(7r - 4)$ exceeds 350. **(3)**

(Total for Question 6 is 8 marks)

7 The terms of a geometric sequence satisfy $u_2 = 36$ and $u_6 = 64/9$. The common ratio is positive.

(a) Find the common ratio, showing your method clearly. **(2)**

(b) Find the first term and the sum of the first 6 terms. **(4)**

(c) Find the sum to infinity of the series. **(3)**

(Total for Question 7 is 9 marks)

8 The sequence u_r is defined by $u_r = 6r - 2$, $r = 1, 2, 3, ...$

(a) Write down u_1 and the common difference, and state the type of sequence. **(2)**

(b) Evaluate the sum from $r = 1$ to $r = 15$ of $(6r - 2)$. **(3)**

(c) Find the least value of n for which the sum from $r = 1$ to $r = n$ of $(6r - 2)$ exceeds 680. **(3)**

(Total for Question 8 is 8 marks)

9 A sequence is arithmetic with first term a = 7 and common difference d = 4.

(a) Find the 15th term of the sequence. **(2)**

(b) Show that the sum of the first n terms, S_n, satisfies $S_n = n(2n+5)$. **(3)**

(c) Given that $S_n = 900$, form a quadratic equation in n and hence find the value of n. **(4)**

(Total for Question 9 is 9 marks)

10 A charity runner trains for a marathon. In week 1 she runs 3 km, and each week she runs 10 km further than the week before. The pattern continues for 12 weeks.

(a) Find the value in week 12. **(2)**

(b) Find the total over the first 12 weeks. **(3)**

(c) Find the smallest number of weeks for which the total exceeds 4000. **(3)**

(Total for Question 10 is 8 marks)

11 A stack of tiles has 13 tiles in the first row, and each further row has 2 more tiles than the row before it. The pattern continues for 13 rows.

(a) Find the value in row 13. **(2)**

(b) Find the total over the first 13 rows. **(3)**

(c) Find the smallest number of rows for which the total exceeds 1100. **(3)**

(Total for Question 11 is 8 marks)

12 Consider the expansion of $(1 + x)^5$ in ascending powers of x.

(a) Find the first four terms in the expansion of $(1 + x)^5$, giving each coefficient as an integer. **(4)**

(b) Hence find the coefficient of x^2 in the expansion of $(4 + x)(1 + x)^5$. **(3)**

(Total for Question 12 is 7 marks)

13 A stack of tiles has 29 tiles in the first row, and each further row has 8 more tiles than the row before it. The pattern continues for 29 rows.

(a) Find the value in row 29. **(2)**

(b) Find the total over the first 29 rows. **(3)**

(c) Find the smallest number of rows for which the total exceeds 1600. **(3)**

(Total for Question 13 is 8 marks)

14 Ferndale Ltd's annual profit forms a geometric sequence. In year 1 the profit is £12000, and the profit grows by 8% each year, so the common ratio is r = 1.08.

(a) Find the profit in year 8, giving your answer to the nearest pound. **(2)**

(b) Find the total profit made over the first 10 years, giving your answer to the nearest pound. **(3)**

(c) State one limitation of using this geometric model to predict Ferndale Ltd's profit far into the future. **(1)**

(Total for Question 14 is 6 marks)

15 A geometric series has first term a = 40 and sum to infinity 100.

(a) Find the common ratio, r. **(3)**

(b) Find the sum of the first 6 terms of the series, giving your answer to 3 significant figures. **(3)**

(c) Explain why the series would not have a sum to infinity if the common ratio were r=1.5 instead. **(1)**

(Total for Question 15 is 7 marks)

16 An arithmetic sequence has 3rd term 17 and common difference 4. Find the first term.

(Total for Question 16 is 2 marks)

17 Find the sum of the first 20 positive integers (1 + 2 + 3 + ... + 20).

(Total for Question 17 is 2 marks)

18 A geometric sequence has first term 4 and common ratio 3. Find the 4th term.

(Total for Question 18 is 1 mark)

19 A geometric sequence has first term 100 and common ratio 0.5. Find the 3rd term.

(Total for Question 19 is 1 mark)

20 Write down the value of 5C2 (5 choose 2).

(Total for Question 20 is 1 mark)

21 Write down the coefficient of x in the expansion of $(1+x)^7$.

(Total for Question 21 is 1 mark)

22 An arithmetic series has first term 2 and common difference 5. Find the sum of the first 4 terms.

(Total for Question 22 is 1 mark)

---

23 A geometric series has first term 3 and common ratio 2. Find the sum of the first 4 terms.

(Total for Question 23 is 1 mark)

24 Consider the sum $\sum_{r=1}^{n} (4r - 3)$.

(a) Show that $\sum_{r=1}^{n} (4r-3) = n(2n-1)$. **(3)**

(b) Hence find the value of $\sum_{r=1}^{25} (4r-3)$. **(2)**

(c) Show that $\sum_{r=n+1}^{2n} (4r-3) = 6n^2 - n$. **(4)**

(Total for Question 24 is 9 marks)

25 This question uses the binomial expansion of $(2+x)^7$.

(a) Find, in ascending powers of x, the first four terms of the binomial expansion of $(2+x)^7$, giving each coefficient as an integer. **(4)**

(b) Hence find an estimate for 2.01^7, giving your answer to 3 significant figures. **(3)**

(Total for Question 25 is 7 marks)

26 Find the coefficient of x^2 in the expansion of $(1+3x)^5$.

(Total for Question 26 is 2 marks)

27 An arithmetic series has first term 8 and 20th term 84. Find the common difference, and find the sum of the first 20 terms.

(Total for Question 27 is 3 marks)

28 A geometric sequence has first term 6 and 4th term 162. Find the common ratio, and find the 6th term.

(Total for Question 28 is 3 marks)

29 Find the sum of the first 15 terms of the arithmetic series $7 + 11 + 15 + ...$

(Total for Question 29 is 3 marks)

30 A geometric series has first term 20 and common ratio 0.5. State the sum to infinity.

(Total for Question 30 is 1 mark)

31 The Kingswood Theatre has rows of seats arranged in an arithmetic sequence. Row 1 (nearest the stage) has 18 seats, the common difference between consecutive rows is d, there are 30 rows, and the total seating capacity is 1410.

(a) Show that d = 2. **(3)**

(b) Find the number of seats in row 30 (the back row). **(2)**

(c) The theatre wants to add extra rows at the back, continuing the same arithmetic sequence (same first term and common difference), so that the total capacity is at least 2000 seats. Find the minimum number of extra rows needed. **(5)**

(Total for Question 31 is 10 marks)

32 A company's sales form an arithmetic sequence. In month 1, sales are 150 units, and sales increase by 12 units each month. Find the total sales over the first 24 months.

(Total for Question 32 is 4 marks)

33 A geometric series has first term a = 54 and sum to infinity 81. Find the common ratio r, and find the sum of the first 5 terms, giving your answer to 3 significant figures.

(Total for Question 33 is 4 marks)

34 $f(x) = (1-3x)^{1/3}$.

(a) Find the binomial expansion of f(x), in ascending powers of x, up to and including the term in x^3, simplifying each coefficient. **(5)**

(b) State the range of values of x for which this expansion is valid. **(1)**

(c) By choosing a suitable value of x, use your expansion to estimate $0.94^{1/3}$ to 5 decimal places, and state, with a reason, whether your estimate is an over-estimate or an under-estimate. **(4)**

(Total for Question 34 is 10 marks)

35 The first three terms of an arithmetic sequence, in order, are $k - 2$, $2k + 1$ and $5k - 4$, where k is a constant. Find the value of k, and hence find the common difference of the sequence.

(Total for Question 35 is 4 marks)

36 An arithmetic sequence has first term a and common difference d, where a>0 and d>0. The 1st, 2nd and 4th terms of this sequence, taken in that order, form the first three terms of a geometric sequence.

(a) Show that d=a. **(3)**

(b) Given that a=5, write down the first four terms of the arithmetic sequence and verify that its 1st, 2nd and 4th terms form a geometric sequence, stating the common ratio. **(3)**

(c) A geometric sequence has first term 5 and common ratio 2 (as found in part (b)). Find the smallest value of n for which the sum of the first n terms of this geometric sequence exceeds 100000. **(5)**

(Total for Question 36 is 11 marks)

Mark scheme · 1.4 Pure: Sequences and Series (incl. Binomial Expansion)

Question 1

32 cao **B1**

Answer: 32

Question 2

25 cao **B1**

Answer: 25

Question 3

(a) binomial expansion with the correct form for the x term: $4C1\ (3)^3(3)x$ **M1**

(a) first two terms $81 + 324x$ **A1**

(a) attempts the x^2 and x^3 terms using 4C2 and 4C3 **M1**

(a) $81 + 324x + 486x^2 + 324x^3$ (all four terms correct) **A1**

(a) Answer: $81 + 324x + 486x^2 + 324x^3$

(b) identifies the two contributions to x^3: 2 times the x^3 coefficient and -1 times the x^2 coefficient **M1**

(b) 648 - 486 **A1**

(b) 162 **A1**

(b) Answer: 162

Question 4

(a) forms $r^2 = u_6/u_4 = 9/4$ **M1**

(a) r = 3/2 (r = -3/2 is rejected because the common ratio is positive) **A1**

(a) Answer: r = 3/2

(b) $a = u_4/r^3$ **M1**

(b) a = 24 **A1**

(b) uses $S_n = a(1 - r^n)/(1 - r)$ **M1**

(b) $S_6 = 1995/4$ **A1**

(b) Answer: a = 24, $S_6 = 1995/4$

Question 5

(a) forms $r^2 = u_5/u_3 = 1/9$ **M1**

(a) r = 1/3 (r = -1/3 is rejected because the common ratio is positive) **A1**

(a) Answer: r = 1/3

(b) $a = u_3/r^2$ **M1**

(b) a = 189 **A1**

(b) uses $S_n = a(1 - r^n)/(1 - r)$ **M1**

(b) $S_6 = 2548/9$ **A1**

(b) Answer: a = 189, $S_6 = 2548/9$

(c) states $|r| < 1$ so the series converges **B1**

(c) uses $S_\infty = a/(1 - r)$ **M1**

(c) 567/2 **A1**

(c) Answer: 567/2

Question 6

(a) $u_1 = 3$ **B1**

(a) d = 7, arithmetic **B1**

(a) Answer: $u_1 = 3$, d = 7

(b) uses the arithmetic series formula with a = 3, d = 7, n = 17 **M1**

(b) (17/2)(2(3) + 16(7)) **A1**

(b) 1003 **A1**

(b) Answer: 1003

(c) forms $(n/2)(2(3) + (n - 1)(7)) > 350$ **M1**

(c) solves the quadratic inequality or tests consecutive values **A1**

(c) $S_{10} = 345$ and $S_{11} = 418$, so n = 11 **A1**

(c) Answer: n = 11

Question 7

(a) forms $r^4 = u_6/u_2 = 16/81$ **M1**

(a) r = 2/3 (r = -2/3 is rejected because the common ratio is positive) **A1**

(a) Answer: r = 2/3

(b) $a = u_2/r$ **M1**

(b) a = 54 **A1**

(b) uses $S_n = a(1 - r^n)/(1 - r)$ **M1**

(b) $S_6 = 1330/9$ **A1**

(b) Answer: a = 54, $S_6 = 1330/9$

(c) states $|r| < 1$ so the series converges **B1**

(c) uses $S_\infty = a/(1 - r)$ **M1**

(c) 162 **A1**

(c) Answer: 162

Question 8

(a) $u_1 = 4$ **B1**

(a) d = 6, arithmetic **B1**

(a) Answer: $u_1 = 4$, d = 6

(b) uses the arithmetic series formula with a = 4, d = 6, n = 15 **M1**

(b) (15/2)(2(4) + 14(6)) **A1**

(b) 690 **A1**

(b) Answer: 690

(c) forms $(n/2)(2(4) + (n - 1)(6)) > 680$ **M1**

(c) solves the quadratic inequality or tests consecutive values **A1**

(c) $S_{14} = 602$ and $S_{15} = 690$, so n = 15 **A1**

(c) Answer: n = 15

Question 9

(a) uses $u_n = a + (n-1)d$ with n=15 **M1**

(a) 63 cao **A1**

(a) Answer: 63

(b) correct substitution into $S_n = n/2(2a+(n-1)d)$ **M1**

(b) correct expansion and simplification **M1**

(b) $S_n = n(2n+5)$ cso, answer given **A1**

(b) Answer: $S_n = n(2n+5)$ (shown)

(c) forms $2n^2+5n-900=0$ **M1**

(c) solves the quadratic using the formula or by factorising **M1**

(c) n=20 cao **A1**

(c) rejects n=-22.5 since n must be a positive integer **A1**

(c) Answer: n = 20

Question 10

(a) uses $u_n = a + (n - 1)d$ with a = 3, d = 10, n = 12 **M1**

(a) 113 **A1**

(a) Answer: 113

(b) uses $S_n = (n/2)(2a + (n - 1)d)$ or $(n/2)(a + l)$ **M1**

(b) 12/2 x (3 + 113) **A1**

(b) 696 **A1**

(b) Answer: 696

(c) forms and solves $(m/2)(2(3) + (m - 1)(10)) > 4000$ **M1**

(c) critical value m = 28.48 (or tests m = 28 and m = 29) **A1**

(c) $S_{28} = 3864 < 4000$ and $S_{29} = 4147 > 4000$, so m = 29 **A1**

(c) Answer: 29

Question 11

(a) uses $u_n = a + (n - 1)d$ with a = 13, d = 2, n = 13 **M1**

(a) 37 **A1**

(a) Answer: 37

(b) uses $S_n = (n/2)(2a + (n - 1)d)$ or $(n/2)(a + l)$ **M1**

(b) 13/2 x (13 + 37) **A1**

(b) 325 **A1**

(b) Answer: 325

(c) forms and solves $(m/2)(2(13) + (m - 1)(2)) > 1100$ **M1**

(c) critical value m = 27.70 (or tests m = 27 and m = 28) **A1**

(c) $S_{27} = 1053 < 1100$ and $S_{28} = 1120 > 1100$, so m = 28 **A1**

(c) Answer: 28

Question 12

(a) binomial expansion with the correct form for the x term: $5C1\ (1)^4(1)x$ **M1**

(a) first two terms 1 + 5x **A1**

(a) attempts the x^2 and x^3 terms using 5C2 and 5C3 **M1**

(a) $1 + 5x + 10x^2 + 10x^3$ (all four terms correct) **A1**

(a) Answer: $1 + 5x + 10x^2 + 10x^3$

(b) identifies the two contributions to x^2: 4 times the x^2 coefficient and 1 times the x coefficient **M1**

(b) 40 + 5 **A1**

(b) 45 **A1**

(b) Answer: 45

Question 13

(a) uses $u_n = a + (n - 1)d$ with a = 29, d = 8, n = 29 **M1**

(a) 253 **A1**

(a) Answer: 253

(b) uses $S_n = (n/2)(2a + (n - 1)d)$ or $(n/2)(a + l)$ **M1**

(b) 29/2 x (29 + 253) **A1**

(b) 4089 **A1**

(b) Answer: 4089

(c) forms and solves $(m/2)(2(29) + (m - 1)(8)) > 1600$ **M1**

(c) critical value m = 17.12 (or tests m = 17 and m = 18) **A1**

(c) $S_{17} = 1581 < 1600$ and $S_{18} = 1746 > 1600$, so m = 18 **A1**

(c) Answer: 18

Question 14

(a) uses $u_n = a\,r^{n-1}$ with n=8 **M1**

(a) awrt 20566 **A1**

(a) Answer: £20566 (nearest pound)

(b) correct use of $S_n = a(r^n - 1)/(r-1)$ with n=10 **M1**

(b) correct value of r^{10} used (awrt 2.1589) **M1**

(b) awrt 173839 **A1**

(b) Answer: £173839 (nearest pound)

(c) valid limitation, e.g. profit cannot keep growing at a constant percentage rate indefinitely / markets saturate / real profits are affected by unpredictable factors not captured by a constant ratio **B1**

(c) Answer: e.g. constant 8% growth is unrealistic long-term as markets saturate.

Question 15

(a) uses $S_\infty = a/(1-r)$ **M1**

(a) forms 1-r = 40/100 **M1**

(a) r=0.6 cao **A1**

(a) Answer: r = 0.6

(b) correct use of $S_n = a(1-r^n)/(1-r)$ with n=6 **M1**

(b) correct value of $r^6 = 0.6^6$ = awrt 0.0467 **M1**

(b) awrt 95.3 **A1**

(b) Answer: 95.3 (3sf)

(c) states $|r|>1$ so the terms do not tend to zero and the series diverges, so no sum to infinity exists **B1**

(c) Answer: Because $|r| = 1.5 > 1$ the terms grow without bound so the series diverges.

Question 16

uses u3 = a + 2d = 17 **M1**

a = 9 cao **A1**

Answer: a = 9

Question 17

uses $S_n = n(n+1)/2$ (or the arithmetic series formula with a=1, d=1, n=20) **M1**

210 cao **A1**

Answer: 210

Question 18

108 cao **B1**

Answer: 108

Question 19

25 cao **B1**

Answer: 25

Question 20

10 cao **B1**

Answer: 10

Question 21

7 cao **B1**

Answer: 7

Question 22

38 cao **B1**

Answer: 38

Question 23

45 cao **B1**

Answer: 45

Question 24

(a) splits the sum as $4 \times \sum_{r=1}^{n} r - 3n$ **M1**

(a) uses $\sum_{r=1}^{n} r = n(n+1)/2$ and simplifies **M1**

(a) n(2n-1) cso, answer given **A1**

(a) Answer: n(2n-1) (shown)

(b) substitutes n=25 into n(2n-1) **M1**

(b) 1225 cao **A1**

(b) Answer: 1225

(c) expresses the required sum as $\sum_{r=1}^{2n} - \sum_{r=1}^{n}$ **M1**

(c) substitutes 2n into n(2n-1) to get 2n(4n-1) **M1**

(c) correct expansion and subtraction: $(8n^2-2n) - (2n^2-n)$ **M1**

(c) $6n^2 - n$ cso, answer given **A1**

(c) Answer: $6n^2 - n$ (shown)

Question 25

(a) correct structure using $C(7,k)\ 2^{7-k}\ x^k$ **M1**

(a) 128 + 448x **A1**

(a) $672x^2$ term correct **A1**

(a) $560x^3$ term correct **A1**

(a) Answer: $128 + 448x + 672x^2 + 560x^3$ (+...)

(b) substitutes x=0.01 into the expansion from part (a) **M1**

(b) correct evaluation of the sum (awrt 132.5) **M1**

(b) awrt 133 **A1**

(b) Answer: 133 (3sf)

Question 26

uses $5C2 \times 3^2$ **M1**

90 cao **A1**

Answer: 90

Question 27

uses u20 = a + 19d = 84 to find d **M1**

d = 4 **A1**

S20 = 920 (using the correct sum formula), cao **A1**

Answer: d = 4; S20 = 920

Question 28

uses $u4 = a\,r^3 = 162$ **M1**

r = 3 **A1**

u6 = 1458 cao **A1**

Answer: r = 3; u6 = 1458

Question 29

identifies a = 7, d = 4 **M1**

correct use of $S_n = n/2(2a+(n-1)d)$ with n = 15 **M1**

525 cao **A1**

Answer: 525

Question 30

40 cao **B1**

Answer: 40

Question 31

(a) correct substitution into $S_n = n/2(2a+(n-1)d)$ with a=18, n=30, S=1410 **M1**

(a) correct rearrangement to 870 = 435d **M1**

(a) d=2 cso **A1**

(a) Answer: d = 2 (shown)

(b) u30 = 18 + 29(2) **M1**

(b) 76 cao **A1**

(b) Answer: 76 seats

(c) forms $S_n = n/2(36+2(n-1)) = n(n+17)$ for the extended arrangement **M1**

(c) sets up the inequality $n(n+17) \geq 2000$ **M1**

(c) solves the associated quadratic $n^2+17n-2000=0$ (formula or trial), obtaining n=awrt 37.0 **dM1**

(c) smallest integer total rows n=38 (since n=37 gives 1998<2000) **A1**

(c) minimum extra rows = 8 (38-30) cao **A1**

(c) Answer: 8 extra rows

Question 32

identifies a = 150, d = 12, n = 24 **M1**

correct substitution into $S_n = n/2(2a+(n-1)d)$ **M1**

correct unsimplified value 12(300+276) **A1**

6912 cao **A1**

Answer: 6912 units

Question 33

uses $S_\infty = a/(1-r) = 81$ **M1**

r = 1/3 **A1**

correct use of $S_n = a(1-r^n)/(1-r)$ with n = 5 **M1**

awrt 80.7 **A1**

Answer: r = 1/3; S5 = 80.7 (3 s.f.)

Question 34

(a) correct structure $(1+u)^n = 1+nu+n(n-1)/2\ u^2+n(n-1)(n-2)/6\ u^3$ with n=1/3, u=-3x	**M1**
(a) correct first two terms 1 - x	**A1**
(a) correct method for the x^2 coefficient	**M1**
(a) $-x^2$ term correct	**A1**
(a) $-(5/3)x^3$ term correct	**A1**

(a) Answer: $1 - x - x^2 - (5/3)x^3$ (+...)

(b) $\|x\| < 1/3$ oe (e.g. $-1/3 < x < 1/3$)	**B1**

(b) Answer: $|x| < 1/3$

(c) identifies x=0.02 (from 1-3x=0.94)	**M1**
(c) correctly substitutes x=0.02 into the expansion from part (a)	**M1**
(c) awrt 0.97959	**A1**
(c) states over-estimate, with valid reason (e.g. the next term in the series is negative, so the truncated sum is larger than the true value)	**B1**

(c) Answer: 0.97959 (over-estimate)

Question 35

sets consecutive differences equal: (2k+1) - (k-2) = (5k-4) - (2k+1)	**M1**
simplifies to a linear equation, k + 3 = 3k - 5	**M1**
k = 4 cao	**A1**
common difference = 7 (from terms 2, 9, 16), cao	**A1**

Answer: k = 4; common difference = 7

Question 36

(a) forms $(a+d)^2 = a(a+3d)$ using the given geometric sequence condition	**M1**
(a) correctly expands to $a^2+2ad+d^2=a^2+3ad$ and rearranges to $d^2=ad$	**M1**
(a) d=a cso (dividing by d, valid since d>0)	**A1**

(a) Answer: d = a (shown)

(b) arithmetic terms 5, 10, 15, 20 (using d=a=5)	**B1**
(b) computes both ratios 10/5 and 20/10	**M1**
(b) both ratios equal 2, confirming a geometric sequence with common ratio r=2	**A1**

(b) Answer: 5, 10, 15, 20; r = 2

(c) correct use of $S_n = a(r^n-1)/(r-1) = 5(2^n-1)$	**M1**
(c) forms the inequality $5(2^n-1) > 100000$, i.e. $2^n > 20001$	**M1**
(c) takes logs of both sides: n > log(20001)/log(2)	**M1**
(c) n > awrt 14.3	**A1**
(c) smallest integer n=15 cao	**A1**

(c) Answer: n = 15