



# **Mark Scheme (Results)**

Summer 2018

Pearson Edexcel International GCSE  
In Mathematics A (4MA1) Paper 2F

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

| International GCSE Maths A June 2018 – Paper 2F Mark scheme                                                                                                                           |                                          |                  |      |                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Apart from Questions 20 and 23 where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method. |                                          |                  |      |                                                                                                                                                                                                   |
| Question                                                                                                                                                                              | Working                                  | Answer           | Mark | Notes                                                                                                                                                                                             |
| 1 (a)                                                                                                                                                                                 |                                          | $\frac{63}{100}$ | 1    | B1                                                                                                                                                                                                |
| (b)                                                                                                                                                                                   |                                          | 46800            | 1    | B1                                                                                                                                                                                                |
| (c)                                                                                                                                                                                   |                                          | 73.7             | 1    | B1                                                                                                                                                                                                |
| (d)                                                                                                                                                                                   |                                          | 9                | 1    | B1                                                                                                                                                                                                |
|                                                                                                                                                                                       |                                          |                  |      | Total 4 marks                                                                                                                                                                                     |
| 2 (a)                                                                                                                                                                                 |                                          | E                | 1    | B1 Accept 0.2                                                                                                                                                                                     |
| (b)                                                                                                                                                                                   |                                          | D                | 1    | B1                                                                                                                                                                                                |
| (c)                                                                                                                                                                                   |                                          | C                | 1    | B1 Accept 0.5                                                                                                                                                                                     |
|                                                                                                                                                                                       |                                          |                  |      | Total 3 marks                                                                                                                                                                                     |
| 3                                                                                                                                                                                     | 400 and 1300 or 900                      |                  | 3    | M1 read scales correctly or<br>$1300 \times 0.4 (=520)$ or $400 \times 0.4 (=160)$ or $9 \times 0.4 (=3.6)$ or<br>$(x - y) \times 0.4$ where $x$ and $y$ are readings and $x = 1300$ or $y = 400$ |
|                                                                                                                                                                                       | $(1300-400) \times 0.4$ or "520" - "160" |                  |      | M1 Difference of<br>both correct readings $\times 0.4$ oe                                                                                                                                         |
|                                                                                                                                                                                       |                                          | 360              |      | A1 cao                                                                                                                                                                                            |
|                                                                                                                                                                                       |                                          |                  |      | Total 3 marks                                                                                                                                                                                     |

| Question | Working | Answer               | Mark | Notes                                                                                |
|----------|---------|----------------------|------|--------------------------------------------------------------------------------------|
| 4 (a)    |         | (2, -1)              | 1    | B1                                                                                   |
| (b)      |         | 3.6                  | 1    | B1 Allow 3.4 to 3.8 and answers written as fractions in this range eg $3\frac{1}{2}$ |
| (c)      |         | D marked at (-1, -1) | 1    | B1                                                                                   |
|          |         |                      |      | Total 3 marks                                                                        |

|       |  |                            |   |                                                                                                                                                                             |
|-------|--|----------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 (a) |  | 24                         | 1 | B1 Accept 32 or 40 or 48                                                                                                                                                    |
| (b)   |  | 2                          | 1 | B1                                                                                                                                                                          |
| (c)   |  | No<br>It is divisible by 3 | 1 | B1 Only consider reason if No is given. Allow any reason that shows a clear understanding of why 57 is not prime, eg it is divisible by 19 or 3 or equal to $3 \times 19$ . |
|       |  |                            |   | Total 3 marks                                                                                                                                                               |

|       |                                                                                                                           |                 |   |                                                                      |
|-------|---------------------------------------------------------------------------------------------------------------------------|-----------------|---|----------------------------------------------------------------------|
| 6 (a) |                                                                                                                           | correct pattern | 1 | B1 5 dots $\times$ 5 dots open square                                |
| (b)   |                                                                                                                           | 16, 20          | 1 | B1                                                                   |
| (c)   | eg $4 \times 13$ or $14 + 14 + 12 + 12$ or $12 \times 4 + 4$ or 24, 28, 32, 36, 40, 44, 48, 52 or a fully correct diagram |                 | 2 | M1 allow 1 arithmetical error in continuing the sequence to 13 terms |
|       |                                                                                                                           | 52              |   | A1                                                                   |
| (d)   |                                                                                                                           | $4n$            | 1 | B1 oe eg $n + n + n + n$ or $4 + (n - 1)4$                           |
| (e)   | $90 \div 4$ (= 22.5) or 88                                                                                                |                 | 2 | M1 or continuing the sequence to 88 or 92 with just one error        |
|       |                                                                                                                           | 22              |   | A1                                                                   |
|       |                                                                                                                           |                 |   | Total 7 marks                                                        |

| Question | Working                                                                                                                                                           | Answer                | Mark | Notes                                                                                   |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-----------------------------------------------------------------------------------------|
| 7 (a)    |                                                                                                                                                                   | $7^5$                 | 1    | B1                                                                                      |
| (b)      | $64=8^2$ or $64=4^3$ or $\sqrt{64}=8$ or $\sqrt[3]{64}=4$<br>or $8 \times 8 = 64$ or $4 \times 4 \times 4 = 64$<br>or 1, 4, 9, 16, 25, 36, 49, 64 or 1, 8, 27, 64 |                       | 2    | M1                                                                                      |
|          |                                                                                                                                                                   | $64=8^2$ and $64=4^3$ |      | A1 or $\sqrt{64}=8$ and $\sqrt[3]{64}=4$ or correct list of square & cube numbers to 64 |
| (c)      |                                                                                                                                                                   | 1331                  | 1    | B1                                                                                      |
| (d)      |                                                                                                                                                                   | 9.9                   | 1    | B1                                                                                      |
|          |                                                                                                                                                                   |                       |      | Total 5 marks                                                                           |

  

|       |                                               |                 |   |                         |
|-------|-----------------------------------------------|-----------------|---|-------------------------|
| 8 (a) | $25 - 4 \times -3$ or $25 - -12$ or $25 + 12$ |                 | 2 | M1 Correct substitution |
|       |                                               | 37              |   | A1                      |
| (b)   | $2x^2 + x$                                    |                 | 3 | M1                      |
|       | $(+)3x - 6$                                   |                 |   | M1 indep                |
|       |                                               | $2x^2 + 4x + 1$ |   | A1 cao                  |
|       |                                               |                 |   | Total 5 marks           |

| Question | Working                                                                   | Answer           | Mark | Notes                                                                                                                                     |
|----------|---------------------------------------------------------------------------|------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 9 (a)    |                                                                           | Segment shaded   | 1    | B1 Accept minor segment or major segment.                                                                                                 |
| (b)      |                                                                           | Chord            | 1    | B1                                                                                                                                        |
| (c)      | $\angle OQT = 90^\circ$ and $\angle OQT = 18^\circ$ or $90 - 18$          |                  | 3    | M1 For $90^\circ$ and $18^\circ$ correctly identified in the working or on the diagram or for $90 - 18$ or for other fully correct method |
|          |                                                                           | 72               |      | A1                                                                                                                                        |
|          | Angle between <u>tangent</u> and <u>radius</u> is 90 degrees              |                  |      | B1 Correct reason for $90^\circ$ angle<br>[If used <u>alternate segment theorem</u> ]                                                     |
|          |                                                                           |                  |      | Total 5 marks                                                                                                                             |
| 10 (a)   | $\frac{36+33}{135}$                                                       |                  | 2    | M1 for numerator of $36 + 33 (= 69)$ or denominator of 135                                                                                |
|          |                                                                           | $\frac{69}{135}$ |      | A1 Accept $0.51(11\dots)$ or $51.(11\dots)\%$<br>2 sf or better                                                                           |
| (b)      | $\frac{27}{135} \times 360$ or $360 \div 5$ or $27 \times \frac{8}{3}$ oe |                  | 2    | M1 allow use of $\frac{8}{3} = 2.666\dots$ to 1 dp<br>truncated or rounded                                                                |
|          |                                                                           | 72               |      | A1 cao                                                                                                                                    |
|          |                                                                           |                  |      | Total 4 marks                                                                                                                             |

| Question | Working                                                                 | Answer           | Mark | Notes                                                                                                                                        |
|----------|-------------------------------------------------------------------------|------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 11 (a)   | $4.3333(3...) + 0.37894(7...) \text{ or } \frac{13}{3} + \frac{36}{95}$ |                  | 2    | M1 Evaluate either fraction correctly as a decimal to at least 5SF(rounded or truncated) or as a simplified fraction or an answer of 4.71(2) |
|          |                                                                         | 4.7122(80702)    |      | A1 Correct to at least 5SF (rounded or truncated).                                                                                           |
| (b)      |                                                                         | 4.71             | 1    | B1 ft if at least 4SF given in (a)<br>(not 4.71)                                                                                             |
|          |                                                                         |                  |      | Total 3 marks                                                                                                                                |
| 12 (a)   | $0.5 \times 2 \times 3$                                                 |                  | 3    | M1 Accept even if added to another area                                                                                                      |
|          |                                                                         | $3 \text{ cm}^2$ |      | A1 for 3<br>B1 for units                                                                                                                     |
| (b)      |                                                                         | alternate angles | 1    | B1 'alternate' or 'alternating' or equivalent statement                                                                                      |
| (c)      |                                                                         | $y=4$            | 1    | B1                                                                                                                                           |
|          |                                                                         |                  |      | Total 5 marks                                                                                                                                |



| Question | Working                                                                                                             | Answer      | Mark | Notes                                                             |
|----------|---------------------------------------------------------------------------------------------------------------------|-------------|------|-------------------------------------------------------------------|
| 13 (a)   | $\frac{2000-800}{300} (= 4)$ or $\frac{2000-800}{150} (= 8)$ or $-8$ seen correctly in working                      |             | 3    | M1 Accept 300 + 300 + 300 + 300 or 800, 1100, 1400, 1700, 2000 oe |
|          | 6 – “4” × 2                                                                                                         |             |      | M1                                                                |
|          |                                                                                                                     | –2          |      | A1                                                                |
| (b)      | $\frac{12}{5} (= 2.4 \text{ hr})$ or $\frac{12}{5} \times 60 (= 144 \text{ min or } 2 \text{ hr } 24 \text{ mins})$ |             | 3    | M1                                                                |
|          | $\frac{800}{10} (= 80 \text{ min})$ or $\frac{800}{10} \div 60 (= 1.3 \text{ or } 1 \text{ hr } 20 \text{ min})$    |             |      | M1 indep                                                          |
|          |                                                                                                                     | 3 hr 44 min |      | A1                                                                |
|          |                                                                                                                     |             |      | Total 6 marks                                                     |

| Question | Working                        | Answer         | Mark | Notes                                                                                                                                                                                   |
|----------|--------------------------------|----------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14 (a)   | 7 outcomes with at least one C |                | 2    | M1 Identify at least 6 (with no more than 2 incorrectly identified) outcomes with at least one C or an answer of $\frac{6}{16}$ <b>or</b> $\frac{8}{16}$ or $\frac{7}{n}$ where $n > 7$ |
|          |                                | $\frac{7}{16}$ |      | A1 Or 0.4375 or 43.75% (allow 2dp rounded or truncated)                                                                                                                                 |
| (b)      | $\frac{7}{16} \times 80$       |                | 2    | M1 ft from (a) for value between 0 and 1 or for an answer of $\frac{35}{80}$                                                                                                            |
|          |                                | 35             |      | A1 ft from (a)                                                                                                                                                                          |
|          |                                |                |      | Total 4 marks                                                                                                                                                                           |

|    |                           |     |   |                                                                             |
|----|---------------------------|-----|---|-----------------------------------------------------------------------------|
| 15 | $\frac{180-80}{2}$ (= 50) |     | 3 | M1 could be marked correctly on diagram or in working with no contradiction |
|    | 360 – “50” – 90           |     |   | M1 dep on first M1                                                          |
|    |                           | 220 |   | A1 cao                                                                      |
|    |                           |     |   | Total 3 marks                                                               |

| Question | Working                                                                                                                                                            | Answer | Mark | Notes         |     |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|---------------|-----|
| 16       | $\frac{3450}{2+6+7} (=230)$ or $\frac{2}{2+6+7} \times 3450 (=460)$ or<br>$\frac{7}{2+6+7} \times 3450 (=1610)$ or $\frac{7-2}{2+6+7} \left( =\frac{1}{3} \right)$ |        | 3    | M1            |     |
|          | $(7-2) \times "230"$ or $7 \times "230" - 2 \times "230"$ or<br>"1610" - "460" or $"\frac{1}{3}" \times 3450$                                                      |        |      | M1            | dep |
|          |                                                                                                                                                                    | 1150   |      | A1            |     |
|          |                                                                                                                                                                    |        |      | Total 3 marks |     |

|    |                                                                                                                   |      |   |               |                                         |
|----|-------------------------------------------------------------------------------------------------------------------|------|---|---------------|-----------------------------------------|
| 17 | $\frac{8}{100} \times 20000 (=1600)$                                                                              |      | 4 | M1oe          | Award M2 for<br>20000×1.08 or<br>21600  |
|    | $20000 + \frac{8}{100} \times 20000 (=21600)$ or<br>$(20\,000 - 19200) + \frac{8}{100} \times 20000 (=2400)$      |      |   | M1            |                                         |
|    | $\frac{"21600"-19200}{19200} (\times 100)$ or $\frac{"2400"}{19200} (\times 100)$<br>or "21600" ÷ 19200 (×100) oe |      |   | M1            | or for 1.125 or $\frac{9}{8}$ or 112.5% |
|    |                                                                                                                   | 12.5 |   | A1            | oe                                      |
|    |                                                                                                                   |      |   | Total 4 marks |                                         |

| Question | Working                                                                    | Answer               | Mark | Notes                                                                                                                                                                                      |
|----------|----------------------------------------------------------------------------|----------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18 (a)   | $ac=M+bd$ or $-ac = -M - bd$ or<br>$\frac{M}{c} = a - \frac{bd}{c}$        |                      | 2    | M1 For a correct first stage                                                                                                                                                               |
|          |                                                                            | $a = \frac{M+bd}{c}$ |      | A1<br>oe, eg $a = \frac{M}{c} + \frac{bd}{c}$ ,<br>$a = \frac{-M-bd}{-c}$<br>[must have been seen with a = to award accuracy mark]                                                         |
| (b)      | $5x < 39 + 4$ oe                                                           |                      | 2    | M1 Accept as equation or with the wrong inequality sign. Also award M1 for an answer of 8.6 or 8.6 with an = sign or the incorrect inequality sign.                                        |
|          |                                                                            | $x < 8\frac{3}{5}$   |      | A1<br>Accept $x < \frac{43}{5}$ or $x < 8.6$ or $[-\infty, 8.6)$                                                                                                                           |
| (c)      | eg $6e^2(3f^3 - 2ef)$ , eg $2f(9e^2f^2 - 6e^3)$<br>eg $ef(18ef^2 - 12e^2)$ |                      | 2    | M1 Any correct partially factorised expression with at least 2 terms in the common factor or for the correct common factor and a 2 term expression inside the brackets with just one error |
|          |                                                                            | $6e^2f(3f^2 - 2e)$   |      | A1                                                                                                                                                                                         |
|          |                                                                            |                      |      | Total 6 marks                                                                                                                                                                              |

| Question | Working                                                                                                                                                                                 | Answer | Mark | Notes                                                                                                                                                                 |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 19 (a)   | $2 \times \pi \times 0.56 \times 1.6$                                                                                                                                                   |        | 2    | M1 Award even if part of a calculation including 1 or 2 circles                                                                                                       |
|          |                                                                                                                                                                                         | 5.63   |      | A1 awrt 5.63                                                                                                                                                          |
| (b)      | $\frac{0.6}{1.6} (=0.375)$ or $\frac{1.6}{0.6} (= \frac{8}{3} = 2.\dot{6})$ or<br>$\frac{r}{0.56} = \frac{0.6}{1.6}$ or $(r =) \frac{0.56 \times 0.6}{1.6}$ or $0.56 \div 2.\dot{6}$ oe |        | 2    | M1 Correct scale factor (given as a fraction or a ratio) or correct equation in $r$ or a correct expression for $r$ .<br>Allow 2.6666... to 1 dp rounded or truncated |
|          |                                                                                                                                                                                         | 0.21   |      | A1 Allow 21 cm oe if units shown                                                                                                                                      |
|          |                                                                                                                                                                                         |        |      | Total 4 marks                                                                                                                                                         |

| Question | Working                                                                                     | Answer          | Mark | Notes                                                                                                                                                                           |
|----------|---------------------------------------------------------------------------------------------|-----------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 20       | $\frac{25}{7}$ and $\frac{13}{8}$                                                           |                 | 3    | M1 correct improper fractions or two improper fractions with a common denominator, at least one correct                                                                         |
|          | eg $\frac{200}{56} - \frac{91}{56}$ or $\frac{8 \times 25}{56} - \frac{7 \times 13}{56}$    |                 |      | M1 two correct fractions with a common denominator                                                                                                                              |
|          | $\frac{109}{56} = 1\frac{53}{56}$<br>Or $\frac{109}{56}$ with RHS shown as $\frac{109}{56}$ | correctly shown |      | A1 dep on M2 with sight of the result of the subtraction eg $\frac{109}{56}$ and $1\frac{53}{56}$<br>but allow showing that $1\frac{53}{56} = \frac{109}{56}$ on RHS in working |
|          | Alternative method                                                                          |                 |      |                                                                                                                                                                                 |
|          | eg $(3)\frac{32}{56} - (1)\frac{35}{56}$                                                    |                 | 3    | M1 two improper fractions with a common denominator, at least one correct                                                                                                       |
|          | $-\frac{3}{56}$                                                                             |                 |      | M1 correct subtraction of fractional parts                                                                                                                                      |
|          |                                                                                             | correctly shown |      | A1 dep on M2 with sight of the result of the subtraction eg $\frac{109}{56}$ or $2 - \frac{3}{56}$                                                                              |
|          | Alternative method                                                                          |                 |      |                                                                                                                                                                                 |
|          | eg $3\frac{32}{56} - 1\frac{35}{56}$                                                        |                 | 3    | M1 two correct fractions with a common denominator, at least one correct                                                                                                        |
|          | eg $2\frac{88}{56} - 1\frac{35}{56}$                                                        |                 |      | M1 complete correct method                                                                                                                                                      |
|          |                                                                                             | correctly shown |      | A1 dep on M2                                                                                                                                                                    |
|          |                                                                                             |                 |      | Total 3 marks                                                                                                                                                                   |

| Question | Working                                                                                   | Answer | Mark | Notes                                                                                                                                                                                                                                                      |
|----------|-------------------------------------------------------------------------------------------|--------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 21       | $\cos 52 = \frac{12.6}{x}$ or $\sin 38 = \frac{12.6}{x}$                                  |        | 3    | M1 Or use of tan to find horizontal side $12.6 \times \tan 52$ or $\frac{12.6}{\tan 38}$ (=16.12...) and a correct first stage to find x eg $x^2 = 12.6^2 + "16.12..."^2$ or $\sin 52 = \frac{"16.12..."}{x}$ oe<br>Allow correct first stage of sine rule |
|          | $(x =) \frac{12.6}{\cos 52}$ or $\frac{12.6}{\sin 38}$ ( $= \frac{12.6}{0.61566...}$ ) or |        |      | M1 Accept decimal correct to at least 3SF<br>Or $(x =) \sqrt{12.6^2 + "16.12..."^2}$ or $(x =) \frac{"16.12..."}{\sin 52}$<br>Allow rearranged $(x =)$ sine rule                                                                                           |
|          |                                                                                           | 20.5   |      | A1 20.4 – 20.5                                                                                                                                                                                                                                             |
|          |                                                                                           |        |      | Total 3 marks                                                                                                                                                                                                                                              |

| Question | Working                                                            | Answer | Mark | Notes                                                                |
|----------|--------------------------------------------------------------------|--------|------|----------------------------------------------------------------------|
| 22 (a)   | $(28+32) \times 72.6 (= 4356)$ or $28 \times 75 (= 2100)$          |        | 4    | M1 Expression for total of both classes together or total of class A |
|          | $(28+32) \times 72.6 - 28 \times 75 (= 2256)$                      |        |      | M1 Expression for total of class B.                                  |
|          | $\frac{(28+32) \times 72.6 - 28 \times 75}{32} (= "2256" \div 32)$ |        |      | M1 Correct calculation for mean of class B                           |
|          |                                                                    | 70.5   |      | A1                                                                   |
| (b)      | Highest in A = $39 + 57 (= 96)$<br>Highest in B = $33 + 60 (= 93)$ |        | 3    | M1 for $39 + 57 (=96)$ or $33 + 60 (=93)$                            |
|          | $(39 + 57) - 33$                                                   |        |      | M1 or for $33 - "96"$ or $33$ to $"96"$ oe                           |
|          |                                                                    | 63     |      | A1                                                                   |
|          |                                                                    |        |      | Total 7 marks                                                        |

|    |                                                                                                           |                            |  |   |                                                                                                                                                                                                                                                              |
|----|-----------------------------------------------------------------------------------------------------------|----------------------------|--|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 23 | eg $7x + 7y = 105 -$<br>75 +<br>$7x - 5y = 3$<br>3<br><br>$7(15 - y) - 5y = 3$ or $7x - 5(15 - x) = 3$ oe | $5x + 5y =$<br>$7x - 5y =$ |  | 3 | M1 Correct method to eliminate x or y: coefficients of x or y the same and correct operation to eliminate selected variable (condone any one arithmetic error in multiplication) or writing x or y in terms of the other variable and correctly substituting |
|    | $6.5 + y = 15$ or $x + 8.5 = 15$ or<br>$7 \times 6.5 - 5y = 3$ or $7x - 5 \times 8.5 = 3$                 |                            |  |   | M1 dep Correct method to find second variable using their value from a correct method to find first variable or for repeating above method to find second variable                                                                                           |
|    |                                                                                                           | $x = 6.5, y = 8.5$         |  |   | A1oe dep on first M1                                                                                                                                                                                                                                         |
|    |                                                                                                           |                            |  |   | Total 3 marks                                                                                                                                                                                                                                                |



| Question | Working                                                                                               | Answer | Mark | Notes                                          |
|----------|-------------------------------------------------------------------------------------------------------|--------|------|------------------------------------------------|
| 24 (a)   | $\frac{2^3}{2^7}$ or $2^3 \times 2^{-7}$ or $\frac{1}{2^4}$ or $(\frac{1}{16} \text{ and } 16 = 2^4)$ |        | 2    | M1                                             |
|          |                                                                                                       | -4     |      | A1 Accept $2^{-4}$                             |
| (b)      | $13^{-24} \times 13^5$                                                                                |        | 2    | M1 for $13^{-24}$ or for $k = -6 \times 4 + 5$ |
|          |                                                                                                       | -19    |      | A1 Accept $13^{-19}$                           |
|          |                                                                                                       |        |      | Total 4 marks                                  |

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