

Mark Scheme (Results)

May 2012

Pearson Edexcel International GCSE

Mathematics A (4MA1)

Paper 4H

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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.

# Types of mark

* + M marks: method marks
	+ A marks: accuracy marks
	+ B marks: unconditional accuracy marks (independent of M marks)

# Abbreviations

* + cao – correct answer only
	+ ft – follow through
	+ isw – ignore subsequent working
	+ SC - special case
	+ oe – or equivalent (and appropriate)
	+ dep – dependent
	+ indep – independent
	+ awrt – answer which rounds to
	+ eeoo – each error or omission

# No working

If no working is shown then correct answers normally score full marks

If no working is shown then incorrect (even though nearly correct) answers score no marks.

# With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If it is clear from the working that the “correct” answer has been

obtained from incorrect working, award 0 marks.

If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review. If there is a choice of methods shown, mark the method that leads to the answer on the answer line; where no answer is given on the answer line, award the lowest mark from the methods shown.

If there is no answer on the answer line then check the working for an obvious answer.

# Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

# Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded to another.

|  |
| --- |
| **International GCSE Maths** |
| **Apart from questions 2, 7, 10, 11, 17, 18, 21b and 26 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method** |
| **Q** | **Working** | **Answer** | **Mark** | **Notes** |
| **1** | (a) | 2 *y*  4 *y*  8  *y*2 |  | 2 | M1 | for 3 correct terms **or**for 4 correct terms ignoring signs**or**...  2 *y*  *y*2 **or**8  2 *y* ... |
|  |  | 8  2 *y*  *y*2 |  | A1 | Any order but simplified |
| (b) |  | 5*b*3*c*(3*b*2  7*c*8 ) | 2 | B2 | fully correct **or**B1 for a correct partial factorisation with at least two terms outside the bracket eg 5*b*3(3*b*2*c*  7*c*9 ) or5*c* (3*b*5 – 7*b*3*c*8) etc**or** the fully correct factor outside the bracket with a two term expression in terms of *b* and *c* inside the bracket eg5*b*3*c*(15*b*2  *c*8 ) |
|  |  |  |  | **Total 4 marks** |

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| **2** | eg 27 **and** 184 7 |  | 3 | M1 | Both fractions expressed as improper fractions. |
|  | 27  7 oe4 18**or** eg 189  7228 28 |  |  | M1 | Invert 2nd fraction or for both fractions expressed as equivalent fractions with denominators that are a common multiple of 4 and 7 (seeing this stage gains M2) |
|  | eg 27  7 **=** 189 **=** 21 = 2 54 18 72 8 8**or** 27  7 **=** 189 **=** 2 45 = 2 54 18 72 72 82 7 3 7 21 5**or**  **=** = 24 1 8 2 8 8**or** 189  72 = 189 **=** 2 45 = 2 5 oe28 28 72 72 8if the student clearly shows 2 5  21 then they8 8only need to complete the LHS to 21 (often8done in 1st line of working) | shown |  | A1 | dep M2 conclusion to 2 5 from8correct working – either sight of the result of the multiplication e.g.189 must be seen then cancelled72or correct cancelling prior to themultiplication with 21 seen.8NB entire solution using decimals scores no marks. |
|  |  |  |  | **Total 3 marks** |

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| **3** | (a) | 12 ( 3) **or** 4 ( 0.3) **or** *BC*  16.54 12 4 12**or** *BC* 16.5  4 12 **or** (*BC* )16.5  12 oe4 |  | 2 | M1 | correct scale factor (given as 3 or a fraction or a ratio) **or** correct equation using *BC* **or** a correct expression for *BC*(award for SF even if not used) |
|  |  | 5.5 |  | A1 |
| (b) |  | 3*x* | 1 | B1 | allow 3 × *x* or *x ×* 3 ft their “3” in (a) |
|  |  |  |  | **Total 3 marks** |



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| **4** | (a) |  | 17.75 | 1 | B1 | oe |
| (b) |  | 18.25 | 1 | B1 | oe 18.249 (allow 18.249…) |
|  |  |  |  | SC B1 for 17.5 in (a) **and** 18.5 (or 18.49 )in (b) |
|  |  |  |  | **Total 2 marks** |

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| **5** | (a) | 700 ÷ 200 (= 3.5) |  | 3 | M1 | or 3.5 shown on diagram – within bounds of overlay |
|  |  |  |  | M1 | for line drawn at correct angle ± 2 within bounds of overlay |
|  |  | *C* indicated in correct position |  | A1 | for *C* drawn within bounds of overlay, inclusive of lines. |
| (b) |  | (1 :) 20 000 | 1 | B1 |
|  |  |  |  | **Total 4 marks** |

|  |  |  |  |  |  |  |  |  |
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| **6** | 28 | ÷ | 0.35 (= 80) oe eg | (28 ÷ 7) × 20 (= 80) |  | 5 | M1 | indep for calculating total number of sweets |
|  | 1 (0.2  0.35) (= 0.45) oe**or** (0.2 + 0.35) × “80” (= 44) or 28 + “16” (= 44) |  |  | M1 | or for a correct equation for missing values eg*x* + 2*x* + 0.2 + 0.35 = 1 oe(can be implied by 2 probabilities that total0.45 in table if not contradicted in working space) |
|  | “0.45” ÷ 3 (= 0.15) oe |  |  | M1 | (or 0.15 or 0.3 seen in table – either order) |
| **or** “0.45” × “80” (= 36) |  |  |
| **or** “80” – “44” (= 36) |  |  |
|  | “80” × “0.15” **or** “80” × “0.3” (= 24) |  |  | M1 | A correct calculation for the number of white |
| **or** “36” ÷ 3 or "36"  3 (= 24) |  | sweets or the number of pink sweets |
| 2 |  |  |
|  |  | 12 |  | A1 |
| **6** | **alt** | 1 (0.2  0.35) (= 0.45) or |  | 5 | M1 | or for a correct equation for missing values eg |
|  |  | 100(%) ‒ 20(%) ‒ 35(%) = 45(%) |  |  | *x* + 2*x* + 0.2 + 0.35 = 1 oe |
|  | “0.45” ÷ 3 (= 0.15)45(%) ÷ 3 (= 15(%)) |  |  | M1 | (or 0.15 or 0.3 seen in table – either order) |
|  | *n* 0.15 **or** *n* 28 oe or |  |  | M1 | for using proportion with an expression for *n* |
| 28 0.35 0.15 0.35 |  | white sweets orfinding 5% oe to enable calculation to 15% |
| *n* 0.3 **or** *n* 28 **or** 35% = 28 so 5% = 4 |  |  |
| 28 0.35 0.3 0.35 |  |  |
|  | (*n* =) 28 0.15 **or** (*n* =) 0.15 28 or 15% = 3 × 40.35 0.35 |  |  | M1 | a calculation using proportion that would lead to finding their *n* or 2*n* |
| or 28 0.3 **or** 0.3 28 **or** 30% = 6 × 4 (= 24) |  |  |
| 0.35 0.35 |  |  |
|  |  | 12 |  | A1 |
|  |  |  |  | **Total 5 marks** |



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| **7** | 2 2 7 or 23 7 or 32  7 oe condone 1’s in factor tree**or** showing at least 5 correct multiples across at least 2 lists (excluding 28, 42, 63)(28) 56, 84, 112, 140, 168, 196, 224, 252(42) 84, 126, 168, 210, 252(63) 126, 189, 252 |  | 3 | M1 | accept prime factors seen in factor tree **or** correct position in Venn diagram for at least one of the numbers given. |
|  | 2 2 7 **and** 23 7 **and** 3 3 7**or** showing at least 9 correct multiples across all 3 lists (excluding 28, 42, 63) |  |  | M1 | accept prime factors seen in factor tree **or** correct position in Venn diagram for all 3 of the numbersgiven. |
|  |  | 252 |  | A1 | or 2² × 3² × 7 oe Dep on M1 |
| **7 alt** |  | 7 | 28 | 42 | 63 |  |  | 3 | M1 | For one correct row in table eg division by 7 gives 4, 6, 9 |
|  | 2 | **4** | **6** | **9** |  |
|  | 3 | **2** | **3** | **9** |  |
|  |  | 2 | 1 | 3 |  |
| oe |  |  |  |  |
|  | or |  |  |  |  |  |
| M1 | Fully correct table – need only go as far as top table – we want to see prime factors along the side or prime factors along the sides and bottom (condone 1’s) |
|  | 7 | 28 | 42 | 63 |  |  |
|  | 2 | 4 | 6 | 9 |  |  |
|  | 3 | 2 | 3 | 9 |  |  |
|  | 2 | 2 | 1 | 3 |  |  |
|  | 3 | 1 | 1 | 3 |  |  |
|  | (1) | 1 | 1 | 1 |  |  |
|  |  | 252 |  | A1 | or 2² × 3² × 7 oe Dep on M1 |
|  |  |  |  | **Total 3 marks** |

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| **8** | (a) | (231 776 – 228 314) ÷ 228 314**or** 3462 ÷ 228 314 (= 0.01516…)**or** 231 776 ÷ 228 314 (= 1.01516…) |  | 2 | M1 |
|  |  | 1.5 |  | A1 | for 1.5 or better (1.516…)(be careful: 3462 ÷ 231 776 × 100 = 1.49….) |
| (b) | 231 776 ÷ 1.077 oe |  | 3 | M2 | If not M2then M1 for 100 + 7.7 (=107.7) or1 + 0.077(=1.077 ) seenbut not 1 + 7.7% |
|  |  | 215 000 |  | A1 | for 215 000 or better( 215 205.19…)(if no marks awardedSCB1 for 212000 or better (211990.71…)) |
|  |  |  |  | **Total 5 marks** |

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| **9** | (013) 117  28  3*x*  411 or(0 +) 17 + 16 + 3*x* + 44 (= 77 + 3*x*) |  |  | M1 | at least **3** correct products with intention to add.eg award for 77 seen as this is sum of 3 products |
|  | (13 17  8  *x* 11) oe eg 49 + *x***or** 98  2*x* |  |  | M1 | Sum for total frequency or (frequency × 2) |
|  | "77  3*x*"  2 oe e.g. "77  3*x*"  2("49  *x*")"49  *x*" |  |  | M1 | for use of mean in valid equation (ft their values for sum of products and their total frequency if M2awarded previously) |
|  |  | 21 |  | A1 |
|  |  |  |  | **Total 4 marks** |

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| **10** | eg 6*x* + 10*y* = 6.2 \_ 6*x* + 3*y* = 3.757*y* = 2.45eg 30*x* + 15*y* = 18.75  9*x* + 15*y* = 9.321*x* = 9.45**or** eg 6  3.1 5 *y*   3*y*  3.75 3   |  | 3 | M1 | for correct method to eliminate one variable – multiplying one or both equations so the coefficient of *x* or *y* is the same in both (condone one arithmetic error), with the intention to subtract all 3 terms to eliminate one variable (intention to subtract is clearly showing a minus sign or subtracting 2 or 3 out of 3 terms)**or** isolating *x* or *y* in one equation and substituting into the other |
|  | eg. 6 × “0.45” + 3*y* = 3.75or 3 × “0.45” + 5*y* = 3.1**or** 3*x* + 5 × “0.35” = 3.1or 6*x* + 3 × “0.35” = 3.75 |  |  | M1 | dep. Substitute found value into one equation **or** correct method to eliminate second unknown. |
|  |  | *x* = 0.45 oe*y* = 0.35 oe |  | A1 | dep M1 |
|  |  |  |  | **Total 3 marks** |

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| **11** | 360 **(=** 36) ext angle1010 – 2 180**or (=** 144)10 |  | 4 | M1 | method to find interior or exterior angle. (angles may be seen on diagram) |
|  | *x* = “144” ‒ 90 (= 54) or*x* = "540" 3"144" (=54) or2*x*  90 "36"( 54)54 on the diagram is insufficient – must see working |  |  | M1 | method to find *x* (must show it is intended to be *x*)eg use of int angle ‒ 90⁰ use of ext angle + *x* = 90⁰ use of pentagon *GHIJA*All figures in “ “ must come from correct working |
|  | *BAD*  *CDA*  *GDE*  *DGF*  360  2"144" ( 36)2 |  |  | M1 | A correct method to find an angle of 36º within the shape (not exterior angle)or36º shown in correct place in diagram |
|  | There are other correct methods. Please check for correct working. | *x* = 54*y* = 54 |  | A1 | dep on M3 to find each of *x* and *y* and thecorrect value of 54 for both from correct working |
|  |  |  |  | **Total 4 marks** |
| **ALT** | *ADG* = “144” ‒ 2 × “36” (= 72) |  |  | M1 |
|  | *JA* is parallel to *GD* |  |  | M1 |
|  | *DGA* = *DAG* (*y*) [isosceles triangle] |  |  | M1 |
|  | *x* = *DGA* = *y* | shown |  | A1 |
|  | There are other correct methods. Please check for correct working. |  |  | **Total 4 marks** |

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| **12** | 216 or 2.16 or 10120 or 10122 or 63 10403 |  | 3 | M1 | or for digits 216 |
|  | 21610120 oe or or 2.16 × 10*n* where *n* ≠ 122 |  |  | M1 |
|  |  | 2.1610122 |  | A1 |
|  |  |  |  | **Total 3 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | *x*  1 | 1 | B1 | oe condone > in place of ≥ |
|  |  | *y*  *x* | 1 | B1 | oe condone > in place of ≥ |
|  |  | *x*  2 *y*  8 | 1 | B1 | oe condone < in place of  |
|  |  |  |  | SCB1 | if all inequalities reversed |
|  |  |  |  | **Total 3 mark*s*** |

|  |  |  |  |  |  |
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| **13** | 12 × tan 5 (=1.05) **or**tan 5  ' *y* ' **or** 12tan5 **or** tan 85  12 **or** 1212 ' *y* ' tan 85*y*  12 oe **or** (*y* =) 1.04986… oesin 5 sin 85 |  | 3 | M1 | oe correct expression using tan or the sine ruleor 12 2  122 (= 1.04986…) cos 5  |
|  | (*AB* =) 2.6 + “1.05” oe |  |  | M1 |
|  |  | 3.65 |  | A1 | allow awrt 3.65 |
|  |  |  |  | **Total 3 marks** |

|  |  |  |  |  |  |
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| **14** | 5 5 7 8 10 12 13 14 16 21 23 |  | 3 | M1 | For ordering the numbersAllow one error or omission in the list. |
|  | 16 & 7 identified for LQ and UQ |  |  | M1 | For identifying 16 and 7 – may also have identified the median (12) |
|  |  | 9 |  | A1 |
|  |  |  |  | **Total 3 marks** |

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| **15** | *DFE* = 42° or *DOG* = 180 ‒ 2 × 42 (= 96) or *EFG* = 90° or *EDG* = 90ºor *DEG* = 90 – 42 (= 48) |  | 4 | M1 | used or seen in diagram (must be clearly labelled if not in diagram) |
|  |  | 48° |  | A1 | award 2 marks for 48 unless from an incorrect method |
|  | angles in same segment **or**angles from same chord **or**angles at the circumference subtended from the same arc of the circleangles in a semicircle are 90° angles in a semicircle are 90° angle subtended by diameter is 90°angle at centre twice angle at circumference oe angles in a triangle add to 180angles in a triangle add to 180 |  |  | B2 | Dep on a fully correct method to find angle *DFG*for a full set of reasons relevant to their method.B1 dep on M1 for at least one relevant **circle theorem.** |
|  |  |  |  | **Total 4 marks** |

|  |  |  |  |  |  |  |  |  |
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| **16** | eg | 12 3  2 | 3  23  2 |  |  | 3 | M1 | rationalise denominator – award forseeing multiplication by 3  2 or3  2 3  2 3  2 |
|  |  36  2 12  6  2 12eg **or**3  4 1**or** 6  4 3 **or** 6  4 31 | **or** 6  2 12 |  |  | M1 | dep M1 correctly simplifying |
|  | numerator and denominator. |
|  | (denominator could be 3 ‒ 4 or ‒1) |
|  |  | 6  | 48 |  | A1 | dep M2 must be in correct form (including 48 )allow *a* = ‒6 and *b* = 48 |
|  |  |  |  | **Total 3 marks** |





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|  | eg (2*n* + 1)2 + (2*n* – 1)2or(2*n* + 1)² + (2*n* + 3)² oe |  | 3 | M1 | for setting up a correct algebraic expression (any letter can be used) must have intention to add (may come after expanding) |
|  | Eg 4*n*2 + 4*n* + 1 + 4*n*2 – 4*n* + 1**or** 8*n*2 + 2**or**4*n*2 + 4*n* + 1 + 4*n*2 + 12*n* + 9**or** 8*n*2 + 16*n* + 10 oe |  |  | M1 | correct expansion of brackets and correct signs or a correct result. |
|  |  |  |  |  |  |
|  |  |  |  | **Total 3 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **17** | (*PT* =) 12 4 ( = 16)3 |  | 3 | M1 | NB: 16 from 12 + 4 is incorrect working |
|  | (*r* =) (“16” + 3) ÷ 2 |  |  | M1 |
|  |  | 9.5 |  | A1 | oe |
|  |  |  |  | **Total 3 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **18** | at least **two** of 3, 8, 5, 2 seen**or**at least **two** correct frequency densities from 0.6, 0.8, 1, 1.2, 0.4**or**eg one cm on FD axis = 0.25**or**eg top of FD axis labelled 2**or**eg 1 plant = 20 small squares**or**total small squares in at least 2 bars (60, 160, 100, 240, 40)**or**total number of 1 cm squares for at least 2 bars (2.4, 6.4, 4, 9.6, 1.6) oe |  | 4 | M1 | At least 2 frequencies for other bars**or** scale on FD axis**or** eg 20 small squares represents 1 plant oe |
|  | 3 + 8 + 5 + 12 + 2 (= 30) |  |  | M1 | add up 5 frequencies (allow one error) |
| **or** |  | or |
| adding the number of small squares in all bars: |  | adding the number of small squares in |
| 60 + 160 + 100 + 240 + 40 (= 600) |  | all bars |
| **or** |  | (allow one error) |
| adding the number of 1 cm squares in all bars: |  | or |
| 2.4 + 6.4 + 4 + 9.6 + 1.6 (= 24) |  | adding the number of 1 cm squares in |
| oe |  | all bars (allow one error) |
|  |  | oe |
|  | 0.25"12""2" **or** 0.25"240""40" **or** 0.25"9.6"1.6 **oe** |  |  | M1 | ft their figures dep on the previous M1 |
|  "30" "600" "24" |  |
|  |  | 1 |  | A1 | oe eg 100600allow 0.16(66…) ie 2 dp truncated or rounded or better |
| 6 |  |
|  |  |  |  | **Total 4 marks** |

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| **21** | (a) |  | –0.2 and 2.2 | 2 | B2 | Both correct to 1 decimal place(B1 for (–0.2, 0), (2.2, 0)**or**a single correct value to 1 decimal place**or**both values within‒0.2 to ‒0.23 and 2.2 to 2.23) |
| (b) | (*y* =) –2*x* + 1 oe seen |  | 3 | M1 | Written – could be label on graph |
|  | *y* = –2*x* + 1 drawn |  |  | M1 | dep on previous M1 for drawing *y* = –2*x* + 1 passing through (–1, 3) and (2, –3)(allow 1 square tolerance) |
|  |  | –0.6 and 1.6 |  | A1 | dep on M2 for both answers to 1 decimal place |
|  |  |  |  | **Total 5 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **22** | (2*x* + 3)(*x* – 1) < 75 |  | 5 | B1 | For writing the correct inequality sign with a correct calculation or correct value – this could be initially or saying that*x* < 6 at the end |
|  | 2*x*2 + *x* – 78 < 0 |  |  | M1 | rearranged to form correct quadratic < 0 (allow = 0 or other incorrect inequality sign) oe |
|  | (*x* – 6)(2*x* + 13) (< 0)1 (1)2  (4  2  78)**or** *x* 2  2 1 2  1 2**or** 2 *x*  4   2 4   78  0    |  |  | M1 | first step to find critical values from the correct quadratic |
|  |  | *x* = 6 |  | A1 | *x* = 6 identified as critical value, ignore–6.5 if given |
|  |  | 1 < *x* < 6 |  | A1 | correct inequality |
|  |  |  |  | **Total 5 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **23** | sin *Q*  sin18 oe or4.2 1.61.62  4.22  *RQ*2  2 4.2 *RQ* cos18 oe |  | 6 | M1 | correct sine ratio - could be rearranged or correct substitution into the cosine rule using angle *R* |
|  | sin1  4.2  sin18  (= 54.2) **or** sin1 0.811... 1.6  2  4.2 cos18  (2  4.2 cos18)2  4 115.082 |  |  | M1 |
|  | 180 – “54.2” (=125.8) or*RQ* = 3.0585.. and 4.933… |  |  | M1 | This can be implied by the correct value(s) (125.8 or 3.0585…) used later |
|  | (*P* =) 180 –“125.8” – 18 (=36.2)**or***RQ*  4.22 1.62  2 4.21.6cos"36.2" (= 3.0585…)or 3.0585 chosen as value from cosine rule above**or**perpendicular height = 4.2sin”36.2” (= 2.4805…) (where “36.2” comes from correct working) |  |  | M1 |
|  | (Area =) 1  4.21.6sin("36.2") 2**or**(Area = ) 1  4.2"3.0585..." sin18 2**or**(Area = ) 1 1.6"2.4805..."2 |  |  | M1 |
|  |  | 1.98 |  | A1 | awrt 1.98 |
|  |  |  |  | **Total 6 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **24** | (*v =*) 12*t*2 – 27 (= 0) |  | 5 | M1 | Correct differentiation |
|  | *t*2  27 ( 9) oe12 4**or** (3)(2*t* + 3)(2*t* − 3) (= 0) |  |  | M1 | dep M1 first stage to solve *v* = 0 by rearranging, factorising, quadratic formula, or completing the square |
|  | 9 oe (= 3 ) **or**  9 oe (=  3 )4 2 4 2 |  |  | A1 | Correct value of *t* (allow  ) |
|  | (*a* =) 24*t* |  |  | M1 | dep 1st M1 for differentiating *v* |
|  |  | 36 |  | A1 | correct answer |
|  |  |  |  | **Total 5 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **25** | (a) | (*x* – 3)2 or (3 ‒ *x*)² or (*y* – 3)2 or ( 3 ‒ *y*)² |  | 4 | M1 |
|  | 14 or ‒ 14 |  |  | M1 | As part of an expression in *x* or *y* or an equation in *x* and *y* |
|  | 3  14  *x* or 3  14  *y* |  |  | M1 | Can be  or ‒ or + |
|  |  | 3  | 14  *x* |  | A1 | oe must be in *x* |
| **25** | alt (a) | Alternative method:*x*2  6*x*  ( *y*  5)  0 oe or*y*2  6 *y*  (*x*  5)  0 oe |  | 4 | M1 | rearrange to form a quadratic in *x* or *y*terms can be in any order but must be in an equation equal to zero |
|  | *y*  6  36  4(*x*  5) or *x*  6 2 | 36  4( *y*  5)2 |  |  | M1 | correct substitution into quadratic formula |
|  | 3  14  *x* or 3  14  *y* |  |  | M1 | Can be  or ‒ or + |
|  |  | 3  | 14  *x* |  | A1 | oe must be in *x* |
| (b) |  | *x* ⩽ 14 | 1 | B1 | oe **must** ft from part (a) dep on an answer in correct form |
|  |  |  |  | **Total 5 marks** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **19** | (*Sm* =) *m* (2*a*  (*m* 1)*d* )  39 oe2**or** (*S2m* =) 2*m* (2*a*  (2*m* 1)*d* ) = 320 oe2 |  | 5 | M1 | one correct equation for *Sm* or *S2m* (condone consistent use of *n* instead of *m*) |
|  | (*Sm* =) *m* (2*a*  (*m* 1)*d* )  39 oe2**and** (*S2m* =) 2*m* (2*a*  (2*m* 1)*d* ) = 320 oe2 |  |  | M1 | both equations correct |
|  | eliminate to get *dm*2  242 oe |  |  | M1 |
|  | 242 = 2 × 11 × 11 or 242 = 2 × 121 oe |  |  | M1 |
|  |  | *d* = 2*m* = 11 |  | A1 | Dep on M2 Both correct |
|  |  |  |  | **Total 5 marks** |