Mark Scheme for November 2013
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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates’ scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Annotations used in the detailed Mark Scheme.

<table>
<thead>
<tr>
<th>Annotation</th>
<th>Meaning</th>
</tr>
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<tbody>
<tr>
<td>✔️</td>
<td>Correct</td>
</tr>
<tr>
<td>❌</td>
<td>Incorrect</td>
</tr>
<tr>
<td>BOD</td>
<td>Benefit of doubt</td>
</tr>
<tr>
<td>FT</td>
<td>Follow through</td>
</tr>
<tr>
<td>I/SW</td>
<td>Ignore subsequent working (after correct answer obtained), provided method has been completed</td>
</tr>
<tr>
<td>M:0</td>
<td>Method mark awarded 0</td>
</tr>
<tr>
<td>M:1</td>
<td>Method mark awarded 1</td>
</tr>
<tr>
<td>M:2</td>
<td>Method mark awarded 2</td>
</tr>
<tr>
<td>A:1</td>
<td>Accuracy mark awarded 1</td>
</tr>
<tr>
<td>B:1</td>
<td>Independent mark awarded 1</td>
</tr>
<tr>
<td>B:2</td>
<td>Independent mark awarded 2</td>
</tr>
<tr>
<td>MR</td>
<td>Misread</td>
</tr>
<tr>
<td>SC</td>
<td>Special case</td>
</tr>
<tr>
<td>A</td>
<td>Omission sign</td>
</tr>
</tbody>
</table>

These should be used whenever appropriate during your marking.

The M, A, B, etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks. It is vital that you annotate these scripts to show how the marks have been awarded. It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.
Subject-Specific Marking Instructions

1. **M** marks are for using a correct method and are not lost for purely numerical errors. 
   **A** marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded. 
   **B** marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage. 
   **SC** marks are for special cases that are worthy of some credit.

2. Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is ‘banded’, then if the correct answer is clearly given and is not from wrong working full marks should be awarded.

   Do **not** award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

3. Where follow through (FT) is indicated in the mark scheme, marks can be awarded where the candidate’s work follows correctly from a previous answer whether or not it was correct.

   Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT 180 × (*their* ‘37’ + 16), or FT 300 – √(*their* ‘5² + 7²’). Answers to part questions which are being followed through are indicated by eg FT 3 × *their* (a).

   For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4. Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

5. The following abbreviations are commonly found in GCSE Mathematics mark schemes.

   - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   - **isw** means ignore subsequent working after correct answer obtained and applies as a default.
   - **nfww** means not from wrong working.
   - **oe** means or equivalent.
   - **rot** means rounded or truncated.
   - **seen** means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.
   - **soi** means seen or implied.
6. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie isw) unless the mark scheme says otherwise, indicated by the instruction ‘mark final answer’.

7. In questions with a final answer line following working space,

(i) if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says ‘mark final answer’. Place the annotation ✓ next to the correct answer.

(ii) if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

(iii) if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation × next to the wrong answer.

8. In questions with a final answer line:

(i) If one answer is provided on the answer line, mark the method that leads to that answer.

(ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

(iii) If more than one answer is provided on the answer line and there is more than one method provided, award zero marks for the question unless the candidate has clearly indicated which method is to be marked.

9. In questions with no final answer line:

(i) If a single response is provided, mark as usual.

(ii) If more than one response is provided, award zero marks for the question unless the candidate has clearly indicated which response is to be marked.

10. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for A and B marks. Deduct 1 mark from any A or B marks earned and record this by using the MR annotation. M marks are not deducted for misreads.
11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

12. Ranges of answers given in the mark scheme are always inclusive.

13. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

14. Anything in the mark scheme which is in square brackets [...] is not required for the mark to be earned, but if present it must be correct.
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<th>Marks</th>
<th>Part Marks and Guidance</th>
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</table>
| 1 (a)    | 2\(^5\) \times 3  
Or 2 \times 2 \times 2 \times 2 \times 2 \times 3 or better | 2 M1 for correct factor pair or product seen  
or attempt at factor tree/ladder with at least two steps  
or answer 2\(^k\) \times 3 oe  
OR  
SC1 for 2, 2, 2, 2, 3 identified but not as product | Condone 3\(^{1}\) for 2 or 1 marks  
May be part of factor tree or eg  
4 \times 8 \times 3  
May contain errors |
| (ii)     | 12 final answer | 2 B1 for 2, 2, 3 clearly identified for both 96 and 108  
or answer of 2, 3, 4 or 6 oe  
e.g. in a Venn diagram  
e.g. accept 2\(^2\) for B1 | |
| (b)      | 5\(\frac{1}{6}\) final answer | 3 B2 for \(\frac{5}{12}\) or \(\frac{62}{12}\) seen  
or other unsimplified equivalent  
OR  
M1 for \(\frac{3}{4}\) converted to \(\frac{9}{12}\) or \(\frac{21}{12}\)  
AND  
M1 for correct addition of their two improper fractions/mixed numbers with common denominator  
AND  
M1 for their improper fraction/mixed number correctly converted to a mixed number in its lowest terms max 2 marks if answer incorrect | M1 may be implied by \(\frac{3}{4}\) converted to \(\frac{9}{12}\) but not \(\frac{9}{12}\).  
Or M1 for other conversion to common denominator with at least one correct numerator  
allow this M1 even if no simplification required |
| 2 (a)    | -7 \(\frac{1}{125}\) | 1  
1 | |
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<tr>
<td>(b) 21</td>
<td></td>
<td>2</td>
<td>M1 for 9 from $b^2$ or + 3 from $-b$ soi Or for $2 \times (-3)^2 - (-3)$ seen e.g. $-36 - (-3) = -33$ implies M1 Condone missing brackets in $(-3)^2$ if result 9 seen</td>
</tr>
<tr>
<td>3 (a) 97.28 [p]</td>
<td>4</td>
<td>B3 for 24.32 seen from $12.8 \times 1.9$ or answer £97.28 or figs 9728 OR M1 for $1.9 \times 4 \times 12.8$ soi AND B1 for figs 76, 512, 38, 152, 1152 896, 768, 608, 4608 or 95 seen AND B1 for answer in range 87 to 104 allow rounding of 97.28 seen for 4 marks May be seen in stages, may be done in any order but not using rounded values. Condone additional multiplication by 7</td>
<td></td>
</tr>
<tr>
<td>(b) (i) 4 9 5 3 4 7 6 0 4 7 8 7 0 3 3 4 4 7 8 8 6</td>
<td>3</td>
<td>M2 for table with 4 correct rows Or M1 for unordered diagram with at most one error or omission</td>
<td></td>
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</table>
| (ii)     | He uses fewer units than average with clear and correct working using appropriate representative value/values  
|          | e.g. Using median = 69, he uses 276 units per month on average which is less than average household  
|          | e.g. Using his maximum four weekly values, he uses 315 units per month which is less than the average household  
|          | e.g. The average household uses 82.5 units per week and his median weekly use is 69 units which is less than the average                                                                                     | 4     | **B2** for selecting an appropriate representative daily or weekly or monthly or 4-monthly amount making the time period clear  
|          | Or                                                                                                                                                                                                     |       | **B1** for representative amount that is not appropriate or incorrect representative value  
|          | **M1** for correct answer to calculation allowing like with like comparison  
|          | e.g. for their weekly average × 4  
|          | Or their daily average × 30  
|          | Or calculation of their monthly average  
|          | Or average household uses 330 × 4 = 1320 in 4 months  
|          | Or average household uses 330 ÷ 4 = 82.5 per week  
|          | **B1** for comparison and conclusion ft their values  
|          | **If their conclusion follows from comparison of incorrect figures, maximum 3 marks may be awarded**  
|          | For all marks follow through their stem and leaf diagram  
|          | e.g. median [weekly ] = 69  
|          | maximum monthly = 74 + 77 + 78 + 86 [= 315]  
|          | total in 4 months = 1077  
|          | e.g. addition of any four weekly amounts or incorrect addition of all 16 amounts or incorrect median  
|          | Allow use of e.g. $4 \frac{1}{3}$ weeks per month or 28 to 31 days per month  
|          | Must compare like with like, e.g. Felix weekly with average weekly or Felix monthly with average monthly  
<p>|          | If choice of values used, mark to the candidate’s advantage |       |                                                                                                                                                                                                               |</p>
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<tr>
<td>4*</td>
<td>$x = 45^\circ$ with correct and clearly laid out solution. All required angles clearly identified in working with a correct reason given for each angle found. Correct mathematical terminology and notation throughout</td>
<td>5</td>
<td>e.g. $\angle CED = \angle ACB = 80^\circ$, corresponding angles $\angle ABC = 180^\circ - 125^\circ = 55^\circ$, angles on a line $\angle CAB = 180^\circ - 55^\circ - 80^\circ = 45^\circ$, angles in a triangle $x = 45^\circ$, alternate angles equal</td>
</tr>
<tr>
<td>4a</td>
<td>correct answer of $x = 45^\circ$ with at least two correct angles and related reasons stated</td>
<td>4–3</td>
<td>For the lower mark</td>
</tr>
<tr>
<td>4b</td>
<td>complete solution with full reasons and maximum one arithmetic slip to reach incorrect value for $x$</td>
<td>2–1</td>
<td>3a correct answer of $x = 45^\circ$ with insufficient solution/reasons seen</td>
</tr>
<tr>
<td>2a</td>
<td>one relevant angle stated with correct reason, allow FT</td>
<td>2–1</td>
<td>3b at least two relevant angles stated with correct reasons, may FT arithmetic slip</td>
</tr>
<tr>
<td>2b</td>
<td>two relevant angles found, may be indicated in correct position on diagram, allow FT</td>
<td>2–1</td>
<td>3c at least three relevant angles found, may be indicated in correct position on diagram, may FT arithmetic slip</td>
</tr>
<tr>
<td>2c</td>
<td>two relevant reasons stated, need not be linked with appropriate angles</td>
<td>0</td>
<td>For the lower mark</td>
</tr>
<tr>
<td>No correct work seen</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Acceptable reasons:
Alternating angles equal
Corresponding angles equal
[Co-interior/allied] angles = 180
[angles in a] triangle = 180
[angles on a straight] line = 180
[angles in a] quadrilateral = 360
Similar triangles (only if correct angle pairs used)

180 may be implied in above reasons by a correct calculation seen and equal by a correct pair soi
Condone use of Z (in place of alternate), F (in place of corresponding), C/U (in place of interior/allied) for up to 4 marks
Supplementary angles alone is not sufficient, needs some context
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<tbody>
<tr>
<td>5 (a) (i)</td>
<td>( \frac{74}{120} ) oe</td>
<td>1</td>
<td>accept 0.616[...] or 0.617 or 61.6[...][%] or 61.7% or better do not accept ratio as answer isw for incorrect cancelling or 74 in 120 or 74 out of 120 etc after correct fraction seen Condone 'likely' after correct fraction seen</td>
</tr>
<tr>
<td>5 (ii)</td>
<td>600 final answer</td>
<td>2</td>
<td>M1 for ( \frac{30}{120} \times 2400 ) oe or for 600 seen with 2400 e.g. ( \frac{600}{2400} ) or 600 out of 2400</td>
</tr>
<tr>
<td>5 (b)</td>
<td>50</td>
<td>2</td>
<td>M1 for ( \frac{1500}{2400} \times 80 ) oe</td>
</tr>
<tr>
<td>6 (a)</td>
<td>( x \leq 4 )</td>
<td>2</td>
<td>M1 for ( 3x \leq 8 + 4 ) or better AND M1 for ( x \leq \frac{b}{a} ) after ( ax \leq b ) seen max 1 mark if answer incorrect OR SC1 for answer 4 or ( x \ldots 4 ) with any incorrect equality or inequality symbol or answer ( 3 \times 4 - 4 \leq 8 ) Condone use of = or incorrect inequality symbol in place of ( \leq ) for all method marks ( a \neq 1, b \neq 0 ) condone e.g. '4 or less' as answer for SC1</td>
</tr>
<tr>
<td>6 (b)</td>
<td>( \geq ) ( \leq ) ( \cdots ) ( \leq ) 4</td>
<td>1</td>
<td>FT their inequality in (i) Condone any indication at 4 Condone missing arrow at other end but do not accept indication of the line terminating Accept any length line</td>
</tr>
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<tr>
<td>7</td>
<td>Use of 360° at point Or use of symmetry to halve 90° [Angle in each polygon =] 135° Number of sides = 360 ÷ (180 – their 135) Octagon</td>
<td>B1 B1 B1 B1</td>
<td>implied by 270 seen implied by 270 seen implied by 270 seen implied by 270 seen</td>
</tr>
<tr>
<td></td>
<td>e.g. 360 – 90 seen or angles summing to 360 seen or exterior angle is 45 or identifying polygon has 8 sides or 180(n – 2) = 135n used</td>
<td>condone poor notation for division e.g. 45 ÷ 360 if intention clear condone poor notation for division e.g. 45 ÷ 360 if intention clear condone poor notation for division e.g. 45 ÷ 360 if intention clear condone poor notation for division e.g. 45 ÷ 360 if intention clear</td>
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<tr>
<td></td>
<td>All marks independent</td>
<td>All marks independent All marks independent All marks independent</td>
<td>All marks independent All marks independent All marks independent All marks independent</td>
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<tr>
<td>8</td>
<td>Triangle B correctly positioned Vertices (−4, −2), (−4, −3), (−1, −2)</td>
<td>B3 B2 B1</td>
<td>Use overlay Use overlay Use overlay Use overlay</td>
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<tr>
<td></td>
<td>B3 for triangle B with two vertices correct Or for correct rotation followed by translation by 5 left or 1 down Or for correct translation following 90° anticlockwise rotation about origin OR B2 for correct rotation of A clockwise about origin followed by incorrect or no translation Or for 90° anticlockwise rotation about origin followed by translation by 5 left or 1 down OR B1 for rotation of A 90° anticlockwise about origin followed by incorrect or no translation OR SC2 for correct translation following 180° rotation about origin OR SC1 for translation of 5 left or 1 down following 180° rotation about origin</td>
<td>Use overlay Use overlay Use overlay Use overlay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Red triangle scores 4 marks, horizontal or vertical translation of red scores B3, any other translation of red scores B2 Green triangle scores B3, horizontal or vertical translation of green scores B2, any other translation of green scores B1 Blue triangle scores SC2, horizontal or vertical translation of blue scores SC1, any other translation of blue scores SC0</td>
<td>Use overlay Use overlay Use overlay Use overlay</td>
<td></td>
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<td>Use overlay Use overlay Use overlay Use overlay</td>
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<td>Part Marks and Guidance</td>
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</table>
| (b)      | [Centre] (−1, 2) and [scale factor] −2 with no other transformation | 2 | B1 for (−1, 2)  
Or  
B1 for −2  
Do not accept centre written as vector  
Condone e.g. ‘negative enlargement of 2’ for scale factor −2 |
| 9        | [Shortest side = ] 7 nfww | 5 | M4 for \( x = 4 \) nfww  
OR  
M1 for \( 8x + 2 \) or \( 4x + 18 \) seen  
AND  
M1 for their ‘\( 8x + 2 \)’ = their ‘\( 4x + 18 \)’  
AND  
M1 for correctly collecting terms  
their ‘\( 8x − 4x \)’ = their ‘\( 18 − 2 \)’  
AND  
M1 for \( x = \frac{b}{a} \) after \( ax = b \) seen  
AND  
M1 for correctly evaluating \( 11 − x \) using their positive \( x \)  
max 4 marks if answer incorrect  
allow 5 marks for \( 11 − x \) on answer line if seen evaluated as 7 in working  
accept unsimplified  
yellow equivalent equation FT  
their attempts at perimeters  
FT their linear equation  
\( a \neq 1 \) and \( a \neq b \) and \( \frac{b}{a} > 0 \)  
\( 0 < x < 11 \)  
Trial and improvement methods can score 5 for shortest side = 7 or 4 for \( x = 4 \) only. Answer 7 with no working scores 5 |
<p>| 10 (a)   | 5 15 34 48 60 | 1 | |</p>
<table>
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| (b)      | All points plotted correctly and joined with smooth curve or straight line segments | 2 | FT *their* table  
B1 for at least 4 points plotted at correct height within interval  
Allow ±1 mm for plotting points and drawing curve, use overlay for guidance  
Condone starting at (20, 5)  
Mark curve generously  
Bar chart only scores 0, bar chart with curve scores max B1 |
| (c)      | 14 to 16 | 2 | B1 for 44 to 46 seen  
or FT reading from *their* line or curve at s = 75  
FT for *their* reading or ‘60 – *their* reading’, tolerance ±1  
no FT from bar chart |
| 11 (a)   | 9 060 000 | 1 | condone dots for commas if digits clear |
| (b)      | 3.4 × 10⁵ or 340 000 | 2 | B1 for figs 34  
Or  
M1 for 10 100 000 and 9 760 000 seen  
or 10.1 and 9.76 seen  
or 1.01 and 0.976 seen  
may be as part of numbers in standard form |
| (c)      | 2 × 10⁸ or 1.995 × 10⁸ | 2 | M1 for 50 × 4 × 10⁸ soi  
or 50 × 3.99 × 10⁸ soi  
SC1 for answer figs 2  
or answer figs 1995  
e.g. may be implied by correct figs seen in working, and answer truncated but with 10⁸ in correct standard form |
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<tr>
<td>12 (a)</td>
<td>(i) 1.8</td>
<td>2</td>
<td>M1 for $3 \times 0.6$ or answer figs 18</td>
</tr>
<tr>
<td></td>
<td>(ii) 1800</td>
<td>1FT</td>
<td>FT $1000 \times their$ 1.8 strict follow through</td>
</tr>
<tr>
<td>(b) (i)</td>
<td>0.03 [m$^2$]</td>
<td>3</td>
<td>M2 for $0.1^2$ soi Or M1 for 100 seen or scale factor 0.1 soi accept answer 300 cm$^2$ if units clearly stated e.g. M1 implied by answer 0.3</td>
</tr>
<tr>
<td></td>
<td>(ii) 1.8</td>
<td>1FT</td>
<td>FT $their$ (a)(ii) $\div 1000$ strict follow through</td>
</tr>
<tr>
<td>13</td>
<td>Correct region R indicated</td>
<td>3</td>
<td>B2 for region on the correct side of two inequalities B1 for region on the correct side of one inequality Do not assume axes are boundaries unless identified by shading i.e. if no shading, assume that the region is bounded by the inequality lines If no label R, assume shading identifies region unless clearly shading out each individual inequality If their region is bounded by lines other than those given maximum B1 may be awarded</td>
</tr>
<tr>
<td>14</td>
<td><img src="image1.png" alt="Graphs" /></td>
<td>1</td>
<td>both correct, first line any with positive gradient, second line any with negative gradient or horizontal or vertical line accept any clear intention of correct graphs, ie not ruled but attempt at straight line</td>
</tr>
<tr>
<td></td>
<td><img src="image2.png" alt="Graphs" /></td>
<td>2</td>
<td>both correct, first graph any with two positive solutions, second any with one/no positive solutions Or B1 for any one parabola seen Accept any clear intention of correct graphs, ie attempt at parabola Condone more than one parabola on axes for B1</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td>Marks</td>
<td>Part Marks and Guidance</td>
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| 15       | $\frac{5}{8} \text{ oe}$     | 4     | M3 for sum of at least four of required probabilities seen: DD, DM, MD, DW and WD  
Or for $P(D) + P(MD) + P(WD)$  
Or for $1 - P(\text{no dark})$  

OR

M2 for $P(\text{no dark}) = \frac{10}{16} \times \frac{9}{15}$ or $\frac{3}{8}$  
Or for correct tree diagram showing probabilities on sufficient branches  
Or for at least two of the five required probabilities found  

OR

M1 for at least one correct combined probability seen  
Or for three correct probabilities for first chocolate seen:  
$M = \frac{8}{16}$, $D = \frac{6}{16}$ and $W = \frac{2}{16}$  
Or for identifying the five required pairs of outcomes: DD, DM, MD, DW and WD  

OR

SC2 for answer $\frac{27}{28}$ or $\frac{39}{64}$  
Or  

SC1 for correct tree diagram assuming just 6 dark, 2 white chocolates  
or correct tree diagram assuming replacement  

allow all method marks if correct multiplication seen, even if not evaluated or incorrectly evaluated  
$P(\text{MM}) = \frac{8}{16} \times \frac{7}{15} = \frac{7}{30}$  
$P(\text{MD}) = \frac{8}{16} \times \frac{6}{15} = \frac{1}{5}$  
$P(\text{MW}) = \frac{8}{16} \times \frac{2}{15} = \frac{1}{15}$  
$P(\text{DM}) = \frac{6}{16} \times \frac{8}{15} = \frac{1}{5}$  
$P(\text{DD}) = \frac{6}{16} \times \frac{5}{15} = \frac{1}{8}$  
$P(\text{DW}) = \frac{6}{16} \times \frac{2}{15} = \frac{1}{20}$  
$P(\text{WM}) = \frac{2}{16} \times \frac{8}{15} = \frac{1}{15}$  
$P(\text{WD}) = \frac{2}{16} \times \frac{6}{15} = \frac{1}{15}$  
$P(\text{WW}) = \frac{2}{16} \times \frac{1}{15} = \frac{1}{120}$  

allow equivalent marks throughout for methods using dark/not dark
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
<th>Part Marks and Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 (a)</td>
<td>4.5</td>
<td>3</td>
<td>nfww M1 for eliminating fraction and expanding bracket 3x − 1 = 5x − 10 AND M1 for collecting terms FT −1 + 10 = 5x − 3x AND M1 for x = b/a after ax = b seen max 2 marks if answer incorrect condone 3x − 1 = 5x − 2 or 3x − 1 = x − 10 or 0.6x − 0.2 = x − 2 for M1 correct collection from ax + b = cx + d to ax − cx = d − b a ≠ 1 or 0 and a ≠ b and b ≠ 0</td>
</tr>
<tr>
<td>(b)</td>
<td>a⁻⁸</td>
<td>2</td>
<td>M1 for (a⁻⁴)² or ( \left( \frac{1}{a^4} \right)^{-2} ) or ( \left( \frac{a^8}{a^7} \right)^2 ) or ( a^{18} ) or ( a^{-10} ) seen condone a⁻⁴ for M1</td>
</tr>
<tr>
<td>(c)</td>
<td>( \frac{14 - x}{(x - 2)(x + 1)} ) or ( \frac{14 - x}{x^2 - x - 2} )</td>
<td>3</td>
<td>M1 for 4(x + 1) − 5(x − 2) or 4x + 4 − 5x + 10 with three terms correct or better seen M1 for correct common denominator seen as denominator Mark final answer but isw for incorrect expansion of denominator after correct denominator seen May be in two separate fractions condone missing final bracket in denominator</td>
</tr>
<tr>
<td>17 (a)</td>
<td>a + b</td>
<td>1</td>
<td>final answer</td>
</tr>
<tr>
<td>(b)</td>
<td>b − a</td>
<td>1</td>
<td>final answer Condone b + −a</td>
</tr>
<tr>
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<td>Answer</td>
<td>Marks</td>
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<tr>
<td>(c)</td>
<td>(\frac{1}{3} (a + b)) or (\frac{1}{3} a + \frac{1}{3} b) final answer</td>
<td>1 M1</td>
<td>FT (\frac{1}{3} (\text{their}'a + b'))</td>
</tr>
</tbody>
</table>
| (d)      | \(\frac{1}{3} (2b - a)\) or \(\frac{2}{3} b - \frac{1}{3} a\) final answer | 2 M1 | M1 for \(-\frac{1}{3} (a + b) + b\) oe  
|          |        |       | or for \(b \pm \text{their}'\frac{1}{3} (a + b)\)'  
|          |        |       | or for \(\overline{XO} + \overline{OR}\) or \(\overline{XQ} + \overline{QR}\) soi |
| 18       | \(20 + 5\sqrt{3}\) | 4 B1 | B1 for \(\sqrt{5}\) or \(\sqrt{15}\) or \(\sqrt{75}\) seen  
|          |        |       | M1 for \([\frac{1}{2}] \sqrt{5} \times \sqrt{15}\)  
|          |        |       | M1 for total area  
|          |        |       | \(= 15 + 5 + 2 \times \frac{1}{2} \times \sqrt{5} \times \sqrt{15}\) or better  
|          |        |       | M1 for \(5\sqrt{3}\) seen  
|          |        |       | max 3 marks if answer incorrect |

\(\sqrt{75}\) seen implies B1 and M1 may be implied by adding their 'simplified' \(\sqrt{5} \times \sqrt{15}\) to 20.
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| 19       | $x = -0.75, y = 8$  
$x = 2, y = -3$ | 6 | **M2** for $4x^2 - 5x - 6 \text{ or } 6 + 5x - 4x^2$  
**soi**  
OR  
**M1** for attempting to equate  
e.g. $5 - 4x = 4x^2 - 9x - 1$  
**oe**  
AND  
**M2** for correctly factorising *their* quadratic  
$(4x + 3)(x - 2)$  
OR  
**M1** for $(4x \pm 3)(x \pm 2)$  
AND  
**A1** for $x = 2$ and $-0.75$  
**A1** for $y = -3$ and $8$  
After **A0**, allow **SC1** for one pair of $x$ and $y$ values correct  
Or for both $y$ values correctly **FT** their $x$ values substituted into $y = 5 - 4x$  
Or $y^2 - 5y - 24$  
reaching quadratic equation in one variable, need not be simplified  
dependent on at least **M1**  
e.g. $(y + 3)(y - 8)$  
Or for correct **FT** substitution into formula  
with $\frac{5 \pm \sqrt{25 + 96}}{8}$ or better  
seen e.g. $\frac{5 \pm 11}{8}$  
dependent on at least **M1**  
Or for attempt to use formula with no more than one error  
allow **A** marks if solutions clear in working, transferred to wrong places on answer lines |