

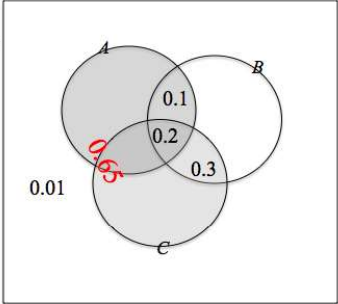
METHODS UNIT 1 HIGHER TIER

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1(a) <table><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>1</td><td>3</td><td>5</td><td>7</td><td>9</td><td>11</td><td>13</td></tr><tr><td>2</td><td>5</td><td>8</td><td>11</td><td>14</td><td>17</td><td>20</td></tr><tr><td>3</td><td>7</td><td>11</td><td>15</td><td>19</td><td>23</td><td>27</td></tr><tr><td>4</td><td>9</td><td>14</td><td>19</td><td>24</td><td>29</td><td>34</td></tr><tr><td>5</td><td>11</td><td>17</td><td>23</td><td>29</td><td>35</td><td>41</td></tr><tr><td>6</td><td>13</td><td>20</td><td>27</td><td>34</td><td>41</td><td>48</td></tr></table>		1	2	3	4	5	6	1	3	5	7	9	11	13	2	5	8	11	14	17	20	3	7	11	15	19	23	27	4	9	14	19	24	29	34	5	11	17	23	29	35	41	6	13	20	27	34	41	48	B3	All 10 entries correct B2 for any 7 correct entries, B1 for any 4 correct entries <u>FT for their completed table in (b) and ignore incorrect cancelling</u> Penalise incorrect notation, e.g. ‘out of’, ‘in’, only once. FT throughout consistent incorrect denominator FT 1 – ‘their 9/36’, i.e. 1 – P(even)
	1	2	3	4	5	6																																													
1	3	5	7	9	11	13																																													
2	5	8	11	14	17	20																																													
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5	11	17	23	29	35	41																																													
6	13	20	27	34	41	48																																													
(b) 4/36 9/36 27/36 2/36	B1 B1 B1 B1 7																																																		
2(a) Attempt at method $7 \div 8$ = 0.875 (b) Numerator 0.48 OR correct first stage of simplification Multiplying numerator and denominator by suitable multiple of 10 (if correct 100) – for eliminating decimals OR sight of answer 0.01 1/100 (c) 99 (d) Method to evaluate, allow 1 slip in tables 10.983 rounded to 11	M1 A1 B1 B1 B1 B2 M1 A1 A1 10	Or equivalent complete method FT depending on their numerator. CAO. B3 for an unsupported answer of 1/100 B1 for sight of 33, or $x/3 + 7 = 40$, or sight of 40-7 followed by ‘their 33’ $\times 3$ or 2 trials substituted and correctly evaluated <i>Answer only ‘11’ is B0</i> Accept digits 1 0 9 8 3 with incorrect place value FT their 10.983 provided M1 awarded Do not allow 11.00 as a final answer. Do not accept unsupported answer of 11																																																	
3. 33(°)	B3 3	B2 for sight of ‘101 – 68’, or ‘180 – 68 - 79’ or ‘180 – 147’ or ‘112 – 79’, OR B1 for appropriate indication of 101° or 147° or 112°																																																	

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4. Intention to subtract the sum of the 4 angles given from 360° (Sum of remaining 3 angles is) 150° 40° , 50° , 60° QWC2: Candidates will be expected to - present work clearly, with words explaining process or steps AND - make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer QWC1: Candidates will be expected to - present work clearly, with words explaining process or steps OR - make few if any mistakes in mathematical form, spelling, punctuation and grammar and include units in their final answer	M1 A1 B2 QWC 2 6	$360 - (34 + 46 + 53 + 77)$ <i>Alternative using interior angles:</i> $900 - (146 + 134 + 127 + 103)$ <i>Sum of remaining 3 angles is) 390°</i> If M1 awarded, B1 for 3 values all multiples of 10 with sum 'their 150' <i>Alternative using interior angles:</i> <i>B1 for values of 120°, 130°, 140°</i> <i>If no marks, award SC1 for answers of 220°, 230° and 240° following on from use of the interior angle sum of 900° and treating the given angles as interior. FT to award QWC marks.</i> QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.
5(a) 20 (b) 154 (c) Two fractions correctly written in a form that allows for comparison For all three correctly written in forms that allow for comparison $3/4$, $13/20$, $3/5$ and in this order or equivalent (d) Method to find primes with 2 correct prime factors before the 2 nd error $2, 2, 3, 3, 5$ $2^2 \times 3^2 \times 5$	B1 B2 B1 B1 B1 M1 A1 B1 9	B1 for $2 \times 7 \times 11$ or for finding multiples for both numbers i.e.(14,) 28, 42, ... and (22,) 44, 66, ... or factors for both numbers (2×7 and 2×11) or sight of ($14 \times 22 =$) 308 Allow reasonably accurate diagrammatic form (e.g. $13/20$, $15/20$, $12/20$ or 0.65, 0.75, 0.6 or $65/100$, $75/100$, $6/10$) CAO. Answer only allow final B1 only At least 2 primes found before second error Ignore 1s Correct FT with no 1s and at least one power >1
6(a) 47 (b) Conclusion (stated or implied) that $(3x)^2$ is greater with either sight of $3x^2 = 12$ AND $(3x)^2 = 36$ OR statement that $(3x)^2$ is 3 times the value of $3x^2$ OR Sight of $(3x)^2 = 9x^2$ is sufficient	B2 B1 3	B1 for $5 \times 9 + 8 \times \frac{1}{4}$ (i.e. substitution with $-3^2 = 9$) or for $5 \times -3^2 + 2$ (i.e. substitution shown, may be an arithmetic error in evaluating the 1 st term, $8 \times \frac{1}{4} = 2$ shown) (B0 for $5 \times -3^2 + 8 \times \frac{1}{4}$ or $(\pm)15^2 + 8 \times \frac{1}{4}$) <i>If no marks SC1 for an answer of -43</i> Allow sight of $3x^2 = 12$ AND $(3x)^2 = 36$ as implied conclusion

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7. $3 \times 35 \div 5$ OR $4 \times 35 \div 5$ OR equivalent 21(m) 28(m)	M1 A1 A1 3	CAO CAO <i>Do not accept strategy 35/12 as a MR</i>
8. Intention to subtract 155 and 45 from 360° (Sum of remaining angles is) 160($^\circ$) Realising one of the remaining angles has to be 155° or 45° as a kite has 2 equal angles 155($^\circ$) AND 5($^\circ$) 45($^\circ$) AND 115($^\circ$)	M1 A1 B1 B1 B1 5	$360 - 155 - 45$ If considering exterior angles: $360 - (180 - 155) - (180 - 45)$ (Sum of remaining exterior angles is) 200($^\circ$) Realising that one of the remaining exterior angles is 35° or 135° <i>Allow B1 following M1 A0 for interior angles of (155, 45), and two angles equal to 'their 160' $\div 2$</i> <i>An unsupported single correct set of all four angles e.g. (155, 45,) 155, 5($^\circ$) or (155, 45,) 45, 115($^\circ$) receives M1 A1 B1 with B1 B0 or B0 B1 depending on the solution given.</i>
9(a) Indicates there are 4 ways of scoring 5 Indicates there are 40 possible outcomes, e.g. denominator 40 of a fraction 4/40 (= 1/10) (b) $200 \times \frac{1}{8}$ or equivalent 25 (c) Explanation comparing answer from (b) with 80, e.g. 'six more often than expected' (d) Notices or implies that the (first) spinner must land on numbers other than 6 less often Implies best estimate would be less than (a)	B1 B1 B1 M1 A1 E1 M1 A1 8	1, 4 2, 3 3, 2 4, 1 Accept sight of $\dots/8 \times \dots/5$ Do not accept $\dots/8 + \dots/5$ Ignore incorrect cancelling <i>Award B3 for an answer of 4/40</i> A final answer of 25/200 implies M1, A0 Accept explanation that states, e.g. '6 not used in scoring 5', or '6 is opposite the numbers needed to score 5' If no marks, SC1 if best estimate less than (a) with a reason based on an understanding of bias.
10(a) 6 (b) $n^2 + 5$ or equivalent	B1 B3 4	Accept unsimplified equivalents B2 for sight of $n^2 \pm \dots$ (not for n^2), or a partially correct expression (e.g. looking at strips) B1 for (9,) 14, 21, 30 with sight of second difference 2, or equivalent numerical pattern, or n^2
11(a) Correctly completing the tree diagram 0.2, 0.6, 0.6, 0.4 (b) 0.8×0.4 or $8/10 \times 4/10$ or equivalent = 0.32 or 32/100 or equivalent. (c) 0.2×0.4 or $2/10 \times 4/10$ or equivalent = 0.08 or 8/100 or equivalent	B2 M1 A1 M1 A1 6	B1 for any one pair of branches correct (total 1) An incorrect answer of 3.2 is awarded M1, A0 Or other complete method. FT for their $P(\text{stairs up}) \times P(\text{stairs down})$ correctly evaluated, or by alternative method An incorrect answer of 0.8 from a correct tree diagram is awarded M1, A0

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12(a) 7×10^{-6} (b) $7x - 3x = m + h$ or $4x = m + h$ $x = (m + h)/4$ (c) $(x + 7)(x - 7)$ (d)(i) $2x^2 + 6x + x + 3$ $2x^2 + 7x + 3$ (ii) $2x^2 + 7x + 3 - 7 = 0$ or $2x^2 + 7x - 4 = 0$ $(2x - 1)(x + 4) (=0)$ $x = \frac{1}{2}$ AND $x = -4$	B1 B1 B1 B1 B1 M1 M1 A1 9	FT until 2 nd error Allow $x = (m+h)/(7-3)$ ISW Any 3 correct terms CAO FT their $2x^2 + 7x + 3$ of equivalent difficulty OR correct use of formula with b^2-4ac correctly evaluated (including FT equivalent difficulty) CAO
13(a) $a \times 16.4 = 12 \times 4.1$ or equivalent $a = 3$ (cm) (b) $b = 69(^{\circ})$ (c) Angle opposite 146° in cyclic quadrilateral, $180(^{\circ}) - 146(^{\circ}) (= 34(^{\circ}))$ OR Reflex angle at the centre $2 \times 146(^{\circ}) (=292(^{\circ}))$ $c = 68^{\circ}$	M1 A1 B1 M1 A1 5	Accept indicated on the diagram or implied by further working. The calculation $180(^{\circ}) - 146(^{\circ}) (= 34(^{\circ}))$ alone or with a misinterpretation as the angle at the centre is M0 Allow $(O =) 2 \times 146(^{\circ})$ provided not indicated as the acute angle on the diagram CAO. Accept a correct answer without working for M1, A1; do not accept an incorrectly placed 68° .
14. Numerator of $7(3x + 5) - 4(x - 3)$ Denominator of $(x - 3)(3x + 5)$ $\frac{17x+47}{(x-3)(3x+5)}$ or $\frac{17x+47}{3x^2-4x-15}$	M1 M1 A2 4	FT 1 error from expansion of brackets or collection of like terms to allow A1, or A1 for a correct numerator with an incorrect expansion of the denominator or if the denominator un-simplified ($3x^2 - 9x + 5x - 15$) If A2, penalise further incorrect work -1 <i>SC1 for sight of $17x + 47$ if no other marks awarded</i>
15. Sight (gradient) $-12/8$ or $8/12$ or equivalents Selects $3y = 2x + 5$ AND $2x - 3y = 8$ only Reason, e.g. 'gradient given times gradient of these lines is -1', or '(perpendicular) gradient is $\frac{2}{3}$ ', or ' $m \times -1/m = -1$ ', or 'product of gradients is -1'	B1 B2 E1 4	Provided 1st B1 is awarded, allow further B1 for either selected with no more than 1 incorrect selection. <i>Sight of gradient $12/8$ with perpendicular gradient $-8/12$ award B0, B2 for $y = (-2x+8)/3$ AND $2x + 3y = 8$, or B0 B1 for either selected with no more than one incorrect selection.</i> FT their gradient

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16(a) $a = 5$ $x^2 + 10x + 25 - 11$ or $(x+5)^2 - 25 + 14$ OR alternative full method to find b $b = -11$ (b) $(x + 5)^2 - 11 = 0$ $(x + 5)^2 = 11$ $x + 5 = (\pm)\sqrt{11}$ $x = -5 \pm \sqrt{11}$	B1 M1 A1 B1 M1 M1 A1 7	Accept an embedded answer FT their a Accept an embedded answer FT their (a) provided it is equivalent in difficulty If 'their 11' is negative then M0 CAO Must show $\pm$ or two answers Use of formula leading to $(-10 \pm 2\sqrt{11})/2$ gets B2, $(-10 \pm \sqrt{44})/2$ gets B0
17.  Note: Shaded $P(A \cup C) = 0.65$ Method to find B not intersecting with A nor C, e.g. $1 - 0.65 - 0.01 (= 0.34)$ $P(B) = 0.34 + 0.1 + 0.2 + 0.3$ $P(B) = 0.94$	B1 B3 M1 M1 A1 7	Evidence for B marks may be seen in working Correct indication of 0.01 For Venn diagram shown, correct indication of 0.1, 0.2 and 0.3, or - the 0.3 shown and $A \cap B$ is 0.3 used - the 0.1 shown and $B \cap C$ as 0.5 used <u>If not B3 then mark individually as follows:</u> B1 for correct indication of 0.2, B1 for correct indication of 0.3, B1 for correct indication of 0.1 Allow "$P(B)$" = 0.34 (not from $2 - 1.66$) (FT 'their 0.34') CAO Alternative $P((A \cup C) \cap B') = 0.65 - 0.2 - 0.3 - 0.1 (= 0.05)$ M1 $P(B) = 1 - 0.01 - 0.05 = 0.94$ (FT 'their 0.05') M1 $P(B) = 0.94$ (CAO) A1