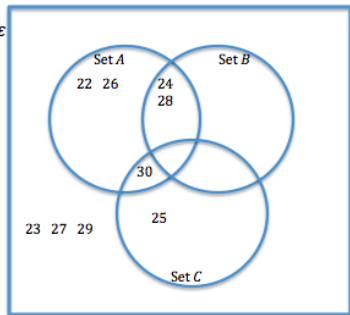


METHODS UNIT 1 HIGHER TIER

Methods Unit 1 Higher Tier January 2014	Mark	Comment
1(a) $(12 + 10)/(9 + 2)$ = 2 (b) $-18x - 33y$ (c) $(2x + 7)^3$	M1 A1 B2 B1 5	Allow 1 error with a sign or 1 slip CAO Must be an expression as shown B1 for either of the 2 terms Do not ignore further work if B2 then -1 ISW
2(a) $180 - 126 (=54^\circ)$ x indicated as $(180 - 58 - '54' =) 68^\circ$ Two appropriate stages of explanation given, e.g. 'angles on a straight line 180°' AND 'angles in a triangle 180°', or - corresponding angles or equivalent, or - interior angles, or equivalent Look for: - Clear identification of any angles referred to on the diagram - Use of degree symbol - Appropriate use of '=' - Use of correct terminology for angles, not 'C' or 'F' angles 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 (b) Sight of 40° Showing or stating $140 + 140 + 40 + 40$ OR $140 + 40 = 180^\circ$ WITH straight line sum 180° stated Use of, or statement that, angles at a point add to 360°	B1 B1 E1 QWC 2 B1 B1 E1 8	1st step of appropriate working OR an appropriate 54° indicated on the diagram. Allow B1 even if then incorrectly assuming an 'isosceles trapezium' FT 'their 54°' ($=180 - 126$) evaluated correctly May be on diagram, do not accept contradiction in answers for x in working space and on diagram Accept reference to 'C' and 'F' angles Allow FT for 'isosceles trapezium' provided both stages explained, i.e. parallel fact and sum 360° If no marks: SC2 for $x = 61^\circ$ from an isosceles triangle with explanation of triangle sum 180° AND a parallel line fact, OR SC1 for $x = 61^\circ$ from an isosceles triangle <i>Alternative method</i> <i>M1</i> $126 - 58$ <i>A1</i> = 68° <i>B1 Explanation:</i> 'exterior angle of a triangle is the sum of the two other angles' AND 'corresponding angle' 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. May be shown on a diagram, showing angles at a point, or a diagram showing they do tessellate FT their '$180 - 140$' OR 'angle sum of the tile is 360°'. For award of E1 360° at a point MUST be stated, not simply implied If no marks then allow B2 for the statement 'all quadrilaterals tessellate', then possible E1 for an explanation, e.g. 'angle sum at a point is 360°'

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3(a) All 4 correct entries <table><tr><th>Fraction</th><th>Decimal</th><th>Recurring or terminating?</th></tr><tr><td></td><td></td><td></td></tr><tr><td>3/20</td><td></td><td>Terminating</td></tr><tr><td></td><td>0.6363(63...)</td><td>Recurring</td></tr></table>	Fraction	Decimal	Recurring or terminating?				3/20		Terminating		0.6363(63...)	Recurring	B1 B1 B1	3/20. Do not accept 15/100 0.6363... Do not accept 0.63 unless 0.6363 seen in working Terminating and recurring in the correct cells. CAO
Fraction	Decimal	Recurring or terminating?												
3/20		Terminating												
	0.6363(63...)	Recurring												
(b) $\frac{0.0072}{0.002}$ OR 120×0.03 OR $\frac{24 \times 0.03}{0.2}$ $\frac{72}{20}$ OR 3.6 OR $\frac{0.72}{0.2}$ OR $\frac{7.2}{2}$ 18/5	M1 m1 A1 6	OR any appropriate correct first calculation Place value must be correct for M1 OR appropriate correct second calculation CAO. Allow sight of $3\frac{3}{5}$ Must be from correct working, watch for compensating errors. If no working then $3\frac{3}{5}$ allow M1 m1 A1												
4(a) No AND a reason, e.g. 'y coordinate is not 3 times the x coordinate', or 'a=-5 then 3a=-15' (b) All 5 points plotted fit rule (a, 3a), with no incorrect plots (c) $y = 3x$	E1 B2 B2 5	Any counter example ((-5, -15) or (-2/3, -2)) must be relevant and correct with NO stated B1 for at least 3 correct plots and no more than 2 incorrect plots, OR B1 for 5 sets of possible coordinates listed, which may be outside the grid FT their points provided they fall on a straight line B1 for attempt to find the gradient as 3/1, or $y = 3a$, or equivalent												
5(a) All 9 numbers placed correctly 	B3 E2	B2 for any 7 or 8 numbers placed correctly, the other numbers omitted or incorrectly placed, OR B1 for any 5 or 6 numbers placed correctly, the other numbers omitted or incorrectly placed. <i>Any ambiguous duplicates are marked as an incorrect placement for that number</i> OR selects Venn diagram 2 and explains why the other 2 Venn diagrams are not selected E1 for choice of Venn diagram 2 AND a partial reason, i.e. only mentions 1 aspect or attempts an explanation e.g. '4 times table is within 2 times table', or 'shows which of A are within 4 times table', or '22 is in A but not in C', or 'no multiples of 4 in C' OR E1 for selection of Venn diagram 2 and explains why 1 of the other 2 Venn diagrams are not selected <i>Accept informal words such as 'within' for 'subset', 'overlap' for 'intersection'</i>												
(c) $3/9 (=1/3)$ 7/9 1/9	B1 B1 B1 8	FT their Venn diagram. FT a slip in the denominator used consistently FT a slip in the denominator used consistently												

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6(a)					B1	Cumulative numbers 7, 14, 20, 24, 28
(10)	20	30	40	50	B1	Fractions, FT their cumulative numbers
(7/10)	14/20	20/30	24/40	28/50	B1	Decimals, FT their cumulative numbers as quotients over cumulative denominators, correctly evaluated
(0.7)	0.7	0.66...	0.6	0.56		
0.66 or 0.67						Not 0.6
(b) Relative frequencies plotted accurately					B2	Ignore if points joined or not FT their relative frequencies provided no more than 1 is outside the range 0.4 to 0.8. B1 for 3 plots accurate.
(c) Conclusion, ‘no, as there is still a variation in relative frequencies’, ‘no, the results are not settled’, ‘results are still going down’					E1	Do not accept FT answers of yes. Allow ‘no, needs more to get a more accurate answer’. Ignore further foolish comments.
					6	Do not accept ‘no, need to throw more times’
7. Total of interior angles $5 \times 180(^{\circ})$ $= 900(^{\circ})$ $900 - \text{sum of 4 angles given } (594^{\circ})$ $(=306)$ $\div 3$ (Each of the 3 angles is) $102(^{\circ})$					M1 A1 M1 m1 A1	Or equivalent full method FT ‘their 900’ provided >594 Unique division by 3, no further operations Alternative: Corresponding exterior angles are $66(^{\circ})$, $30(^{\circ})$, $20(^{\circ})$ and $10(^{\circ})$ B1 Remaining exterior angles = $360 - \text{sum of exterior angles found } (126^{\circ}) (=234^{\circ})$ M1 $\div 3$ m1 (Each of the remaining 3 exterior angles =) $78(^{\circ})$ A1 (Each of the remaining 3 interior angles =) $102(^{\circ})$ FT provided B1, M1, m1, $180 - \text{‘their 78’}$ A1
8(a) 18 (b) $\sqrt{(16 \times 9)}$ $= 12$ (c) Two of the prime factors are 2 and 5 Other factor is either 3 or 7 Missing number is 70					B1 M2 A1 M1 M1 A1 7	M1 for sight of each of 16 or 9 FT from M1 provided simplified using surd notation if necessary An answer of $2 \times 5 \times 7$ gets M1, M1, A0 Award all 3 marks for sight of unsupported 70. An answer of 70 from incorrect working is not awarded all 3 marks Example: An answer of 30 is M1, M1, A0 (as it meets M1, M1 for factors 2 and 5, with 3) If no marks, allow SC1 for prime numbers which sum to 70 AND clues 2 to 4 are met, e.g. $2+31+37$ Alternative: Considering multiples of a number which would include 210 M1 Considering multiples of 10 which would include 210, i.e. multiples of 30 or 70 m1 Answer 70 A1
9(a) Correct sketch (b) Correct sketch (c) Correct sketch					B1 B1 B1 3	FT reflection in x-axis of their (a)
10(a) $5 \times 40^2 - 3 \times 40 - 1$ with 5×40^2 evaluated as 8000 $= 7879$ (b) $n^2 + 3$ or equivalent					M1 A1 B3 5	Accept full description in words or given in a fully labelled diagram for B3, B2 or B1 as appropriate B2 for $1n^2 \pm \dots$ (not for $1n^2$), OR B1 for $1n^2$ or for sight of the 2 nd difference 2

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11(a) Correct entries 0.7 and 0.2 Other entries 0.8, 0.2 with 0.8 Labels correct for no cereal, no toast, toast and no toast (b) 0.3×0.2 $= 0.06$ (=6/100)	B1 B1 B1 M1 A1 5	In this order if no labels, otherwise as their label order Not a FT need to match probabilities. If labels incorrect B0, however allow previous B1 for order 0.8, 0.2, 0.8 FT from their probability tree for M1 only CAO. Allow M1 for sight of an unsupported 0.6
12(a) $(2x + 5)(3x - 1)$ (b) $dw = 3m^2$ $m^2 = dw/3$ $m = (\pm) \sqrt{dw/3}$ (c) $ab - bc = e$ $b(a - c) = e$ $b = \frac{e}{a - c}$	B2 M1 m1 A1 B1 B1 B1 8	B1 for $(2x \pm \dots)(3x \pm \dots)$ Square root must clearly be over $dw/3$ entirely If no marks SC1 for $\sqrt{(w/3d)}$ from 1 initial error Collect FT until 2nd error Factorise Divide
13. Strategy, e.g. suitable outline of a suitable tree diagram Sight of $P(\text{man red}) = 1/5$ or $P(\text{woman red}) = 3/10$ $1/5 \times 3/10$ $= 3/50$ Conclusion 'greater than' stated or implied, with reason, e.g. $6/100 > 3/50$	S1 B1 M1 A1 E1 5	Listing WM, MW, MM, WW is not a suitable strategy The award of M1 also implies S1 FT provided at least 1 other mark has been awarded. Accept if compared with 6%, i.e. same format for 5% and their answer
14(a) $6x^2 + 14xy - 15xy - 35y^2 (+ xy)$ $= 6x^2 - 35y^2$ (b) $7x(3x - 2) + 2(2x + 3)$ as a numerator $(2x + 3)(3x - 2)$ as a denominator $21x^2 - 14x + 4x + 6$ $\frac{21x^2 - 10x + 6}{(2x + 3)(3x - 2)}$	B2 B1 M1 M1 A1 A1 7	B1 for any 2 of the expansion terms correct FT from B1. Mark final answer. Allow $6x^2 + -35y^2$ Mark final answer. If the denominator is expanded it must be correct. FT from 1 error in numerator expansion, provided it is a trinomial
15. Selecting $4y = x$ AND $y = -4x$ Showing that $m_1 = 1/4$ and $m_2 = -4$ $1/4 \times -4 = -1$ or equivalent	B1 M1 A1 3	
16(a) P indicated correctly, where XY touches the circle (b) WXY is a tangent meeting the circle radius at 90° Corresponding angles equal (angles at X and W) OR Supplementary angles OR shows or states both angles are 90° (c) $\angle HBG = 160^\circ$ or $\angle ABW = 80^\circ$ or equivalent Reason, e.g. 'angle at the centre is twice the angle at the circumference' 100° Reason, e.g. 'sum of angles in a quadrilateral is 360° (and right angle where tangent meets the radius)' or 'allied (interior) angles'	B1 B1 B1 B1 E1 B1 E1 7	Accept description in words Accept description in words

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17(a) $a = 4$ $x^2 + 8x + 16 = -11$ OR alternative method to find b $b = -11$	B1 M1 A1	Accept embedded answers Accept embedded answers
(b) $(x + 4)^2 - 11 = 0$ $(x + 4)^2 = 11$ $x + 4 = (\pm)\sqrt{11}$ $x = \pm\sqrt{11} - 4$	B1 M1 M1 A1 7	Use of completing the square from (a), FT from their (a) provided equivalent format Must show $\pm$ Use of formula leading to $(-8 \pm 2\sqrt{11})/2$ gets B2, $(-8 \pm \sqrt{44})/2$ gets B0