Question Number	Working	Answer	Mark	Notes
Apart from questions 5, 7, 13c, 16b, 20, 21 and 22 (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.				
1.	7.92 ÷ 1.65	4.8 oe	2	M1 M1 for 7.92 or 1.65 A1 Accept $\frac{24}{5}$
				Total 2 marks
2.	(12 x 18) + (8 x 16.5) (=348) "348" ÷ 20	17.4	4	M2 M1 for 12 x 18 (=216) or 8 x 16.5 (=132) M1 dep on at least 1 previous M1 A1 17.4 Alt Ratio method M1: 12:8 = 3:2 or 6:4 M1: 18 x3 and 16.5 x 2 or 18 x 6 and 16.5 x 4 M1: (18 x 3 + 16.5 x 2) ÷ 5 or (18 x 6 + 16.5 x 4) ÷ 10 A1: 17.4 Alt Proportion method M1 60 % boys and 40% girls stated or implied M2 (0.6 x 18) + (0.4 x 16.5) (= 10.8 + 6.6) M1 for 0.6 x 18 or 0.4 x 16.5 A1 17.4
				SC B1 for 17.1 (from {(8 x 18) + (12 x 16.5)}÷20)
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
3. (a) (i)		30	1	B1
(ii)		21	1	B1
(b)	Horizontal line from (1400,39) to (1600,39) Line from ("1600", 39) to (1715, 0)		2	B1 B1ft ft if line finishes at (17 15, 0) (± 5 mins) and starts at height 39km
(c)		13 25to 1330 1625 to 1630	2	B1 Accept 1 25 pm to 1 30 pm B1 Accept 4 25 pm to 4 30 pm or ft if line finishes at (17 15, 0) (± 5 mins) and starts at height 39 km
(d)	39 ÷ 1.25 oe (39 ÷ 75 x 60)	31.2	3	M2 M1 for 39 ÷ 1.15 (=33.9..) or 39 ÷ 75 (= 0.52) A1
				Total 9 marks

4. (a)	reflection in line $x = 1$ (rotation (90° {anticlockwise} oe) about (1 , 1)		2	B1 B1 must be a single transformation oe for $x = 1$ B1 B1 must be a single transformation
(b)	flag at (4, – 1) (5, –1) (6, – 1) (5, – 2) or triangle at (5, –1) (6, –1) (5, – 2)		2	B2 B1 for correct orientation of flag, or triangle but in wrong position
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
5. (a)	4/5 x 15/7	12/7 oe	2	M1 or 12a/15a ÷ 7a/15a (denominators the same and a multiple of 15) A1 dep on M1. Improper fraction equivalent to 1 5/7 required produced directly from M1
(b)	21/4 – 5/3 63a/12a – 20a/12a	43/12 oe	3	M1 Correct improper fractions M1 Correct fractions with a common denominator a multiple of 12 A1 dep on M2 Improper fraction required. Alt method M1 (5) 3/12 – (1) 8/12 (i.e. can ignore integer parts) M1 – 5/12 A1 Improper fraction required or 4 – 5/12. Ans dep on M2. Alt method M1 (4) 5/4 – (1) 2/3 (i.e. can ignore integer parts) M1 (4) 15/12 – (1) 8/12 (i.e. can ignore integer parts) A1 (3 +) 7/12 or improper fraction Ans dep on M2
				NB: Follow one strand that gives most marks.
				Total 5 marks

6.	tan 72 or tan 18 selected (*MN*=) 34 x tan 72	105 105	3	M1 M1 or (*MN* =) 34 ÷ tan 18 A1 104.64.... awrt 105 Alt Sine rule method M1 34/sin 18 = "MN"/sin 72 M1 (*MN*=) (34 x sin 72) ÷ sin 18 A1 104.64.... awrt 105
				Total 3 marks

7.	$2a = -4$ or $4b = 14$	$a = -2 \quad b = 3.5$	3	M1 Correctly eliminate 1 variable: Accept $3(5 - 2b) + 2b = 1$ oe A1 A1 Ans dep on M1 Ans only or T&E = M0A0A0
				Total 3 marks

Question Number	Working	Answer	Mark	Notes
8.	A product of 3 or more factors of 300 of which at least 2 are different primes (i.e. from 2, 3 or 5)			M1 e.g 2 x 3 x 50 (must multiply to 300) could be implied from a factor tree or division ladder
	All 5 correct prime factors & no extras (ignore 1's)	2, 2, 3, 5, 5 (with/without 1's) or 2^2 x 3 x 5^2 x 1 or $2^2 + 3 + 5^2$		M1 could be implied from a factor tree or division ladder $2 \times 2 \equiv 2^2$ $5 \times 5 \equiv 5^2$
		2 x 2 x 3 x 5 x 5	3	A1 any order, do not accept inclusion of 1's accept . in place of x
				Total 3 marks

9.	(19 x1)(=19) + (8x3)(=24) + (3x5)(=15) + (1x 9) (=9)	67	3	M2 for freq x all correct midpoint values correctly evaluated (condone omission of 4th interval) {do not have to see intention to add} if not M2 then M1 for freq x consistent point in each interval or M1 for 1 error in list of 19, 24, 15, (0), 9 A1 isw if 67 calculated correctly. (2.16.. = M2A1)
				Total 3 marks

10. (a) (i)	$10x + 5 - 9x + 3$	$x + 8$	2	B2 B1 for 3 correct terms with correct signs or 4 correct terms ignoring signs
(ii)	$y^2 + 5y - 7y - 35$	$y^2 - 2y - 35$	2	B2 B1 for 3 correct terms with correct signs or 4 correct terms ignoring signs N.B. $-2y$ (with no more y terms) implies $+5y - 7y$
(b)	$V / \pi h = r^2$ (oe)	$\sqrt{\frac{v}{\pi h}}$ oe	2	M1 isolating r^2 (must be correct equation). A1 condone ± Allow $\sqrt{v} \div \sqrt{\pi} \div \sqrt{h}$ etc
				Total 6 marks

11. (a)		78000	1	B1
(b)	$(4.62 \times 10^5) + (7.8 \times 10^4)$	5.4×10^5	2	M1 Intention to add correct values or digits 54 A1 Answer must be in standard form
				Total 3 marks

Question Number	Working	Answer	Mark	Notes
12. (a)	set B separate to A, set C within A		2	B1 B1 Set C has to be a unique set
(b)	outer ring between A and C shaded		1	B1ft Completely outside of C and within all of A. Set C has to be a unique set
				Total 3 marks
13. (a)		–3, (1), –1, –3, 1, 17	2	B2 for all correct, B1 for 3 or 4 correct
(b)	All points plotted correctly from their table Curve		1 1	B1 ft if at least B1 scored in (a) Plotting tolerance ± ½ sq B1 ft if B1 scored from plotting points. Must be attempt at a smooth curve & not line segments
(c)		Line segment at $y = 5$ drawn 2.2 → 2.5 inc	 2	M1 M1 for $x^3 - 3x - 1 = 5$ stated or evidence of reading from $y = 5$ or y=5 stated A1 dep on M1
(d) (i)		$3x^2 - 3$	2	B2 B1 for $3x^2$ or – 3
(ii)		$3 \times 4^2 - 3$ 45	 2	M1 ft for a quadratic in d i) A1 cao
				Total 10 marks
14.	(2) overlapping circles, 6 outside circles 10 in F only, 8 in S only, 7 in overlap	18	4	M1 M2 Venn diagram sets have to labelled if not M2 then M1 for any two values in correct place in union or 7 in overlap A1
	Alt Method 31 – 6 (=25) or (17+15+6) – 31 (=7) oe "25"–17 (=8) {Sp} and "25"– 15 (=10) {Fr} or 17 – "7" (=10) {Fr} and 15 – "7" (=8) {Sp} "10" + "8"	18	4	M1 Identifies union or intersection M1 dep Identifies components to add M1 dep Adds components A1 (Ans only = M3A1) or M2 for "25" – "7"
				Total 4 marks

Question Number	Working	Answer	Mark	Notes
15. (a)	180 – (90 + 58) (oe)	32	2	M1 i.e. 90 – 58 A1
(b) (i)		122	1	B1
(ii)	Opposite angles in a cyclic quad (=180°)		1	B1 Accept abbreviations if meaning is clear. B0 for incorrect statements
				Total 4 marks
16. (a)	("AC^2"=) $6^2+(7+5)^2 - 2 \times 6 \times (7+5) \cos 28$ ("AC^2"=)52.855...	7.27	3	M1 A1 awrt to 52.8 or 52.9 A1 awrt to 7.27
(b)	6 x "DX" = 12 x 5 "DX" = (12 x 5 ÷ 6) (=10) "DC" = "10" – 6	4	3	M1 M1 for an attempt to use intersecting chord theorem (external or internal case e.g 7 x 5 = 6 x "x") M1 must see a correct justification for the value 10 seen A1 Ans dependent on at least M1
				Total 6 marks

17. (a)	3.6 ÷ 20 x 100 oe (large squares or heights of bars) or (6+6+6) ÷ (10+10+8+35+19+6+6+6) x 100 or 90 ÷ 500 x 100 (small squares)	18	3	M2 a full and correct calculation leading to correct ans heights = 2+2+1.6+7+3.8+1.2+1.2+1.2 (=20) or 10+10+8+35+19+6+6+6 (=100) if not M2 then M1 for 3.6 and 20 (large sq or heights) or 6+6+6 and 10+10+8+35+19+6+6+6 (heights) or 12+12+12 and 20+20+16+70+38+12+12+12 (frequencies) or 90 and 500 (small sq) A1 Ans only = M2A1
(b)	20 x 10	200	2	M1 or 1 (large) square = 10 (people) or 1 (small) square = 0.4 (people) or correct fd seen with no errors or 16 ÷ 5 (= 3.2) {fd on 3rd bar} or 20+20+16+70+38+12+12+12 (people in blocks) A1 Ans only = M1A1
				Total 5 marks

Question Number	Working	Answer	Mark	Notes
18. (a)		0.3 on bottom LH branch 0.8, 0.2, 0.5, 0.5 0.5, 0.5, 0.8, 0.2	3	B1 B1 Second game branches correct B1 Third game branches correct
(b)	(0.7 x "0.8")+(0.7 x "0.2"x"0.5")+("0.3"x"0.5"x "0.8")	0.75 oe	3	M2 ft M1 for 1 correct (ft) branch A1
				Alt method (1 – Jo winning) M2 1 – {(0.7x"0.2"x"0.5)+("0.3"x"0.5"x"0.2)+("0.3"x"0.5") A1
				Total 6 marks

19. (a)	$y = 3x - 2$ $y + 2 = 3x$	$(x + 2)/3$	2	or $x = 3y - 2$ M1 or $x + 2 = 3y$ must reach 2nd stage A1 Ans only = M1A1 must be a function of x
(b)	$\frac{10}{3x - 2 + 2}$	$\frac{10}{3x}$	2	M1 A1 cao Do not isw if correct answer is seen in body and extra incorrect operations take place. Ans only = M1A1
				Total 4 marks

20.	$36 - 6\sqrt{8} - 6\sqrt{8} + 8$ or $36 - 12\sqrt{8} + 8$ $44 - 12\sqrt{(4 \times 2)}$ $44 - 12\sqrt{4} \times \sqrt{2}$	$44 - 24\sqrt{2}$*	3	M2 M1 for $6^2 + (\sqrt{8})^2$ or $36 + 8$ or $6^2 + \sqrt{64}$ or $-12\sqrt{8}$ or $-6\sqrt{8} - 6\sqrt{8}$ M1 for $(-)12\sqrt{8} = (-)12 \times 2\sqrt{2}$ or $\sqrt{8} = 2\sqrt{2}$ or $6\sqrt{8} = 6 \times 2\sqrt{2}$ Must see $\sqrt{8}$ stated as $2\sqrt{2}$ for final M1
	LHS = $(6 - 2\sqrt{2})^2$ or $\sqrt{8} = 2\sqrt{2}$ $6^2 - 12\sqrt{2} - 12\sqrt{2} + 4 \times 2$ or $36 - 24\sqrt{2} + 8$			Alt: M1 M2 M1 for $6^2 + 4 \times 2$ or $36 + 8$
				Total 3 marks

Question Number	Working	Answer	Mark	Notes	
21.	$\frac{5(x-2)+9(x+2)}{(x+2)(x-2)}$ (=2) $14x + 8 = 2(x + 2)(x – 2)$ or $\frac{14x+8}{(x-2)(x+2)}$ (=2) $2x^2 – 14x – 16$ (= 0) oe $x^2 – 7x – 8$ (= 0) oe $(x + 1)(x – 8)$ (= 0) oe	$x = – 1,\ x = 8$	5	M1 M1 A1 M1 A1	correct expression with correct common denominator or $5(x – 2) + 9(x + 2) = 2(x + 2)(x – 2)$ gather terms correctly. Accept $x^2 – 4$ for $(x + 2)(x – 2)$ correct 3 part quadratic or $\frac{7\pm\sqrt{7^2-4x1x-8}}{2}$ oe condone 1 sign error dep on previous M1
					Total 5 marks

22.	$\pi r^2 \times 4r – 2 \times 4\pi\ r^3/3 = 125\pi/6$ oe $24\ r^3 – 16\ r^3 = 125$ oe $r^3 = 125/8$ oe $r = \sqrt[3]{(125/8)}$	2.5	5	M2 M1 M1 A1	Any equation based on cylinder – 2 spheres = space oe h = 4r must be implicit for award of M2 {decimal form: $12.6r^3 – 8.4r^3 = 65.4$ (1 dp or better)} If not M2 then M1 for $\pi r^2 \times 4r$ or better One occurrence of r^3 in correct equation. awrt to 2.5 Ans dep on M3
					Total 5 marks

				TOTAL FOR PAPER : 100 MARKS