Question	Working	Answer	Mark	Notes
1. (a)	7/32 x 100 oe	21.9	2	M1 A1 (21.875) accept awrt to 21.9
(b)	4/100 x 32 (=1.28) or 4/100 x 32000000 (=1280000) 32 + "1.28" or 32000000 + "1280000")	33	3	M1 M2 for 32 x 1.04 oe or 32000000 x 1.04 oe M1 (dep) A1 (33.28) accept 33.3, 33000000, 33300000, 33280000
				Total 5 marks

2.	2/5 x 30	12	2	M1 A1 12 out of 30 = M1A1 12/30 = M1A0
				Total 2 marks

3.	π x 7.5^2 x 26	4590	3	M2 M1 for π x 15^2 x 26 or 18369 → 18386 inc A1 (4594.579....) accept answers 4592 →4597 inc
				Total 3 marks

4.	Arcs of length 6cm from A **and** B			M1
	Arc of length 10 cm from A **or** B			M1
	Arc of length 6 cm from correct top vertex			M1
	Correct rhombus within overlay tolerance		4	A1 Dependent on M3 sc B1 for correct rhombus with no construction lines.
				Total 4 marks

5. (a)		a(5 – 3a)	2	B2 B1 for factors which when expanded & simplified give 2 terms for which one is correct.
(b) (i)		8 – 6w	1	B1
(ii)		$y^3 + 10y^2$	2	B2 B1 for y^3 or $10y^2$
(c)	7.168 / 0.64	11.2	2	B2 B1 for 7.168 or 0.64
				Total 7 marks

6. (a) (i)		Does not study Maths No student studies (both) German **and** Maths Students who study German do not study Maths etc	1	B1	Accept general answers (e.g. no student belongs in both sets).
(ii)		(Preety) does not study French (Preety) is not a member of (set) F	1	B1	Accept she /he in place of Preety or omission of name. Penalise extra incorrect statements (e.g. Preety studies Maths and German but not French)
(b)		1,2,3,4	2	B2	B1 for any 3 correct with no repetitions or additions.
					Total 4 marks

7. (a)		9 to 11	1	B1	
(b) (i)	(1 x 3) + (4 x 6) + (7 x 10) + (10 x 15) + (13 x 5) + (16 x 1) (=328) "328" ÷ ("3+6+10+15+5+1")	8.2	4	M2 M1 A1	All products, t x f using ½ way points correctly, and intention to add. Award M1 if all products, t x f using their ½ way points consistently, from 6 to 8 interval onwards and intention to add. (dep on one at least M1) Accept 8 with working. 8 without working = M0A0
(ii)		Mid-points used as actual data is unknown	1	B1	Mention of mid-points or exact (actual) data is unknown.
					Total 6 marks

8. (a)		x/60 oe	1	B1	Must be a fraction or 0.016 rec x
(b) (i)	2("x/60") = (x+20)/80 16(0) x = 6(0)(x + 20) or 80 x = 30(x + 20) or 2x/3 = (x + 20)/4		3	M2 (must be an equation) M1 for either 2("x/60") or (x+20)/80 A1 dep Correct removal of denominators. Correct removal of denominators. Simplifying denominators.	
(ii)	8x = 3x + 60 or 5x = 60 or 60÷ 5	12	2	M1 A1	Dependent on M1. Can be marked if seen in b(i)
					Total 6 marks

9. (a)	Use of sine or $\frac{\sin x}{3.4} = \frac{\sin 90}{5.8}$ sin "x" = 3.4 / 5.8 (=0.586..)	35.9	3	M1 Sine must be selected for use. M1 A1 (35.888...)Use isw on awrt 35.9
(b) (i)		5.85	1	B1 accept 5.849 rec
(ii)		5.75	1	B1
				Total 5 marks

10.	6/100 x 7500 (=450) {Ist Year} or 1.06 x 7500 (=7950) "450" + "477" + "505.62"	1432.62	3	M1 M2 for 1.06^3 x 7500 (=8932.62) M1 Calculating 6% of previous capital for another 2 years. A1 M1A0 for 1350 or 8850
				Total 3 marks

11.	$3y + 6x - 3 = x + 5y$ $5x - 3 = 2y$ oe	$(5x - 3)/2$	3	M1 Multiplying out brackets. M1 dep Correctly collecting like terms, (3 terms needed here). A1 oe
				Total 3 marks

12. (a)	6/9 x 12 oe	8	2	M1 e.g 12 ÷ 1.5 A1
(b)	9/6 (or 12/"8") x 5	7.5	2	M1 A1 cao
(c)	1.5^2 x 32 (=72) oe "72" – 32	40	3	M1 M1 for 1.5^2 or $(2/3)^2$ M1 dep A1
				Total 7 marks

13. (a) (i)		41°		B1
(ii)		Angles in same segment (are equal)	2	B1 Accept "from same chord", "on same arc".
(b) (i)		75°		B1
(ii)		Angle at centre/middle is not 2 x angle at circumference / edge / perimeter / arc or Angle PQT ≠ QPT or PRS ≠ RSQ (oe) or 34 ≠ 41	2	B1 Accept 75 ≠ 2 x 41 or 75 ≠ 2 x 34 or using idea of isosceles triangles but must mention angles.
				Total 4 marks

14. (a)	$y = 36 - x$	(Area =) x $(36 - x)$	3	M2 M1 for $x + y = 36$ oe or $2y = 72 - 2x$ A1 Must see x times (36 – x) dep on M2
(b)		$(dA/dx) = 36 - 2x$	2	B1 B1 B1 for 36 B1 for $-2x$
(c)	"$36 - 2x$" = 0 $x = 18$	(Area =) 324	3	M1 allow ft only on $a + bx$ ($a,b \neq 0$) A1ft A1ft
				Total 8 marks

15. (a)	F = " k"/d^2 $12 = k/2^2$ k = 48	$F = 48/d^2$	3	M1 k= letter not number. M1 A1 Award 3 marks for F = " k"/d^2 and k = 48 stated anywhere, unless contradicted by later work.
(b)	(F =) "48"/ 5^2	1.92 oe	1	B1 ft $k \neq 1$ accept 48/25 as an answer.
(c)	$3 =$ "48"/ d^2 $d^2 =$ "48"/3	4	2	$k \neq 1$ M1 Rearrangement to make d^2 or d the subject A1 ignore ±
				Total 6 marks

16. (a)	10 x 3 or 15 x 2 or 12 x 7.5/3	30	2	M1 or any correct fd in correct position and no errors, or 1 sq = 2 (runners) indicated. A1
(b)	Missing blocks = 6cm, 10cm, 2cm		2	B2 3 correct blocks B1 1 or 2 correct blocks
(c)	0.6 x 20 + 0.8 x "30" or 3 x "4" + 8 x "3" or 450 x 0.08	36	2	M1 (partitioning blocks) (time x fd's) {must see clear evidence that fd values used}. 450 small squares. A1 cao
				Total 6 marks

17.	$x = 0.1777....$ and $10x = 1.777..$ $9x = 1.6$	16/90 oe		See at least 3 sevens or recurring symbol. Condone omission of x. M1 Accept $10x = 1.777..$ and $100x = 17.77..$ A1 Must be integers in numerator and denominator but not 8 & 45 N.B for $0.1777 = 1/10 + 0.0777..$ (0.777 needs to be shown to be 7/90 to gain first M1)
				Total 2 marks

18.	AOC = 70^o "70"/360 x π x 9^2 (=49.48..) 0.5 x 9^2 x sin "70" = (38.057..) 49.48.. or 38.057... "49.48.." – "38.057.."	11.4	6	B1 Could be marked on diagram. M1ft Area of sector. M1ft Area of triangle. Follow through angles must be the same. A1 Either area correct to 3 sf M1 dep on both previous M1's A1 (11.42253...) awrt 11.4
				Total 6 marks

19.	$(\sqrt{3} + 3\sqrt{3})/\sqrt{2}$ $4\sqrt{3}/\sqrt{2}$ $2\sqrt{6}$ or $(\sqrt{48}/\sqrt{2})$	24	3	M1 Must see $\sqrt{27}$ reduce to $3\sqrt{3}$ alternative $\frac{\sqrt{6}+\sqrt{54}}{2}$ (or better) M1 dep on 1st M1 A1cao dep on M2 Accept $\sqrt{24}$ if M2 awarded.
				Total 3 marks
20.	$\frac{4(2-x)+3x}{x(2-x)}$ oe $\frac{8-4x+3x}{x(2-x)}$	$\frac{8-x}{x(2-x)}$	3	M1 M1 A1 Accept $\frac{8-x}{2x-x^2}$ Single fraction needed as final answer.
				Total 3 marks

21. (a)	$0.5x[(x + 5) + (x + 8)] = 42$ (trapezium formula) or $x(x + 5) + 0.5x \times (3) = 42$ (partitioning) $x(2x + 13) = 84$ or $x^2 + 5x + 1.5x = 42$		2	M1 M1 dep on 1st M1 then needs to develop on to quadratic given.
(b)	$(2x + 21)(x - 4)$ (= 0) oe $x = 4$ (P=) "4" + "9" + "12" + $\sqrt{(3^2 + "4"^2)}$	30	5	B2 B1 for either factor correct or $(2x \pm 21)(x \pm 4)$ or M1 for $x = \frac{-13 \pm \sqrt{13^2 - 4 \times 2 \times -84}}{4}$ (condone 1 sign error) then M1 for $x = \frac{-13 \pm \sqrt{169 + 672}}{4}$ A1 dep on M1 or B2 M1 i.e $x + (x + 5) + (x + 8) + \sqrt{(3^2 + x^2)}$ in numeric form. A1cao (Last two marks independent) N.B. Working for solving quadratic could be seen in (a) if not contradicted in (b).
				Total 7 marks