Revision F4 (All topics) A [49] MARKSCHEME

1.

(a) correct midpoints × correct frequency — M1
1 × 12, 3× 18, 5 × 10, ... allow one error

Σtheir (midpoints × frequency) — M1
their(1 × 12) + their(3 × 18) + their (5 × 10) + ...

(their 190) ÷ 50 — M1

3.8 **or** $3\frac{4}{5}$ — A1

SC These values with full method:
*4.8 (using ucb as midpoints) **or***
*2.8 (using lcb as midpoints) **or***
*4.3 (using 1.5, 3.5, 5.5, ... as midpoints) **or***
3.3 (using 0.5, 2.5, 4.5, ... as midpoints)

(b) (i) 3.4 to 3.5 — B1

(ii) UQ – LQ — M1
or attempt to find both UQ and LQ with either correct and their (UQ – LQ) or distances at CF 12.5 and 37.5 marked on graph and their (UQ – LQ) seen

3.3 to 3.6 — A1

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2.

(a) When $x = 3$, $3^3 + 5 \times 3 < 66$
When $x = 4$, $4^3 + 5 \times 4 > 66$ substitutes both 3 and 4 into equation [M1]
Since there is a sign change there is a root between 3 and 4 [R1]

(b) Substitutes a value between 3 and 4 into $x^3 + 5x = 66$ [M1]
Substitutes 3.6 to get < 0 and 3.7 to get > 0 [M1]
Substitutes 3.65 to get > 0 [M1]*
Answer is $x = 3.6$ [A1] dep*

3.

400	P1	Start to process eg. 1200 ÷ 60
	A1	400 oe (accept number of whole pizzas eg. 400÷4 = 100 with 4 people per pizza)
	C1	Eg. Assumption that sample is representative of population – it may not be all 1200 people are going to the party – need less pizza if they don't, assume 4 people per pizza – if different may need more/fewer pizzas

4.

(a) $B \propto h^3$ or $B = kh^3$ M1

When $B = 54$, $h = 3$

$\Rightarrow 54 = 27k$ or $3^3 k$ M1

$k = 2$

$\therefore B = 2h^3$ A1

(b) When $h = 1$, $B = 2 \times 1 = 2$ B1 ft

From h^3

(c) When $B = 128$,

$128 = 2h^3$ M1 ft

From h^3

$h^3 = 64$ M1 ft

From h^3

$h = 4$ metres A1

Must have units

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5.

5 red 20 blue	**3** **1 AO1.3b** **1 AO3.1b** **1 AO3.2**	**M1** for listing at least two pairs of red and blue marbles giving a probability $\frac{1}{5}$ **M1** for at adding 5 red marbles to at least two pairs **SC2** for 10 and 20 pairing **seen**

6.

(a) (i) $(x - 8)(x + 1)$ B2

B1 $(x \pm 8)(x \pm 1)$

(ii) 8 and –1 B1 ft

(b) $15x + 9y = 39$ or $25x + 15y = 65$

and and

$15x + 25y = 15$ $9x + 15y = 9$ M1

allow a total of 1 error in either 1st or 2nd M mark

$16y = -24$ or $16x = 56$ M1

$y = -1.5$ or $x = 3.5$ A1

$x = 3.5$ and $y = -1.5$ A1

accept $y = -24/16$ and $x = 56/16$

SC1 correct answers with no working or using T & I

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7.

(a)		1.44	**3** 3 AO1.3a	**M2** for $9 \times 4^2 = y \times 10^2$ **oe** Or **M1** for 9×4^2 or $y = \frac{k}{x^2}$ **soi**	
(b)		56.25	**3** 1 AO1.3a 1 AO3.1a 1 AO3.3	**M2** for 1.5625 or $\frac{1}{0.8^2}$ **soi** Or **M1** for 0.8^2 **soi**	Alternative method: **M1** for calculation of values of *y* for *their x* and *their* 0.8*x* **M1** for calculation of percentage increase in *y* values

8.

Second differences = -2 so coefficient of n^2 is -1 [B1]

Attempt to find the rest of the formula: [M1]

E.g. $-1 + b + c = 19$ gives $b + c = 20$

$-4 + 2b + c = 15$ gives $2b + c = 19$

Either $b = -1$ or $c = 21$ [A1]

Formula is $-n^2 - n + 21$ [A1]

9.

$\frac{1}{2}x(x+4) \times \sin 60 = 15\sqrt{3}$ [M1]

$\sin 60 = \frac{\sqrt{3}}{2}$ [B1]

$\frac{\sqrt{3}}{4}x(x+4) = 15\sqrt{3}$

$x(x+4) = 60$ [A1] oe

Attempt to get = 0: $x^2 + 4x - 60 = 0$ [M1]

Attempt to solve the quadratic – e.g. $(x+10)(x-6) = 0$ [M1]

So $x = 6$ since $x > 0$ [A1] 1 answer only