*****PLEASE DO NOT WRITE ON THIS SHEET*****

A1 Doubles - Starting with Confidence Test version 2 – September 2019

- Attempt ALL questions.
- Do not use a calculator.
- Show working-out clearly and triple check for expensive errors.
- Time allowed: 40 minutes

1. Express the following as single fractions: (a) $\left(\frac{3}{2}\times\frac{1}{4}\right)+3$ (b) $\frac{2}{x}+\frac{3}{x^2}$ **(4)**

2. Solve the equation $\frac{2x}{3}-\frac{x-2}{4}=1$ for x. **(3)**

3. Evaluate the following: (a) $4^{\frac{5}{2}}$ (b) $16^{-\frac{7}{4}}$. **(2)**

4. (a) Write $\frac{2\sqrt{x}+4}{x^2}$ in the form $\alpha x^n+\beta x^m$. **(3)**

   (b) Solve the equation $x^{-\frac{2}{3}}=9$ for x. **(3)**

5. Simplify $\sqrt{20}+2\sqrt{45}-3\sqrt{80}$ as much as possible. **(3)**

6. Rationalise the denominator of $\frac{-7}{4\sqrt{5}}$, and hence write it in the form $b\sqrt{c}$. **(2)**

7. Rationalise the denominator of $\frac{5}{2-\sqrt{3}}$ and hence write it in the form $a+b\sqrt{c}$. **(4)**

8. Write down the discriminant of $4x-3x^2=-3$ and hence state whether the equation has zero roots, one repeated root or two distinct roots. **(2)**

9. Factorise the quadratic $9-4x^2$ using the difference of two squares **(2)**

10. Factorise the following:
    (a) $3x^2+4x$ (b) $5x^2-13x-6$ **(2)**

11. Solve $6x^2-5x-6=0$ by factorising. **(4)**

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12. Solve $2x^2 - 4x - 1 = 0$
Leave your answer in the form $x = A \pm B\sqrt{C}$ **(3)**

Quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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13. Given $f(x) = x^2 + 5x + 10$:

a. Show that $y = f(x)$ can be written in the form $y = (x + a)^2 + b$ **(2)**

b. Sketch $y = 2\left(f\left(x - \frac{5}{2}\right)\right)$, showing clearly on your graph the minimum point.

(3)

14. Using the formula $y - y_1 = m(x - x_1)$, write the equation of the line passing through the points $(-4, -1)\ and\ (6,4)$ in the form $ax + by + c = 0$ where $a, b, and\ c$ are integers. **(3)**

15. By listing these values in order, find the median (Q2), and lower (Q1) and upper (Q3) quartiles:
$76, 56, 44, 77, 12, 1, 9$. **(2)**

16. Find an estimate of the mean of the following data, leaving your answer in any form:

Age of children (years)	Frequency (f)	Mid value (x)	fx
0-2	4		
3-7	7		
8-10	14		
11-13	20		
14-18	5		

(3)

Total: 50 marks

*****END OF TEST*****

Question Number	Scheme test 2	Marks
1 (a)	$\frac{3}{8}+\frac{24}{8}=\frac{27}{8}$	M1 for common denominator A1 for correct and simplified fraction
(b)	$\frac{2x+3}{x^2}$	M1 for a common denominator A1 for correct and simplified fraction
2	$\frac{8x-3(x-2))}{12}=1$ 8x - 3x + 6 = 12 5x = 6 $x=\frac{6}{5}$	M1 common denominator M1 multiply out and simplify A1 correct simplified fraction
3 (a)	$(4^{\frac{1}{2}})^5=2^5=32$	B1 cao
(b)	$(16^{\frac{1}{4}})^{-7}=2^{-7}=\frac{1}{128}$	B1 cao
4 (a)	$\frac{2\sqrt{x}}{x^2}+\frac{4}{x^2}=2x^{-\frac{3}{2}}+4x^{-2}$	M1 for separating into two fractions A1 A1 correct co-effs and indices
(b)	$x^{-\frac{1}{3}}=\pm 3$ $x^{\frac{1}{3}}=\pm\frac{1}{3}$ $x=\pm\frac{1}{27}$	M1 for evidence of dealing with the negative power (reciprocal) M1 for evidence of dealing with the fractional power (rooting or cubing) A1
5	$2\sqrt{5}+6\sqrt{5}-12\sqrt{5}=-4\sqrt{5}$	M1 evidence of common factor of $\sqrt{5}$ M1 evidence of rooting a perfect square A1
6	$\frac{-7}{4\sqrt{5}}\times\frac{(\sqrt{5})}{(\sqrt{5})}=-\frac{7\sqrt{5}}{20}$	M1 multiply top and bottom by $k\sqrt{5}$ A1
7	$\frac{5}{(2-\sqrt{3})}\times\frac{(2+\sqrt{3})}{(2+\sqrt{3})}=\frac{5(2+\sqrt{3})}{4-3}=10+5\sqrt{3}$	M1 multiply top and bottom by correct bracket A1 correct denominator A1 , A1
8	$(-4)^2-4(3)(-3)$ **=52** ∴ +ve discrim. 2 distinct real roots	B1 for 52 B1ft their discriminant value
9	$(\mathbf{3+2x})(\mathbf{3-2x})$	M1 A1 correct attempt at factorising
10 (a)	$3x^2+4x=x(3x+4)$	B1 correct answer only
(b)	$(5x+2)(x-3)$	B1 correct answer only
11	(3x + 2)(2x - 3) = 0 $x=-\frac{2}{3}$ or $x=\frac{3}{2}$	M1A1 correct attempt at factorising A1, A1
12	$x=\frac{4+\sqrt{16-4(2)(-1)}}{4}$	M1 M1A1

	$x = 1 \pm \frac{1}{2}\sqrt{6}$ Or $x^2 - 2x - \frac{1}{2} = 0$ $(x-1)^2 - \frac{3}{2} = 0$ $x = 1 \pm \sqrt{\frac{3}{2}}$	 M1 M1 A1
13 (a) **(b)**	$y = \left(x + \frac{5}{2}\right)^2 + \frac{15}{4}$ Sketch min pt $(0, \frac{15}{2})$	M1A1 B1 Any horizontal translation B1 Any vertical stretch B1 correct min pt
14	$grad = \frac{1}{2}$ $x - 2y + 2 = 0$	M1 A1 gradient A1
15	Median=44 LQ=9, UQ=76	B1 for median B1 for both quartiles
16	Eg. 1x4=4 Mean=$\frac{485}{50} = \frac{97}{10} = 9.7$	M1 for fx calculation seen M1 for dividing by their total A1 any form