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

A1 Doubles - Starting with Confidence Test version 1 – 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 a single fraction: (a) $\left(\frac{12}{11}-\frac{4}{3}\right)\div\frac{1}{3}$ (b) $\frac{5}{x}+\frac{2x}{5}$ **(4)**

2. Solve the equation $\frac{x+1}{3}+\frac{4x}{12}=8$ for x. **(3)**

3. Evaluate the following: (a) $9^{-\frac{1}{2}}$ (b) $32^{-\frac{3}{5}}$ **(2)**

4. (a) Write $\frac{(1-4\sqrt{x})}{x}$ in the form $\alpha x^n + \beta x^m$. **(3)**

   (b) Solve the equation $x^{-\frac{2}{3}}=25$ for x. **(3)**

5. Simplify $\sqrt{200}+\sqrt{18}-2\sqrt{72}$ as much as possible. **(3)**

6. Rationalise the denominator of $\frac{\sqrt{2}}{3\sqrt{3}}$, and hence write it in the form $b\sqrt{c}$. **(2)**

7. Rationalise the denominator of $\frac{4}{\sqrt{3}-1}$ and hence write it in the form $a+b\sqrt{c}$. **(4)**

8. Write down the discriminant of $2x=2x^2+5$ and hence state whether the equation has zero roots, one repeated root or two distinct roots. **(2)**

9. Factorise the quadratic $49-9x^2$ using the difference of two squares. **(2)**

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

11. Solve $4x^2-16x+15=0$ 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:

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

13. Given $f(x) = x^2 + 3x + 5$:

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

b. Sketch $y = 2\left(f\left(x - \frac{3}{2}\right)\right)$, 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 $(5, -3)$ and $(7,5)$ 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: $3, 7, 1, 40, 5, 9, 2, 9$. **(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 1	Marks
1 (a)	$\frac{36-44}{33} \div \frac{1}{3} = \frac{-8}{33} \times 3 = \frac{-8}{11}$	M1 for common denominator A1 for correct and simplified fraction
(b)	$\frac{25+2x^2}{5x}$	M1 for a common denominator A1 for correct and simplified fraction
2	$\frac{12(x+1)+12x}{36} = 8$ $24x + 12 = 288$ $x = \frac{23}{2}$	M1 common denominator M1 multiply out and simplify A1 correct simplified fraction
3 (a)	$\frac{1}{3}$	B1
(b)	$\mathbf{2^{-3} = \frac{1}{8}}$	B1
4 (a)	$\frac{1}{x} - \frac{4x^{\frac{1}{2}}}{x}$ $x^{-1} - 4x^{-\frac{1}{2}}$	M1 for separating into two fractions A1 A1 correct co-effs and indices
(b)	$x^{\frac{1}{3}} = \pm\frac{1}{5}$ $x = \pm\frac{1}{125}$	M1 for evidence of dealing with the negative power (reciprocal) M1 for evidence of dealing with the fractional power (rooting or cubing) A1
5	$\sqrt{200}+\sqrt{18}-2\sqrt{72}$ $=\sqrt{100}\sqrt{2}+\sqrt{9}\sqrt{2}-2\sqrt{36}\sqrt{2}$ $=10\sqrt{2}+3\sqrt{2}-12\sqrt{2}$ $=\sqrt{2}$	M1 evidence of common factor of root 2 M1 evidence of rooting a perfect square A1
6	$\frac{\sqrt{2}}{3\sqrt{3}} = \frac{\sqrt{2}\sqrt{3}}{3\sqrt{3}\sqrt{3}} = \frac{\sqrt{6}}{9} = \frac{1}{9}\sqrt{6}$	M1 multiply top and bottom by $k\sqrt{3}$ A1
7	$\frac{4(\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1))}$ $\frac{4(\sqrt{3}+1))}{3-1}$ $2+2\sqrt{3}$	M1 multiply top and bottom by correct bracket A1 correct denominator A1 , A1
8	$(-2)^2 - 4(2)(5) = -36$ $\therefore$ no real roots or zero real roots	B1 for -36 B1ft their discriminant value
9	$(7-3x)(7+3x)$	M1 A1correct attempt at factorising
10 (a)	$2x^2+6x = 2x(x+3)$	B1 correct answer only

(b)	$2x^2+5x+2=(2x+1)(x+2)$	B1 correct answer only
11	(2x-5)(2x-3)=0 2x-5=0 or 2x-3=0 $x=\frac{5}{2}$ or $x=\frac{3}{2}$	M1A1 correct attempt at factorising A1, A1
12	$2x^2+4x+1=0$ $x=\frac{-4\pm\sqrt{(4)^7-4(2)(1)}}{4}$ $=-\frac{4}{4}\pm\frac{\sqrt{8}}{4}$ $=-1\pm\frac{1}{4}\sqrt{4}\sqrt{2}$ $=-1\pm\frac{1}{2}\sqrt{2}$ **Or** $x^2+2x+\frac{1}{2}=0$ $(x+1)^2-\frac{1}{2}=0$ $x=-1\pm\sqrt{\frac{1}{2}}$	M1 A1 for substituting into formula A1 M1 M1 A1
13 (a) **(b)**	$f(x)=\left(x+\frac{3}{2}\right)^2+\frac{11}{4}$ sketch min pt (0, 5.5)	M1A1 B1 Any horizontal translation B1 Any vertical stretch B1 correct min pt
14	grad=4 4x-y-23=0	M1 A1 gradient A1
15	Median=6 LQ=2.5, UQ=9	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